

UPPER KOOTENAY ECOSYSTEM ENHANCEMENT PLAN



View of the Kootenay River and its habitats near Canal Flats. Photo credit: Ben Meunier.

August 2014

A partnership between



EXECUTIVE SUMMARY

Background and Context

Koocanusa Reservoir was created by Libby Dam in Montana. Since the dam is in the United States, there is no provincial water licence in place. That means, unlike other reservoirs in the Columbia Basin, there is no fish and wildlife compensation program associated with the historical footprint impacts of Koocanusa Reservoir in Canada and this has long been acknowledged as a gap. This acknowledgement, combined with growing pressures from human activity (e.g. development, recreation), highlighted the need to further address fish and wildlife impacts in the region. While the Fish and Wildlife Compensation Program (FWCP), Columbia Basin Trust (the Trust) and others have delivered fish and wildlife projects in the region, until now there has been no comprehensive assessment of the issues, no holistic approach to addressing them, nor the required funds to do so.

In the spring of 2013, Columbia Basin Trust (the Trust), together with the Fish and Wildlife Compensation Program (FWCP), announced their partnership, and their intention to implement a joint fish and wildlife initiative for the Upper Kootenay River watershed, including Koocanusa Reservoir. With a \$3-million commitment from the Trust, the partners committed to developing an Action Plan for ecosystems and species of interest. The plan – the Upper Kootenay Ecosystem Enhancement Plan or UKEEP – will help conserve, restore and enhance fish and wildlife by focusing on their habitats. The initial funding from the Trust supported development of the Plan and will support implementation of the priority actions identified in the Plan for the first three- to five-years. The Plan's success will be monitored and the Plan's long-term future will be reviewed later in the implementation phase.

The Plan will cover more than 20,000 square kilometres, including the Upper Kootenay River drainage and associated tributaries within Canada, such as the Elk, Bull, St. Mary's, Lussier, White and Wigwam rivers and Koocanusa Reservoir itself. Please see UKEEP area map (Figure 2).

Developing the Upper Kootenay Ecosystem Enhancement Plan

The UKEEP incorporates community- and science-based actions to conserve, restore and enhance fish, wildlife and their habitats and support their sustainable use in the Plan area. These objectives support the Plan's vision for the Upper Kootenay River watershed: "thriving fish and wildlife in sustainable, functioning watersheds supported by actions of engaged citizens."

The Plan was developed with input from local stakeholders, residents and First Nations, who identified a broad range of conservation concerns and potential solutions.

The UKEEP includes four stand-alone Ecosystem Plans for the following four ecosystems:

1. [Lakes](#);
2. [Streams](#);
3. [Wetland](#) ; and
4. [Upland and Dryland Areas](#) .

The intention is to achieve objectives by focusing on ecosystems, which include important habitats for [Species of Interest](#). By doing so, the Plan will support species that rely on the habitats found within each ecosystem.

Each of the four Ecosystem Plans:

- reflects community- and science-based priorities;
- identifies a mix of on-the-ground and research and information acquisition projects in order to inform further on-the-ground projects;

- builds on conservation work already under way by others while not duplicating current efforts by existing organizations or by replacing the role of government;
- includes actions and projects that will require new partnerships with government agencies, stakeholders and residents alike in order to make demonstrable progress;
- will be responsive to new and emerging priorities, including but not limited to climate change; and
- addresses five broad types of action. (See Section 2.5):
 - research and information acquisition
 - habitat-based actions
 - species-based actions
 - land securement
 - monitoring and evaluation

Each of the four Ecosystem Action Plans will achieve the following broad objectives:

Objective 1: Conserve productivity and diversity of ecosystems in the Plan area;

Objective 2: Restore and enhance habitats and populations of Species of Interest; and

Objective 3: Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

The actions proposed in each Ecosystem Plan address the above objectives and will achieve the following outcomes:

- Increased understanding of Species of Interest and their habitat, as well as options to conserve, restore and enhance species and their habitats;
- Improved ecological function of each ecosystem through on-the-ground habitat improvements, Species of Interest recovery and maintenance, and management of invasive species;
- Improved opportunities for and/or maintained sustainable use; and
- Improved coordination with existing regulatory and management activities in the Plan area.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in the individual Ecosystem Plans.

Implementation of the Upper Kootenay Ecosystem Enhancement Plan (UKEEP)

The Upper Kootenay Ecosystem Enhancement Plan is comprised of five stand-alone Action Plans focused on the geographic scope outlined in Figure 1. Each Action Plan recommends a suite of prioritized actions aimed at achieving conservation, restoration, enhancement and sustainable use objectives.

In addition to the UKEEP, FWCP- Columbia has developed six stand-alone Action Plans aimed at a broader geographic scope (i.e. the FWCP-Columbia region includes the Columbia River Basin, excluding the Flathead River). These plans guide FWCP investments in the Columbia region, which includes the upper Kootenay River watershed.

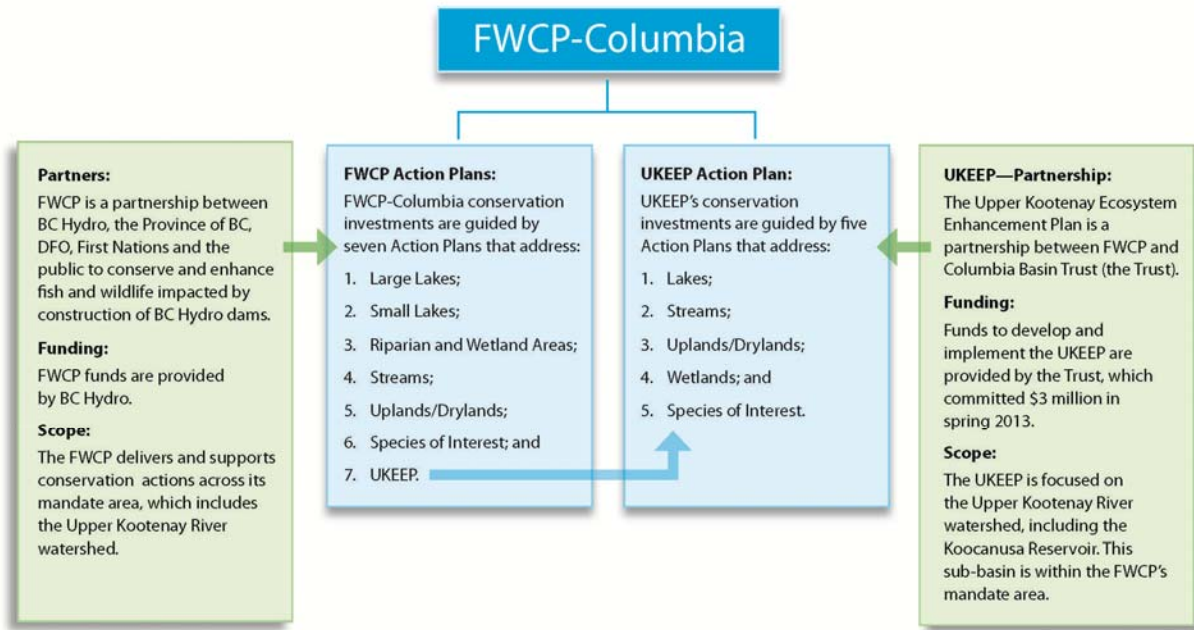


Figure 1: FWCP and UKEEP overview of partnership and Action Plans.

The Fish and Wildlife Compensation Program (FWCP) – Columbia is responsible for implementing and managing the Upper Kootenay Ecosystem Enhancement Plan.

The FWCP's existing implementation framework (delivery model) will be used to support and implement the range of projects recommended in the UKEEP. The FWCP typically delivers projects in three key ways:

1. funding projects via the FWCP's annual funding application intake process (open projects);
2. directed projects (e.g. projects undertaken via a request for proposal, limited bid, etc.) to undertake specific projects identified in the Plan; and
3. negotiating long-term agreements to deliver actions on behalf of FWCP.

Implementing the conservation, restoration, enhancement and sustainable use actions across four ecosystems will require a collaborative approach involving a range of partners, including local government, First Nations, residents, existing non-government organizations and others.

Proponents interested in applying to the FWCP for funding to undertake an action recommended in the UKEEP will follow the FWCP's application process. Proponents are responsible for ensuring their project idea is in alignment with the FWCP's conservation priorities. Funding applications are due in November each year. See www.fwcp.ca for details.

The partners – the Trust and FWCP – will monitor the success of the UKEEP, adapt actions and projects in the Plan (based on new information and performance outcomes) and update and modify the Plan as necessary to ensure it continues to address current priorities. The partners will also review the entire Plan in the next three to five years as part of an overall review and evaluation of the Upper Kootenay Ecosystem Enhancement Plan.

GLOSSARY/ACRONYMS

Columbia Basin Plan = a FWCP strategic planning document for the Columbia River watershed.

East Kootenay = the Canadian portion of the Kootenay River watershed east of the Purcell Mountains and west of the Rocky Mountains. This delineation differs from that used by the Regional District of East Kootenay, which includes portions of the Columbia River watershed.

Ecosystem Plan = a section of the Upper Kootenay Ecosystem Enhancement Plan (UKEEP) that focuses on a specific ecosystem (e.g. lake, stream, riparian/wetland area, upland/dryland area).

ER = ecosystem restoration. Considerable ER knowledge and management has been developed for the Plan area, particularly for upland and dryland ecosystems.

FWCP = Fish and Wildlife Compensation Program.

Koocanusa Reservoir = the reservoir on the Upper Kootenay River created by inundation from the Libby Dam. Name formation: “Koo” = Kootenay; “can” = Canada; “usa” = United States of America.

Upper Kootenay River = the Canadian portion of the Kootenay River upstream of Libby Dam.

NDT3 = natural disturbance type 3. These are ecosystems with frequent stand-initiating events (Ministry of Environment, 1995).

NDT4 = natural disturbance type 4. These are ecosystems with frequent stand-maintaining fires (Ministry of Environment, 1995).

OGMA = old-growth management area. These are areas that contain, or are managed to replace, specific structural old-growth attributes and that are identified and treated as special management areas (Ministry of Forests and Range, 2008).

Program area = the Canadian portion of Kootenay River upstream of Libby Dam, excluding the Moyie and Flathead drainages and the western extent of Kootenay River as it re-enters Canada in the Creston and Kootenay Lake area.

The Trust = Columbia Basin Trust.

UKEEP = Upper Kootenay Ecosystem Enhancement Plan or “the Plan.”

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1 The Upper Kootenay Ecosystem Enhancement Plan

1.1 Introduction

Koocanusa Reservoir was created as a result of the operation of Libby Dam in Montana. There is no water licence issued by the Province of British Columbia since the dam is in the United States. As a result, there is no fish and wildlife compensation program associated with the historical footprint impacts of Koocanusa Reservoir in Canada, unlike other reservoirs in the Columbia Basin. The absence of a specific fish and wildlife compensation program to address these impacts, has been a long-standing issue identified by both public residents and agencies alike. This gap, combined with growing pressures from human activity (e.g. development, recreation), and input received at community engagement processes related to the Columbia River Treaty (i.e. the Libby Dam was constructed under the Columbia River Treaty) highlighted the need to address fish and wildlife impacts in the region.

In spring 2013, Columbia Basin Trust (the Trust), together with the Fish and Wildlife Compensation Program (FWCP), announced their partnership, and their intention to implement a joint fish and wildlife initiative. With a \$3-million commitment from the Trust, the partners committed to developing an Action Plan for ecosystems and species of interest in the Upper Kootenay River watershed. The plan – the Upper Kootenay Ecosystem Enhancement Plan or UKEEP – will help conserve, restore, enhance fish, wildlife and their habitats, and support their sustainable use in and around Koocanusa Reservoir and tributaries in the Upper Kootenay River watershed. The initial funding from the Trust is intended to support the first three to five years of the Plan. The Plan's success will be monitored and the Plan's long-term future will be reviewed later in the implementation phase.

The existing FWCP delivery framework will be used to support implementation and delivery of the Upper Kootenay Ecosystem Enhancement Plan (the Plan). The FWCP has a long history of delivering similar programs elsewhere in the Basin and the Province, and has a delivery framework already in place. The FWCP is a partnership between BC Hydro, the Province of British Columbia and Fisheries and Oceans Canada to conserve and enhance fish and 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. By building on this existing framework, cost savings can be realized and an effective, integrated approach can be taken for delivering this the conservation actions recommended in the Plan.

1.2 Geographic Scope

The geographic scope for the Plan is based on a watershed boundary approach. The Plan area includes the Canadian portion of the Upper Kootenay River watershed upstream of Libby Dam from the Canada/U.S. border and covers 2,011,683 ha. It excludes the Flathead and Moyie drainages, as well as the western extent of the Kootenay River as it re-enters Canada in the Creston and Kootenay Lake area. It includes major tributaries such as the Elk, Bull, St. Mary's, Lussier, White and Wigwam rivers, as well as Koocanusa Reservoir. A map of the Plan area is provided in Figure 2.

The Kootenay River originates in Kootenay National Park in the Canadian Rocky Mountains and flows southward for approximately 275 km to the Canada-U.S. border. Six biogeoclimatic zones occur in the Upper Kootenay basin, reflecting a wide range of ecosystems. These include grasslands, wetlands, dry pine and Douglas fir forests, interior rainforests, alpine meadows and glaciers. Over 375 wildlife and fish species have been inventoried in the region. The Plan considers the ranges and life requirements of the

species that occur within it, as well as processes and dynamics that occur across provincial and international boundaries.

A number of parks and protected areas—such as Kootenay National Park, Purcell Wilderness Conservancy, Height of the Rockies Provincial Park, Top of the World Provincial Park and Elk Lakes Provincial Park—provide significant environmental, social and economic value to the area.

Fishing, hunting and outdoor activities are important recreational and commercial pursuits across the region. Some larger communities in the Plan area include Cranbrook, Elko, Elkford, Fernie, Jaffray, Kimberley and Sparwood.

1.3 First Nations

The people of the Ktunaxa Nation have occupied the lands adjacent to Kootenay and Columbia rivers and Arrow Lake of BC, Canada for more than 10,000 years. The Traditional Territory of the Ktunaxa Nation covers approximately 70,000 square kilometres of south-eastern British Columbia and historically included parts of Alberta, Montana, Washington and Idaho.

The Ktunaxa Nation is comprised of members from seven communities located throughout historic traditional Ktunaxa territory including the five of which are located in BC. Three Ktunaxa communities lie within or adjacent to the Plan area: St. Mary's/?aqam, Tobacco Plains/?akink'umasnuqi?it and Columbia Lake/?akisqnuuk.

The territory of the St. Mary's community is located along the St. Mary's River upstream of its confluence with the Kootenay River. To learn more, visit aqam.net.

The Tobacco Plains community is located at the Tobacco Plains near Grasmere. The western border of its territory is near Koocanusa Reservoir, while the eastern border is near Waterton Lakes National Park. To learn more, visit tobaccoplains.org.

The territory of the Akisqnuuk community is located near the communities of Windermere and Fairmont Hot Springs. Akisqnuuk's western border is located along the shore of Lake Windermere. The community's eastern border lies just short of the base of the Rocky Mountains. To learn more, visit akisqnuuk.org.

1.4 Land Use Activities

The construction of Libby Dam in Montana and the creation of Koocanusa Reservoir in 1972 had a significant impact on the Upper Kootenay River watershed. Under agreement through the Columbia River Treaty between Canada and the U.S., hydroelectric facilities were developed and operated to provide regulated flow on the Columbia and Kootenay rivers, and to optimize flood control and power generation in both countries. Under the treaty, the Hugh Keenleyside, Mica and Duncan dams were constructed in Canada, and Libby Dam was constructed in the U.S. Through the Treaty, the U.S. compensates Canada (specifically B.C.) for the downstream benefits to the U.S. from controlled conditions offered by the upstream Canadian dams.

Inundation (flooding) of the Kootenay River and formation of the Koocanusa Reservoir has resulted in the loss of floodplain habitats, wetlands, streams, and lakes. Approximately 64 km of riverine habitat has been permanently replaced by reservoir habitat, subject to annual drawdown, which in turn, has created a variety of effects on native species, both terrestrial and aquatic. From an aquatic perspective, the shift from riverine to reservoir habitat has altered trophic level dynamics from an algal/insect-based to an algal/zooplankton-based food web to the detriment of Westslope Cutthroat Trout and Mountain

Whitefish and to the benefit of Kokanee and to a lesser extent Rainbow Trout, Burbot, and Bull Trout. The specifics of competitive or predator/prey interactions are largely unknown.

Impacts on habitat from drawdown and water level fluctuations include a variety of physical (water depth and temperature), chemical (nutrient), and biological (species interactions) changes. The shift from riverine to reservoir form imposes changes in habitat type that affect both juvenile and adult life stages due to the removal of important habitat. For example, species such as Burbot have lost off-channel or backwater habitats important for rearing young, whereas species such as Westslope Cutthroat Trout have been displaced by Kokanee and to a lesser extent, Rainbow Trout, due to the competitive disadvantage of Westslope Cutthroat Trout in pelagic (deep water) habitat.

Creation of the Koocanusa Reservoir inundated and eliminated a significant amount of important habitat for an array of terrestrial wildlife. Additionally, it created a barrier to the free movement of some upland terrestrial species. Impeding an animal's ability to freely move between important seasonal habitats throughout the year (for example, moving to safe birthing grounds from winter grazing habitat) limits a population's ability to sustain healthy numbers and/or exchange genetics between populations. Finally, inundation resulted in the displacement of animals and humans to adjacent upland areas, causing additional stress to the limited land base. The impacts of the operations of Libby Dam (i.e. associated upstream water level changes) on the Canadian Upper Kootenay watershed and its aquatic and terrestrial habitats are not well understood.

The functioning and production of wetland and shallow water/pond habitats found on floodplains of the Upper Kootenay River depended on seasonal flooding. Conversely, they produced important nutrients that were transported to downstream river, lake and floodplain forest (e.g. cottonwood forest) habitats. Wetlands provide essential resting and feeding habitat for migratory waterfowl and upland birds, consequently, they may have had both local and broader regional impacts. The productivity of terrestrial ecosystems may have been affected by loss of high water tables on floodplains and other riparian zones that can reduce the effects of drought (or water deficits) later in the year. Loss of floodplain vegetation affected bank stability and erosion, accumulation and input of large woody debris (necessary habitat for a variety of aquatic and terrestrial species) and sediment inputs for adjacent aquatic environments.

BC Hydro's Aberfeldie and Elko run-of-river dams are in the Plan area, with reservoirs that are less than 25 ha each. Both dams exist at falls that were historic barriers to fish migration. Their reservoirs have more stable water levels compared to other BC Hydro hydroelectric facilities, with minimal seasonal changes in habitat. In recent years, fish and wildlife studies by BC Hydro have been implemented on both facilities for water use planning. (See [Aberfeldie Water Use Planning](#) and [Elko Water Use Planning](#)).

Historic and ongoing resource use activities such as logging, mining and grazing, as well as changes in land use by agriculture, urbanization, transportation corridors (e.g. roadways, railroads) and other development have impacted the region. These effects have been magnified by the displacement of human settlement and changes in road and railway infrastructure onto a landbase reduced by the Koocanusa Reservoir. As well, the region has experienced an increased demand for access to areas for recreation (e.g. snowmobiling, ATVing, boating, camping). This creates pressure from the public on governments to build or expand related infrastructure such as boat docks, camping sites and waste facilities. Specific details on the impacts, threats, limiting factors, trends and knowledge status related to land use activities are discussed in Ecosystem and Species of Interest Plans in the following sections.

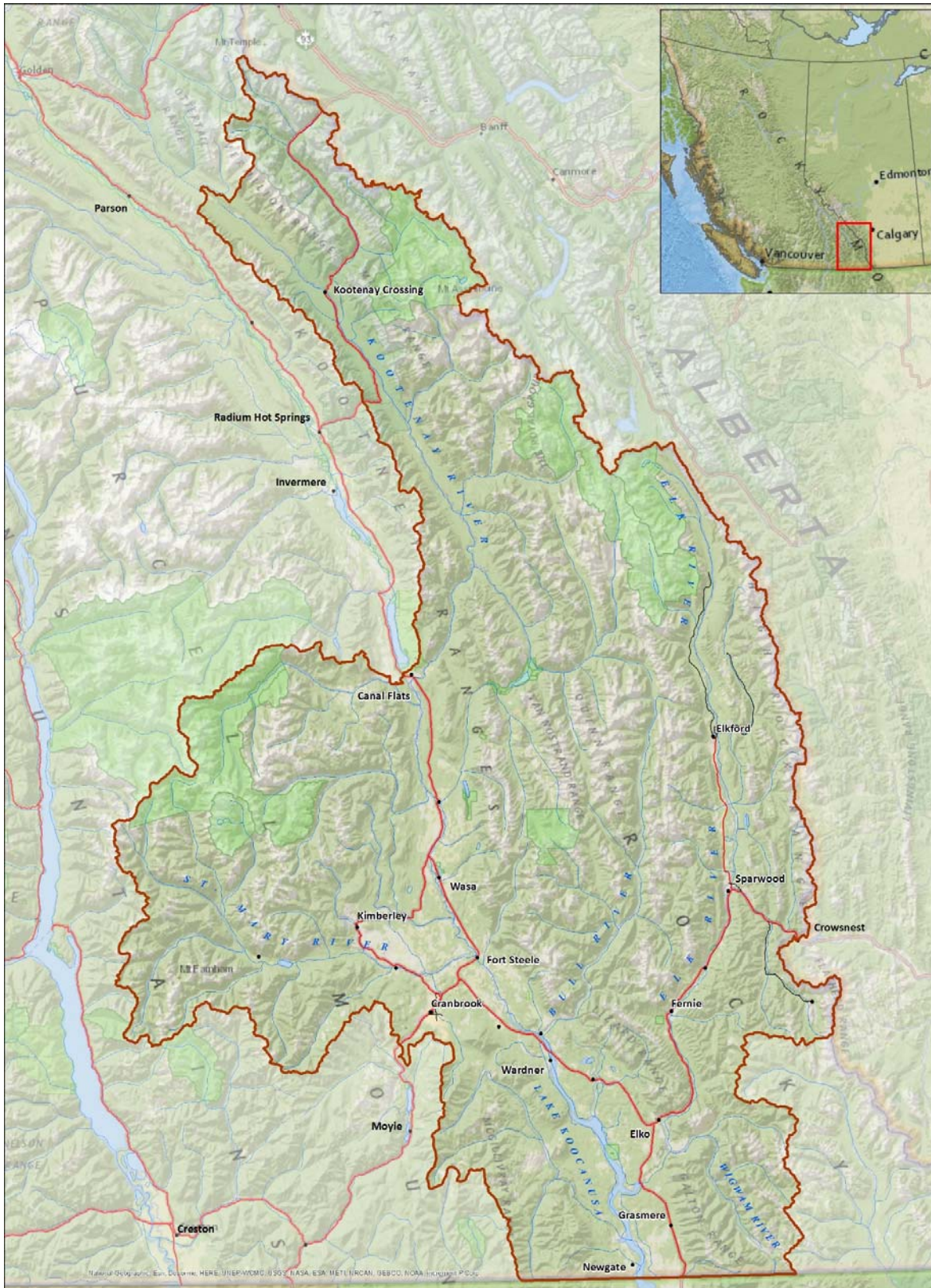


Figure 2: The Upper Kootenay Ecosystem Enhancement Plan area. Light green areas highlight national and provincial parks.

1.5 Strategic Framework

1.5.1 Upper Kootenay Ecosystem Enhancement Plan - Vision

Thriving fish and wildlife in sustainable, functioning watersheds supported by actions of engaged citizens.

This statement reflects the vision for the UKEEP area and is based on community input as expressed during development of the plan. (See Section 2.2).

1.5.2 FWCP Principles

The FWCP is responsible for implementing the Upper Kootenay Ecosystem Enhancement Plan and will do so in accordance with its organizational principles and strategic objectives

Approach: The Plan has a forward-looking, ecosystem-based approach that defines the desired outcomes and takes actions to conserve, restore, enhance and support sustainable use of priority species and their habitats, and where possible, maintain or restore ecosystem function. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Decision Making: The FWCP efficiently uses its resources, will engage with its partners and strives to make informed and consensus-built decisions. Through engagement with First Nations, government agencies, industry and the public, the Plan delivers effective, meaningful and measurable projects that have broad support.

Objectives: The FWCP defines and delivers on conservation, restoration, enhancement and sustainable use objectives through actions that align with local, provincial and federal fish and wildlife conservation and management objectives.

Delivery: The FWCP strives to be high-performing with skilled and motivated staff that deliver efficient, effective and accountable projects in alignment with strategic objectives.

1.5.3 FWCP Strategic Objectives

The Plan's strategic objectives follow those of the FWCP as outlined below:

Conservation

- Maintain or improve the status of species or ecosystems of concern.
- Maintain or improve the integrity and productivity of ecosystems and habitats.

Sustainable Use

- Maintain or improve opportunities for sustainable use, including harvesting and other uses.

Community Engagement

- Build and maintain relationships with stakeholders and aboriginal communities.

2 Overview of the Upper Kootenay Ecosystem Enhancement Plan

2.1 Introduction

The UKEEP sets out priorities for projects focused on ecosystems and Species of Interest within the Plan area (see Figure 1). The Plan builds on the FWCP's strategic objectives, the *FWCP Columbia Basin Plan* and associated Action Plans ([FWCP, 2012](#)). The Plan specifies actions that will conserve, restore, enhance and support sustainable use of species and their habitats. In this endeavour, actions may be complementary across the different plans but reflect the knowledge and work done to date for the specific ecosystem or Species of Interest.

The actions and priorities described in the Plan are a result of input from First Nations, government agencies, industry and the public. (See Section 2.2). In addition, to further guide initial planning efforts, information was compiled and reviewed to help prioritize actions and prevent redundancies in effort. (See Appendix 2).

The Upper Kootenay Ecosystem Enhancement Plan includes four stand-alone Ecosystem Action Plans for the following four ecosystems:

1. [Lakes](#);
2. [Streams](#);
3. [Wetland](#) ; and
4. [Upland and Dryland Areas](#) .

The intention is to achieve the strategic objectives (See 1.5.3) by focusing on ecosystems, which include important habitats for [Species of Interest](#), and by doing so it will support Species of Interest that rely on those habitats within each ecosystem.

Each of the four Ecosystem Action Plans:

- Reflects community- and science-based priorities;
- Reflects a mix of on-the-ground and research/ information acquisition projects in order to inform further on-the-ground activities;
- Builds on conservation work already under way by others while not duplicating current efforts by existing organizations or by replacing the role of government;
- Includes actions and projects that will require new partnerships with government agencies, stakeholders and residents alike in order to make demonstrable progress;
- Will be responsive to new and emerging priorities, including but not limited to climate change; and
- Addresses five broad types of action (See Section 2.5):
 - research and information acquisition;
 - habitat-based actions;
 - land securement;
 - species-based actions; and
 - monitoring and evaluation.

2.2 Developing the Upper Kootenay Ecosystem Enhancement Plan

Generating Community-Based Ideas Grounded in Science

Community-level and science-based technical input contributed to the development of the UKEEP combining local knowledge and concerns with the best available science and data has created a unique Plan that reflects community-based priorities grounded in science.

The development of this Plan for upper Kootenay River watershed was guided by a Working Group (WG) made up of representatives from provincial government agencies, First Nations, local governments, industry and community groups within the geographic area, including representatives from agencies in the United States to ensure a transboundary perspective. Columbia Basin Trust and the Fish and Wildlife Compensation Program were also represented on the Working Group.

The Ktunaxa Nation Council (KNC) and three Ktunaxa communities (St. Mary's/?aqam, Tobacco Plains/?akink'umasnuqi?it, and Columbia Lake/?akisqnuk) were invited to participate in the planning process and contribute their ideas to the Plan. A workshop with the St. Mary's/?aqam community was held on November 25, 2013. Representatives of KNC also participated in the Working Group.

In December 2013, community-level conversations were hosted in Fernie and Cranbrook. An afternoon and evening session was held in each location and helped identify a broad range of conservation concerns and potential solutions.

In addition, current conservation, restoration, and enhancement actions delivered by a wide range of groups and agencies were identified, compiled and analyzed in a literature review in order to determine what is currently happening, where and what gaps exist, if any. The results of this analysis informed development of the Plan.

An informal network of local experts provided ongoing input to the process by commenting on the proposed actions and helping set priorities.

Input from community members, the Working Group and technical experts, combined with a review of current issues and actions, generated many conservation issues and potential actions for the Plan. See Appendix 2 for more detailed information on compilation and prioritization of actions.

2.3 Definitions of UKEEP Objectives, Measures, and Targets

To guide information gathering, and effective prioritizing of management actions, clear management objectives are required. Priority actions and information needs will change as improvements to the ecosystem are realized and further information is gained. The following terminology is used:

Objectives: Objectives are high-level statements of desired future conditions (outcomes), consistent with mandates and policies of the Trust and FWCP.

Sub-objectives and Status Indicators: Sub-objectives are more detailed statements of desired future conditions within an objective. They provide specific details needed to translate policy and plans into actions and to evaluate the consequences of these actions. Sub-objectives can be arranged in order of importance and they usually outline conditions needed to achieve a given objective. Status indicators can be derived and alternative management actions evaluated from sub-objectives.

Measures: Measures are specific values (or metrics) that indicate how closely one gets to a desired condition or target. Measures can be either qualitative (descriptive) or quantitative

(counted). Quantitative measures are preferred because numbers are easier to evaluate, compare and analyze.

Targets: Targets are the values of measurable items that indicate the attainment of a desired condition. In this Program, targets might be expressed as a single value or as a range of values (to acknowledge the variability of ecosystems).

Actions: Management actions, plans or policies that make it possible to meet an objective.

2.4 Upper Kootenay Ecosystem Enhancement Plan Objectives

Each of the four Ecosystem Action Plans will achieve the following broad objectives:

Objective 1 – Conserve productivity and diversity of ecosystems in the Plan area.

- *Identify and conserve important habitat for Species of Interest*
- *Characterize and monitor the status of Species of Interest*
- *Support efforts to prevent introduction of invasive species.*

Objective 2 – Restore and enhance habitats and populations of Species of Interest.

- *Restore and enhance important habitat for Species of Interest*
- *Support Species of Interest population recovery/maintenance*
- *Control of established invasive species.*

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

- *Contribute data to help inform decision-making on sustainable use targets for resources*
- *Support public education and awareness regarding threats and challenges to ecosystems*
- *Motivate ecologically-informed decisions and actions.*

The Plan supports Species of Interest through actions that conserve, restore, enhance and support sustainable use of ecosystems, which include important habitats that provide resources for Species of Interest. By executing ecosystem actions, the Plan will also conserve, restore, enhance and support sustainable use of Species of Interest.

An overview of the relationships between FWCP core strategic objectives and the Plan objectives, sub-objectives and actions are presented in Figure 3. The objectives are reflected in each of the stand-alone ecosystem and species of interest Action Plans that make up the UKEEP.

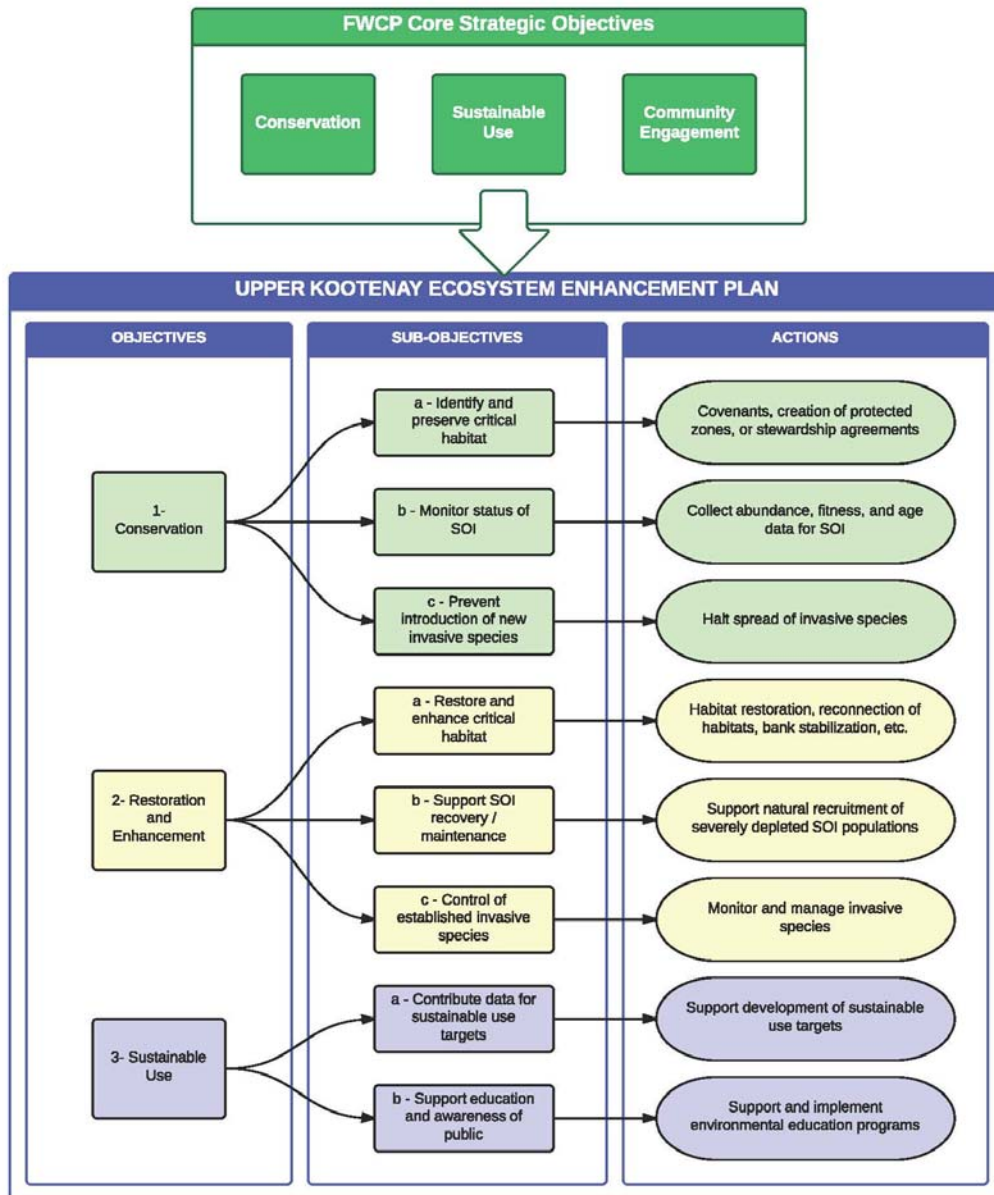


Figure 3: Relationships between objectives, sub-objectives, actions in the Upper Kootenay Ecosystem Enhancement Plan and FWCP core strategic objectives.

2.5 Action Categories

Actions are organized by the five broad categories of activities undertaken by FWCP.

1. **Research and Information Acquisition**—New information and changes to management plans for ecosystems and Species of Interest must be integrated. Actions to collect information to evaluate, review and implement conservation, restoration, enhancement and sustainable use are presented. These actions will address data gaps and the need for research to complete actions from the other categories (e.g. to identify focal areas for conservation, restoration and enhancement efforts). Research and Information Acquisition actions must be pragmatic and facilitate on-the-ground activities.

The main types of actions under the Research and Information Acquisition category include:

- inventory (e.g. compilation of distribution, abundance, and breeding status information);
 - assessments (e.g. limiting factor assessment, habitat suitability for conservation, restoration and enhancement actions); and
 - integrated planning (e.g. information acquisition to inform broader planning processes).
2. **Habitat-based Actions**—The Plan will pursue conservation, restoration, enhancement and sustainable use activities that have been proven to be effective and that can be implemented immediately (particularly where potential partnership opportunities exist). Actions include:
 - habitat creation (e.g. erect nest boxes or loafing platforms)
 - habitat restoration/enhancement (e.g. prescribed burning, stream habitat improvement)
 - restoration/maintenance of ecosystem connectivity (e.g. provide Species of Interest access to seasonal habitats and/or habitats between populations, assist with and recommend solutions to human access and recreation management concerns).
 3. **Land Securement**—Conversion from natural to other land use is an ongoing threat to ecosystems of the Upper Kootenay River watershed. Identifying and securing important habitat (i.e. areas that are sensitive to land conversion/development or important for Species of Interest) to prevent loss is a high priority. Habitat is considered “secure” if it is protected from conversion to other land uses through the following actions:
 - habitat acquisition (e.g. covenants, provide supporting information for the creation of protected zones, contributing to land securement); and
 - habitat stewardship (e.g. stewardship agreements with landowners).
 4. **Species-based Actions**—Most actions identified in the Plan are habitat-based actions, or activities like research or monitoring in support of habitat-based actions. The majority of species-based actions are coordinated through the Species of Interest Action Plan. Actions include:
 - translocation and reintroduction (e.g. captive rearing and breeding)
 5. **Monitoring and Evaluation**—Monitoring is a cornerstone of good resource management because it provides information on present status/trends and allows post-implementation assessment of actions. Fundamentally, monitoring provides direction on adjustments that may be necessary. Actions include:
 - trend monitoring (e.g. species or habitat status)
 - evaluation (e.g. project effectiveness).

2.6 Setting Priorities

Potential actions that would address the Plan's objectives were reviewed and prioritized based on consensus input from the Working Group and local experts. Actions were ranked 1 (highest priority) to 3 (lowest priority).

Actions rankings are summarized as follows:

- 1** = required urgently due to current/imminent threats, are effective in the short-term (i.e. provide observable benefits in one to two years), are required before subsequent actions can be completed, and/or are cost-effective.
- 2** = required due to anticipated/less imminent threats, require more testing/research, and/or require mid-term funding (i.e. provide observable benefits in three to five years and/or require monitoring).
- 3** = required due to possible threats, require more testing/research, and/or require long-term funding (i.e. provide observable benefits in over five years and/or require monitoring).

2.7 Implementation of the Upper Kootenay Ecosystem Action Plan

The Upper Kootenay Ecosystem Enhancement Plan is comprised of five stand-alone Action Plans focused on the geographic scope outlined in Figure 4. Each Action Plan recommends a suite of prioritized actions aimed at achieving conservation, restoration, enhancement and sustainable use objectives.

In addition to the UKEEP, FWCP- Columbia has developed six stand-alone Action Plans aimed at a broader geographic scope (i.e. the FWCP-Columbia region includes the Columbia River Basin, excluding the Flathead River. These plans guide FWCP investments in the Columbia region, which includes the upper Kootenay River watershed.

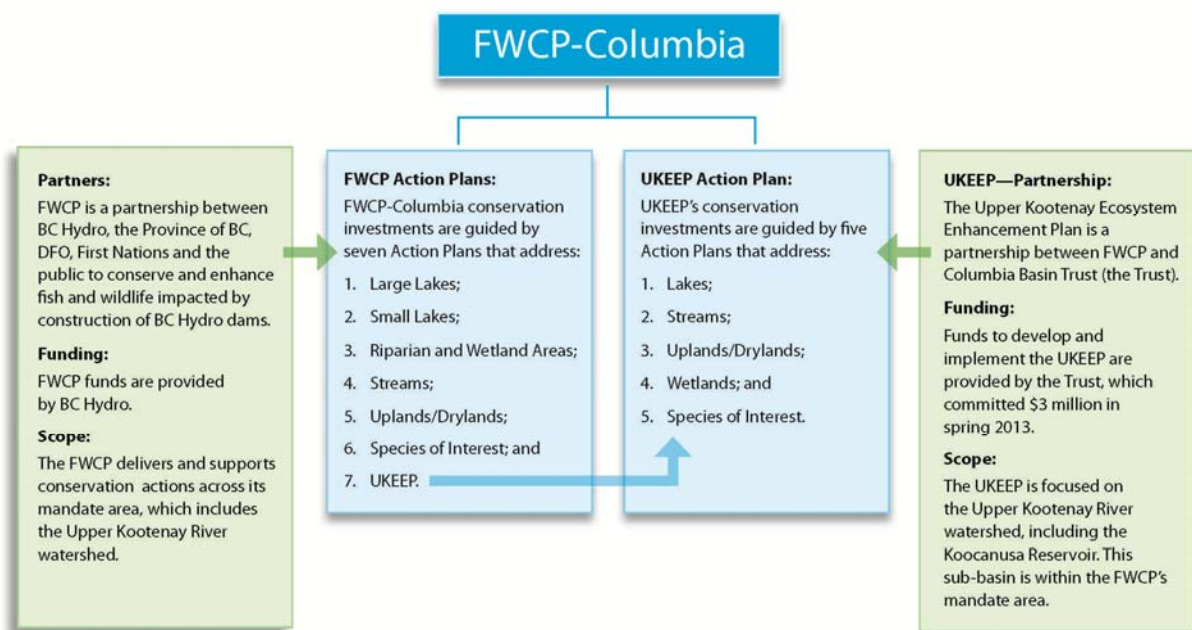


Figure 4: FWCP and UKEEP overview of partnerships and Action Plans.

The Fish and Wildlife Compensation Program (FWCP) – Columbia is responsible for implementing and managing the Upper Kootenay Ecosystem Enhancement Plan.

The FWCP's existing implementation framework (delivery model) will be used to support and implement the range of projects recommended in the UKEEP. The FWCP typically delivers projects in three key ways:

1. funding projects via the FWCP's annual funding application intake process (open projects);
2. directed projects (e.g. projects undertaken via a request for proposal, limited bid, etc.) to undertake specific projects identified in the Plan; and
3. negotiating long-term agreements to deliver actions on behalf of FWCP.

Each action has been prioritized: those ranked as #1 are the highest priority actions. An implementation approach has been selected for each action. Projects to be implemented through funding applications (i.e. FWCP annual funding application process) are referred to as OPEN projects. Projects to be implemented through other means suitable to the FWCP and the Trust are referred to as DIRECTED projects.

Implementing the conservation, restoration, enhancement and sustainable use actions across four ecosystems will require a collaborative approach involving a range of partners, including local government, First Nations, residents, existing non-government organizations and others.

Proponents interested in applying to the FWCP for funding to undertake an action recommended in the UKEEP will follow the FWCP's application process. Proponents are responsible for ensuring their project idea is in alignment with the FWCP's conservation priorities. Funding applications are due in November each year. See www.fwcp.ca for details.

The Trust funds a range of environmental projects annually. Interested residents, including members of the public and local non-government organizations, can apply to the Trust for funding to undertake projects in alignment with Plan.

The partners – the Trust and FWCP – will monitor the success of the UKEEP, adapt actions and projects in the Plan (based on new information and performance outcomes) and update and modify the Plan as necessary to ensure it continues to address current priorities. The partners will also review the entire Plan in the next three to five years as part of an overall review and evaluation of the Upper Kootenay Ecosystem Enhancement Plan.

Some key priority ecosystems and Species of Interest identified for the Plan area overlap with those identified in the FWCP - Columbia Action Plans¹ and will require alignment of actions. A key difference between the FWCP - Columbia Action Plans and the UKEEP is that the former addresses impacts of BC Hydro-owned and -operated dams (see [FWCP – Columbia](#)). The UKEEP focuses on general conservation, restoration, enhancement and sustainable use requirements within the area to address fish and wildlife issues (See Section 1.4 for a discussion of the Land Use Activities in the Plan area).

Some of the actions recommended in the UKEEP will include small-scale, short-duration strategic projects that target specific issues identified by UKEEP partners or others (e.g. community members). These could include projects not yet identified in any action plans.

¹ FWCP-Columbia is guided by Action plans that address large lakes, small lakes, streams, uplands and drylands, wetland and riparian areas, and species of interest.

2.8 Ecosystem and Species of Interest Action Plans

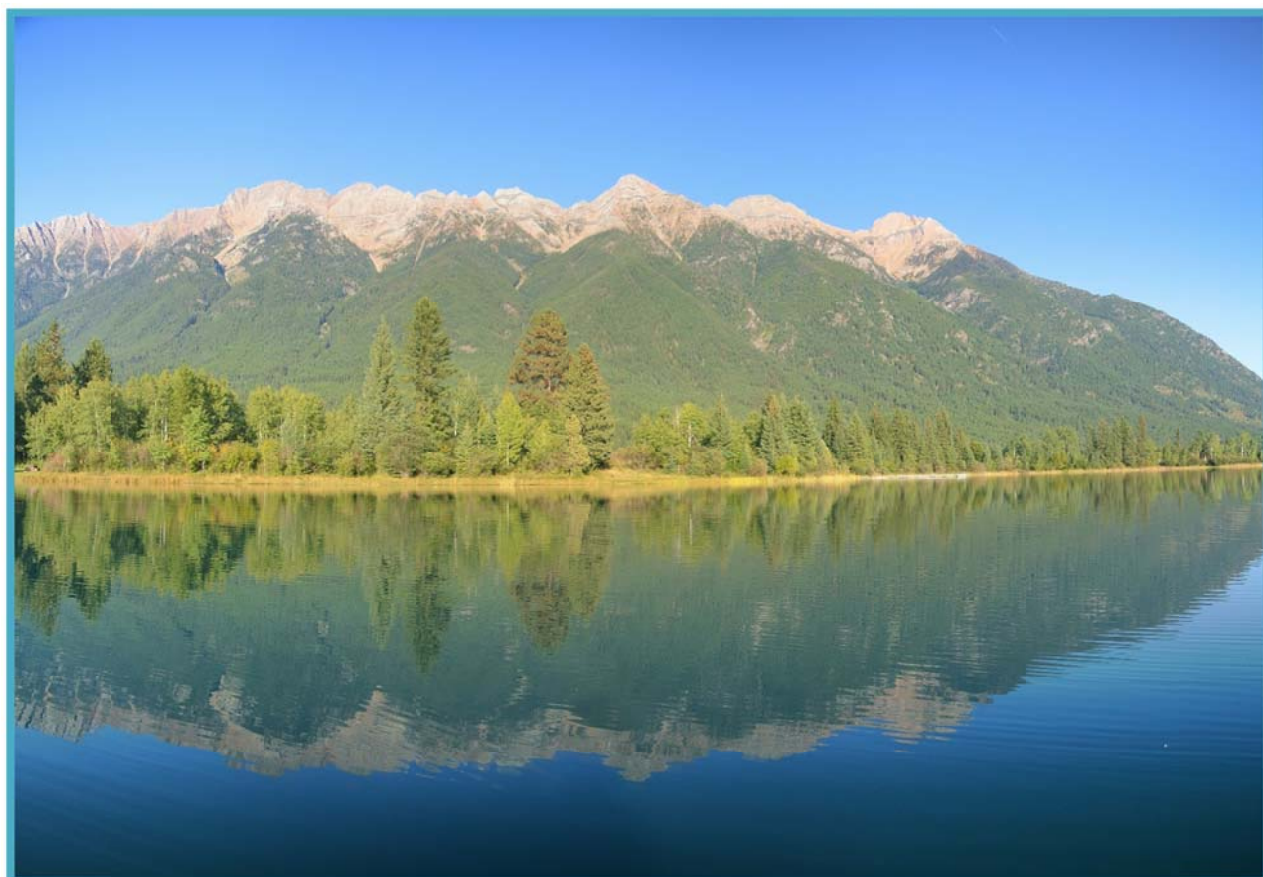
The following sections of the Plan (Sections 3 to 7) provide an overview of the Action Plans for ecosystems ([Lakes](#), [Streams](#), [Wetland](#), [Upland and Dryland Areas](#)) and [Species of Interest](#). Each Action Plan summarizes the objectives, measures and targets and lists priority actions.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in the individual Ecosystem Plans.

LAKES ACTION PLAN



Peckham Lake. Photo credit: Ben Meunier.

3 Lakes Action Plan

3.1 Introduction

The Lakes Action Plan sets out priorities for the Plan to guide projects to conserve, restore, enhance, and support sustainable use of lake ecosystems within the Plan area. General actions have been developed to help provide focus for the Plan over the next three to five years based on input from First Nations, government agencies, industry and the public. As part of these actions, further research on lakes within the Plan area is required to inform review and synthesis of lake information and to further refine priorities and identify/confirm specific areas needing immediate action.

The proposed actions in this Plan build on past and ongoing projects of various environmental organizations/agencies and leverage their results to address outstanding needs in the Plan area. The expected outcomes of the Lake Actions include:

- understanding the current status of Species of Interest populations and their habitat, as well as identifying opportunities to conserve, restore and enhance them;
- improved ecological function of lakes through on-the-ground habitat improvements, Species of Interest recovery/maintenance and management of invasive species;
- improved/maintained sustainable use; and
- improved coordination with existing regulatory and management activities in the Plan area.

3.2 Overview

3.2.1 Impacts and Threats to Lakes

There are approximately 1,738 lakes and ponds in the Upper Kootenay River watershed. This includes 386 high elevation small lakes (above 1500 m), 242 low elevation small lakes (below 1500 m), and 1 large reservoir, Koocanusa Reservoir (*BC Watershed Atlas, 2005*). Small lakes are defined as water bodies between 1 ha and 1,000 ha. There are no large lakes (greater than 1,000 ha) in the Plan area.

The main threats to lake ecosystems in the Plan area identified through literature review and expert opinion are invasive species, loss of shoreline habitat, water quality, fishing pressure and water craft use. These threats primarily impact low elevation lakes and Koocanusa Reservoir mainly as a result of shoreline development and recreational use. Cattle farming and forestry activities are also a significant source of impact on lake habitats. High elevation lakes in the region remain relatively pristine although very little data are available regarding the health of these systems.

A number of invasive species, particularly Largemouth Bass (*Micropterus salmoides*), Yellow Perch (*Perca flavescens*) and other spiny-ray fish species, are well established in the Plan area lakes and present a major threat to native fish populations (due to competition for resources and predation). Conversely, these species provide good angling opportunities, which often contribute to their illegal transfer to new areas. Rainbow Trout (*Oncorhynchus mykiss*) is a non-native species that is stocked in lakes of the Plan area but cause a significant threat to native Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) populations due to hybridization between the two species. Loss of shoreline habitat and water quality are particularly dominant in lakes along the Rocky Mountain Trench, which are influenced by extensive housing development and recreational use. A number of lake communities have started to take action to manage and control shoreline development through the collection of scientific information and the development of Official Community Plans, policies, and bylaws. Some lakes in the region experience heavy fishing pressure, which can present a significant threat to native fish populations. In particular,

Burbot (*Lota lota*) populations have significantly declined in recent history and are now subject to angling restrictions.

In addition to these threats, Koocanusa Reservoir is subject to the Libby Dam operations, which result in significant changes in water elevation during the year. Very little information is available on the effects of the Libby Dam water use plan and operations on aquatic life in the Canadian portion of Koocanusa Reservoir, although studies have been conducted for the U.S. portion.

3.2.2 Limiting Factors for Lakes

Factors limiting the quality and abundance of Lakes fall into three broad categories:

Extent: The contribution of lakes to broader ecological function is ultimately limited by the extent of the areas on the land base. Areas have been lost through inundation and conversion to other land uses. Extent is generally considered the most important limiting factor.

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

Productivity: The productivity of an ecosystem is defined as the rate of generation of biomass (i.e. the mass of living biological organisms) in an ecosystem or, simply, the ability to grow or yield plants and animals in an ecosystem. Even where lake habitats are adequately represented and connected, there are several factors that can negatively affect their productivity.

- Hydrologic conditions such as water level variability and flow rates are among the most important variables driving stream habitat development, structure, function and persistence (National Research Council 2001). Hydrologic conditions also influence the extent and distribution of habitats where changes in hydrology result in succession to riparian and upland habitat types.
- Stressors such as invasive species or disruptive human access can affect community structure and function.
- Loss of specific habitat features can affect life requirements of specific species, (e.g. shoreline features such as shallow waters, emergent vegetation, and wildlife trees), suitable spawning substrate, vegetation cover and habitat complexity for rearing and foraging.

Limiting factors to Species of Interest likely vary among species, trophic levels, and locations. Limiting factors for fish and wildlife include biotic factors like predation and competition, which may include effects of invasive species and harvesting. Abiotic factors are also important, such as habitat quantity and quality, access to habitats (e.g. passage in tributary streams), summer and winter water temperatures, water levels, nutrient levels, length of the growing season, and various natural and human-induced disturbances/processes.

The Plan will focus on each of these factors to conserve, restore, enhance, and support sustainable use of lake ecosystems in the Plan area. In particular, physical works to improve habitat quantity, quality and connectivity have been proven to produce significant and cost-effective results to support lake productivity and will be one of the priorities of the Plan.

3.2.3 Trends and Knowledge Status of Lakes

Information, such as trends in abundance of Species of Interest of lakes and availability of habitat that support them, has only partially been compiled. For instance, Sensitive Habitat Inventory Mapping (SHIM) exercises have been conducted on Wasa, Rosen, Jim Smith, St. Mary, and Tie lakes but not on

many other lakes. Similarly, long-term water quality datasets are lacking for the many of lakes in the region, particularly those at high elevation. Some abundance data are being collected for a number of Species of Interest, including Burbot, Bull Trout, and Kokanee but there are no plans in place to monitor trends in the health of these populations. Various measures are being implemented to prevent the illegal introduction of non-native fish species (e.g. special angling regulations), but these have had no success in rehabilitating lakes where invasive species are well established.

3.3 Objectives, Measures, and Targets for Lakes

The following objectives and sub-objectives have been developed to define the scope of the Lake Actions and guide funding decisions of the Plan on lake related conservation, restoration, enhancement and sustainable use actions. These objectives and sub-objectives were developed to address fish and wildlife issues of the Plan area as identified through research and engagement. Measures and targets will help assess the overall success of the plan at achieving each objective. Measures and targets may change as management priorities change or new information becomes available. Objectives and sub-objectives are common to all lakes discussed in this plan, although the Species of Interest vary somewhat among lakes. While the objectives and sub-objectives are expected to remain stable over time, the indicators and targets may evolve as management priorities shift, or new information becomes available. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Objective 1 – Conserve productivity and diversity of lake ecosystems in the Plan area.

a. Identify and conserve important habitat for Species of Interest.

Sensitive habitat inventories will help identify areas of critical importance that can be protected through stewardship agreements, covenants, creation of protected zones, or land purchases. Completion of sensitive habitat inventory exercises for lakes subjected to extensive recreational use and housing developments will be a priority of the Plan.

Measure: Area of conserved habitat.

Target: Increase in availability of important habitat for *Species of Interest* protected against human impacts.

b. Characterize and monitor the status of Species of Interest.

Abundance, distribution, age, size, and angler-use data are critical information to determine and monitor the health of fish populations. Trends in the status of Species of Interest will help refine priority actions of the Plan and inform regulatory agencies in developing/revising integrative management plans if/when necessary.

Measure: Knowledge of the status of Species of Interest.

Target: The establishment or improvement of baseline knowledge of the status of Species of Interest.

c. Support efforts to prevent introduction of invasive species.

The Plan will implement actions to halt the spread of invasive species and prevent their establishment in the area.

Measure: Establishment/spread of invasive species in new areas.

Target: No new established invasive species.

Objective 2 – Restore and enhance lake habitats and populations of Species of Interest.

a. Restore and enhance important habitat for Species of Interest.

Where habitat has been impacted, the Plan will implement actions to restore and enhance lake productivity through on-the-ground actions such as fish spawning/rearing/overwintering habitat restoration or improvement, shoreline stabilization, reconnection of isolated habitats and riparian area rehabilitation.

Measure: Area of restored/enhanced habitat.

Target: Increased area of restored/enhanced habitat that improves lake productivity.

a. Support Species of Interest population recovery/maintenance.

If populations of Species of Interest are deemed too depleted to remain self-sustained, the Plan will implement actions to supplement natural recruitment of these populations for example, through introduction of hatchery raised individuals. These actions may be particularly instrumental for the recovery of Burbot populations in the regions. Actions should also support Species of Interest with healthy populations to ensure the restoration of populations to self-sustaining levels.

Measure: Natural recruitment of Species of Interest populations.

Target: Improvement in abundance and distribution of Species of Interest populations due to recovery efforts.

b. Control of established invasive species.

The Plan will implement actions to monitor and manage established invasive species threatening lake ecosystems in the region. In particular, actions that mitigate hybridization of introduced Rainbow Trout and native Westslope Cutthroat Trout will be one of the priorities of the Plan. Also targeted will be non-native spiny-ray species, such as Largemouth Bass, Yellow Perch, and invasive plants, such as Knapweed, which often grow along lake shorelines and affect riparian function.

Measure: Abundance and distribution of invasive species.

Target: Decrease in abundance and distribution of invasive species due to control efforts.

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

a. Contribute data to help inform decision making on sustainable use targets for resources.

Using information collected as part of Objectives 1 and 2, the Plan will provide information to agencies to support efforts to develop and update sustainable use targets for lake resources. These targets may include harvest quotas for Species of Interest, water use limits, water quality standards, or shoreline development plans.

Measure: Habitat that supports Species of Interest populations and abundance of Species of Interest populations.

Target: Lake resource use does not affect the sustainability of Species of Interest populations.

b. Support public education and awareness regarding threats and challenges to lake ecosystems, which will motivate ecologically-informed decisions and actions.

The Plan will implement actions to educate the public about lake ecology and best practices to conserve healthy lake ecosystems in the Plan area. Key subjects include the impacts of shoreline development, recreational and land use activities, invasive species and their spread, and the importance of special angling regulations.

Measure: Awareness of the public of threats and challenges to lake ecosystems.

Target: Reduced incidence of negative impacts caused by humans due to ecologically-informed decisions and actions as a result of increased awareness of the public of threats and challenges to lake ecosystems.

3.4 Actions for Lakes

Table 1 identifies a set of preliminary actions that have been identified to guide initial planning efforts. Actions reflect the current knowledge and work completed for lakes in the Plan area. Actions are organized by Action Category: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement, and Monitoring and Evaluation. Actions are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority). See Section 2.6.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in Table 1 Lakes Actions. Actions presented in Table 1 will also benefit Species of Interest that rely on lake habitats. Species that depend on lake habitats for all or part of their life cycle are provided in APPENDIX 4 Table 8.

Table 1: Lake Action Plan

Each action has been prioritized and ranked according to priority. Those ranked as #1 are the highest priority actions. Each recommended action is linked to a specific objective (see Section 2.4). All objectives are outlined in **Figure 3** on page 9. An implementation approach has been selected for each action. Projects to be implemented through funding applications (e.g. FWCP annual funding application process) are referred to as OPEN projects. Projects to be implemented through other means suitable to the FWCP and the Trust are referred to as DIRECTED projects (see Section 2.7).

Action #	Objective	Lake Action	Rationale & Expected Outcomes	Rank	Implementation Approach
Research and Information Acquisition					
1	1a	Review and map land use activities and existing information on condition and limitations of lake habitats used by lacustrine and adfluvial Species of Interest to identify and prioritize focal lake habitats. Describe past and present management actions (e.g. land use planning, zoning, setbacks) and identify data gaps.	The review of existing information on lacustrine habitat is necessary to identify threats, prioritize and establish targets for future conservation/ restoration/ enhancement activities, and avoid duplication of effort. Expected outcome: inform management plans, inform Actions #3 & 15, and identify lakes that require Species of Interest/habitat assessment.	1	Open
	2a				
	3a				
2	2a	Assess feasibility (i.e. assess current nutrient levels, cost-benefit analysis) of nutrient additions to Koocanusa Reservoir to improve productivity.	Nutrient sink reported in Koocanusa Reservoir (Woods 1982, Snyder and Minshall 1996). If found feasible, results will inform development of a nutrient addition program.	2	Open
3	1a	Inventory and prioritize potential lake habitat conservation/ restoration/ enhancement opportunities for Species of Interest using information collected from Action #1.	Future conservation/ restoration/ enhancement strategies will focus on important habitat for Species of Interest. Expected outcome: a list of potential projects for individual lakes, which will help address or mitigate negative impacts and limiting factors to habitat; inform Action #15.	2	Open
	2a				
4 ^a	3a	Conduct creel surveys to monitor catch, effort, and estimate angling-related mortality of lacustrine and adfluvial Species of Interest.	Catch, effort, and angling-related mortality information will inform suitability of sustainable use targets. Expected outcome: better estimation of angling-related mortality.	2	Directed
5 ^a	3a	Conduct aerial overview survey of angling pressure for select (index) water bodies to estimate angling-related mortality of lacustrine and adfluvial Species of Interest. Complement aerial surveys with ground verification by creel surveys.	Catch, effort, and angling-related mortality information will inform suitability of sustainable use targets. Expected outcome: better estimation of angling-related mortality.	3	Directed

Habitat-based Actions					
6 ^a	1a	Support work that seeks to resolve access and recreation management issues that affect conservation/ restoration/ enhancement objectives (e.g. increase signage and education, 'Access Guardian' program).	The rapid expansion in road networks and recreational water craft use has resulted in a dramatic increase in public access and use of lakes. This increase negatively impacts sensitive fish and wildlife populations and their habitats and exacerbates the spread of invasive species. Expected outcome: decrease in negative impacts related to access and recreational use.	1	Open
	2a				
	3b				
7 ^a	3b	Support education and outreach for public awareness of threats and challenges of lake ecosystems. Threats include consequences of unauthorized introductions of invasive species and impacts from recreational use (particularly watercraft use). (Examples include support for implementation of mandatory boat washes, educational signage, and stewardship).	Impacts and threats to lakes related to human activities, such as spread of invasive species and irresponsible watercraft use can be mitigated by better education. Expected outcome: better awareness of the public, which will change behaviours responsible for negative impacts.	1	Open
8	1a	Implement habitat-based actions to conserve/ restore/ enhance water levels and water quality. Ensure alignment with relevant actions for other ecosystems. (e.g. removal/reduction of sources of pollution (i.e. agricultural run-off, septic systems) and improved connection to streams/wetlands).	The protection of water resources is a critical conservation value for healthy lake ecosystems. Expected outcome: improvement of water resources and inform development of management plans (where applicable).	2	Open
	2a				
9	1a	Implement habitat-based actions to conserve, restore, and enhance shorelines of lakes. Ensure alignment with relevant actions for other ecosystems (e.g. re-vegetation and/or erosion control projects).	Shoreline areas are an integral part of lake ecosystems and therefore the protection of riparian areas is critical for the support of Species of Interest populations. Expected outcome: improved shoreline habitat and inform development of management plans (where applicable). Pilot studies should explore ecologically friendly techniques for shoreline stabilization (e.g. alternatives to riprap).	2	Open
	2a				
10 ^b	1a	Implement habitat-based actions to conserve, restore, and enhance spawning, rearing, overwintering, and foraging habitat for Species of Interest. Ensure alignment with relevant actions for other ecosystems. (e.g. re-establishment of connection with stream/wetland habitat, addition of aquatic vegetation or artificial structures to improve cover and habitat complexity and placement of suitable spawning substrate).	The protection of lake habitat is critical for the support of lacustrine and adfluvial Species of Interest populations. Expected outcome: improved lake habitat.	3	Open
	2a				

Species-based Actions					
11	1b	Inventory, review, and synthesize existing information on lacustrine and adfluvial Species of Interest in the Plan area, including past and present management actions and identify data gaps. Integrate with historic information. This action can be completed concurrently with Action #12.	The review of existing abundance, distribution, age, and size information on lacustrine/adfluvial Species of Interest will inform management plans addressing specific issues affecting individual lakes. Expected outcome: identification of high risk populations, which will help inform next steps/Action #12.	1	Directed
	2b				
12	1b	Collect biological information to address data gaps and define status of lacustrine and adfluvial Species of Interest populations. Integrate with historic information. This action can be completed concurrently with Action #11.	Addressing data gaps will enable a better depiction of the status of Species of Interest populations in the watershed. Expected outcome: abundance, distribution, age and size information on lacustrine/adfluvial Species of Interest from poorly studied populations to inform management plans.	1	Directed
	2b				
13 ^a	1c	Support the development of invasive species monitoring and rapid response plans. Identify areas where invasive species are likely to establish or have already established.	Invasive species compete with native species and present a threat to the conservation of Species of Interest. Expected outcome: better understanding of the distribution of invasive species in the Plan area and the ability to respond quickly to new infestations.	1	Open
	2c				
14	2b, 2c	Conduct risk assessments of established Rainbow Trout populations and stocking programs with regard to hybridization with Westslope Cutthroat Trout.	Rainbow Trout genetic introgression has been identified as one of the main threats to native Westslope Cutthroat Populations. Expected outcome: identification of high risk populations, which will help inform next steps/priority actions.	1	Directed
Land Securement					
15	1a	Protect critical lake habitats identified in Actions #1 and/or 3 through covenant and stewardship opportunities. Properties adjacent to existing protected properties, and those that protect Recovery and Focal Species should be the priority.	Multi-stakeholder cooperation is required to secure high-value lands that are under threat. Expected outcome: securement of critical lake habitat.	2	Directed

Monitoring and Evaluation					
16	1a	Evaluate results of habitat-based actions.	To measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future habitat-based actions, develop schedules and budgets for habitat targets.	2	Directed
	2a				
17 ^a	1b	Monitor the status and trends of lacustrine and adfluvial Species of Interest populations (i.e. Westslope Cutthroat Trout, Kokanee, Rainbow Trout). Collect genetic data at the same time.	To identify changes in populations, which would inform requirement for new management actions and to measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future actions; identification of changes to threats.	3	Directed
	2b				
18	1a	Collect baseline data and/or monitor lake habitats to evaluate climate change impacts.	Changes in climate are anticipated to affect water levels and quantity conditions as well as riparian vegetation growth and productivity. Expected outcome: prediction of climate change impacts, their severity and means to improve habitat resiliency in response to climate change.	3	Open
	2a				
	3a				

^a Actions that are traditionally out of FWCP scope as they directly overlap with core activities of government, non-government agencies, and/or programs.

^b Actions that overlap with the Columbia Basin Lakes Action Plan.

3.5 Conclusions

The Lakes Action Plan identifies actions to address the overall objectives of the UKEEP. Opportunities to undertake conservation, restoration, enhancement and sustainable use actions have been identified, as outlined in Section 3.4. Importantly, this Plan identifies the need to undertake additional research, inventory, information synthesis, evaluations and planning/partnerships to refine the target lakes that require immediate action. By pursuing these actions in lakes, the Plan will directly address objectives to maintain productive and diverse ecosystems, restore/enhance impacted lakes and ensure sustainable use for the future.



Kootenay River. Photo credit: Ben Meunier.

4 Streams Action Plan

4.1 Introduction

The Streams Action Plan sets out priorities to guide projects to conserve, restore, enhance and support sustainable use of stream ecosystems within the Plan area, primarily in support of fish identified as priority stream species. General actions have been developed to help provide focus for the Plan over the next five years based on input from First Nations, government agencies, industry and public stakeholders. As part of these actions, a review and synthesis of the existing stream information for the Plan area will be conducted to further refine priorities and identify/confirm specific areas needing immediate action.

The proposed actions in this Plan build on past and ongoing projects of various environmental organizations/agencies and leverage their results to address outstanding needs in the Plan area. The expected outcomes of the Stream Actions include:

- Understanding the current status of Species of Interest populations and their habitat, as well as identifying opportunities to conserve, restore, and enhance them.
- Improved ecological function of streams through on-the-ground habitat improvements, Species of Interest recovery/maintenance, and management of invasive species.
- Improved/maintained sustainable use.
- Improved coordination with existing regulatory and management activities in the Plan area.

4.2 Overview

4.2.1 Impacts and Threats to Streams

Anthropogenic activities, invasive species, and climate change are the three main threats to stream ecosystems in the Plan area. In particular, intensive upland development, forestry, mining, and water use in the region often result in significant impacts to fish populations at the physical and bio-chemical habitat level. These activities vary substantially throughout the Plan area but often occur concurrently and can lead to cumulative impacts that decrease habitat quantity and quality. Landscape level changes in vegetative cover brought about by multiple land use activities can strongly influence hydrologic stability at the watershed scale. Water yield, run-off timing and rates of release are strongly influenced by land use activities that alter the infiltration capacity/permeability of soils to mediate run-off during precipitation/meltwater events. Loss of riparian vegetation leads to reduced cover/large woody debris accrual, nutrient input for food production, changes in stream channel form (geomorphology), lateral bank stability and erosional processes. A reduction in channel complexity can increase water velocity, exacerbate erosive forces, alter rates of coarse and fine sediment deposition, affect balances in bedload transport (i.e. inputs versus outputs), and often cause channels to widen and shallow. Alterations in canopy cover, at lower elevations, can also strongly influence water temperature. Loss of stream habitat connectivity due to inappropriate or poorly designed stream crossing structures prevents migratory species from accessing important habitat or may create isolated populations. Impacts of recreational water craft use on stream ecosystems is largely unknown.

Biological invasions at multiple trophic levels, such as the algae, Didymo (*Didymosphenia geminata*), or introduction of non-native species, such as Rainbow Trout (*Oncorhynchus mykiss*) and Eastern Brook Trout (*Salvelinus fontinalis*), present threats to native species' abundance, diversity, and genetic integrity. Didymo can affect stream habitats and resources of other species. Rainbow Trout are a significant threat to native Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) populations due to

hybridization between the two species. Eastern Brook Trout can displace Westslope Cutthroat Trout, particularly in stream environments that are already degraded.

The impact of climate change on stream ecosystems in the Plan area has not yet been characterized. Expectations are that related changes in temperature and water flow will severely impact stream habitats and associated species.

4.2.2 Limiting Factors for Streams

Factors limiting the quantity and quality of Streams fall into three broad categories:

Extent: The contribution of streams to broader ecological function is ultimately limited by the extent of the areas on the land base. Areas have been lost through inundation and conversion to other land uses (e.g. channelization). Extent is generally considered the most important limiting factor.

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

Productivity: The productivity of an ecosystem is defined as the rate of generation of biomass (i.e. the mass of living biological organisms) in an ecosystem or, simply, the ability to grow or yield plants and animals in an ecosystem. Even where stream habitats are adequately represented and connected, there are several factors that can negatively affect their productivity:

- Hydrologic conditions such as water level variability and flow rates are among the most important variables driving stream habitat development, structure, function and persistence (National Research Council 2001). Hydrologic conditions also influence the extent and distribution of habitats where changes in hydrology result in succession to riparian and upland habitat types.
- Stressors such as invasive species or disruptive human access can affect community structure and function.
- Loss of specific habitat features can affect life requirements of specific species, (e.g. deep overwintering pools, suitable spawning substrate, vegetation cover and habitat complexity for rearing and foraging).

Many streams in the Upper Kootenay River basin are naturally low productivity (oligotrophic) systems, dependent on characteristics such as geology, biogeochemistry, elevation, and biological interactions. However, anthropogenic inputs from industrial and urban development provide examples (both present and historical) where elevated nutrient introduction has increased levels above background. Limiting factors to Species of Interest likely vary among species, trophic levels and locations. Limiting factors for fish typically include biotic factors such as predation and competition, and abiotic factors such as habitat quantity and quality, access to habitats, climate, flow regime, nutrient levels, and length of the growing season.

The Plan will focus on each of these factors to conserve, restore, enhance and support sustainable use of stream ecosystems in the Plan area. In particular, physical works to improve habitat quantity, quality and connectivity have been proven to produce significant and cost-effective results to support stream productivity and will be one of the priorities of the Plan.

4.2.3 Trends and Knowledge Status of Streams

Information on trends in the quality and productivity of streams, as well as the abundance and distribution of Species of Interest in the Plan area has not yet been compiled. While a large body of

biological information has been collected over the years by various groups and agencies, local experts agree that a fundamental need exists for synthesising the existing knowledge in order to inform future decisions and implement integrative conservation plans.

As part of its main conservation objectives, the Plan will initiate the development of status reports for stream habitat and Species of Interest in the Plan area in which current knowledge and trends will be analysed and summarized following a scientific approach. This first step will inform future Program actions for stream ecosystems, enable the identification of knowledge gaps and serve as an effective management tool for environmental groups and agencies.

4.3 Objectives, Measures, and Targets for Streams

The following objectives and sub-objectives have been developed to define the scope of the Streams Actions and guide funding decisions of the Plan on stream related conservation, restoration, enhancement and sustainable use actions. These objectives and sub-objectives were developed to address fish and wildlife issues of the Plan area as identified through research and engagement. Measures and targets will help assess the overall success of the plan at achieving each objective. Measures and targets may change as management priorities change or new information becomes available. Objectives and sub-objectives are common to all streams discussed in this plan, although the Species of Interest vary somewhat among the streams. While the objectives and sub-objectives are expected to remain stable over time, the indicators and targets may evolve as agencies' management priorities shift, or new information becomes available. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Objective 1 – Conserve productivity and diversity of stream ecosystems in the Plan area.

a. Identify and conserve important habitat for Species of Interest

The inventory of important habitat for each Species of Interest will help identify areas of critical importance that can be protected through stewardship agreements, covenants, creation of protected zones, or land purchases.

Measure: Area of conserved habitat.

Target: Increase in availability of important habitat for Species of Interest protected against human impacts.

b. Characterize and monitor the status of Species of Interest

Abundance, distribution, age, size and angler-use data are critical information to determine and monitor the health of fish populations. Trends in the status of Species of Interest will help refine priority actions of the Plan and inform regulatory agencies in developing/revising integrative management plans when necessary.

Measure: Knowledge of the status of Species of Interest.

Target: The establishment or improvement of baseline knowledge of the status of Species of Interest.

c. Support efforts to prevent introduction of invasive species.

The Plan will implement actions to halt the spread of invasive species and prevent their establishment in the area.

Measure: Establishment/spread of new invasive species.

Target: No new established invasive species.

Objective 2 – Restore and enhance stream habitat and populations of Species of Interest.

a. Restore and enhance important habitat for Species of Interest

Where habitat has been impacted, the Plan will implement actions to restore and enhance stream productivity through on-the-ground actions such as spawning/rearing/overwintering habitat restoration or improvement, reconnection of isolated habitats, bank stabilization, riparian area rehabilitation, and support for road deactivation. Support for remediation of poorly designed stream crossing structures preventing fish passage may be one of the priorities of the Plan.

Measure: Area of restored/enhanced habitat.

Target: Increased area of restored/enhanced habitat that improves stream productivity.

b. Support Species of Interest population recovery/maintenance.

If populations of Species of Interest are deemed too depleted to remain self-sustained, the Plan will implement actions to supplement natural recruitment of these populations for example, through introduction of hatchery-raised individuals. These actions will be particularly instrumental in conserving small populations of pure strain Westslope Cutthroat Trout and Bull Trout, which occur in headwater systems throughout the Plan area and are critical to maintain the genetic diversity of the species. Actions should also support Species of Interest with healthy populations to ensure the restoration of populations to self-sustaining levels.

Measure: Natural recruitment of Species of Interest populations.

Target: Improvement in abundance and distribution of Species of Interest populations due to recovery efforts.

c. Control of established invasive species.

The Plan will implement actions to control and manage established invasive species threatening stream ecosystems in the area. In particular, actions that mitigate hybridization of introduced Rainbow Trout and native Westslope Cutthroat Trout will be one of the priorities of the Plan. Invasive plants, such as Knapweed, which often grow on stream banks and affect riparian function will also be targeted.

Measure: Abundance and distribution of invasive species.

Target: Decrease in abundance and distribution of invasive species due to control efforts.

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

a. Contribute data to help inform decision making on sustainable use targets for resources.

Using information collected as part of Objectives 1 and 2, the Plan will provide information to agencies to support efforts to develop and update sustainable use targets for stream resources. These targets may include harvest quotas for Species of Interest, water use limits, water quality standards, or riparian management rules. Specific targets will be developed for each stream supporting important habitat for Species of Interest.

Measure: Habitat that supports Species of Interest populations and abundance of Species of Interest populations

Target: Stream resource use does not affect the sustainability of Species of Interest populations.

b. Support public education and awareness regarding threats and challenges to stream ecosystems, which will motivate ecologically-informed decisions and actions.

The Plan will implement actions to educate the public about stream ecology and best practices to conserve healthy stream ecosystems in the Plan area. Key subjects include the importance of special angling regulations, the impact of recreational and land use activities on streams, and the impacts of invasive species and their spread.

Measure: Awareness of the public of threats and challenges to stream ecosystems.

Target: Reduced incidence of negative impacts caused by humans due to ecologically-informed decisions and actions as a result of increased awareness of the public of threats and challenges to stream ecosystems.

4.4 Priority streams

The following 15 streams and their tributaries provide important habitat in the Upper Kootenay River watershed. These streams will be given priority for the Plan over the next three to five years (2014-2018). Refinement of priority reaches of these streams will be attained through the completion of Actions under Objective 1a (identification and preservation of important habitat for Species of Interest). Although no [Recovery Species](#) inhabit streams, Blue-listed Westslope Cutthroat Trout and Bull Trout occur throughout the Plan area and will be the priority of Stream Actions.

- Kootenay River mainstem from its headwaters to Koocanusa Reservoir
- Vermillion River
- Cross River
- Palliser River
- White River
- Findlay Creek
- Lussier River
- Skookumchuck Creek
- St. Mary River
- Wildhorse River
- Bull River
- Sand Creek
- Elk River
- Wigwam River
- Gold Creek

4.5 Actions for Streams

Table 2 identifies a set of preliminary actions that have been identified to guide initial planning efforts. Actions reflect the current knowledge and work completed for streams in the Plan area. Actions are organized by Action Category: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement, and Monitoring and Evaluation. Actions are assigned priorities from 1 (highest priority) to 3 (lowest priority). See Section 2.6.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in Table 2 Stream Actions.

Actions presented in Table 2 will also benefit Species of Interest that rely on stream habitats. Species that depend on stream habitats for all or part of their life cycle are provided in APPENDIX 44 Table 9. No [Recovery Species](#) inhabit streams, however, Blue-listed Westslope Cutthroat Trout and Bull Trout occur throughout the Plan area and will be a priority for the Stream Action Plan. Other Species of Interest include Burbot, Kokanee, and Rainbow Trout.

Table 2: Streams Action Plan

Each action has been prioritized and ranked according to priority. Those ranked as #1 are the highest priority actions. Each recommended action is linked to a specific objective (see Section 2.4). All objectives are outlined in **Figure 3** on page 9. An implementation approach has been selected for each action. Projects to be implemented through funding applications (e.g. FWCP annual funding application process) are referred to as OPEN projects. Projects to be implemented through other means suitable to the FWCP and the Trust are referred to as DIRECTED projects (see Section 2.7).

Action #	Objective	Stream Action	Rationale & Expected Outcomes	Rank	Implementation Approach
Research and Information Acquisition					
1	1a	Review and map land use activities and existing information on condition and limitations of stream habitats used by fluvial and adfluvial Species of Interest to identify and prioritize critical stream habitats. Describe past and present management actions (i.e. land use planning, zoning, setbacks) and identify data gaps.	The review of existing information on stream habitat is necessary to identify threats, prioritize future conservation/ restoration/ enhancement strategies and avoid duplication of effort. Expected outcome: inform development/revision of management plans to address specific issues affecting individual streams and their tributaries, inform Actions #2 & 12, and identify streams that require Species of Interest/habitat assessment.	1	Open
	2a				
2 ^b	1a	Inventory and prioritize potential stream habitat conservation/ restoration/ enhancement opportunities for Species of Interest.	Conservation/ restoration/ enhancement strategies will focus on important habitat for Species of Interest. Expected outcome: a list of potential projects for individual streams, which will help address or mitigate negative impacts and limiting factors to stream habitat; inform Action #12.	1	Open
	2a				
3 ^a	3a	Conduct creel surveys to monitor catch, effort, and estimate angling-related mortality of fluvial and adfluvial Species of Interest.	Catch, effort, and angling-related mortality information will inform suitability of sustainable use targets. Expected outcome: better estimation of angling-related mortality.	2	Directed
Habitat-based Actions					
4 ^b	1a	Implement habitat-based actions to conserve, restore, and enhance water flow, stream geomorphology, and water quality on priority streams. Ensure alignment with relevant actions for other ecosystems. Examples include stream stewardship, channel restoration, erosion control, increased connectivity (i.e. culvert replacement).	The protection of water resources is a critical conservation value for healthy stream ecosystems. Expected outcome: improvement of water resources and inform development of management plans (where applicable). Pilot studies should explore ecologically friendly techniques (e.g. alternatives to riprap).	1	Open
	2a				

Action #	Objective	Stream Action	Rationale & Expected Outcomes	Rank	Implementation Approach
5 ^b	1a	Implement habitat-based actions to conserve, restore, and enhance spawning, rearing, overwintering, and foraging habitat for Species of Interest. Focus on culvert replacement. Ensure alignment with relevant actions for other ecosystems (e.g. include re-establishment of connection with lake/wetland habitat, addition of aquatic vegetation or artificial structures to improve cover and habitat complexity and placement of suitable spawning substrate).	The protection of instream habitat is critical for the support of Species of Interest populations. Culvert replacement is a cost-effective way to enhance habitat and ensure habitat connectivity. Expected outcome: improved instream habitat.	1	Open
	2a				
6	1a	Support work that seeks to resolve access and recreation management issues that affect conservation/ restoration/ enhancement objectives (e.g. increase signage and education, 'Access Guardian' program).	The rapid expansion in road networks and recreational water craft use has resulted in a dramatic increase in public access and use of streams. This increase negatively impacts sensitive fish and wildlife populations and their habitats and exacerbates the spread of invasive species. Expected outcome: decrease	1	Open
	2a				
	3b				
7	3b	Support education and outreach for public awareness of threats and challenges of stream ecosystems. Threats include consequences of unauthorized introductions of invasive species and impacts from recreational use (particularly water craft use). Examples include educational signage and stewardship.	Impacts and threats to streams related to human activities, such as spread of invasive species and irresponsible recreational use, can be mitigated by better education. Expected outcome: better awareness of the public, which will change behaviours responsible for negative impacts.	1	Open
Species-based Actions					
8 ^a	1c	Support the development of invasive species monitoring and rapid response plan. Identify areas where invasive species are likely to establish.	The outcome of this action will be a better understanding of the distribution of invasive species in the Plan area and the ability to respond quickly to new infestations.	1	Open
	2c				
9	2b, 2c	Conduct risk assessments of established Rainbow Trout populations and stocking programs with regard to hybridization with Westslope Cutthroat Trout.	Rainbow Trout genetic introgression has been identified as one of the main threats to native Westslope Cutthroat Populations. Expected outcome: identification of high risk populations, which will help inform next steps/priority actions.	1	Directed
10	1b	Inventory, review, and synthesize existing information on fluvial and adfluvial Species of Interest in the Plan	The review of existing abundance, distribution, age and size information on fluvial/adfluvial Species of Interest	2	Directed

Action #	Objective	Stream Action	Rationale & Expected Outcomes	Rank	Implement- -ation Approach
	2b	area, including past and present management actions and identify data gaps. Integrate with historic information. This action can be completed concurrently with Action #11.	will inform management plans addressing specific issues affecting individual streams. Expected outcome: identification of high risk populations, which will help inform next steps/Action #11.		
11 ^a	1b	Collect biological information to address data gaps and define status of <u>fluvial and adfluvial Species of Interest</u> populations. Integrate with historic information. This action can be completed concurrently with Action #10.	Addressing data gaps will enable a better depiction of the status of Species of Interest populations in the watershed. Expected outcome: abundance, distribution, age and size information on fluvial/adfluvial Species of Interest from poorly studied populations to inform management plans.	2	Directed
	2b				
Land Securement					
12 ^b	1a	Protect critical stream habitats identified in Action #1 and/or 2 through covenant and stewardship opportunities. Properties adjacent to existing protected properties, and those that protect Recovery and Focal Species should be the priority.	Multi-stakeholder cooperation is required to secure high-value areas that are under threat. Expected outcome: securement of critical lake habitat.	1	Directed
Monitoring & Evaluation					
13 ^a	1b	Monitor the status and trends of <u>fluvial and adfluvial Species of Interest</u> populations (e.g. Westslope Cutthroat Trout, Kokanee, Rainbow Trout, Bull Trout). Collect genetic data at the same time.	To identify changes in populations which would inform requirement for new management actions and to measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future actions; identification of changes to threats.	1	Directed
	2b				
14 ^b	1a	Evaluate results of habitat-based actions.	To measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future habitat-based actions, develop schedules and budgets for habitat targets.	2	Directed
	2a				
15	1a	Collect baseline data and/or monitor stream habitats to evaluate climate change impacts.	Changes in climate are anticipated to affect water levels and quantity conditions as well as riparian vegetation growth and productivity. Expected outcome: prediction of climate change impacts, their severity and means to improve habitat resiliency in response to climate change.	3	Open
	2a				
	3a				

^a Actions that are traditionally out of FWCP scope as they directly overlap with core activities of government, non-government agencies, and/or programs.

^b Actions that overlap with Columbia Basin Streams Action Plan.

4.6 Conclusions

This Streams Action Plan identifies actions to address the Plan's objectives. Opportunities to undertake conservation, restoration, enhancement, and sustainable use actions have been identified for a set of streams in the Basin, as outlined in Section 4.5. Importantly, this Plan identifies the need to undertake additional information synthesis, evaluations, and planning/partnerships to refine the target streams that require immediate action. By pursuing these actions in these streams, the Plan will directly address objectives to maintain productive and diverse ecosystems, restore/enhance impacted streams, and promote sustainable use for the future.

WETLAND AND RIPARIAN AREAS ACTION PLAN



Wetland of Elizabeth Lake. Photo credit: Ian Adams.

5 Wetland and Riparian Areas Action Plan

5.1 Introduction

The Wetland and Riparian Areas Action Plan sets out priorities to conserve, restore, enhance and support sustainable use of wetland and riparian ecosystems within the Plan area. Actions will provide focus over the next three to five years and have been developed based on input from First Nations, government agencies, industry and the public. Research on wetland and riparian areas and synthesis of the existing information for the Plan area will be conducted to further refine priorities and identify/confirm specific areas needing immediate action. Further research is required for many wetland and riparian areas in the Plan area. Significant riparian areas exist along the Upper Kootenay River and along its tributaries, such as St. Mary's River, and require classification. A significant number of wetlands also occur in upland areas in the Plan area and their value is heightened by their influence on the upland and dryland ecosystems that surround them. Research is required to inform review and synthesis of wetland and riparian information and to further refine priorities and identify/confirm specific areas needing immediate action.

The proposed actions in this Wetland and Riparian Areas Action Plan build on past and ongoing projects of various environmental organizations/agencies and leverage their results to address outstanding needs. The expected outcomes of the Wetland and Riparian Actions include:

- Understanding the current status of Species of Interest populations and their habitat, as well as identifying opportunities to conserve, restore, and enhance them.
- Improved ecological function of wetland and riparian areas through on-the-ground habitat improvements, Species of Interest recovery/maintenance, and management of invasive species.
- Improved/maintained sustainable use.
- Improved coordination with existing regulatory and management activities in the Plan area.

5.2 Overview

5.2.1 Impacts and Threats to Wetland and Riparian Areas

Riparian areas are defined as the area adjacent to a body of water (i.e. stream or lake) that is influenced by water. A wetland is an area of land whose soil is saturated with moisture either permanently or seasonally.

Many wetland and riparian areas in the Plan area have been altered by the construction of Libby Dam and consequent changes to flood regimes. Approximately 1,071.9 ha of wetlands and 2,193.1 ha of floodplains have been inundated by Koocanusa Reservoir created by the Libby Dam (Ketcheson et al., 2005; Moody et al., 2007; Utzig and Holt, 2008; Utzig and Schmidt, 2011). Minimal impacts from hydro development are associated with run-of-the-river Aberfeldie and Elko dams with little storage capacity.

Other wetland and riparian areas have experienced impacts from intensive land development, agricultural and grazing practices, forestry, mining, water and recreational use in the region. These activities vary substantially throughout the Plan area but often occur concurrently and can lead to cumulative impacts. Impacts include loss and degradation of wetland and riparian areas due to changes in flood regimes and habitat connectivity, loss of vegetation and stability, and decline in water quality due to pollution. Loss of wetland and riparian habitat connectivity due to poorly designed stream crossing structures can inhibit or completely block fish, amphibian and reptile passage. In addition, biological invasions of species, such as Eurasian Watermilfoil (*Myriophyllum spicatum*), Diffuse

Knapweed (*Centaurea diffusa*), Spotted Knapweed (*Centaurea biebersteinii*), and Yellow Perch (*Perca flavescens*) present threats to native species abundance, diversity and genetic integrity. The impact of climate change on riparian/wetland ecosystems in the Plan area has not been characterized but expectations are that related changes in temperature and water flow will severely impact habitats and the species that depend on them.

5.2.2 Limiting Factors for Wetland and Riparian Areas

Factors limiting the quality and abundance of Wetland and Riparian areas fall into three broad categories:

Extent: The contribution of wetland and riparian areas to broader ecological function is ultimately limited by the extent of the areas on the land base. Areas have been lost through inundation, conversion to other land uses, and impacts from resource and recreational use. Extent is generally considered the most important limiting factor.

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

Productivity: The productivity of an ecosystem is defined as the rate of generation of biomass (i.e. the mass of living biological organisms) in an ecosystem or, simply, the ability to grow or yield plants and animals in an ecosystem. Even where wetland and riparian habitats are adequately represented and connected, there are several factors that can negatively affect their productivity:

- Hydrologic conditions such as water level variability and flow rates are among the most important variables driving wetland and riparian habitat development, structure, function and persistence (National Research Council 2001). Hydrologic conditions also influence the extent and distribution of habitats where changes in hydrology result in succession to upland habitat types.
- Stressors such as invasive species or disruptive human activity can affect community structure and function.
- Loss of specific habitat features can affect life requirements of specific species (e.g. dense nesting cover for waterfowl, suitable tree cavities for nesting owls or waterfowl, basking sites for turtles).
- Poorly understood factors limit the productivity of created wetlands. These are generally thought to be related to unnatural hydrologic regimes, soil conditions, and/or cattle grazing (e.g. Atkinson et al. 2010).

The Plan will focus on each of these factors to conserve, restore, enhance and support sustainable use of wetland and riparian ecosystems. In particular, physical works to improve habitat quantity, quality and connectivity have been proven to produce significant and cost-effective results to support wetland and riparian productivity and will be one of the priorities of the Plan.

5.2.3 Trends and Knowledge Status of Wetland and Riparian Areas

Information on trends in the extent, distribution and productivity of wetland and riparian areas, as well as the abundance and distribution of Species of Interest in the Plan area has not yet been compiled.

Further work is required to understand changes from:

- loss of wetland and riparian habitat in the Plan area from the creation of the Koocanusa Reservoir;

- alteration of wetland and riparian habitat from flow regulation;
- loss of wetland and riparian habitat from land development; and
- loss in wetland and riparian productivity from hydrology changes and stressors such as resource use and extraction, human recreational activity, and invasive species.

Although conservation and restoration work has been conducted on a number of wetland and riparian areas in the Plan area, local experts agree that a fundamental need exists for categorizing and synthesizing the existing knowledge on wetland and riparian areas in the Plan area in order to highlight priority areas requiring action, implement integrated conservation plans, and identify data gaps.

As part of its main conservation objectives, the Plan will initiate inventory and categorization of wetland and riparian ecosystems in the Plan area augmented by analysis of current knowledge and trends. This first step will inform future Program actions for wetland and riparian ecosystems, enable the identification of knowledge gaps and serve as an effective management tool for environmental groups and agencies. Ecological assessment of site condition could be used to prioritize and rank future Program actions.

5.3 Objectives, Measures and Targets for Wetland and Riparian Areas

The following objectives and sub-objectives have been developed to define the scope of the Wetland and Riparian Actions and guide funding decisions of the FWCP-Columbia and the Trust on wetland and riparian related conservation, restoration, enhancement and sustainable use actions. These objectives and sub-objectives were developed to address wetland and riparian issues of the Plan area as identified through research and engagement. Measures and targets will help assess the overall success of the plan at achieving each objective. Measures and targets may change as management priorities change or new information becomes available. Objectives and sub-objectives are common to all wetland and riparian areas discussed in this plan, although Species of Interest occurrence and abundance vary somewhat among the wetland and riparian areas. While the objectives and sub-objectives are expected to remain stable over time, the indicators and targets may evolve as agencies' management priorities shift, or new information becomes available. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Objective 1 – Conserve productivity and diversity of wetland and riparian ecosystems in the Plan area.

a. Identify and conserve important habitat for Species of Interest

The inventory of important habitat for each Species of Interest will help identify areas of critical importance that can be protected through covenants, creation of protected zones, stewardship agreements, or land purchases.

Measure: Area of conserved habitat.

Target: Increase in availability of important habitat for Species of Interest conserved from human impacts.

b. Characterize and monitor the status of Species of Interest

Abundance, distribution, age, and size, and angler use data are critical information to determine and monitor the health of Species of Interest populations. Trends in the status of Species of Interest will help refine priority actions of the Plan and inform regulatory agencies in developing/revising integrative management plans when necessary.

Measure: Knowledge of the status of Species of Interest.

Target: The establishment or improvement of baseline knowledge of the status of Species of Interest.

c. *Support efforts to prevent introduction of invasive species.*

A number of invasive species such as Eurasian Watermilfoil and Spotted and Diffuse Knapweed have invaded adjacent watersheds and are threatening to become established (i.e. self-sustaining populations) in the Upper Kootenay River drainage. The Plan will implement actions to halt the spread of invasive species and prevent their establishment in the area.

Measure: Establishment of new invasive species.

Target: No new established invasive species.

Objective 2 – Restore and enhance wetland and riparian habitat and populations of Species of Interest.

a. *Restore and enhance important habitat for Species of Interest*

Where habitat has been impacted, the Plan will implement actions to restore and enhance wetland and riparian habitat productivity through on-the-ground actions such as habitat restoration or improvement, reconnection of isolated habitats, bank stabilization, riparian area rehabilitation and support for road deactivation. The remediation of faulty stream crossing structures (i.e. bridges, culverts) preventing animal and plant dispersal will be one of the priorities of the Plan.

Measure: Area of restored/enhanced habitat.

Target: Increased area of restored/enhanced habitat that improves riparian/wetland area productivity.

b. *Support Species of Interest population recovery/maintenance.*

If populations of Species of Interest are deemed too depleted to remain self-sustained, the Plan will implement actions to supplement natural recruitment and maintenance of genetic diversity of these populations. Actions should also support Species of Interest with healthy populations to ensure the restoration of populations to self-sustaining levels.

Measure: Natural recruitment of Species of Interest populations.

Target: Improvement in abundance and distribution of Species of Interest populations due to recovery efforts.

c. *Control of established invasive species.*

The Plan will implement actions to control and manage established invasive species threatening wetland and riparian ecosystems in the area. In particular, actions that control invasive plants, such as Knapweed, which often grow on stream banks and other riparian areas, impairing riparian function and bank stability, will be one of the priorities of the Plan.

Measure: Abundance and distribution of invasive species.

Target: Decrease in abundance and distribution of invasive species due to control efforts.

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

a. *Contribute data to help inform decision making on sustainable use targets for resources.*

Using information collected as part of Objectives 1 and 2, the Plan will provide information to agencies to support efforts to develop and update sustainable use targets for wetland and riparian resources. These targets may include harvest quotas for Species of Interest, water use limits, water quality standards, or wetland and riparian management rules. Specific targets will be developed for each wetland and riparian area supporting Species of Interest critical habitat.

Measure: Habitat that supports Species of Interest populations and abundance of Species of Interest populations.

Target: Riparian/wetland area resource use does not affect sustainability of Species of Interest populations.

b. Support public education and awareness regarding threats and challenges to wetland and riparian ecosystems, which will motivate ecologically-informed decisions and actions

The Plan will implement actions to educate the public about wetland and riparian ecology and good practices to conserve healthy wetland and riparian ecosystems in the Plan area. Key subjects include the impacts of recreational and land use activities on wetland and riparian ecosystems, and the impacts of invasive species and their spread.

Measure: Awareness of the public of threats and challenges to wetland and riparian ecosystems.

Target: Reduced incidence of negative impacts caused by humans due to increased awareness of the public of threats and challenges to wetland and riparian ecosystems

5.4 Actions for Wetland and Riparian Areas

Table 3 identifies a set of preliminary actions that have been identified to guide initial planning efforts. Actions reflect the current knowledge and work completed for wetland and riparian areas in the Plan area. Actions are organized by Action Category: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement, and Monitoring and Evaluation. Actions are assigned priorities from 1 (highest priority) to 3 (lowest priority). See Section 2.6.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in Table 3 Wetland and Riparian Area Actions.

Actions presented in Table 3 will also benefit Species of Interest that rely on wetland and riparian habitats. Species that depend on wetland and riparian habitats for all or part of their life cycle are provided in APPENDIX 4 Table 10.

Table 3: Wetland and Riparian Area Action Plan

Each action has been prioritized and ranked according to priority. Those ranked as #1 are the highest priority actions. Each recommended action is linked to a specific objective (see Section 2.4). All objectives are outlined in **Figure 3** on page 9. An implementation approach has been selected for each action. Projects to be implemented through funding applications (e.g. FWCP annual funding application process) are referred to as OPEN projects. Projects to be implemented through other means suitable to the FWCP and the Trust are referred to as DIRECTED projects (see Section 2.7).

Action #	Objective	Riparian & Wetland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
Research and Information Acquisition					
1 ^b	1a	Determine abundance, distribution, and category of wetland and riparian habitat, using LIDAR and/or available information from the Southern Rocky Mountain Management Plan (SRMMP) where possible. Identify data gaps. This work is currently being completed in the Elk Valley Focal Area through the Columbia Riparian/Wetland Action Plan but is required for the rest of the Plan area, which is poorly mapped. This action can be completed concurrently with Action #2 & 3.	Assessing wetland and riparian habitat is necessary to identify threats, prioritize and establish targets for conservation/ restoration/ enhancement activities and avoid duplication of effort. Expected outcome: inform management plans, inform Actions #2, 3 & 19, and identify wetlands/riparian areas that require habitat assessment.	1	Directed
	2a				
	3a				
2 ^b	1a	Conduct/compile a biophysical inventory of the wetland and riparian areas and identify data gaps. This work is currently being completed in the Elk Valley Focal Area but is required for the rest of the Plan area. This action can be completed concurrently with Action #1 & 3.	Assessing wetland and riparian habitat is necessary to identify threats, prioritize and establish targets for conservation/ restoration/ enhancement activities and avoid duplication of effort. Expected outcome: inform management plans, inform Actions #3 & 19 and identify wetlands/riparian areas that require habitat assessment.	1	Directed
	2a				
	3a				
3 ^b	1a	Assess habitat to identify condition and prioritize focal wetland and riparian conservation/ restoration/ enhancement opportunities. This work is currently being completed in the Elk Valley Focal Area but is required for the rest of the Plan area. This action can be completed concurrently with Action #1 & 2.	Future conservation/ restoration/ enhancement strategies will center on focal habitat. Consider small wetlands, which provide important habitat but are often missed because of their size. Expected outcome: a list of potential projects for individual wetland and riparian areas, which will help address or mitigate negative impacts and limiting factors to habitat; inform Action #19.	1	Directed
	2a				
4 ^b	1a	Conduct an overview of existing wetland/riparian stewardship groups to identify work completed and	Complex arrangement of existing stewardship groups to be unravelled to ensure that duplication of effort does	3	Directed

Action #	Objective	Riparian & Wetland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
	2a	underway and the capacity/interest of these groups for additional projects. This work is currently being completed in the Elk Valley Focal Area but is required for the rest of the Plan area.	not occur. Need to develop partnerships and local support for this work. Expected outcome: understanding of stewardship work underway and potential for partnerships.		
	3b				
Habitat-based Actions					
5 ^b	1a	Identify and map high-value wildlife trees in wetland and riparian environments.	Information can be used for wildlife tree stewardship and protection. Expected outcome: inform management plans and understanding of priority wildlife trees that require protection.	1	Open
	2a				
	3a				
6 ^b	2a	Evaluate and implement options to improve habitat connectivity across roadways and along streams for amphibians and reptiles.	Movement between habitats, across provincial/international borders and transportation routes (e.g. major highways) is often disrupted. Expected outcome: improved connectivity.	1	Open
7 ^b	2a	Explore opportunities to work with managing partners to maintain the productivity of managed wetlands (e.g. Bummers Flats).	Managed wetlands require periodic treatment to maintain productivity. Expected outcome: sustained productivity of managed wetlands.	1	Open
8 ^b	1a	Where ecologically significant habitats exist, support initiatives (e.g. Grassland and Rangeland Enhancement Program, GREP) to find management solutions (e.g. working with range agreement holders and private landowners to purchase and deploy permanent and/or portable fencing and water systems).	Although agriculture provides benefits to wildlife by maintaining large tracts of non-urbanized land, overgrazing and uncontrolled access by domestic stock can generate significant habitat damage resulting in soil compaction, introduction of invasive species and indirect impacts on wildlife (e.g. reduced ungulate winter range quality). Expected outcome: decreased impact of cattle grazing on habitat.	1	Open
	2a				
9 ^b	1a	Implement educational stewardship program on streambank and wetland clearing.	Riparian vegetation is being lost due to private land clearing. Expected outcome: better awareness of impacts of streambank and wetland clearing, including bank stability.	1	Open
	2a				
	3b				
10 ^b	1a	Explore opportunities to work with partners to manage recruitment of cottonwood stands. Evaluate influence of upland/riparian/wetland habitat on cottonwood stands and Species of Interest.	Cottonwood recruitment/persistence within the drawdown zones or habitats that do not receive seasonal flooding have been significantly degraded in some areas. Expected outcome: improved cottonwood habitat and Species of Interest populations that depend on them.	1	Open
	2a				

Action #	Objective	Riparian & Wetland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
11 ^b	2a	Restore riparian grass sites to native species composition to improve function.	Some grassland habitats are composed of non-native grasses that enable invasive plant encroachment when disturbed. Expected outcome: restoration of native grasses and improved function.	1	Open
12 ^a	1a	Support work that seeks to resolve access and recreation management issues that affect conservation/ restoration/ enhancement objectives (e.g. increase signage and education, 'Access Guardian' program).	The rapid expansion in road networks and off-road vehicle use has resulted in a dramatic increase in public use of lands. This increase negatively impacts sensitive fish and wildlife populations and their habitats and exacerbates the spread of invasive species. Expected outcome: decrease in negative impacts related to access and recreational use.	1	Open
	2a				
	3b				
13	3b	Support education and outreach for public awareness of threats and challenges of wetland and riparian ecosystems. Threats include consequences of unauthorized introductions of invasive species and impacts from recreational use. Examples include educational signage and stewardship.	Impacts and threats to wetland and riparian areas related to human activities, such as spread of invasive species and irresponsible recreational use can be mitigated by better education. Expected outcome: better awareness of the public, which will change behaviours responsible for negative impacts.	1	Open
14 ^b	1a	Improve cross-valley habitat linkages for wide-ranging carnivores (e.g. grizzly bears), ungulates, amphibians and reptiles.	Bottomland riparian habitats can provide important linkages across valleys. Expected outcome: improved connectivity.	1	Open
	2a				
15 ^b	1a	Integrate restoration of fish rearing and spawning habitat (Burbot, Westslope Cutthroat Trout, Bull Trout, and Kokanee) with wetland and riparian conservation/ restoration/ enhancement (e.g. re-establishment of connection with stream/lake habitat, addition of aquatic vegetation or artificial structures to improve cover and habitat complexity and placement of suitable spawning substrate).	Development in wetland/riparian areas has reduced and/or affected access to rearing and spawning habitat for fish. Expected outcome: improved fish habitat in alignment with wetland and riparian conservation/ restoration/ enhancement efforts.	2	Open
	2a				
16 ^b	1a	Conduct an inventory and assessment of spruce stands within wetlands. Evaluate influence of upland/ riparian/ wetland habitat on spruce stands and Species of Interest.	A limited number of larger tributaries provide suitable site conditions for spruce stands. These stands are unique due to their elevation and juxtaposition with the wetlands. Expected outcome: better knowledge of spruce stands, their ecological role and risks.	3	Open
	2a				

Action #	Objective	Riparian & Wetland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
17 ^b	2a	Assess drawdown zones value as spring foraging habitat for ungulates and as habitat for other species.	Drawdown zones may provide resources for Species of Interest, particularly with enhancement. Expected outcome: understanding of the potential for Species of Interest use of enhanced drawdown zones.	3	Open
Species-based Actions					
18 ^a	1c	Support the development of invasive species monitoring and rapid response plans. Identify areas where invasive species are likely to establish or have already established.	Invasive plants threaten the productivity of native wetland and riparian ecosystems (e.g. Eurasian Watermilfoil, Spotted and Diffuse Knapweed, Dalmatian and Yellow Toadflax, Common Tansy, Perennial Pepperweed, Orange Hawkweed, Purple Loosestrife, Leafy Spurge, and Yellow Perch). Expected outcome: better understanding of the distribution of invasive species in the Plan area and the ability to respond quickly to new infestations.	1	Open
	2c				
19 ^b	1b	Conduct baseline waterfowl, migratory shorebird and other Species of Interest surveys. Integrate with historic information.	Use and trend information is required to assess the importance of the Plan area wetlands. Expected outcome: better understanding of the status of Species of Interest.	1	Open
Land Securement					
20 ^b	1a	Protect critical wetland and riparian habitats identified in Actions #1, 2, and/or 3 through covenant and stewardship opportunities. Properties adjacent to existing protected properties, and those that protect Recovery and Focal Species should be priority.	Multi-stakeholder cooperation is required to secure high-value lands that are under threat. Expected outcome: securement of critical wetland and riparian habitat.	2	Directed
Monitoring and Evaluation					
21 ^b	1a	Evaluate results of habitat-based actions.	To measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future habitat-based actions, develop schedules and budgets for habitat targets.	1	Directed
	2a				
22 ^b	1a	Monitor use of riparian zone by ungulate and bear populations.	These riparian areas are located on the valley floors (reduced snowpack) and produce large quantities of forage for ungulates and bears so contribute to their survival. Expected outcome: better understanding of riparian habitat use by ungulates and bears.	2	Directed
	2a				

Action #	Objective	Riparian & Wetland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
25	1a	Collect baseline data and/or monitor wetland and riparian habitats to evaluate climate change impacts.	Changes in climate are anticipated to affect water levels and quantity conditions as well as riparian vegetation growth and productivity. Expected outcome: prediction of climate change impacts, their severity and means to improve habitat resiliency in response to climate change.	3	Open
	2a				
	3a				

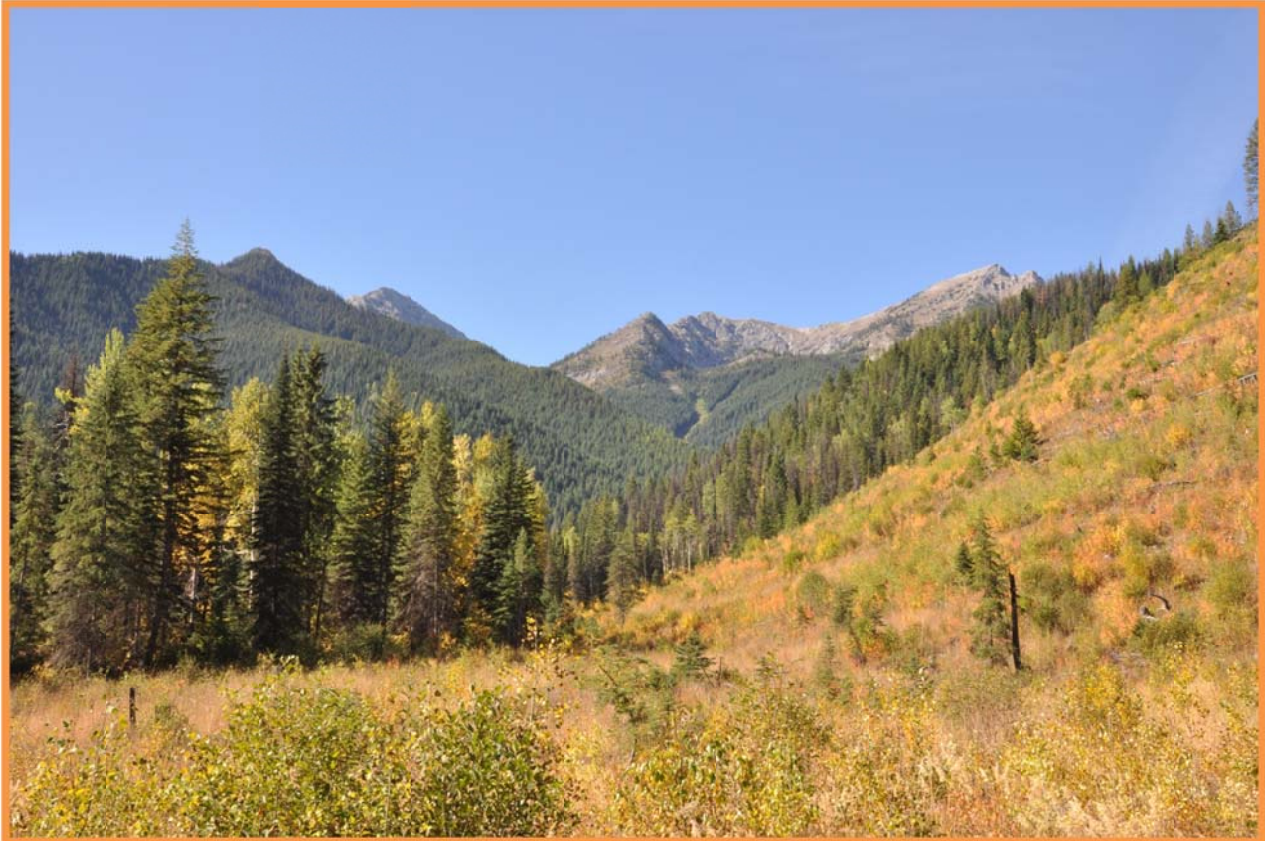
^a Actions that are traditionally out of FWCP scope as they directly overlap with core activities of government, non-government agencies, and/or programs.

^b Actions that overlap with Columbia Basin Riparian/Wetlands Action Plan.

5.5 Conclusions

The Wetland and Riparian Areas Action Plan identifies actions to address Program objectives. Opportunities to undertake conservation, restoration, enhancement and sustainable use actions have been identified as outlined in Section 5.4. Importantly, this Plan identifies the need to undertake additional research, inventory, information synthesis, evaluations and planning/partnerships to refine the target wetland and riparian areas that require immediate action. By pursuing these actions in wetland and riparian areas, the Plan will directly address objectives to maintain productive and diverse ecosystems, restore/enhance impacted wetland and riparian areas, and ensure sustainable use for the future.

UPLAND AND DRYLAND AREAS ACTION PLAN



Upland area near McCool Creek on Mount Hosmer. Photo credit: Ian Adams.

6 Upland and Dryland Areas Action Plan

6.1 Introduction

The Upland and Dryland Areas Action Plan sets out priorities to conserve, restore, enhance and support sustainable use of upland and dryland ecosystems within the Plan area. General actions have been developed to provide focus for the Plan over the next three to five years and are based on input from First Nations, government agencies, industry and the public. Considerable ecosystem restoration (ER) knowledge has been developed and management implemented for upland and dryland areas of the Plan area and actions will require collaboration with relevant agencies and organizations.

The proposed actions in this Plan build on past and ongoing projects of various environmental organizations/agencies and leverage their results to address outstanding needs in the Plan area. The expected outcomes of the Upland and Dryland Actions include:

- understanding the current status of Species of Interest populations and their habitat, as well as identifying opportunities to conserve, restore and enhance them;
- improved ecological function of upland and dryland areas through on-the-ground habitat improvements, Species of Interest recovery/maintenance, and management of invasive species;
- improved/maintained sustainable use; and
- improved coordination with existing regulatory and management activities in the Plan area.

6.2 Overview

6.2.1 Impacts and Threats to Upland and Dryland Areas

Upland ecosystems are defined as those ecosystems that are found above habitat influenced by water (i.e. riparian or wetland habitat). Dryland ecosystems are a subset of upland ecosystems characterized by relatively low rainfall and rapid drainage, which results in vegetation communities dominated by grasses and drought-tolerant shrubs and trees. Examples of upland and dryland ecosystems include forests, grassland, rangeland and alpine habitats.

Upland and dryland areas in the Plan area have been altered by the construction of Libby Dam and consequent changes to flood regimes. Approximately 1,646.8 ha of upland ecosystems have been inundated by Koocanusa Reservoir created by the Libby Dam (Ketcheson et al., 2005; Moody et al., 2007; Utzig and Holt, 2008; Utzig and Schmidt, 2011). Minimal impacts from hydro development are associated with the run-of-the-river Aberfeldie and Elko dams, which have little storage capacity.

Other impacts to upland and dryland ecosystems have resulted from intensive land development, agriculture, forestry and mining in the region. These activities vary substantially throughout the Plan area but often occur concurrently and can lead to cumulative impacts. Impacts include loss and degradation of upland and dryland area due to changes in flood regimes, land use, and resource extraction and management, resulting in habitat fragmentation and loss of important habitat features (e.g. nesting cavities, wildlife trees, snags, ungulate winter range). Widespread forest encroachment and ingrowth has occurred as a consequence of fire suppression, greatly reducing the area occupied by open range and open forest ecosystems and reducing their vigour and production. In addition, invasive plant species, such as Diffuse Knapweed (*Centaurea diffusa*) and Spotted Knapweed (*Centaurea biebersteinii*), present threats to native species abundance, diversity and genetic integrity.

In the Columbia Basin, most climate change models predict that winters will become warmer and wetter, while summers will be hotter and drier (Murdock and Werner 2011; Murdock et al., 2013). The Canadian Columbia Basin is predicted to be 1.2°C to 2.7°C warmer by the 2050's. Total precipitation is expected to increase across the Columbia Basin from 1-9%, but changes will be seasonal and differ within the region. Precipitation is predicted to increase by as much as 15% in winter (with an increased proportion of rain, particularly at lower elevations) but decrease by as much as 14% in summer. More extreme precipitation events are anticipated. However, all these changes are expected to be more moderate in the Plan area (Murdock and Werner, 2011; Hamlet et al., 2013; Murdock et al., 2013). Biogeoclimatic zones are anticipated to shift both upslope and north (Hamann and Wang 2006). Most of the Rocky Mountain Trench is expected to become Ponderosa Pine (PP) BEC zone, while the overall increase in precipitation will likely result in more Interior Cedar Hemlock (ICH) ecosystems (Hamann and Wang 2006).

Addressing these impacts and threats requires integrated ecological restoration and resource management plans to increase the resiliency of ecosystems.

6.2.2 Limiting Factors for Upland and Dryland Areas

Factors limiting the quality and abundance of upland and dryland area fall into three broad categories:

Extent: The contribution of upland and dryland habitats to broader ecological function is ultimately limited by the extent of the areas on the land base. Habitats have been lost through inundation, conversion to other land uses, resource extraction and management of uncontrolled forest succession.

Distribution: Connectivity among upland and dryland habitats, and between these habitats and other ecosystems and features (and across international boundaries), are important for dispersal of plants and animals and for seasonal movements of some species. Land use pressures, such as conversion for urban and agricultural purposes, and the creation of barriers, such as transportation corridors (i.e. roadways, railways) and agricultural fencing, have exacerbated habitat fragmentation.

Productivity: The productivity of an ecosystem is defined as the rate of generation of biomass (i.e. the mass of living biological organisms) in an ecosystem, or simply, the ability to grow or yield plants and animals in an ecosystem. Even where the extent and distribution of upland and dryland habitats are 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, mining, livestock grazing, fire suppression and other extractive activities.

The Plan will focus on each of these factors to conserve, restore, enhance and support sustainable use of upland and dryland ecosystems in the Plan area. In particular, significant ecological restoration efforts to improve habitat quantity, quality and connectivity have been undertaken by various agencies in the Plan area. Supporting and aligning with these efforts will be one of the priorities of the Plan.

6.2.3 Trends and Knowledge Status of Upland and Dryland Areas

A variety of stressors affecting upland and dryland ecosystems are directly or indirectly associated with resource extraction and management, including forest harvesting and the associated expansion of road networks. These activities and associated human-related pressures have resulted in habitat loss, habitat changes, habitat fragmentation, interrupted wildlife movement, the dispersal (i.e. spread) and establishment (i.e. development of self-sustaining populations) of invasive species, and erosion. Altered disturbance regimes have also greatly affected upland and dryland ecosystems in the Plan area. Fire was the primary natural disturbance throughout the area prior to the mid-1900s. Since then, fire has largely been excluded from Rocky Mountain Trench where it previously maintained grassland and open forest

(NDT-4 ecosystems). Historic stand-replacing wildfires in mid-elevation (NDT-3) forests still occur but have largely been replaced by forest harvesting.

An expanding human population has increased demand for resources and services provided by upland habitats. In addition to forest harvesting, mining, livestock grazing, urban and rural development have expanded the footprint of human settlement. An increasing population has also created an increasing demand for access to areas for recreational activities, including snowmobiling, ATVing, camping, hunting, hiking and backcountry skiing, as well as pressure to build or expand tourism infrastructure such as ski resorts, backcountry lodges, adventure tourism tenures and waste facilities.

6.3 Objectives, Measures, and Targets for Upland and Dryland Areas

The following objectives and sub-objectives have been developed to define the scope of the Upland and Dryland Actions and guide funding decisions of the FWCP-Columbia and the Trust on conservation, restoration, enhancement and sustainable use actions related to upland and dryland ecosystems. These objectives and sub-objectives were developed to address upland and dryland issues of the Plan area as identified through research and engagement. Measures and targets will help assess the overall success of the plan at achieving each objective. Measures and targets may change as management priorities change or new information becomes available. While the objectives and sub-objectives are expected to remain stable over time, the indicators and targets may evolve as agencies' management priorities shift, or new information becomes available. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Objective 1 – Conserve productivity and diversity of upland and dryland ecosystems in the Plan area.

a. Identify and conserve important habitat for Species of Interest

The inventory of important habitat for each Species of Interest will help identify areas of critical importance that can be protected through covenants, creation of protected zones, stewardship agreements, or land purchases.

Measure: Area of conserved habitat.

Target: Increase in availability of important habitat for Species of Interest conserved from human impacts.

b. Characterize and monitor the status of Species of Interest

Abundance, distribution, age and size data are critical information to determine and monitor the health of Species of Interest populations. Trends in the status of Species of Interest will help refine priority actions of the Plan and inform regulatory agencies in developing/revising integrative management plans when necessary.

Measure: Knowledge of the status of Species of Interest.

Target: The establishment or improvement of baseline knowledge of the status of Species of Interest.

c. Support efforts to prevent introduction of invasive species.

A number of invasive species, including Common Reed, have invaded adjacent areas and are threatening to disperse and become established (i.e. self-sustaining populations) in the Plan area. The Plan recommends actions that will halt the spread of invasive species and prevent their establishment in the area.

Measure: Establishment of new invasive species.

Target: No new established invasive species.

Objective 2 – Restore and enhance upland and dryland habitat and populations of Species of Interest.

a. Restore and enhance important habitat for Species of Interest

Where habitat has been impacted, the Plan will implement actions to restore and enhance upland and dryland habitat productivity through on-the-ground actions such as ecological restoration (ER) and connection of habitats and corridors.

Measure: Area of restored/enhanced habitat.

Target: Increased area of restored/enhanced habitat that improves upland/dryland area productivity.

b. Support Species of Interest population recovery/maintenance.

If populations of Species of Interest are deemed too depleted to remain self-sustaining, the Plan will implement actions to supplement natural recruitment and maintenance of genetic diversity of these populations (i.e. restoration of ungulate winter range). Actions should also support Species of Interest with healthy populations to ensure the restoration of populations to self-sustaining levels.

Measure: Natural recruitment of Species of Interest populations.

Target: Improvement in abundance and distribution of Species of Interest populations due to recovery efforts.

c. Control of established invasive species.

The Plan will implement actions to control and manage established invasive species threatening upland and dryland ecosystems in the area. In particular, actions that control for invasive plants, such as Knapweed, which are difficult to control will be one of the priorities of the Plan.

Measure: Abundance and distribution of invasive species.

Target: Decrease in abundance and distribution of invasive species due to control efforts.

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

a. Contribute data to help inform decision making on sustainable use targets for resources.

Using information collected as part of Objectives 1 and 2, the Plan will provide information to agencies to support efforts to develop and update sustainable use targets for upland and dryland resources. These targets may include harvest quotas for Species of Interest, upland and dryland management plans and regulations. Specific targets will be developed for each upland and dryland area supporting Species of Interest critical habitat.

Measure: Habitat that supports Species of Interest populations and abundance of Species of Interest populations.

Target: Upland/dryland area resource use does not affect the sustainability of Species of Interest populations.

b. Support public education and awareness regarding threats and challenges to upland and dryland ecosystems, which will motivate ecologically-informed decisions and actions.

The Plan identifies actions to educate the public about upland and dryland ecology and good practices to conserve healthy upland and dryland in the Plan area. Key subjects include the impacts of recreational and land use activities on upland and dryland ecosystems, and the impacts of invasive species and their spread.

Measure: Awareness of the public of threats and challenges to upland and dryland ecosystems.

Target: Reduced incidence of negative impacts caused by humans due to increased awareness of the public of threats and challenges to upland and dryland ecosystems

6.4 Actions for Upland and Dryland Areas

Table 4 identifies a set of preliminary actions that have been identified to guide initial planning efforts. Actions reflect the current knowledge and work completed for upland and dryland areas in the Plan area. Actions are organized by Action Category: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement, and Monitoring and Evaluation. Actions are assigned priorities from 1 (highest priority) to 3 (lowest priority). See Section 2.6.

A number of concerns and potential solutions identified by stakeholders and others during the development of the Plan cut across each of the four ecosystem types. Actions that address these concerns are considered priorities and include:

- invasive species monitoring/management (both terrestrial and aquatic);
- access and recreation management;
- enhancing habitat connectivity;
- conserving and enhancing important habitat for Species of Interest; and
- monitoring trends, abundance, and distribution of Species of Interest.

These priorities are reflected in Table 4 Upland and Dryland Area Actions.

Actions presented in Table 4 will also benefit Species of Interest that rely on upland and dryland habitats. Species that depend on upland and dryland habitats for all or part of their life cycle are provided in APPENDIX 4 Table 11.

Table 4: Upland and Dryland Area Action Plan

Each action has been prioritized and ranked according to priority. Those ranked as #1 are the highest priority actions. Each recommended action is linked to a specific objective (see Section 2.4). All objectives are outlined in **Figure 3** on page 9. An implementation approach has been selected for each action. Projects to be implemented through funding applications (e.g. FWCP annual funding application process) are referred to as OPEN projects. Projects to be implemented through other means suitable to the FWCP and the Trust are referred to as DIRECTED projects (see Section 2.7).

Action #	Objective	Upland & Dryland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
Research and Information Acquisition					
1 ^b	2a	Support research that helps develop ER techniques for NDT3/ NDT4 (Daniels et al., 2011) and other habitat types, such as pocket grasslands, riparian forests and mesic sites. Examples include improvements to prescribed burning, slashing, piling, pile burning and seeding techniques.	Allows replication of naturally functioning processes or similar outcomes using alternate techniques. Expected outcome: improved mid- to high-elevation habitat and movement corridors; improved ER techniques for Program area.	2	Open
Habitat-based Actions					
2 ^b	2a	Support ecosystem restoration (ER) in the Plan area. Contribute to re-evaluation and refinement of criteria developed to prioritize suitable ER areas and to determine effectiveness in increasing desirable plant species.	Considerable ER knowledge and management has been developed in the Plan area that align with Program objectives. Expected outcome: improvement in upland and dryland habitat; improvement in selecting ER areas and treatment techniques.	1	Open
3 ^b	1a	Support work towards conservation and improvement of important connectivity habitat (i.e. corridors, including high elevation) for wide-ranging animals (e.g. carnivores and ungulates).	Movement between mountain ranges and drainages, across provincial/international borders and transportation routes (e.g. major highways) is often disrupted. Expected outcome: improved connectivity.	1	Open
	2a				
	2a				
4 ^b	1a	Support recruitment and management of cavity nests and wildlife trees (i.e. identifying and mapping cavity nests and wildlife trees, developing guidelines, maintaining existing cavity nests and wildlife trees, creating artificial cavities, snags, and additional wildlife trees).	Many Species of Interest depend on cavity nests and wildlife trees for habitat. Expected outcome: increase in important cavity nest and wildlife tree habitat.	1	Open
	2a				
5 ^{a,b}	1a	Support work that seeks to resolve access and recreation management issues that affect	The rapid expansion in road networks and off-road vehicle use has resulted in a dramatic increase in	1	Open

Action #	Objective	Upland & Dryland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
	2a	conservation/ restoration/ enhancement objectives (e.g. increase signage and education, 'Access Guardian' program).	public use of lands. This increase negatively impacts sensitive wildlife populations and their habitats, and exacerbates the spread of invasive species. Expected outcome: decrease in negative impacts related to access and recreational use.		
	3b				
6	3b	Support education and outreach for public awareness of threats and challenges of upland and dryland ecosystems. Threats include consequences of unauthorized introductions of invasive species and impacts from recreational use. Examples include educational signage and stewardship.	Impacts and threats to upland and dryland areas related to human activities, such as spread of invasive species and irresponsible recreational use, can be mitigated by better education. Expected outcome: better awareness of the public, which will change behaviours responsible for negative impacts.	1	Open
7	1a	Identify, maintain, and recruit stands or individual trees of large diameter Western Larch, Ponderosa pine and Douglas fir in NDT3 and NDT4 zones. Prioritize stands that may become Old Growth Management Areas (OGMAs).	Large diameter tree species provide important habitat for various wildlife species (e.g. Williamson's Sapsucker) and are rare on the landscape. Expected outcome: improvement in dryland and upland habitat.	1	Open
	2a				
8	2a	Support Whitebark Pine restoration efforts.	Whitebark Pine is listed as Endangered under the Species At Risk Act (SARA) and is the focus of international recovery efforts. Whitebark Pine habitats support a suite of unique, high elevation species. Expected outcome: improved Whitebark Pine habitat.	1	Open
9 ^a	1a	Support efforts to identify, manage and recruit mature and old upland and dryland ecosystems, particularly in grasslands and OGMAs.	The ecology of old growth forests is complex and contiguous blocks are rare in the area. Expected outcome: improvement in dryland and upland habitat.	2	Open
	2a				
10 ^a	1a	Where ecologically significant habitats exist, support initiatives (e.g. Grassland and Rangeland Enhancement Program, GREP) to protect the habitat and associated species. Examples include working with range agreement holders and private landowners to purchase and deploy permanent and/or portable fencing and water systems.	Although agriculture provides benefits to wildlife by maintaining large tracts of non-urbanized land, poorly managed grazing and uncontrolled access by domestic stock can generate significant habitat impacts such as soil compaction, introduction of invasive species, reduced ungulate winter range quantity and quality. Expected outcome: improved habitat due to improved management of domestic stock.	2	Open
	2a				

Action #	Objective	Upland & Dryland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
11 ^{a,b}	2a	Develop a collaborative framework to identify enhancement opportunities in pocket grasslands, riparian forests, mesic sites and NDT3/NDT4 zones based on approved Ungulate Winter Range guidelines developed for forest licensees.	Opportunities exist for working with forest licensees to enhance ungulate winter range, as well as habitat connectivity and ER. Expected outcome: improvement in upland and dryland habitat.	3	Directed
Species-based Actions					
12 ^b	1b	Support ongoing winter ungulate inventories (both aerial and ground) in order to estimate trends in population size, age and sex ratios, as well as level of use in target areas. Integrate with historic information. Additionally, telemetry studies will provide information on movement routes, timing of movement and sources of mortality.	Ungulate inventories and telemetry studies can help evaluate the effectiveness of habitat treatments, identification of sites that may need treatment and aid in determining which ungulate species are increasing and/or decreasing within specific geographical areas. Expected outcome: inform habitat-based actions for ungulates and status of ungulates.	1	Directed
	2b				
	3a				
13 ^a	1c	Support the development of invasive species monitoring and rapid response plans. Identify areas where invasive species are likely to establish or have already established.	Invasive plants can reduce the productivity of important upland and dryland habitats. Expected outcome: better understanding of the distribution of invasive species in the r area and the ability to respond quickly to new infestations.	1	Open
	2c				
14 ^{a,b}	2c	Support the control of invasive plant species (i.e. remove or reduce) prior to habitat restoration treatments.	Removal or reduction in invasive species abundance prior to habitat restoration treatments will help minimize the spread of invasive species post-treatment. Expected outcome: improvement in ER efforts due to reduced impact of invasive species.	1	Open
Land Securement					
15 ^b	1a	Protect critical upland and dryland habitats through covenant and stewardship opportunities. Properties adjacent to existing protected properties and those that protect Recovery and Focal Species should be the priority.	Multi-stakeholder cooperation is required to secure high-value lands that are under threat. Expected outcome: securement of critical upland and dryland habitats.	2	Directed
Monitoring and Evaluation					
16	2a	Monitor and assess ER work in restoring open range and open forest ecosystems, including ungulate winter range. Determine habitat response and influence on ungulate populations.	The effectiveness of ER treatments can be measured by monitoring subsequent species responses (e.g. ungulates, bunch grasses). Expected outcome: inform future ER actions, develop schedules and budgets for habitat targets.	1	Open

Action #	Objective	Upland & Dryland Action	Rationale & Expected Outcomes	Rank	Implementation Approach
17 ^b	2a	Test the Ecosystem Scorecard that was developed by the FWCP to assess the potential impacts of restoration treatment based on pre-treatment vegetation abundance, composition and distribution.	This tool will help in ER planning to determine desired future conditions for sites targeted for restoration. Expected outcome: better ER planning.	2	Directed
18 ^b	2a	Evaluate results of habitat-based actions. Ensure invasive plant species distribution and abundance does not increase.	To measure success of conservation/ restoration/ enhancement efforts. Expected outcome: inform future habitat-based actions, develop schedules and budgets for habitat targets.	2	Directed
19	1a	Collect baseline data and/or monitor upland and dryland habitats to evaluate climate change impacts.	Changes in climate are anticipated to affect upland and dryland productivity. Expected outcome: prediction of climate change impacts, their severity and means to improve habitat resiliency in response to climate change.	3	Open
	2a				

^a Actions that are traditionally out of FWCP scope as they directly overlap with core activities of government, non-government agencies, and/or programs.

^b Actions that overlap with Columbia Basin Riparian/Wetlands Action Plan.

6.5 Conclusions

The Upland and Dryland Areas Action Plan identifies actions to address Program objectives. Opportunities to undertake conservation, restoration, enhancement and sustainable use actions have been identified, as outlined in Section 6.4. Importantly, this Plan identifies the need to undertake planning/partnerships to refine the target upland and dryland areas that require immediate action. By pursuing these actions in upland and dryland areas, the Plan will directly address the objectives to maintain productive and diverse ecosystems, restore/enhance impacted upland and dryland areas and ensure sustainable use for the future.

SPECIES OF INTEREST ACTION PLAN



Westslope Cutthroat Trout. Photo credit: Ben Meunier.

7 Species of Interest Action Plan

7.1 Introduction

The Species of Interest Action Plan sets out priorities to guide projects within the Plan area in support of fish and wildlife, primarily those species identified as Species of Interest. Direction is provided for three categories of Species of Interest: Recovery, Focal, and Inventory Species (See sections below). General actions have been developed to help provide focus for the Plan over the next five years based on input from First Nations, government agencies, industry and the public.

The Plan supports Species of Interest through actions that conserve, restore, enhance and support sustainable use of ecosystems, which include important habitats that provide resources for Species of Interest. By executing ecosystem actions, the Plan will also conserve, restore, enhance, and support sustainable use of Species of Interest.

The proposed actions in this Plan build on past and ongoing projects of various environmental organizations/agencies and leverage their results to address outstanding needs in the Plan area. The expected outcomes of the Actions include:

- Understanding of the current status of Species of Interest populations and their habitat, as well as identifying opportunities to conserve, restore, and enhance them.
- Improved ecological function through on-the-ground habitat improvements and Species of Interest recovery/maintenance.
- Improved/maintained sustainable use.
- Improved coordination with existing regulatory and management activities in the Plan area.

7.2 Overview

7.2.1 Species of Interest Categories

There are 3 categories of Species of Interest:

- 1) **Recovery Species:** Species that are
 - a. Red-listed by the [BC Ministry of Environment Conservation Data Centre \(CDC\)](#) **OR** categorized as 'Endangered' or 'Threatened' by the [Committee on the Status of Endangered Wildlife in Canada \(COSEWIC\)](#) **AND** have a Recovery Plan.
- 2) **Focal Species:** Species that are either
 - a. Red-listed by the [CDC](#) **OR** categorized as 'Endangered' or 'Threatened' by [COSEWIC](#) **AND** have NO Recovery Plan; **OR**
 - b. Ranked priority '1' by the [BC Ministry of Environment Conservation Framework](#); **OR**
 - c. Listed as requiring implementation by the [BC Ministry of Environment Identified Wildlife Management Strategy \(IWMS\)](#); **OR**
 - d. Of local interest (economic, social, cultural).
- 3) **Inventory Species:** Species that are either
 - a. Blue-listed by the [BC Ministry of Environment Conservation Data Centre](#); **OR**
 - b. Categorized as 'Special Concern' by [COSEWIC](#); **OR**
 - c. Ranked priority '2' or '3' by [BC Ministry of Environment Conservation Framework](#); **OR**
 - d. Of local interest (economic, social, cultural) with poor population data.

It is expected that species might move between categories as their conservation status changes (e.g. up-listing or down-listing by the BC Conservation Data Centre) and/or the information basis for planning improves.

7.2.2 Impacts and Threats to Species of Interest

Aquatic and terrestrial habitats in the Upper Kootenay River system in B.C. have been altered by human development, forestry, mining, wetland conversion, cattle grazing, recreational activity and water use, which often result in significant impacts to Species of Interest populations. These activities vary substantially throughout the Plan area but often occur concurrently and can lead to cumulative impacts to habitats of Species of Interest.

Increasing human development continues to result in the loss and fragmentation of important habitat for a variety of species. Hydroelectric development, the widespread clearing of forests and the loss of large wildlife trees impacts habitat directly. Forest fire suppression is a long-standing practice, which results in forest encroachment and in-growth and the widespread development of dense stands that are unsuitable habitat. Invasive species continue to threaten both the aquatic and terrestrial environments and compromise the habitats for many species.

7.2.3 Limiting Factors for Species of Interest

Factors limiting the abundance and distribution of aquatic and terrestrial species are related to three broad categories:

Habitat Extent: The carrying capacity of habitat for any species is ultimately determined by the extent of suitable habitat. Stressors related to human development have directly and indirectly altered the availability of these types of habitats. Habitat enhancement requires either the creation of new habitat or treatments that improve the quality or increase the amount of the remaining habitat.

Distribution: Connectivity among habitats is important for dispersal of fish, plants and animals, and for seasonal movements of some species. Populations in suitable but isolated habitats are often at higher risk of extirpation because immigration and emigration are disrupted, making these populations more susceptible to stochastic events. Management actions that can address habitat fragmentation and barriers include re-establishing connectivity where practical, and/or transplanting individuals into unoccupied or under-occupied habitats.

Productivity: The productivity of an ecosystem is defined as the rate of generation of biomass (i.e. the mass of living biological organisms) in an ecosystem or, simply, the ability to grow or yield plants and animals in an ecosystem. Even where the extent and distribution of habitats is relatively intact, the productivity of ecosystems can be eroded by a variety of pressures such as invasive species, nutrient and sediment loading, soil erosion, changes in drainage patterns, as well as forest harvesting, livestock grazing and other extractive activities. Addressing these factors can increase the productivity of habitats in general and can provide more suitable habitat for native species.

In addition, specific habitat features can limit the distribution and abundance of species (e.g. spawning beds or nest cavities). Projects designed to increase the availability of limiting habitat features can increase the productivity of habitats for specific species.

7.2.4 Trends and Knowledge Status of Species of Interest

Long-term monitoring data are generally unavailable for aquatic and terrestrial species in the Upper Kootenay Basin. As a result, our knowledge of populations is limited to anecdotal accounts or inferences made from habitat impacts. Trend information for some species (e.g. ungulate populations, recreational

fish species) has become more available over the past 25 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.

7.3 Objectives, Measures, and Targets for Species of Interest

The following objectives and sub-objectives have been developed to define the scope of the Species of Interest Actions and guide funding decisions of the Plan on Species of Interest-related conservation, restoration, enhancement, and sustainable use actions. Due to the limited funding available at the time of the development of the Plan, the Species of Interest Actions were focused on Recovery and Focal Species, which require immediate action. Consideration of actions for Inventory Species may be made in the future if further funding becomes available.

Measures and targets will help assess the overall success of the Plan at achieving each objective. Measures and targets may change as management priorities change or new information becomes available. Objectives and sub-objectives are common to all Species of Interest discussed in this plan, although actions are specific to each Species of Interest category. While the objectives and sub-objectives are expected to remain stable over time, the indicators and targets may evolve as agencies' management priorities shift, or new information becomes available. Objectives for Species of Interest overlap with those developed for various ecosystems. Here we present objectives specific to conservation, restoration, enhancement and sustainable use of Species of Interest populations. Projects will align with strategic objectives of agencies and organizations to leverage synergies and prevent duplication of effort.

Objective 1 – Conserve productivity and diversity of ecosystems in the Plan area.

a. Identify and conserve important habitat for Species of Interest

The inventory of important habitat for each Species of Interest will help identify areas of critical importance that can be protected through stewardship agreements, covenants, creation of protected zones, or land purchases.

Measure: Area of conserved Species of Interest habitat.

Target: Increase in availability of important habitat for Species of Interest conserved from human impacts.

b. Characterize and monitor the status of Species of Interest

Abundance, distribution, age and size data are critical information to determine and monitor the health of Species of Interest populations. Trends in the status of Species of Interest will help refine priority actions of the Plan and inform regulatory agencies in developing/revising integrative management plans when necessary.

Measure: Knowledge of the status of Species of Interest.

Target: The establishment or improvement of baseline knowledge of the status of Species of Interest.

Objective 2 – Restore and enhance habitat and populations of Species of Interest.

a. Restore and enhance important habitat for Species of Interest

Where habitat has been impacted, the Plan will implement actions to restore and enhance productivity through on-the-ground actions such as habitat restoration or improvement,

reconnection of isolated habitats, bank stabilization, riparian area rehabilitation and support for road deactivation.

Measure: Area of restored/enhanced Species of Interest habitat.

Target: Increased area of restored/enhanced habitat that improves Species of Interest habitat productivity.

b. *Support Species of Interest population recovery/maintenance.*

If populations of Species of Interest are deemed too depleted to remain self-sustained, the Plan will implement actions to supplement natural recruitment of these populations through transplantation. These actions will be particularly instrumental in conserving small populations of Species of Interest such as American Badger, which have been re-established from Montana populations. Actions should also support Species of Interest with healthy populations to ensure the restoration of populations to self-sustaining levels.

Measure: Natural recruitment of Species of Interest populations.

Target: Improvement in abundance and distribution of Species of Interest populations due to recovery efforts.

Objective 3 – Contribute to the maintenance or improvement of opportunities for sustainable use, including harvesting.

a. *Contribute data to help inform decision making on sustainable use targets for resources.*

Using information collected as part of Objectives 1 and 2, the Plan will provide information to agencies to support efforts to develop and update sustainable use targets for resources. These targets may include harvest quotas for Species of Interest, water use limits, water quality standards, or riparian/forestry management rules. Specific targets will be developed for all habitats critical to Species of Interest.

Measure: Habitat that supports Species of Interest populations and abundance of Species of Interest populations.

Target: Resource use does not affect the sustainability of Species of Interest populations.

b. *Support public education and awareness regarding threats and challenges to Species of Interest, which will motivate ecologically-informed decisions and actions.*

The Plan will implement actions to educate the public about Species of Interest and good practices to conserve healthy ecosystems and important habitat for Species of Interest in the Plan area. Key subjects include the importance of angling/hunting regulations and the impact of recreational and land use activities on critical Species of Interest habitats.

Measure: Awareness of the public of threats and challenges to Species of Interest.

Target: Reduced incidence of negative impacts to Species of Interest caused by humans due to increased awareness of the public of threats and challenges to Species of Interest.

7.4 Species of Interest

The Plan supports Species of Interest through actions that conserve, restore, enhance and support sustainable use of ecosystems, which include important habitats that provide resources for Species of Interest. By executing ecosystem actions, the Plan will also conserve, restore, enhance and support sustainable use of Species of Interest.

Species of Interest for each of the three categories are identified in Table 5, Table 6, and Table 7. Program Actions that support Recovery Species are prescribed by federal/provincial Recovery Plans and actions that support ecosystems that provide habitat for Recovery Species. Table 6 and Table 7, which list Focal and Inventory Species, identify the ecosystems that provide habitat for each Species of Interest, and therefore differ from the tables that list actions for ecosystems.

7.4.1 Recovery Species

Table 5 lists the six species that have been identified as Recovery Species as defined by the Species of Interest categories in Section 7.2.1. The following sections provide an overview of the status of the Recovery Species in the Plan area. Actions to support their recovery are based on federal/provincial recovery plans. Specific actions for Recovery Species are not listed here because recovery plans and priorities change annually.

Table 5: Recovery Species

Program area species that are listed by either BC or Canada as threatened or endangered and for which recovery processes are in place or in development.

Species	COSEWIC/SARA	CDC	Reference
American Badger, <i>jeffersonii</i> subspecies East Population	Endangered	Red-listed	Recovery Strategy for the Badger (<i>Taxidea taxus</i>) in British Columbia
Caribou, Southern Mountain population	Endangered	Red-listed	A Strategy for the Recovery of Mountain Caribou (<i>Rangifer tarandus</i>) in British Columbia
Lewis's Woodpecker	Threatened	Red-listed	Assessment and Status Report on the Lewis's Woodpecker <i>Melanerpes lewis</i> in Canada
Northern Leopard Frog	Endangered	Red-listed	Recovery Plan for the Northern Leopard Frog (<i>Lithobates pipiens</i>) in British Columbia
Western Screech-Owl, <i>macfarlanei</i> subspecies	Threatened	Red-listed	Recovery Strategy for the Western Screech-Owl (<i>Megascops kennicottii macfarlanei</i>) in British Columbia
Williamson's Sapsucker	Endangered	Blue-listed	Recovery Plan for the Williamson's Sapsucker (<i>Sphyrapicus thyroideus</i>) on Crown Lands in British Columbia

7.4.1.1 American Badger

American Badgers (*Taxidea taxus*) are known from the central and western portions of North America. Two populations of *jeffersonii* American Badger (the only subspecies that occurs in B.C.) are now recognized in B.C.: East and West, based on genetic isolation (COSEWIC 2012). The East population occurs in the Plan area. In the B.C. Interior, American Badgers are associated with grassland, open forest, grazing pastures and other non-forested habitats. In the Plan area, badgers have been found in non-traditional habitats up to alpine meadows and in more densely forested areas, although these locations are the exception (Apps et al. 2002). Columbian Ground Squirrels (*Urocitellus columbianus*) are their main prey, although badgers eat a wide variety of small burrowing mammals, other vertebrates and invertebrates and carrion.

Home ranges in the Plan area vary from less than 10 km² to >800 km² (Kinley and Newhouse 2008). They are typically about five times larger for males than females and home ranges of both sexes are generally larger in the Columbia Valley than farther south. American Badgers were extirpated from the Upper Columbia Valley by the late 1990s. A translocation project from northwest Montana helped to re-establish the population in the early 2000s and the population seems to have recovered to a reasonable level of viability (Kinley and Newhouse 2008; see also Kinley and Newhouse 2005).

Primary threats to American Badgers include (COSEWIC 2012; BC Ministry of Water, Land and Air Protection 2004):

- road mortality;
- forest in-growth and encroachment resulting from fire suppression;
- urban development;
- reservoir flooding; and
- uncontrolled off-road access degrading grassland and open forest habitats.

Management actions to address significant threats, including road mortality and forest in-growth and encroachment are ongoing (e.g. Hogg 2011). Actions presented in the [Upland and Dryland Areas Action Plan](#) will also benefit American Badgers.

7.4.1.2 South Mountain Caribou

The Columbia Basin is home to the southernmost Woodland Caribou herds in Canada. Although historically found throughout the Basin, 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. The South Purcell Mountain Caribou population occurs in the Plan area. As part of the larger federal South Mountains Population, Woodland Caribou are threatened, and the province has placed a very high priority on recovery of the South Mountain Caribou ecotype of Woodland Caribou, which ranges in the Columbia Basin. The Province announced a recovery strategy in 2007 and has been implementing actions related to:

- additional habitat protection
- snowmobile closures
- a moratorium on new commercial back-country tenures and operating practices for existing tenure-holders
- predator-prey management
- augmentation of small herds by transplanting caribou from larger herds in northern B.C.

Actions presented in the [Upland and Dryland Areas Action Plan](#) and, secondarily, the [Wetland and Riparian Areas Action Plan](#), will benefit South Mountain Caribou. Caution is required when pursuing actions as some actions may be counter to South Mountain Caribou recovery (e.g. ecosystem restoration actions that may increase predation rates).

7.4.1.3 Lewis's Woodpecker

The total population of Lewis's Woodpeckers in B.C. is estimated to be <1000 individuals (COSEWIC 2010). Approximately 25% of the population occurs in the southern portions of the Columbia Basin, mostly in the East Kootenay trench. Lewis's Woodpecker is associated with three habitat types in B.C.: riparian cottonwood forests, open ponderosa pine forests and recently burned forests (COSEWIC 2010). Beauchesne and Cooper (2007) found greatly reduced numbers of Lewis's Woodpeckers throughout the East Kootenay, compared to surveys completed in the same area in the late 1990's (Cooper and Beauchesne 2000). Thirteen breeding pairs of Lewis's Woodpeckers were found in both 1997 and 1998

between Dutch Creek burn (now on The Nature Trust of BC Hoodoos/Hoffert property) and the Fairmont Hot Springs area, just outside the Plan area. In 2007, only one breeding pair was found in these areas, near Fairmont. Beauchesne and Cooper (2007) attribute the Dutch Creek decline to loss of nesting habitat as most suitable nesting trees had decayed and fallen over. In Fairmont, the authors were unable to access many areas due to private property restrictions but concluded that housing development on previously occupied lands had contributed to significant habitat declines. Jamieson et al. (2009) report other sightings in the Invermere area. FWCP has led/participated in restoration of several crown land areas with Lewis Woodpecker focusing on wildlife tree creation with fungal inoculation (Manning Cooper and Associates, 2007).

Woodpecker recovery planning is led by Environment Canada. The recovery management team is currently drafting a management plan for the species (Leah Westereng, pers. comm.). Draft actions for Lewis's Woodpecker are adapted from the FWCP Columbia Species of Interest Action Plan. Changes to actions may be made for Lewis's Woodpecker to align with the final federal management plan.

Actions presented in the [Upland and Dryland Areas Action Plan](#) and, secondarily, the [Wetland and Riparian Areas Action Plan](#) will also benefit Lewis's Woodpecker.

7.4.1.4 Northern Leopard Frog

The Northern Leopard Frog is one of several leopard frog species that are widely distributed throughout North America. However, they have undergone significant and widespread decline throughout the western portion of its range in Canada and the United States (COSEWIC 2000; Ohanjanian and Paige 2004). Historically, the species occurred only in the Columbia Basin, but it is now known from only one site in the Creston Valley Wildlife Management Area (Ohanjanian 1996). Re-introduction efforts have been under way in the Bummers Flats area (located in the Plan area, north of Fort Steele) since 2003 (Adama and Beaucher 2006; Ohanjanian and Wigle, 2007; Ohanjanian 2012).

The species will also benefit from several actions identified in the [Wetland and Riparian Areas Action Plan](#).

7.4.1.5 Western Screech-Owl

Western Screech-Owls are non-migratory raptors and recovery planning is led by the Province of B.C. The recovery team has completed a draft recovery plan (Western Screech-Owl, *macfarlanei* subspecies Recovery Team, 2008). Population size in B.C. is estimated at 50 - 200 individuals. The centre of the species distribution is in the southern Okanagan. Approximately 20% of the known detection sites of this species occur in the Columbia Basin and these locations are confined to the southernmost portions of the East and West Kootenay (Western Screech-Owl, *macfarlanei* subspecies Recovery Team, 2008). This sub-species of Screech-Owls occur in low elevation riparian habitat in the southern interior of B.C. Riparian cottonwood habitat is consistently identified as the core-nesting habitat for this species. FWCP has supported work on this species since 2003. Work completed to date includes inventory, radio telemetry, stewardship and Wildlife Habitat Area submissions.

Western Screech-Owl will also benefit from actions presented in the [Wetland and Riparian Areas Action Plan](#) and, secondarily, in the [Upland and Dryland Areas Action Plan](#).

7.4.1.6 Williamson's Sapsucker

Williamson's Sapsucker nesting habitat is cavities in large diameter ponderosa pine or western larch trees in closed to open mature and old forests at low- to mid-elevations. They drill distinctive sap wells

in smaller diameter Douglas-fir and western larch trees and are closely tied to carpenter ants for feeding their young.

Williamson's Sapsucker was previously thought to be extirpated from the East Kootenay (Cooper 1995). However, since being listed as 'endangered', an extensive inventory throughout the East Kootenay from 2006 to 2008 has located numerous breeding pairs throughout the southern Trench area (Gyug et al. 2007; Ohanjanian et al. 2006, 2008, 2009). No records exist for the species in the Upper Columbia Valley, but survey efforts for the species did not extend north of an approximate line from Whiteswan Lake to the east and Lavington Creek to the west. No Williamson's Sapsuckers were found north of Kimberly Nature Park. There is one record from the late 1990s near Whiteswan Lake area (Campbell et al. 2000).

Actions presented in [Upland and Dryland Areas Action Plan](#) will also benefit Williamson's Sapsucker.

7.4.2 Focal Species

Table 6 lists Focal Species within the Plan area as defined in Section 7.2.1. The Focal Species listed are cross-referenced with the priority (green) and supporting (yellow) ecosystems. Habitat-based actions identified in Ecosystem Plans of the relevant priority ecosystem will benefit the Focal Species.

Table 6: Focal Species in the Plan Area.

The list is based on species for which there are habitat-based or species-based actions that can be implemented immediately (i.e. where species distribution, abundance and limiting factors are sufficiently understood). Focal Species criteria include 'Red' = Red-listed by BC Conservation Data Centre, 'E' = Endangered by COSEWIC, 'T' = Threatened by COSEWIC, with no recovery planning (noRP); 'CF-1' = Ranked priority 1 by Conservation Framework; 'IWMS' = Identified Wildlife Management Strategy (IWMS) listed; and 'LI' = local interest. Numbers represent the priority ecosystem(s) that support the Focal Species ('1' is highest priority habitat). Species marked with an (I) are introduced.

Common Name	Criteria	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Gillette's Checkerspot	Red-noRP; IWMS; LI	2	1		
Dione (Grey) Copper	Red-noRP; LI		1		
Brown Creeper	CF-1; LI		1		
Bull Trout (Pacific Population)	IWMS; LI			1	1
Bighorn Sheep	IWMS; LI		1		
Sharp-tailed Grouse <i>columbianus</i> subsp.	IWMS; LI		1		
Vivid Dancer	Red-noRP	1	3		2
Mormon Fritillary <i>eurynome</i> subsp.	Red-noRP		1		
Little Brown Myotis	E-NoRP	2	1		
Northern Myotis	E-NoRP	2	1		
Common Nighthawk	T-noRP		1		
Olive-sided Flycatcher	T-noRP	2	1		
Bank Swallow	T-noRP	1	2	2	1
Barn Swallow	T-noRP	2	1		
Bobolink	T-noRP	2	1		
Rubber Boa	CF-1	2	1		
Mountain Goat	CF-1		1		
Western Grebe	CF-1	2		1	
Wood Duck	CF-1	1		3	2
Harlequin Duck	CF-1				1

Common Name	Criteria	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Barrow's Goldeneye	CF-1	2		1	2
Grizzly Bear	IWMS	2	1		
Wolverine <i>luscus</i> subsp.	IWMS		1		
Fringed Myotis	IWMS	1	2		
Great Blue Heron <i>herodias</i> subsp.	IWMS	1		2	2
Long-billed Curlew	IWMS	2	1	2	
Flammulated Owl	IWMS		1		
Columbia Spotted Frog	LI	1		2	
Western Painted Turtle	LI	1		1	
Burbot	LI			1	2
Kokanee (I)	LI			1	2
Rainbow Trout (I)	LI			1	1
Westslope Cutthroat Trout	LI			1	1
White-tailed Deer	LI		1		
Mule Deer	LI		1		
Elk	LI	2	1		
Moose	LI	1	2		
Cougar	LI		1		
Grey Wolf	LI		1		
American Marten	LI		1		
American Beaver	LI	1		2	3
Townsend's Big-eared Bat	LI	2	1		
Northern Goshawk	LI		1		
Wild Turkey (I)	LI		1		
Spotted Sandpiper	LI	2		2	1
American Dipper	LI				1
Townsend's Warbler	LI		1		

7.4.3 Inventory Species

Inventory Species are those for which inventory/data acquisition is the primary action identified for the Plan. Table 7 lists Inventory Species as defined in Section 7.2.1. The Inventory Species listed are cross-referenced with the priority (green) and supporting (yellow) ecosystems. Before further actions are developed and implemented, some baseline inventory work is required for these species to determine their distribution and abundance and/or trend within the Plan area. Habitat-based actions identified in the Plan of the relevant priority ecosystem will benefit the Focal Species.

At this time, actions for Inventory Species will not be implemented due to budgetary restrictions. The Plan identifies high priority actions that allow for immediate implementation and cost-effective methods to achieve objectives. Actions to support Inventory Species specifically may be implemented in the future when high priority actions identified in the Plan are completed and/or additional resources become available.

Table 7: Inventory Species in the Plan area.

Inventory Species are those for which inventory/data acquisition is the primary compensation action. Inventory Species criteria include 'Blue' = Blue-listed by BC Conservation Data Centre, 'SC' = Special Concern by COSEWIC; 'CF-2' = Ranked priority 2 by Conservation Framework; and 'LI' = local interest.

Numbers represent the priority ecosystem(s) that support the Focal Species (1 is highest priority habitat).

Common Name	Criteria	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Short-eared Owl	Blue; SC; CF-2	1			
Sandhill Crane	Blue; SC; LI	1	3	2	
Peregrine Falcon, <i>anatum</i> subsp.	SC; CF-2		1		
Coeur d'Alene Salamander	SC; CF-2	1	2		
Porcupine	CF-2, LI		1		
Western Small-footed Myotis	Blue	2	1		
American Bittern	Blue	1			
Wood Frog	CF-2	1	2	2	
Torrent Sculpin	CF-2				1
California Myotis	CF-2	2	1		
Hoary Bat	CF-2		1		
Long-eared Myotis	CF-2	2	1	2	3
Silver-haired Bat	CF-2	2	1		
American Coot	CF-2	1		2	
American Goldfinch	CF-2		1		
American Kestrel	CF-2		1		
Belted Kingfisher	CF-2	2		2	1
Black Swift	CF-2	1			2
Blue-winged Teal	CF-2	1		2	3
Canvasback	CF-2	1		2	3
Chestnut-backed Chickadee	CF-2		1		
Cliff Swallow	CF-2	1	2	3	2
Dusky Flycatcher	CF-2		1		
Dusky Grouse	CF-2		1		
Eastern Kingbird	CF-2	2	1		
Evening Grosbeak	CF-2		1		
Greater Scaup	CF-2	2		1	3
Horned Lark	CF-2		1		
Killdeer	CF-2	2	1	2	2
Lark Sparrow	CF-2		1		
Lesser Scaup	CF-2	2		1	3
Mourning Dove	CF-2		1		
Northern Harrier	CF-2	1			
Northern Pintail	CF-2	1		2	3
Northern Rough-winged Swallow	CF-2	1	2	3	
Pacific-slope Flycatcher	CF-2	2	1		
Pied-billed Grebe	CF-2	1		2	
Pine Siskin	CF-2		1		
Purple Finch	CF-2		1		
Red Crossbill	CF-2		1		
Red-eyed Vireo	CF-2	1	2		
Redhead	CF-2	1		2	
Rock Wren	CF-2		1		
Rough-legged Hawk	CF-2	2	1		
Ruffed Grouse	CF-2		1		
Rufous Hummingbird	CF-2		1		

Common Name	Criteria	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Swainson's Thrush	CF-2		1		
Townsend's Solitaire	CF-2		1		
Tree Swallow	CF-2	1	3	2	3
Vaux's Swift	CF-2	1	2		2
Veery	CF-2	1	2		
Vesper Sparrow	CF-2		1		
Violet-green Swallow	CF-2	1	2	3	3
Virginia Rail	CF-2	1			
Western Meadowlark	CF-2		1		
Western Wood-Pewee	CF-2		1		
Willow Flycatcher	CF-2	1			
Wilson's Phalarope	CF-2	1		2	
Wilson's Snipe	CF-2	1			
Wilson's Warbler	CF-2		1		
Yellow Warbler	CF-2	1			
Yellow-headed Blackbird	CF-2	1			
Northern Pacific Tree Frog	LI	1	2	3	
American Black Bear	LI		1		
American Pika	LI		1		
Canada Lynx	LI		1		
Raccoon (I)	LI		1		
Yuma Myotis	LI	2	1		
Bald Eagle	LI	1	2		
Black Tern	LI	1			
Clark's Nutcracker	LI		1		
Common Loon	LI			1	
Common Poorwill	LI		1		
Gray-crowned Rosy Finch	LI		1		
Osprey	LI	3	2	1	3
Upland Sandpiper	LI	1	2	2	
White-tailed Ptarmigan	LI		1		
White-winged Crossbill	LI		1		

7.5 Conclusions

This Species of Interest Action Plan identifies actions to address Program objectives. Opportunities to undertake conservation, restoration, enhancement and sustainable use actions are directed by Ecosystem Actions that support [Recovery](#) and [Focal](#) Species of Interest in the Plan area. By pursuing these actions for Species of Interest, the Plan will directly address the objectives to maintain productive and diverse ecosystems, restore/enhance impacted streams, and ensure sustainable use for the future.

8 References

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APPENDIX 1: FWCP PROJECT INVESTMENT CRITERIA

At the level of individual project investment and implementation decisions, the FWCP applies the following criteria to further define its role and actions within defined program areas:

FWCP does:

- Fund actions to create, restore, or otherwise improve the function of ecosystems that have been impacted by BC Hydro activities;
- Fund actions to create, restore, or otherwise improve the function of alternate ecosystems that provide a better opportunity for investment;
- Participate as a team member in Species of Interest planning;
- Fund specific management actions for Species of Interest as identified by recovery teams and action/implementation groups;
- Fund baseline inventory that contributes to the development of habitat or species based actions within Action Plans;
- Fund monitoring programs designed to measure the effectiveness of FWCP funded habitat and species actions; and,
- Contribute to all aspects of managing co-operatively managed conservation lands.

FWCP does not:

- Fund core activities of government or non-government agencies or programs;
- Lead the development of species recovery goals;
- Fund, co-ordinate or lead National Recovery Teams for species at risk;
- Develop policy related to land or wildlife management;
- Administer government regulations;
- Engage in enforcement and compliance activities, except in relation to co-operatively managed conservation lands; and,
- Fund programs designed exclusively to address government harvest objectives.

APPENDIX 2: DEVELOPING ACTIONS

Development of the Plan and priority actions included input from the public, First Nations and the multi-stakeholder Working Group (WG) through the engagement workshops. To effectively achieve Program objectives that integrate community concerns, the Plan is committed to continued and ongoing engagement with these groups.

Actions were compiled through two distinct phases: 1) research and evaluation of fish and wildlife issues of the Plan area; and 2) input on fish and wildlife issues of the area through engagement with the public, First Nations and the Plan's multi-stakeholder Working Group (WG). Actions were prioritized using the input of the WG and local experts. The following sections describe these phases.

Research and the Plan Project Database

Actions were first compiled through information gathering and evaluation of fish and wildlife issues in the Plan area by reviewing reports and conducting interviews with local experts (i.e. government biologists, consultants). Local experts provided input on action prioritization and review of the draft Plan.

Many organizations in the Plan area conduct environmental work relevant to the Plan. A need to centralize this information and help prevent project/plan redundancies was identified. To address these needs and to help prioritize actions, the Plan Project Database was developed.

Working Group

The Plan established the Working Group (WG) to receive input on priority actions and to review the Plan. The WG consists of representatives from the Trust, the FWCP Board, provincial and U.S. government agencies (personnel from 3 U.S. agencies), First Nations, industry and community groups within the Plan geographic area. See APPENDIX 3 for a list of WG members.

Public Engagement

Public input on priority actions was integrated into the development of the Plan. Two community workshops (i.e. afternoon and evening) were held in Fernie on December 9, 2013 and in Cranbrook on December 10, 2013. More than an estimated 50 people participated in these discussions.

First Nations Engagement

Invitations to provide input on the development of the Action Plan were extended to the Ktunaxa Nation Council (KNC) and three Ktunaxa communities with traditional territories within the Plan area: St. Mary's/?aqam, Tobacco Plains/?akink'umasnuqi?it, and Columbia Lake/?akisqnuq. Ongoing engagement efforts will help to support the integration of the interests of First Nations in fish and wildlife in the priorities and focus of the Plan plans, and will facilitate information sharing.

A workshop with the St. Mary's/?aqam community was held on the evening of November 25, 2013. Approximately 20 members of the community attended.

APPENDIX 3: LIST OF WORKING GROUP MEMBERS

Name	Organization
Allie Dickhout	Elk River Alliance, Selenium Task Force
Bob Cutts	Koocanusa Campsite and Marina
Brant Cullum	Sunshine Houseboats
Brian Marotz	Montana Fish, Wildlife & Parks
Casey Brennan	Teck
Chris Stroich	Teck
Dan Gravelle	Ktunaxa Nation Council
Dan Murphy	Rocky Mountain Trench Natural Resources Society
Darrell Smith	Ministry of Agriculture, East Kootenay Invasive Species Council
Dave Hillary	Kootenay Conservation Program
Dave White	Fish and Wildlife Compensation Program (FWCP) – Columbia
Dean den Biesen	BC Hydro
Diane Bender	Lake Koocanusa Community Council
Eva Schindler	Ministry of Forests, Lands and Natural Resource Operations (MFLNRO)
Greg Hoffman	U.S. Army Corps of Engineers (Libby Dam Kootenai River)
Heath Slee	RDEK, Electoral Area B
Joanne Fisher	Canadian Columbia River Inter-Tribal Fishery Commission (CCRIFC)
Joe Van Humbeck	CP Rail
John Bergenske	Wildsight
Kari Stuart-Smith	Canfor
Larry Ingham	Ministry of Forests, Lands and Natural Resource Operations (MFLNRO)
Lee-Anne Walker	Elk River Alliance, Selenium Task Force
Mario Rocca	East Kootenay Wildlife Association
Noreen Thielen	Waldo Stockbreeders Association
Pam Turyk	Kootenay Livestock Association, East Kootenay Invasive Plant Council
Peter Davidson	Rocky Mountain Naturalists
Peter Paquet	Northwest Power and Conservation Council
Randy Harris	Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), Fish & Wildlife Branch
Rick Allen	Columbia Basin Trust

APPENDIX 4: SPECIES OF INTEREST – HABITAT ASSOCIATION TABLES

Table 8 Species of Interest that inhabit lake habitats. Numbers represent the priority habitat for the species. Species marked with an (I) are introduced. See Section 7.2.1 for Species of Interest category criteria.

Taxon	Common Name	Scientific Name	Species of Interest Category	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Reptiles	Western Painted Turtle	<i>Chrysemys picta</i>	Focal	1		1	
Fish	Burbot	<i>Lota lota</i>	Focal			1	2
Fish	Kokanee (I)	<i>Oncorhynchus nerka</i>	Focal			1	2
Fish	Rainbow Trout (I)	<i>Oncorhynchus mykiss</i>	Focal			1	1
Birds	Barrow's Goldeneye	<i>Bucephala islandica</i>	Focal	2		1	2
Birds	Common Loon	<i>Gavia immer</i>	Inventory			1	
Birds	Greater Scaup	<i>Aythya marila</i>	Inventory	2		1	3
Birds	Lesser Scaup	<i>Aythya affinis</i>	Inventory	2		1	3
Birds	Osprey	<i>Pandion haliaetus</i>	Inventory	3	2	1	3
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>	Inventory	2		1	
Amphibians	Northern Leopard Frog	<i>Lithobates pipiens</i>	Recovery	1		2	
Amphibians	Columbia Spotted Frog	<i>Rana luteiventris</i>	Focal	1		2	
Amphibians	Western Toad	<i>Anaxyrus boreas</i>	Focal	1	1	2	
Fish	Westslope Cutthroat Trout	<i>Oncorhynchus Clarki Lewisi</i>	Focal			2	1
Mammals	American Beaver	<i>Castor canadensis</i>	Focal	1		2	3
Birds	Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>	Focal	1		2	2
Birds	Long-billed Curlew	<i>Numenius americanus</i>	Focal	2	1	2	
Birds	Spotted Sandpiper	<i>Actitis macularia</i>	Focal	2		2	1
Amphibians	Wood Frog	<i>Lithobates sylvaticus</i>	Inventory	1	2	2	
Mammals	Long-eared Myotis	<i>Myotis evotis</i>	Inventory	2	1	2	3
Birds	American Coot	<i>Fulica americana</i>	Inventory	1		2	
Birds	Belted Kingfisher	<i>Ceryle alcyon</i>	Inventory	2		2	1
Birds	Blue-winged Teal	<i>Anas discors</i>	Inventory	1		2	3

Taxon	Common Name	Scientific Name	Species of Interest Category	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Birds	Canvasback	<i>Aythya valisineria</i>	Inventory	1		2	3
Birds	Killdeer	<i>Charadrius vociferus</i>	Inventory	2	1	2	2
Birds	Northern Pintail	<i>Anas acuta</i>	Inventory	1		2	3
Birds	Pied-billed Grebe	<i>Podilymbus podiceps</i>	Inventory	1		2	
Birds	Redhead	<i>Aythya americana</i>	Inventory	1		2	
Birds	Sandhill Crane	<i>Grus canadensis</i>	Inventory	1	3	2	
Birds	Tree Swallow	<i>Tachycineta bicolor</i>	Inventory	1	3	2	3
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>	Inventory	1	2	2	
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>	Inventory	1		2	
Birds	Wood Duck	<i>Aix sponsa</i>	Focal	1		3	2
Amphibians	Northern Pacific Tree Frog	<i>Pseudacris regilla</i>	Inventory	1	2	3	
Birds	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Inventory	1	2	3	2
Birds	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Inventory	1	2	3	
Birds	Violet-green Swallow	<i>Tachycineta thalassina</i>	Inventory	1	2	3	4

Table 9 Species of Interest that inhabit streams. Numbers represent the priority habitat for the species. Species marked with an (I) are introduced. See Section 7.2.1 for Species of Interest category criteria.

Taxon	Common Name	Scientific Name	Species of Interest Category	Riparian/ Wetland	Upland/ Dryland	Lakes	Stream
Fish	Bull Trout (Pacific Population; fluvial/ adfluvial)	<i>Salvelinus confluentus</i>	Focal			1	1
Fish	Rainbow Trout (I)	<i>Oncorhynchus mykiss</i>	Focal			1	1
Fish	Westslope Cutthroat Trout	<i>Oncorhynchus clarki lewisi</i>	Focal			1	1
Birds	American Dipper	<i>Cinclus mexicanus</i>	Focal				1
Birds	Harlequin Duck	<i>Histrionicus histrionicus</i>	Focal				1
Birds	Spotted Sandpiper	<i>Actitis macularia</i>	Focal	2		2	1
Birds	Belted Kingfisher	<i>Ceryle alcyon</i>	Inventory	2		2	1
Fish	Torrent Sculpin	<i>Cottus rhotheus</i>	Inventory				1
Fish	Burbot	<i>Lota lota</i>	Focal			1	2
Fish	Kokanee (I)	<i>Oncorhynchus nerka</i>	Focal			1	2
Mammals	American Beaver	<i>Castor canadensis</i>	Focal	1		2	3
Birds	Barrow's Goldeneye	<i>Bucephala islandica</i>	Focal	2		1	2
Birds	Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>	Focal	1		2	2
Birds	Wood Duck	<i>Aix sponsa</i>	Focal	1		3	2
Mammals	Long-eared Myotis	<i>Myotis evotis</i>	Inventory	2	1	2	3
Birds	Black Swift	<i>Cypseloides niger</i>	Inventory	1			2
Birds	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Inventory	1	2	3	2
Birds	Killdeer	<i>Charadrius vociferus</i>	Inventory	2	1	2	2
Birds	Vaux's Swift	<i>Chaetura vauxi</i>	Inventory	1	2		2
Birds	Blue-winged Teal	<i>Anas discors</i>	Inventory	1		2	3
Birds	Canvasback	<i>Aythya valisineria</i>	Inventory	1		2	3
Birds	Greater Scaup	<i>Aythya marila</i>	Inventory	2		1	3
Birds	Lesser Scaup	<i>Aythya affinis</i>	Inventory	2		1	3
Birds	Northern Pintail	<i>Anas acuta</i>	Inventory	1		2	3
Birds	Osprey	<i>Pandion haliaetus</i>	Inventory	3	2	1	3
Birds	Tree Swallow	<i>Tachycineta bicolor</i>	Inventory	1	3	2	3
Birds	Violet-green Swallow	<i>Tachycineta thalassina</i>	Inventory	1	2	3	3

Table 10 Species of Interest that inhabit wetland and riparian habitats. Numbers represent the priority habitat for the species. Species marked with an (I) are introduced. See Section 7.2.1 for Species of Interest category criteria.

Taxon	Common Name	Scientific Name	Species of Interest Category	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Amphibians	Northern Leopard Frog	<i>Lithobates pipiens</i>	Recovery	1		2	
Birds	Western Screech-Owl, <i>macfarlanei</i> subspecies	<i>Megascops kennicottii macfarlanei</i>	Recovery	1			
Amphibians	Columbia Spotted Frog	<i>Rana luteiventris</i>	Focal	1		2	
Reptiles	Western Painted Turtle	<i>Chrysemys picta</i>	Focal	1		1	
Mammals	American Beaver	<i>Castor canadensis</i>	Focal	1		2	3
Mammals	Fringed Myotis	<i>Myotis thysanodes</i>	Focal	1	2		
Mammals	Moose	<i>Alces americanus</i>	Focal	1	2		
Birds	Bank Swallow	<i>Riparia riparia</i>	Focal	1	2	2	1
Birds	Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>	Focal	1		2	2
Birds	Wood Duck	<i>Aix sponsa</i>	Focal	1		3	2
Odonates	Vivid Dancer	<i>Argia vivida</i>	Focal	1	3		2
Amphibians	Western Toad	<i>Anaxyrus boreas</i>	Inventory	1	1	2	
Amphibians	Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>	Inventory	1	2		
Amphibians	Northern Pacific Tree Frog	<i>Pseudacris regilla</i>	Inventory	1	2	3	
Amphibians	Wood Frog	<i>Lithobates sylvaticus</i>	Inventory	1	1	2	
Birds	American Bittern	<i>Botaurus lentiginosus</i>	Inventory	1			
Birds	American Coot	<i>Fulica americana</i>	Inventory	1		2	
Birds	Black Swift	<i>Cypseloides niger</i>	Inventory	1			2
Birds	Black Tern	<i>Chlidonias niger</i>	Inventory	1			
Birds	Blue-winged Teal	<i>Anas discors</i>	Inventory	1		2	3
Birds	Canvasback	<i>Aythya valisineria</i>	Inventory	1		2	3
Birds	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Inventory	1	2	3	2
Birds	Northern Harrier	<i>Circus cyaneus</i>	Inventory	1			
Birds	Northern Pintail	<i>Anas acuta</i>	Inventory	1		2	3
Birds	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Inventory	1	2	3	
Birds	Pied-billed Grebe	<i>Podilymbus podiceps</i>	Inventory	1		2	
Birds	Red-eyed Vireo	<i>Vireo olivaceus</i>	Inventory	1	2		
Birds	Redhead	<i>Aythya americana</i>	Inventory	1		2	

Taxon	Common Name	Scientific Name	Species of Interest Category	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
Birds	Sandhill Crane	<i>Grus canadensis</i>	Inventory	1	3	2	
Birds	Short-eared Owl	<i>Asio flammeus</i>	Inventory	1			
Birds	Tree Swallow	<i>Tachycineta bicolor</i>	Inventory	1	3	2	3
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>	Inventory	1	2	2	
Birds	Vaux's Swift	<i>Chaetura vauxi</i>	Inventory	1	2		2
Birds	Red-eyed Vireo	<i>Vireo olivaceus</i>	Inventory	1	2		
Birds	Veery	<i>Catharus fuscescens</i>	Inventory	1	2		
Birds	Violet-green Swallow	<i>Tachycineta thalassina</i>	Inventory	1	2	3	3
Birds	Virginia Rail	<i>Rallus limicola</i>	Inventory	1			
Birds	Willow Flycatcher	<i>Empidonax traillii</i>	Inventory	1			
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>	Inventory	1		2	
Birds	Wilson's Snipe	<i>Gallinago delicata</i>	Inventory	1			
Birds	Yellow Warbler	<i>Setophaga petechia</i>	Inventory	1			
Birds	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	Inventory	1			
Mammals	American Badger	<i>Taxidea taxus</i>	Recovery	2	1		
Reptiles	Rubber Boa	<i>Charina bottai</i>	Focal	2	1		
Mammals	Elk	<i>Cervus canadensis</i>	Focal	2	1		
Mammals	Grizzly Bear	<i>Ursus arctos</i>	Focal	2	1		
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	Focal	2	1		
Mammals	Northern Myotis	<i>Myotis septentrionalis</i>	Focal	2	1		
Mammals	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Focal	2	1		
Birds	Barrow's Goldeneye	<i>Bucephala islandica</i>	Focal	2		1	2
Birds	Bobolink	<i>Dolichonyx oryzivorus</i>	Focal	2	1		
Birds	Long-billed Curlew	<i>Numenius americanus</i>	Focal	2	1	2	
Birds	Barn Swallow	<i>Hirunda rustica</i>	Focal	2	1		
Birds	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Focal	2	1		
Birds	Spotted Sandpiper	<i>Actitis macularia</i>	Focal	2		2	1
Butterflies	Gillette's Checkerspot	<i>Euphydryas gillettii</i>	Focal	2	1		
Mammals	California Myotis	<i>Myotis californicus</i>	Inventory	2	1		
Mammals	Long-eared Myotis	<i>Myotis evotis</i>	Inventory	2	1	2	3
Mammals	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Inventory	2	1		
Mammals	Western Small-footed	<i>Myotis ciliolabrum</i>	Inventory	2	1		

Taxon	Common Name	Scientific Name	Species of Interest Category	Wetland/ Riparian	Upland/ Dryland	Lake	Stream
	Myotis						
Mammals	Yuma Myotis	<i>Myotis yumanensis</i>	Inventory	2	1		
Birds	Belted Kingfisher	<i>Ceryle alcyon</i>	Inventory	2		2	1
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>	Inventory	2	1		
Birds	Greater Scaup	<i>Aythya marila</i>	Inventory	2		1	3
Birds	Killdeer	<i>Charadrius vociferus</i>	Inventory	2	1	2	2
Birds	Lesser Scaup	<i>Aythya affinis</i>	Inventory	2		1	3
Birds	Pacific-slope Flycatcher	<i>Empidonax oberholseri</i>	Inventory	2	1		
Birds	Rough-legged Hawk	<i>Buteo lagopus</i>	Inventory	2	1		
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>	Inventory	2		1	
Birds	Osprey	<i>Pandion haliaetus</i>	Inventory	3	2	1	3

Table 11 Species of Interest that inhabit upland and dryland habitats. Numbers represent the priority habitat for the species. Species marked with an (I) are introduced. See Section 7.2.1 for Species of Interest category criteria.

Taxon	Common Name	Scientific Name	Species of Interest Category	Riparian/ Wetland	Upland/ Dryland	Lake	Stream
Mammals	American Badger	<i>Taxidea taxus</i>	Recovery	2	1		
Mammals	Caribou (Southern Mountain Pop'n)	<i>Rangifer tarandus</i>	Recovery		1		
Reptiles	Rubber Boa	<i>Charina bottai</i>	Focal	2	1		
Mammals	Bighorn Sheep	<i>Ovis canadensis canadensis</i>	Focal		1		
Mammals	Elk	<i>Cervus canadensis</i>	Focal	2	1		
Mammals	Mountain Goat	<i>Oreamnos americanus</i>	Focal		1		
Mammals	Mule Deer	<i>Odocoileus hemionus</i>	Focal		1		
Mammals	White-tailed Deer	<i>Odocoileus virginianus</i>	Focal		1		
Mammals	Cougar	<i>Puma concolor</i>	Focal		1		
Mammals	Grey Wolf	<i>Canis lupus</i>	Focal		1		
Mammals	Grizzly Bear	<i>Ursus arctos</i>	Focal	2	1		
Mammals	Wolverine, <i>luscus</i> subspecies	<i>Gulo gulo luscus</i>	Focal		1		
Mammals	American Marten	<i>Mustela americana</i>	Focal		1		
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	Focal	2	1		
Mammals	Northern Myotis	<i>Myotis septentrionalis</i>	Focal	2	1		
Mammals	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Focal	2	1		
Amphibians	Wood Frog	<i>Lithobates sylvaticus</i>	Inventory	1	1	2	
Mammals	American Black Bear	<i>Ursus americanus</i>	Inventory		1		
Mammals	Canada Lynx	<i>Lynx canadensis</i>	Inventory		1		
Mammals	American Pika	<i>Ochotona princeps</i>	Inventory		1		
Mammals	Porcupine	<i>Erethizon dorsatum</i>	Inventory		1		
Mammals	Raccoon (I)	<i>Procyon lotor</i>	Inventory		1		
Mammals	California Myotis	<i>Myotis californicus</i>	Inventory	2	1		
Mammals	Hoary Bat	<i>Lasiurus cinereus</i>	Inventory		1		
Mammals	Long-eared Myotis	<i>Myotis evotis</i>	Inventory	2	1	2	3
Mammals	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Inventory	2	1		
Mammals	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	Inventory	2	1		
Mammals	Yuma Myotis	<i>Myotis yumanensis</i>	Inventory	2	1		
Birds	Lewis' Woodpecker	<i>Melanerpes lewis</i>	Recovery	2	1		
Birds	Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	Recovery		1		

Taxon	Common Name	Scientific Name	Species of Interest Category	Riparian/ Wetland	Upland/ Dryland	Lake	Stream
Birds	Barn Swallow	<i>Hirundo rustica</i>	Focal	2	1		
Birds	Bobolink	<i>Dolichonyx oryzivorus</i>	Focal	2	1		
Birds	Brown Creeper	<i>Certhia americana</i>	Focal		1		
Birds	Common Nighthawk	<i>Chordeiles minor</i>	Focal		1		
Birds	Flammulated Owl	<i>Otus flammeolus</i>	Focal		1		
Birds	Long-billed Curlew	<i>Numenius americanus</i>	Focal	2	1	2	
Birds	Northern Goshawk	<i>Accipiter gentilis</i>	Focal		1		
Birds	Olive-sided Flycatcher	<i>Contopus cooperi</i>	Focal	2	1		
Birds	Sharp-tailed Grouse, <i>columbianus</i> subspecies	<i>Tympanuchus phasianellus columbianus</i>	Focal		1		
Birds	Townsend's Warbler	<i>Setophaga townsendi</i>	Focal		1		
Birds	Wild Turkey (I)	<i>Meleagris gallopavo</i>	Focal		1		
Birds	American Goldfinch	<i>Spinus tristis</i>	Inventory		1		
Birds	American Kestrel	<i>Falco sparverius</i>	Inventory		1		
Birds	Chestnut-backed Chickadee	<i>Poecile rufescens</i>	Inventory		1		
Birds	Clark's Nutcracker	<i>Nucifraga columbiana</i>	Inventory		1		
Birds	Common Poorwill	<i>Phalaenoptilus nuttallii</i>	Inventory		1		
Birds	Dusky Flycatcher	<i>Empidonax difficilis</i>	Inventory		1		
Birds	Dusky Grouse	<i>Dendragapus obscurus</i>	Inventory		1		
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>	Inventory	2	1		
Birds	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Inventory		1		
Birds	Gray-crowned Rosy Finch	<i>Leucosticte tephrocotis</i>	Inventory		1		
Birds	Horned Lark	<i>Eremophila alpestris</i>	Inventory		1		
Birds	Killdeer	<i>Charadrius vociferus</i>	Inventory	2	1	2	2
Birds	Lark Sparrow	<i>Chondestes grammacus</i>	Inventory		1		
Birds	Mourning Dove	<i>Zenaida macroura</i>	Inventory		1		
Birds	Pacific-slope Flycatcher	<i>Empidonax oberholseri</i>	Inventory	2	1		
Birds	Peregrine Falcon, <i>anatum</i> subspecies	<i>Falco peregrinus anatum</i>	Inventory		1		
Birds	Pine Siskin	<i>Spinus pinus</i>	Inventory		1		
Birds	Purple Finch	<i>Carpodacus purpureus</i>	Inventory		1		
Birds	Red Crossbill	<i>Loxia curvirostra</i>	Inventory		1		
Birds	Rock Wren	<i>Salpinctes obsoletus</i>	Inventory		1		

Taxon	Common Name	Scientific Name	Species of Interest Category	Riparian/ Wetland	Upland/ Dryland	Lake	Stream
Birds	Rough-legged Hawk	<i>Buteo lagopus</i>	Inventory	2	1		
Birds	Ruffed Grouse	<i>Bonasa umbellus</i>	Inventory		1		
Birds	Rufous Hummingbird	<i>Selasphorus rufus</i>	Inventory		1		
Birds	Swainson's Thrush	<i>Catharus ustulatus</i>	Inventory		1		
Birds	Townsend's Solitaire	<i>Myadestes townsendi</i>	Inventory		1		
Birds	Vesper Sparrow	<i>Pooecetes gramineus</i>	Inventory		1		
Birds	Western Meadowlark	<i>Sturnella neglecta</i>	Inventory		1		
Birds	Western Wood-Pewee	<i>Contopus sordidulus</i>	Inventory		1		
Birds	White-tailed Ptarmigan	<i>Lagopus leucura</i>	Inventory		1		
Birds	White-winged Crossbill	<i>Loxia leucoptera</i>	Inventory		1		
Birds	Wilson's Warbler	<i>Cardellina pusilla</i>	Inventory		1		
Butterflies	Dione (Grey) Copper	<i>Lycaena dione</i>	Focal		1		
Butterflies	Gillette's Checkerspot	<i>Euphydryas gillettii</i>	Focal	2	1		
Butterflies	Mormon Fritillary, <i>eurynome</i> subspecies	<i>Speyeria mormonia eurynome</i>	Focal		1		
Amphibians	Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>	Inventory	1	2		
Amphibians	Northern Pacific Tree Frog	<i>Pseudacris regilla</i>	Inventory	1	2	3	
Mammals	Moose	<i>Alces americanus</i>	Focal	1	2		
Mammals	Fringed Myotis	<i>Myotis thysanodes</i>	Focal	1	2		
Birds	Bank Swallow	<i>Riparia riparia</i>	Focal	1	2	2	1
Birds	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Inventory	1	2	3	2
Birds	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Inventory	1	2	3	
Birds	Osprey	<i>Pandion haliaetus</i>	Inventory	3	2	1	3
Birds	Red-eyed Vireo	<i>Vireo olivaceus</i>	Inventory	1	2		
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>	Inventory	1	2	2	
Birds	Vaux's Swift	<i>Chaetura vauxi</i>	Inventory	1	2		2
Birds	Veery	<i>Catharus fuscescens</i>	Inventory	1	2		
Birds	Violet-green Swallow	<i>Tachycineta thalassina</i>	Inventory	1	2	3	3
Birds	Sandhill Crane	<i>Grus canadensis</i>	Inventory	1	3	2	
Birds	Tree Swallow	<i>Tachycineta bicolor</i>	Inventory	1	3	2	3
Odonates	Vivid Dancer	<i>Argia vivida</i>	Focal	1	3		2