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FISH AND WILDLIFE
COMPENSATION PROGRAM

ALOUETTE WATERSHED *WATERSHED PLAN* FINAL DRAFT

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Alouette Watershed Plan

1 INTRODUCTION

This Alouette Watershed Plan sets forth the strategic direction for the Fish and Wildlife Compensation Program: Coastal Region.

It begins by briefly outlining the vision, principles, policy context and strategic objectives that form the foundation of the FWCP. A description of the Alouette setting includes an overview of the hydro-electric facilities and footprint impacts created by those facilities.

The priority setting process is described, followed by a short direction-setting synopsis of a set of priority Action Plans. Taken together, this Watershed Plan and the accompanying Action Plans present the FWCP: Coastal priorities for investments in compensation activities within the Alouette Watershed.

1.1 FISH AND WILDLIFE COMPENSATION PROGRAM

The Fish and Wildlife Compensation Program (FWCP): Coastal Region evolved from its origin as the Bridge-Coastal Restoration Program (BCRP), a program initiated voluntarily by BC Hydro in 1999 to restore fish and wildlife resources that were adversely affected by the original footprint of the development of hydroelectric facilities in the Bridge-Coastal generation area. Footprint impacts include historical effects on fish and wildlife that have occurred as a result of reservoir creation, watercourse diversions and the construction of dam structures.

In 2009, the program developed a strategic framework that guides overall planning for compensation investments (MacDonald, 2009). The framework has guided the development of strategic plans for each watershed within the FWCP program area, which are in turn informing action plans that focus on specific priorities within each watershed (Figure 1).



Figure 1: Relationship between the FWCP Strategic Framework, basin strategic plans and action plans.

Delivery of the program as a whole is guided by a vision, set of principles and policy priorities as developed by the program's partners.

VISION

Thriving fish and wildlife populations in watersheds that are functioning and sustainable.

An effective program will support the maintenance of healthy fish and wildlife populations in basins significantly altered by hydroelectric development. Actions taken should satisfy both the conservation and sustainable use objectives and, where possible, restore ecosystem function, making species more resistant to emerging pressures such as climate change.

PRINCIPLES

Approach - The program has a forward-looking, ecosystem-based approach that defines the desired outcomes and takes actions to restore, enhance and conserve priority species and their habitats.

Decision Making - The program efficiently uses its resources and works with its partners to make informed and consensus-built decisions that enable the delivery of effective, meaningful and measurable projects that are supported by the impacted communities.

Geographic Scope - Within the watersheds, basins and ranges of the populations of species affected by generation facilities owned and operated by BC Hydro.

Objectives - The program defines and delivers on compensation objectives that reflect the partnership's collective goals, and that align with local provincial and federal fish and wildlife conservation and management objectives in the areas where we work.

Delivery - The program strives to be a high performing organization with skilled and motivated staff and partners delivering efficient, effective and accountable projects.

PARTNERS

The program is a partnership between BC Hydro, the BC Ministry of Environment, Fisheries and Oceans Canada, First Nations and public stakeholders. Our goal is to have engagement and participation of all the partners in priority setting, approval, review and delivery of the program.

POLICY CONTEXT

The FWCP addresses the policy requirements and social commitments to compensate for impacts to fish and wildlife associated with the development of BCH's generating facilities. The core responsibilities of the agencies are:

Ministry of Environment

The Ministry of Environment manages and delivers a wide range of programs and services that support the Province's environmental and economic goals¹. The Ministry encourages environmental stewardship, develops innovative partnerships, engages First Nations, stakeholders and the public and actively promotes the sustainable use of British Columbia's environmental resources. Within this broader context, the Ministry has a number of responsibilities that are particularly relevant to the development and implementation of actions under the FWCP including:

- Management and conservation of the province's biodiversity;

¹ <http://www.bcbudget.gov.bc.ca/2010/sp/pdf/ministry/env.pdf> (MOE Service Plan)

- Protection of fish, wildlife, species-at-risk and their habitats;
- Protection and restoration of BC's watersheds; and,
- Provision and management of fish and wildlife-based recreation.

A number of policies and plans guide the Ministry in delivering on these goals and objectives. The **Conservation Framework**² is British Columbia's approach for maintaining the rich biodiversity of the province, providing a set of science-based tools and prioritized actions for conserving species and ecosystems in B.C. **Program Plans for Freshwater Fisheries, Wildlife and Ecosystems**³ articulate a clear set of strategies supported by actions to achieve both conservation-based outcomes and the provision of recreational opportunity. **Recovery Strategies and Management Plans** have been developed to guide the maintenance, recovery and/or use of specific species and ecosystems. These plans may include specific performance measures and targets.

Fisheries and Oceans Canada

Under the **Fisheries Act**, DFO is the primary agency responsible for conserving and managing Canada's fisheries, including pacific salmon. It does so through management and monitoring of fisheries, protection of fish habitat, and pollution prevention. The **Policy for the Management of Fish Habitat** (1986) has an overall objective of 'net gain' of fish habitat and helps guide the implementation of fish habitat protection through collaboration with relevant provincial agencies. The **Species at Risk Act** mandates protection of geographically and genetically distinct populations. The principle goal of the **Wild Salmon Policy**⁴ is "to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity". This achieved through safeguarding genetic diversity, maintaining ecosystem integrity and managing for sustainable fisheries.

BC Hydro

As a Crown Corporation, BC Hydro is committed to producing, acquiring and delivering electricity in an environmentally, socially and financially responsible manner,⁵ through managing impacts from its operations, and weighing environmental values with social and economic interests. Where negative impacts cannot be avoided, it will work to mitigate or offset them, enhance affected habitat and sustain resources over the long term. As part of its water licenses to operate its facilities, BC Hydro is required to undertake compensation programs in different regions of the province. Through the compensation program, it is committed to developing positive projects, such as investments to improve fish stocks, and building relationships to encourage stakeholder and aboriginal community engagement, particularly where their input can contribute to better decisions.

PROGRAM DELIVERY

The overall vision and common principles drive the FWCP program and projects, and provide a foundation for determining strategic priorities at the watershed level (Watershed Plans) which are developed into Action Plans. The bulk of projects undertaken by the FWCP will be delivered under Action Plans that lay out a suite of key actions to achieve specific goals associated with species and ecosystems. Actions could include research, implementation activities, monitoring and evaluation activities, and communication mechanisms. Applicants are encouraged to use the Watershed Plans and Action Plans to develop projects that meet the overall objectives of the FWCP program. Technical Committees, staff and the management board will reference the plans to ensure that the highest priority projects are invested in.

² <http://www.env.gov.bc.ca/conservationframework/>

³ <http://www.env.gov.bc.ca/esd/>

⁴ Canada's Policy for Conservation of Wild Pacific Salmon, 2005.

⁵ BC Hydro Social Responsibility Policy.

A portion of the FWCP program activities will include small-scale, short-duration strategic projects that target specific issues identified by program partners or others (e.g., community members). These could include projects not yet identified in any action plans, as well as lower priority Action Plan items that require timely response in order to take advantage of a investment or partnership opportunity.

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.

2 ALOUETTE WATERSHED⁶

2.1 SETTING

The Alouette watershed is located approximately 50 km east of Vancouver, next to the Stave watershed on the north side of the Fraser Valley (Figure 2). The Alouette watershed has a drainage area of 202 km² that ranges in elevation from 120m to 1800m. The Alouette River (sometimes called the South Alouette River) flows predominantly southwest and discharges into the Pitt River, less than 6 km upstream of its confluence with the Fraser River. Inflows to the Alouette system come primarily from heavy rain in the fall from Pacific frontal systems and snowmelt in the spring. Average rainfall in November is close to 500 mm, but can reach 900 mm.

The Alouette-Stave Falls-Ruskin generating complex includes four dams, a 1090 m long diversion tunnel and three powerhouses. Alouette Dam at the south end of Alouette Lake Reservoir provides water storage in the Alouette watershed. About 94% of the annual inflow into Alouette Lake Reservoir is diverted through the diversion tunnel to the Alouette Generating Station on the shore of Stave Lake Reservoir. At the south end of Stave Lake Reservoir are Blind Slough and Stave Falls dams, and Stave Falls Generating Station. Flows from Stave Falls Dam discharge into Hayward Reservoir. Outflow from Hayward Reservoir is controlled by Ruskin Dam, with power being generated at the Ruskin Generating Station. Water diverted from Alouette Lake Reservoir is thus used for power generation at three separate generating stations.

The Alouette River system lies within the traditional territory claimed by the Katzie and Kwantlen First Nations. The lower Alouette River flows through parkland, residential area and intensive farmland; it flows through Golden Ears Provincial Park and the municipality of Maple Ridge.

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⁶ More details of the watershed can be found at: <http://www.bchydro.com/bcrp/projects/watersheds.html>



Figure 2. The Alouette Watershed hydropower project.

2.2 FOOTPRINT ISSUES

Fish and Wildlife habitat and species have been significantly altered due to the construction of the dams, the development of hydro-power, and alterations in the hydraulic regimes of the systems. The following summary of the primary footprint impacts is derived from:

- Bridge-Coastal Restoration Program: Strategic Plan, Volume 2: Watershed Plans, Chapter 6: Alouette River (December 2000);
- Alouette River Water Use Plan Consultative Committee Report (April, 2009); and
- Findings in the Community Workshop (Pitt Meadows, February 19, 2009).

Inundation: Reservoir impoundment raised the elevation of the original lake by approximately 15 m. The reservoir area measures 1580 ha after flooding 373 ha of land. The reservoir shoreline length is now 37.6 km – a 1.4 km reduction from the original shoreline, due to flooding of the two lakes and the complex channels at the inlet.

Habitat loss: Loss of instream, riparian and upland habitats; loss of lake outlet spawning for anadromous stocks was compensated by construction of spawning channel below dam in 1994. The dam has reduced recruitment of large woody debris and gravel downstream.

Migration barriers: The Alouette Dam blocked passage of anadromous stocks.

New Habitat: The reservoir has created new habitat for lake species and spawning channels have been constructed below the dam.

Altered Flow Regime. There were no fish flows on Alouette for 40 years. Periodic large spills and low level outlet at the dam may cause sedimentation of spawning habitat in the mainstem.

Diversions. 90% of the water in the Alouette river basin is diverted to the Stave.

Entrainment. The magnitude of entrainment mortality and injury is unknown. It would affect only reservoir species as there is no passage above Alouette dam.

2.3 FWCP ACCOMPLISHMENTS TO DATE

Since 1999 the Bridge Coastal Restoration Program has invested approximately \$600,000 in the Alouette watershed.

Restoration work includes:

- Work has resulted in improved access and rehabilitation of 5100m² of spawning and rearing habitat.
- Tretheway side-channel and spawning habitat
- Hennipen Creek, tributaries T10 and T11, Painted Turtle Slough
- Stewarts' Pond (juvenile rearing)
- Lower Alouette riparian planting.

Research work includes:

- Sockeye/kokanee smolt outmigration
- Sockeye trap-and-truck fish passage trials
- Sockeye reservoir migration, spawning, and DNA studies
- Fish passage feasibility at Alouette Dam
- Bat surveys (various sp.)

3 STRATEGIC OBJECTIVES FOR FWCP

Strategic objectives for the Fish and Wildlife Compensation Program reflect a synthesis of the core objectives and mandates of the partner agencies as they relate to mitigating impacts associated with hydro-power generation in British Columbia.

Conservation and sustainable use are core objectives for both the Ministry of Environment and Fisheries and Oceans. Conservation is addressed in terms of maintaining specific species or habitats both in terms of their importance for diversity (including genetic diversity), as well as their importance for ecosystem functions, integrity and productivity. For example, a species such as White Sturgeon may be important in terms of species diversity, while Pileated Woodpeckers may be important for maintaining ecosystem functioning and integrity by creating habitat for other species. Sustainable use incorporates the human interest in utilizing species for sustenance, commercial, recreational, or cultural purposes. Consequently, species such as coho, moose or bald eagles (wildlife viewing) could be considered important from a sustainable use perspective.

Community engagement is a core objective for BC Hydro under the compensation program and is driven by its social responsibility policy. It also reflects the 'shared stewardship' goal of the Ministry of Environment and those of Fisheries and Oceans' Stewardship and Community Involvement program. It reflects the importance of incorporating local values and interests in determining and implementing projects.

The FWCP strategic objectives are therefore:

Conservation

- **Maintain or improve the status of species or ecosystems of concern.**
This focuses on the conservation goals for ecosystems, habitats or ecological communities, and specific species. Priorities may be identified through the provincial Conservation Framework, or at the Conservation Unit level under the federal Wild Salmon Policy. Conservation priorities may also be identified at the watershed level based on local conditions.
- **Maintain or improve the integrity and productivity of ecosystems and habitats.**
This addresses the concept of ecosystem integrity, resiliency and the functional elements of ecosystems, including efforts to optimize productive capacity.

Sustainable Use

- **Maintain or improve opportunities for sustainable use, including harvesting and other uses.**
This objective focuses on the program's role in restoring or enhancing the abundance of priority species and in providing information to resource management decision makers related to providing opportunities for harvesting and other uses. Harvesting includes First Nations, recreational, sport and commercial harvests. Other uses may include cultural, medicinal, or non-consumptive uses.

Community Engagement

- **Build and maintain relationships with stakeholders and aboriginal communities.**
This objective stems from BCH's social responsibility policy, MOE's shared stewardship goal and the approach of DFO's Stewardship and Community Involvement Program. This recognizes the importance of engaging aboriginal communities, local stakeholders, and other interest groups to contribute toward making good decisions and delivering effective projects.

4 PRIORITIES

4.1 INTRODUCTION

Across all watersheds where the FWCP operates, the general process of identifying priority action plans involves three steps:

Step 1 – Identification (Candidate Priority Species and Ecosystems)

The first step involves identifying and prioritizing the species and ecosystems against the core strategic objectives, and how they have been impacted by footprint issues associated with hydro-power generation.

Step 2 – Preliminary Planning

This step consists of reviewing the identified priorities with consideration to identifying candidate action plans. It may involve grouping species or ecosystems together for coordinated action. Key considerations include: addressing limiting factors, exploring the opportunity for multiple benefits, addressing any specific local threats, the practicality of implementing actions, and the plan's consistency with existing agency programs.

Step 3 - Prioritization

This step consists of a final prioritization of candidate action plans (and their priority areas) according to cost effectiveness and technical feasibility criteria:

- **Technical Feasibility.** – The program should generally seek out investments that are the most technically feasible. Considerations generally include the use of proven methods and availability of technical resources. Innovative approaches should be considered but they must have a credible technical foundation and reasonable expectation of success. The potential interrelationship with system operations and programs being implemented by the Water License Requirements program must also be considered.
- **Cost Effectiveness.** – The program should generally seek out investments that are the most cost effective. This includes issues or actions which may benefit multiple species, areas where there is an opportunity to leverage additional funds for activities, issues where previous work has been conducted and incremental expenditure may have substantive benefits, actions that are closely related to on the ground actions with measurable impacts, amongst others.

4.2 PRIORITY SETTING IN THE COASTAL REGION

In the Coastal region of the FWCP, Step 1 involved a review of existing Watershed Restoration Plans, interviews with agency staff, a series of community workshops and a final evaluation.

In 2000, specific restoration objectives were originally articulated in the Watershed Restoration Plans.⁷ These plans contain details of the major footprint impacts, objectives and limiting factors for productivity and have guided the work of the FWCP Coastal for the past decade.

Priorities for FWCP Coastal were reviewed in 2009 through a multi-stage process involving BC Hydro, Fisheries and Oceans Canada (DFO), Canadian Wildlife Service (CWS), Ministry of Environment (MOE), local First Nations, and local communities. Initial priority setting was developed through consultation with agency staff. These were then reviewed and discussed at a

⁷ Watershed Restoration Plans may be obtained at the FWCP website:

<http://www.bchydro.com/bcrp/projects/watersheds.html>

series of open houses to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities.

The results from the Alouette Watershed workshop are summarized in Appendix A, highlighting the species, habitats, and specific activities as priorities for further work. On the aquatic side, Chinook and pink salmon, steelhead, cutthroat and bull trout were viewed as the highest priority fish species, along with identifying the presence of Nooksack Dace and Salish Sucker. Controlling or reducing carp, bass and Yellow perch were also considered as high priority along with maintaining current habitat for coho. Fertilising the reservoir for kokanee was considered important, while habitat restoration was not due to their healthy population.

Species at Risk were also identified as priorities, in particular the need to improve the overall understanding of which species exist in the watershed, and to identify appropriate actions to conserve them. Specific species of high priority that were mentioned included the Pacific Water shrew, Western screech owl, Band-tailed pigeons, Great Blue heron, and the Western Painted turtle. It should be noted these are not the only priorities or species at risk which might occur in the watershed. Bull frog and reed canary grass were noted as being invasive species which were particularly problematic. Specific ecosystems of interest included wetlands and riparian areas, as well as upland areas for ungulates, in particular the protection of old growth forest.

The priorities emerging from the workshops were subsequently reviewed by BCH and Agency staff in relation to how well they addressed the strategic objectives, the extent to which species were impacted by footprint impacts, and what activities could provide multiple benefits to multiple species. The resulting direction for the Alouette River Watershed is to focus the next five year period on the development and implementation of three priority *Action Plans* for priority topic areas: Salmonids, Riparian / Wetlands and Species of Interest. Other areas for future action plan development were identified as controlling invasive species; upland areas, focussing primarily on preserving old-growth and developing old-growth characteristics in second growth; and to enhance recreational fishing opportunities in the Alouette reservoir.

4.3 PRIORITY ACTION PLAN SUMMARIES

The Salmonid and Riparian / Wetlands Action Plans focus on overall ecosystems in support of multiple fish and wildlife species. The objectives and sub-objectives within these two plans reflect the overall ecosystem focus, and the plans include primarily habitat-based actions, supported as required by research/information acquisition, assessments and monitoring/evaluation actions.

The Species of Interest Action Plan focuses on species of conservation concern (including species-at-risk) or other regionally important species for management planning process. The objectives, sub-objectives and actions within this plan reflect this focus on individual species.

All three priority action plans in the Alouette watershed provide broad support to the FWCP strategic sustainable use objective.

The three priority action plans for the Alouette watershed are summarized below. The full plans can be accessed on the FWCP website ([provide](#)).

SALMONID ACTION PLAN

Rationale

Salmonid species in general have been very heavily impacted by the creation of dams and hydroelectric facilities in the Alouette system. Limiting factors for salmonids in the lower Alouette watershed vary among species and include lack of pool and boulder habitat for steelhead and rainbow; lack of spawning opportunities for pink and Chinook, possibly due to the abundance of

chum; and lack of access to off-channel areas. This overall action plan for salmonids includes integrated habitat restoration planning and analysis to determine actions that provide the most benefit to multiple species.

Conservation priorities for salmonids include pink, Chinook, bull and steelhead, the latter being a conservation concern. Both resident and anadromous cutthroat and bull may be present, though little is known about their abundance and trends. Also, diversity enhancement should focus on studies of the recently identified returning sockeye-kokanee released from the Alouette dam as well as confirming presence and abundance of Nooksack Dace and Salish Sucker.

The bulk of money spent in the Alouette system to-date has been towards enhancement activities on off channel tributaries (e.g., Hennipen Creek, Painted Turtle Creek, etc.) and studies related to sockeye-kokanee. New habitat and restoration activities should focus on opportunities for habitat creation where there will be less competition from chum near the dam; as well as enhancing rearing habitat for steelhead and rainbow.

Focus

1. Implement habitat restoration activities including off-channel access and gravel placement. Enhance spawning near dam for pink and Chinook.
2. Assess opportunities for enhancement of habitat for steelhead/rainbow, coastal cutthroat, coho, Chinook and pink.
3. Maintaining diversity (incl. sockeye-kokanee, Nooksack Dace, Salish Sucker).

Expected outcome

- Improved habitat capacity and productivity in multiple stream systems.
- Sustained abundance of anadromous and resident salmonid populations at target levels over time.
- Improved targets for both habitat capacity (pre-development) and abundance for all salmonid species, and develop targets for coastal cutthroat.
- Confirm presence and abundance of Nooksack Dace and Salish Sucker.
- Identify recovery potential for sockeye-kokanee and develop sub-plan if appropriate.

SPECIES OF INTEREST ACTION PLAN

Rationale

'Species of interest' are defined as species of conservation concern (including species-at-risk) or other regionally important species.

Species at Risk are a priority for all agencies and partners. Some Species at Risk, such as the Great Blue Heron, are known to exist and their habitats have been identified in the Alouette Watershed. However, their numbers of nests have declined by half in recent years. Less is known about other species and there is a general lack of information regarding which species may potentially exist and what opportunities are available to protect them.

Generally, habitat is a limiting factor, particularly as much of the area is urbanized and is in privately owned lands. While Bat surveys and other information gathering has been conducted under the FWCP, the bulk of the money spent to date has been on fish habitat and studies.

To build on previous efforts, more information is needed regarding how effective past efforts have been. More knowledge is needed regarding which species exist, in which habitats, and the opportunities available for their protection. Also, needed is a strategy for evaluation and monitoring

that will support the ongoing process of renewing species plans and priorities in the Alouette River system.

Focus

1. Build upon the past efforts associated with the identified FWCP priority species of concern in the Alouette River watershed.
2. Conduct actions for currently known species such as heron nests, Band-tailed pigeon mineral sites and support for existing recovery plans (Pacific water shrew)⁸
3. Conduct mapping and prioritization of activities for additional species of concern, including identification of opportunities for conservation and restoration.

Expected outcome

- Improved knowledge and status of FWCP priority species of concern.
- Improved habitat mapping for species of concern.
- Identification and prioritization of species, locations and potential future actions for conservation and protection.

RIPARIAN AND WETLANDS ACTION PLAN

Rationale

Riparian and wetland areas have been heavily impacted by the creation of dams, and continue to be severely degraded in the remaining areas due to urbanization. Habitat is the limiting factor for many species, including fish, which depend upon them, either for the majority of their lifecycles or for key periods such breeding. Riparian and wetland areas are extremely diverse and biologically rich and are considered as highly valuable from an ecological stand point.

While some riparian planting has occurred in the lower Alouette, FWCP has not significantly funded restoration of riparian areas or wetlands in the area. At this point it is a priority to assess opportunities and implement restoration actions in areas with high restoration potential.

Focus

1. Mapping of current wetlands and riparian areas, and categorization of areas into healthy and functioning systems (Category 1), and degraded or sub-optimal areas that would benefit from restoration (Category 2).
2. Assessment of opportunities for securement (conservation) and protection (from potential degradation) of Category 1 areas. This includes assessment of legal status, ownership, land use, etc.
3. Assessment of opportunities to enhance and restore Category 2 areas, with a subsequent view to conserve and protect them.
4. Assess potential for partner involvement including Ducks Unlimited, Partners in Flight etc.

⁸ Available at

http://www.env.gov.bc.ca/wld/documents/recovery/rcvrystrat/pacific_water_shrew_rcvry_strat040609.pdf

Expected outcome

- Identification and prioritization of locations and potential future actions for conservation, protection, restoration and creation of wetland and riparian habitats.

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APPENDIX A

The following list of species, ecosystems and actions were identified by agencies, First Nations and communities as being the top priorities for activities under the FWCP program. Following initial input from agencies, a multi-stakeholder workshop was held in Pitt Meadows (19 February, 2009) to identify priorities. Two breakout groups, for fish and wildlife, identified priorities which were reviewed in plenary to allow all participants to comment on the findings.

List of potential opportunities for fish and wildlife

HABITATS

Species	FWCP Rank	Comments
Ungulate Winter Range	n/a	<ul style="list-style-type: none"> The ungulate winter range is not currently a priority. There is a potential for winter range enhancement, land securement, and habitat in Gold Creek. Protection of old growth would benefit other species as well.
Wetland / Riparian Habitat	n/a	<ul style="list-style-type: none"> Objectives should focus on diversity, not just the number of wetland hectares. Diversity should be measured by indicator species. Further clarification is needed on whether the objective should be to just create wetlands or occupied sites, as some previous wetland creation projects have become occupied by bullfrogs and reed canary grass. There is a need to increase cottonwood habitats for western screech-ow and herons, with the emphasis on growing new habitat, not just managing the existing habitat. There is a need for longer term projects and monitoring over time. There is a need for a baseline assessment of wetlands in ALU to determine how they function. There is a need for information on which habitats were lost through BC Hydro developments, including more detail than just the number of hectares. Monitoring of the drawdown is needed, including the effects of thermal changes on wetland wildlife. The creation of bullfrog habitat must be prevented. Focus should be on the restoration of damaged sites to more natural conditions and long term conservation.

FISH

Species	FWCP Rank	Comments
Chinook	high	<ul style="list-style-type: none"> • Although the species is a high restoration priority, it also has a lot of viability potential. • New spawning areas need to be constructed in locations not favoured by chum salmon, either by starting new projects or redesigning existing ones. Projects may also target pinks. • Rearing capacity could be improved by improving access to off-channel habitats or developing new habitats.
Steelhead	high	<ul style="list-style-type: none"> • Identification of habitat capacity above the dam is needed (increased fish passage would also be beneficial). • There is a need for projects to increase pool and boulder habitat areas, as the areas are currently limiting.
Cutthroat Trout/ Bull Trout	high	<ul style="list-style-type: none"> • The species are Blue-listed. • Stream evaluations are needed to determine stock status and habitat capacity, followed by feasibility assessments of habitat restoration projects in the mainstem and tributaries. • Once assessments are complete, restoration projects should focus on improving tributary access through the removal of man-made barriers and instream complexing, as well as stream fertilization. • Stream fertilization and other projects in Gold Creek would benefit cutthroat, bull and rainbow trout.
Pink Salmon	high	<ul style="list-style-type: none"> • Development of new spawning habitat and redesigning of existing habitat is needed in areas not likely to be selected by chum. Focus should be on areas in the vicinity of the dam, north Alouette River (natural fluctuations in flow do not favour chum), and the right side of Mud Creek. • A net fishery for chum may be beneficial in years with high pink runs. chum could be trapped and trucked to Gold Creek. • When outmigration numbers are not consistent with previous brood escapements, hatchery augmentation will be required. • A selective pink channel could be constructed on Corrections-owned property directly across from Allco Park. Larger fish could be excluded using finger fence controls.
Nooksack Dace/ Salish Sucker	high	<ul style="list-style-type: none"> • It is a high priority to determine whether these species are present in the watershed. If their presence is confirmed, critical habitat areas must be established.
Carp, Bass, Yellow Perch, (i.e., non-native species)	high	<ul style="list-style-type: none"> • Projects that would control or reduce bass and carp populations are of high priority. Char are not currently a priority. • Assessments are necessary to determine the prevalence of non-native species and their impact on native species.

Species	FWCP Rank	Comments
Coho	high/ med	<ul style="list-style-type: none"> There is a high priority on maintaining and improving existing habitats, and a medium priority on creating and providing access to new off-channel habitats.
Kokanee	high/ low	<ul style="list-style-type: none"> The fertilization program is of high priority, and will come under review this year. Studies are necessary to better understand recreational demand. Population targets need to be assessed in relation to the sockeye target. Since population continues to increase additional restoration works are of low priority.
Sockeye	high/ low	<ul style="list-style-type: none"> Good baseline data is required before decisions on restoration projects are made. Projects may also benefit kokanee. Feasibility studies should look at: outmigration, entrainment, marine survival and spawning success. While fishway construction at the dam is a low priority, it is of high priority to the community
Chum	low	<ul style="list-style-type: none"> As chum production is improving but nearing capacity, the species is of low priority.

MAMMALS

Species	FWCP Rank	Comments
Species at Risk in General (SAR)	high	<ul style="list-style-type: none"> All wildlife agencies consider SAR a high priority. Species at Risk in the ALU Watershed are listed in the following section.
Pacific Water Shrew	high	<ul style="list-style-type: none"> May be an umbrella species. Habitat assessments need to take place. Note 'inventory' may lead to mortality of species. Wherever shrew habitat is identified, assume they are there and manage for them. Habitats include: <ul style="list-style-type: none"> slow moving creeks wetlands/marshes complex riparian forest structure Opportunities to address shrews under other restoration projects will give those projects a higher ranking. Restoration efforts may be compatible with off-channel restoration work. Guidance should be taken from the restoration work done by the Musqueam Band, and photographs should be obtained of their projects.
Furbearers	low	<ul style="list-style-type: none"> Inventory and landscape-level habitat management should take place, but are of low priority.

BIRDS

Species	FWCP Rank	Comments
Western Screech-Owl	high	<ul style="list-style-type: none"> Classified as a Species at Risk, with habitat restoration and securement potential. Species is a riparian-dependent secondary cavity nester, requiring minimum diameter trees. Population is declining in the lower mainland, likely due to Barred owl predation.
Spotted Owl		<ul style="list-style-type: none"> Species priorities need to be clarified.
Northern Goshawk, laingi subspecies	med	<ul style="list-style-type: none"> Of the two subspecies of Northern Goshawk present, only the laingi subspecies is a priority. Clarification on the occurrence/abundance of the laingi subspecies in ALU is necessary. Breeding habitat conservation and landscape level management are necessary.
Great Blue Heron	high	<ul style="list-style-type: none"> Classified as a Species at Risk with riparian nesting and foraging habitat restoration potential. Dropped from 80 to 40 nests in ALU. As available habitat is restricted, there is a need for a long term plan to establish new habitat. Since herons may eat painted turtles, there is a need to situate habitat restoration efforts accordingly.
Bald Eagle	med/ low	<ul style="list-style-type: none"> There is question as to whether the species should be of low or medium priority, however, it is a high cultural/First Nations priority. As bald eagles are hard on other species, they are good indicators of ecosystem health and should be monitored (e.g., they are hard hit by declining salmon stocks). Resident eagles can “defend” a territory from fly over eagles and thus limit predation on other species. Nesting and roosting habitat conservation and riparian covenants are priorities.
Riverine Birds	med	<ul style="list-style-type: none"> Includes Mergansers, American Dipper and Harlequin Duck. Water quality, stream productivity, fisheries relationships and Riparian conservation are priorities. Research is needed on genetics, the dispersal of birds between river systems, and fisheries relationships. May be studied as an indicator species.

AMPHIBIANS, REPTILES AND TURTLES

Coastal Tailed Frog	priority not known	<ul style="list-style-type: none"> • The species prefers fast moving mountain streams as habitat. • Priorities include conservation of streams and riparian habitats, conservation of covenants on private lands, water quality initiatives, inventory and research. •
Western Painted Turtle	high	<ul style="list-style-type: none"> • While the Painted Turtle is a higher priority than the Pond Turtle, there is a joint recovery team for Painted Turtle and Western Pond Turtle. • There have been only six sightings of Painted Turtle in Lower Fraser Valley but there are lots of opportunities for conservation/restoration work. <p>There was specific mention of potential for projects at Gary Sutherland Park on the Alouette:</p> <ul style="list-style-type: none"> • Monitoring, impact mitigation, wetland and nesting site conservation and husbandry projects are needed. A reintroduction project could also be beneficial.
Red-Legged Frog	priority not known	<ul style="list-style-type: none"> • The species prefers wetland and slow moving water as habitat. • Priorities include the conservation of streams and riparian habitats, conservation of covenants on private lands, water quality initiatives, inventory and research. • As they are an indicator species, projects can be linked to other monitoring projects. • Should be added to the “Conservation of Wetlands” project.

Wildlife Species at Risk that Occur or Could Occur in the Alouette River watershed

Species	COSEWIC	Conservation Framework
Mammals		
Pacific Water Shrew	Endangered	5,6,1
Mountain Beaver	Special Concern	6,4,5
Birds		
Northern Goshawk (laingi subspecies)	Threatened	1,6,1
Western Screech Owl (kennicottii subspecies)	Special Concern	3,1,2
Band Tailed Pigeon (Patagioenas fasciata)	Special Concern	5,2,3
Great Blue Heron (fannini subspecies)	Special Concern	3,6,1
Spotted Owl (caurina subspecies)	Endangered	5,6,2
Amphibians and Reptiles		
Red-Legged Frog	Special Concern	3,1,2
Coastal Tailed Frog	Special Concern	4,1,2
Western Toad	Special Concern	3,2,4
Western Painted Turtle	Endangered	4,6,2
Rubber Boa (Charina bottae)	Special Concern	5,3,4

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