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FISH AND WILDLIFE
 COMPENSATION PROGRAM

WAHLEACH WATERSHED
WATERSHED PLAN
FINAL DRAFT

The FWCP is a partnership of:



Fisheries and Oceans
 Canada

Pêches et Océans
 Canada

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Table of Contents

1	Introduction	2
1.1	Fish and Wildlife Compensation Program	2
	Vision	3
	Principles.....	3
	Partners.....	3
	Policy Context	3
	Program Delivery.....	4
	Project Investment Criteria.....	5
2	Jones Creek-Wahleach Lake Watershed	6
2.1	setting	6
2.2	Footprint issues.....	7
2.3	FWCP Accomplishments to date	7
3	Strategic Objectives for FWCP.....	8
4	Priorities	9
4.1	Introduction	9
4.2	Priority setting in the Coastal Region	9
4.3	Priority Topics	10
	1 – Assess sturgeon use and importance in Herling Island Side Channel	10
	2 Riparian and wetland areas.....	11
	2.1 – Riparian and Wetlands mapping and restoration	11
	2.2 - Inventory of Amphibians	12
	2.3 – Inventory of Riparian and Water-birds	13
	2.4 – Inventory of bats	13
	Naturalization of cutthroat trout in Wahleach Lake.....	14
5	References.....	15
	Appendix A – Priority Tables.....	16
	Fish.....	16
	Mammals.....	17
	Birds.....	18
	Amphibians, Reptiles and Turtles.....	19
	Plants.....	19

Table of Figures and Tables

Figure 1: Relationship between the FWCP Strategic Framework, policy, strategy and action.....	2
Figure 2: Wahleach Watershed.....	6

Jones Creek – Wahleach Lake¹ Watershed Plan

1 INTRODUCTION

This 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 Jones Creek – Wahleach Lake setting includes an overview of the hydro-electric facilities and footprint impacts created by those facilities. The plan describes the development of strategic objectives for FCWP, the creation of priorities for the watershed and outlines priority actions and projects for the system.

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 and that focus on specific priorities within each watershed (



Figure 1).

Figure 1: Relationship between the FWCP Strategic Framework, policy, strategy and action.

¹ Note that various documents and reports refer to the river and lake as both Jones Creek and Wahleach Creek as well as Jones Lake and Wahleach Lake. Since the construction of the hydro facilities the channel from the power house to Herling Side Channel has been referred to as Wahleach Channel.

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 goals². 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;

² <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**³ 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**⁴ 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**⁵ and 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,⁶ 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, for the smaller basins, are developed into actions and projects. The bulk of projects undertaken in small basins by the FWCP will be delivered under Watershed 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 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.

³ <http://www.env.gov.bc.ca/conservationframework/>

⁴ <http://www.env.gov.bc.ca/esd/>

⁵ Canada's Policy for Conservation of Wild Pacific Salmon, 2005.

⁶ 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 Watershed Plan, as well as lower priority items that require timely response in order to take advantage of an 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 Watershed 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 JONES CREEK-WAHLEACH LAKE WATERSHED⁷

2.1 SETTING

The Wahleach facility is situated in the Jones Creek watershed approximately 25 km west of Hope and 100 km east of Vancouver (Figure 2). Wahleach Dam is situated at the outlet of Jones (Wahleach) Lake Reservoir,⁸ and expanded a previously existing lake. Although the lake existed before the hydroelectric facility, the Wahleach Dam has raised its level. Water from the reservoir is diverted to a powerhouse on the south side of the Fraser River and is discharged into a creek, which flows into the Herling Island side channel. The drainage area upstream of Wahleach dam is 93 km². It is steep sided terrain with short tributary streams that flow into Jones Lake. The Jones Creek watershed is dominated by Pacific air masses moving up the Fraser Valley. The largest storms occur during the winter months, with almost 400mm of precipitation on average in November. Elevations in the basin range from 640 to 2300m. Inflow is governed by snow melt between April and July and by winter storms.

The Wahleach hydroelectric facility is part of the BC Hydro Coastal Region. The facility came into service in 1952. Water is drawn from Jones Lake reservoir (489 ha) through the Four Brothers Mountain via a 4.2 km tunnel and a 500 m penstock. The penstock connects to a single 60 MW nameplate generator located in a powerhouse on the south bank of the Fraser River. Additional water is supplied by the diversion of Boulder Creek into Jones Lake Reservoir.

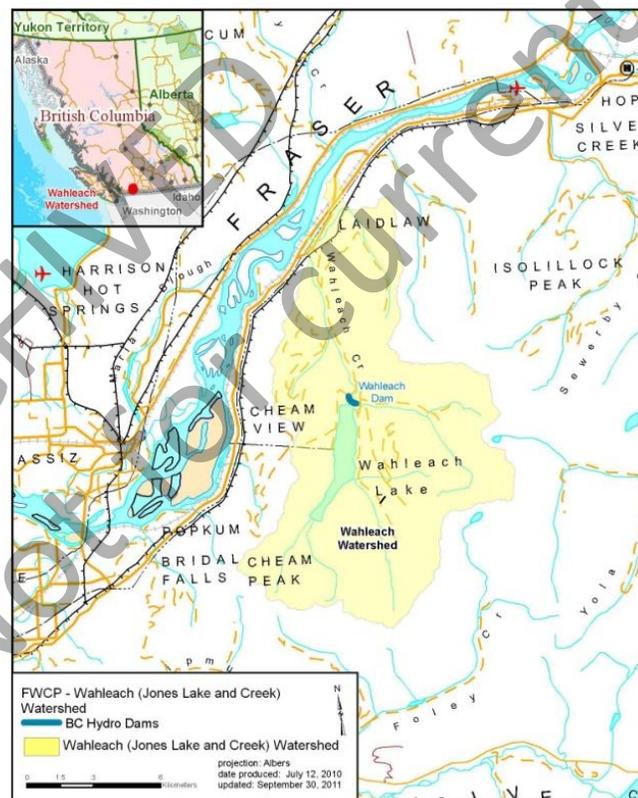


Figure 2: Wahleach Watershed

⁷ More details of the watershed can be found at: http://www.bchydro.com/bcrp/about/strategic_plan.html

⁸ Some sources refer to the old lake as Jones Lake and the new reservoir as Wahleach Lake

The Wahleach watershed lies within the traditional territories of the Stó:lō Nation. The northern portion of Jones Reservoir is a BC Hydro recreational area. As the watershed is in the eastern portion of the Fraser Valley it lies close to several sizable communities including Hope and Chilliwack.

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 9: Jones Creek-Wahleach Lake River (December 2000);
- Wahleach Water Use Plan Consultative Committee Report (October 2003); and
- Findings in the Community Workshop in Chilliwack (27 January 2011).

The original Jones (Wahleach) Lake did not contain either rainbow or kokanee; these were introduced starting in 1924.

Inundation: The original lake was inundated and lake levels were raised from 619.0 m to 641 m, resulting in the loss of 211 ha of land.

Habitat loss: Loss of 30 ha of riparian habitat, 8 km of river habitat, and 11 km of natural shoreline. Access problems for fish to tributaries off Jones Lake may occur in the spring if lake levels are too low. Fluctuating reservoir levels negatively affect shallow littoral habitats. The dam has reduced large woody debris (LWD) into Jones Creek.

New Habitat: Reservoir has created new habitat for lake fish. The Jones Creek spawning channel, constructed in 1954 to mitigate impacts of reduced flows, was damaged beyond repair by debris torrents in 1993 and 1995, and was completely removed by 2004. In 2006, BC Hydro constructed a rearing channel and spawning platform at the confluence of Lower Jones and Lorenzetta Creeks as a requirement of the Wahleach Water Use Plan (WUP).

Altered Flow Regime: Lower Jones Creek flow has been reduced through water diversion for power generation. There is also an altered flow regime in the Herling Island side channel as a result of flows diverted to and released from the powerhouse. The altered flow allows for the Herling Island side channel to be wetted during the late summer through late winter when the channel would be historically dry.

Diversions: Diversion of water out of Jones Lake has diminished the habitat capacity in Jones Creek downstream, in particular the lower sections with coho, pink and steelhead habitat.

Entrainment: Magnitude of entrainment mortality and injury on reservoir fish is unknown, however known to occur through Wahleach Generating Station, Boulder Diversion and dam release facilities.

2.3 FWCP ACCOMPLISHMENTS TO DATE

Since 1999 the Bridge Coastal Restoration Program has invested approximately \$ 100,000 to conduct research in the watershed including:

- Paleolimnological study of Wahleach and Stave reservoirs;
- Phosphorous budget study for Wahleach;
- Coho assessment study.

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. 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, 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 and MOE's shared stewardship objective. 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 the FWCP as a whole, 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.⁹ 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.

In the case of the Wahleach watershed, priorities for FWCP Coastal were further reviewed and updated in 2010 and 2011 through consultation with BC Hydro, Fisheries and Oceans Canada (DFO), and Ministry of Environment (MOE). This resulted in a list of priority tables for fish and wildlife species in the Jones Creek and Wahleach Lake watershed (Appendix A). Draft plans and

⁹ Watershed Restoration Plans may be obtained at the FWCP website:
http://www.bchydro.com/bcrp/about/strategic_plan.html

priorities were reviewed with local First Nations and community groups at a workshop in Chilliwack (27 January, 2011).

4.3 PRIORITY TOPICS

Sturgeon and kokanee are the fish species of principle interest in the project area, though there are also rainbow trout, cutthroat, coho, chum and pink salmon which are also of interest.

While kokanee are a priority, no specific project has been considered for FWCP investments as currently that species is being addressed under implementation of the Water Use Plan (BC Hydro 2003). There was a decline in kokanee population starting in the mid 70s due to a reduction of nutrient input and overfishing (BC Hydro 2003). Following the introduction of a fertilization program in 1995, stocks for kokanee and rainbow trout have increased. However, continued fertilization and increased information on its effect is warranted to ensure maximum benefits are realized.

Assessments of stocks for kokanee and rainbow trout should be conducted to maintain an appropriate ecological balance of species and monitor the effects of the fertilization program. The fertilization program is seen as a very high priority for the Ministry of Environment. The fertilization program and associated fish/limnology monitoring program are due to continue through 2014 as a component of the Wahleach Water Licence Requirements.

The following topics have been identified as priority candidates for development into future FWCP Coastal project proposals. It is important to understand, however, that planning priorities may not translate immediately into funded projects. Limited program funding requires that priority-setting has to also be developed across the program as a whole. The process of selecting which projects will be implemented in any given year will occur during the annual implementation planning cycle.

1 – ASSESS STURGEON USE AND IMPORTANCE IN HERLING ISLAND SIDE CHANNEL

Rationale

In light of possible salmon enhancement opportunities which have been identified as potentially interesting in the long term, there is a need to establish a baseline understanding of sturgeon use in the Herling Island side-channel. Sturgeon numbers in the Fraser have significantly decreased since 2004. Herling Channel was the only site confirmed with sturgeon spawning of the sites assessed in the Emergency Management BC (EMBC) 2010 Fraser River Sturgeon Sampling and Monitoring Program, and it is considered critical for the maintenance, sustainability and recoverability of the Lower Fraser white sturgeon population. The channel is a stable channel with critical crack and substrate size. There are concerns around work that could be completed in the area that would alter the stream dynamics and change the spawning habitat for sturgeon. With the current understanding of population status and habitat use/requirements, any alteration to these critically important habitats could result in irreversible impacts to the population and its recovery potential.

Both pink and chum are abundant and Chinook are also present.¹⁰ Under the WLR Program, a 5-year monitoring study completed in 2009 confirmed that there were significant issues related to stranding of pink salmon and impacts on spawning success in Herling side channel by curtailing highly variable generating flows over a 24 hour period. There may be a potential to further improve salmon populations, particularly Chinook and pink, through enhancement work over the long term.

However, alteration of these habitats would not be considered/supported without additional sturgeon spawning assessments to determine the exact extent of use and potential impacts to these habitats. Furthermore, the area is also used by rainbow trout/steelhead, coastal cutthroat

¹⁰ Chinook were noted at the workshop in Chilliwack 27 January 2011.

trout (blue listed), Dolly Varden char/bull trout (blue listed), and mountain sucker (blue listed). These species would also need to be considered prior to any enhancement work could be undertaken.

Focus

1. Ensure sturgeon spawning area is conserved and maintained.
2. Review any work to date (e.g. monitoring completed by the Water License Requirements Program).
3. Review available information on Herling Channel use by other fish species, or conduct appropriate additional assessments. A number of high risk pink salmon redd stranding locations are identified in the WLR studies.
4. Determine feasibility and acceptability to undertaking works in Wahleach channel which would reduce stranding of spawning pink and chum salmon in relation to sturgeon, as well as rainbow trout/steelhead, coastal cutthroat trout, Dolly Varden char/bull trout, and mountain sucker. This should be a joint operation between agencies and local groups.

Expected outcome

- Assessment of potential impact on sturgeon (and other species) from any chum and pink salmon project activities (e.g., stranding mitigation, spawning enhancement)
- A better understanding of the Herling Channel aquatic environment, its use and importance by multiple fish species, and potential effects associated with the Wahleach facility.

2 RIPARIAN AND WETLAND AREAS

2.1 – RIPARIAN AND WETLANDS MAPPING AND RESTORATION

Rationale

Riparian and wetland areas have been heavily impacted by the creation of dams, and continue to be under threat in many remaining areas. These areas are the limiting factor for critical life stages of many species, both aquatic and terrestrial. Riparian and wetland areas are both diverse and biologically rich and thus considered as highly valuable from an overall ecological standpoint.

To date, FWCP has not significantly funded restoration of riparian areas or wetlands in the Wahleach system. At this point it is a priority to assess opportunities and implement restoration actions in areas with high restoration potential.

Through the FWCP priority-setting process, several general species groups (amphibians, water birds, and bats) were considered first-priority representatives of the wetland and riparian community in terms of where to focus investment. Because there is little up-to-date information for these particular species in the watershed, the most immediate focus is to complete mapping and/or inventory that informs next steps (restoration, management, etc). Habitat mapping would help screen for habitats that might support species at risk, including owls, water shrew, amphibians and certain birds. Follow-up inventories of specific species would be better directed with a habitat mapping base as a foundation.

Focus

- Conduct habitat mapping of potential areas for restoration, particularly in the Lower Wahleach, Jones Creek and Wahleach Lake area. Determine possible habitats for amphibians, include mapping of old large riparian trees and old growth that could be used by cavity nesters (birds and bats). Mapping at a 1:5000 level is suggested.

Expected outcome

- Prioritized areas to conduct field work for species identification and for conservation and restoration.
- Restoration opportunities identified and assessed.

2.2 - INVENTORY OF AMPHIBIANS

Rationale

Amphibians have been heavily impacted by the construction and operation of hydro power facilities. Little to no work has been conducted to identify species or map their habitats in the Jones Creek-Wahleach Lake watershed. There are a number of endangered amphibians, reptiles and turtles that have been identified in the Fraser Valley and could potentially occur in the watershed (Table 1).

Table 1 - Potential Amphibians, Reptiles and Turtles in the Jones Creek-Wahleach watershed.¹¹

Focus	Amphibian, reptile, turtle	COSEWIC	CF Rating
	Northwestern Salamander	NAR (May 1999)	5,1,3
	Western Toad	SC (Nov 2002)	3,2,4
	Pacific Tailed Frog ¹²	SC (May 2000)	4,1,2
	Rubber Boa	SC (May 2003)	5,1,3
	Western Painted Turtle	E/SC (Apr 2006)	6,2,3
	Western Painted Turtle - Pacific Coast Population	E (Apr 2006)	4,6,2
	Common Ensatina	NAR (May 1999)	6,2,4
	Northern Alligator Lizard		5,3,4
	Northwestern Garter Snake		5,3,4
	Northern Red-legged Frog	SC (Nov 2004)	3,1,2
	Oregon Spotted Frog	E (May 2000)	1,6,1

- Conduct field inventory for red-legged frog, Oregon Spotted frog, western toad and painted turtle. The Pacific tailed-frog and Pacific Giant Salamander inhabit fast cascading streams and require a unique inventory methodology.

¹¹ From BC Species Explorer search of GVRD Regional District, <http://a100.gov.bc.ca/pub/eswp/>

¹² Also referred to as Coastal Tailed Frog

Expected outcome

- Confirmation of species presence/non-presence and prioritized areas to conduct work.
- Action recommendations for restoration or management.

2.3 – INVENTORY OF RIPARIAN AND WATER-BIRDS

Rationale

In general, water fowl and riparian birds, including heron have been heavily impacted by the construction and operation of hydro power facilities. There have been several heron colonies in the Alouette and Stave watershed, near the Jones Creek-Wahleach area, which have been abandoned and there is concern for their populations. Harlequin ducks, amongst other water fowl, are also an important species from a conservation perspective and could likely be found in the watershed. The Western Screech owl may also be present in the area. The Breeding Bird Atlas of BC¹³ may also indicate the expected species of birds that may have been found in the Jones Creek-Wahleach Lake watershed.

Focus

- Conduct field inventory for water fowl and heron, and develop recommended actions for restoration.

Expected outcome

- Confirmation of species presence/non-presence and prioritized areas to conduct work.
- Action recommendations for restoration or management.

2.4 – INVENTORY OF BATS

Rationale

Bat species have been affected by the loss of habitat due to the loss of large riparian trees for roosts. They are an important species from both a conservation and ecosystem functioning perspective. Large trees and potential areas for cavity nesters could be identified as part the mapping project. There are several species of conservation interest which could exist in the Jones Creek-Wahleach Lake watershed including: Townsend's Big Eared bat (CF-5,2,3) and Keen's Myotis (CF- 1,6,1).

Focus

- Conduct field inventory for bats, and develop recommended actions for restoration.

Expected outcome

- Confirmation of species presence/non-presence and prioritized areas to conduct work.
- Action recommendations for restoration or management.

¹³ <http://www.birdatlas.bc.ca/english/index.jsp>

Additional future topic which is considered as a low priority at this time:

NATURALIZATION OF CUTTHROAT TROUT IN WAHLEACH LAKE

Rationale

Sterilized cutthroat trout are introduced to Wahleach Lake to cull stickleback. There is a potential for cutthroat to adapt to conditions and reproduce naturally in the lake and tributaries, however, it is currently not a priority for MOE in the region. Uncontrolled increases of cutthroat population (i.e. reproduction by non-sterile, natural residents) may result in unsustainable levels of predation on species of fish other than stickleback, and amphibians. Until the effect of an uncontrolled cutthroat population can be better predicted or understood, Wahleach Lake cutthroat are preferable as a sterile population.

Focus

- Assess stock and population of species.
- Assess potential opportunities to improve cutthroat spawning habitat and potential to establish natural recruitment.

Expected outcome

- As described above, investment by FWCP into naturalizing cutthroat trout should not be pursued until a detailed assessment of cutthroat population and its potential impact on the Jones Lake ecosystem is completed.

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5 REFERENCES

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APPENDIX A – PRIORITY TABLES

The following are the priority tables developed through consultation with the Ministry of Environment and the Department of Fisheries and Oceans in the summer and autumn of 2010. The tables represent the agencies' priorities for different species and what activities should be undertaken for them, and were reviewed by a community workshop in Chilliwack (31 January 2011).

FISH

Species	FWCP Rank	Comments
Wahleach/Jones Lake and Tributaries		
Kokanee ¹⁴	Low	No Targets provided
	Low	Continued fertilization of the reservoir. This project is covered by WUP.
	Low	Assessment of reservoir fishery (catch, satisfaction). This project is covered by WUP.
	Low	Annual stock assessments to monitor fertilization program success. This project is covered by WUP.
Cutthroat	Medium	Stocking of sterile cutthroat used to cull stickleback population as part of fertilization program. Future stocking of cutthroat may be required if stickleback population increase. This project will be covered by WUP until 2014.
	Very Low	Assess potential opportunities to improve cutthroat spawning habitat and potential to establish natural recruitment. There are concerns about increasing the cutthroat population as they may start to key in on other species of fish and amphibians for food instead of eating stickleback. MOE and MNRO would like to see these fish stay as a sterile population.
All species	Medium	Assess restoration opportunities in tributaries. In order of importance for spawning enhancement work: Flat Creek, Jones Creek, Boulder Creek and Mud Creek
Middle Jones (Wahleach) Creek (d/s of dam, u/s of lower obstructions)		
All species	Low	No Targets provided
	Low	Limited access, little/no use by recreational anglers due to difficult access and size of fish.
Lower Jones (Wahleach) Creek		
All species (rainbow,	Medium	WUP requirement to maintain 2006 constructed rearing channel and

¹⁴ Note kokanee is a very high priority for MOE, but noted here as a low priority for FWCP investment at this time since it is currently being addressed under the implementation of the Wahleach Water Use Plan.

cutthroat)		spawning platform through 2014.
Pink, chum and coho	Medium	Assessment of opportunities to develop habitat in Lorenzetti Creek (more stable and shares stocks with Jones)
Herling Island (Wahleach) Side Channel		
Sturgeon,	Very high	Key area for sturgeon spawning. Any work in the area should ensure that there are no impacts to sturgeon spawning.
rainbow/stee lhead, cutthroat, Dolly Varden, bull trout, mountain sucker	High	Ensure future proposed enhancement activities in the side channel assess and avoid impacts to these species. Rainbow trout represent a low proportion of these particular species in the channel. Enhancement for cutthroat may not be critical; area currently provides good deep pools and riffle habitat.
Chum and pink salmon	High	No targets, part of Fraser River stocks.
Chum and pink salmon	High	In the longer term, undertaking works in Wahleach channel which would reduce stranding of spawning pink and chum salmon. DFO advise that this be most beneficial if done in conjunction with establishing a minimum flow from the Wahleach power facility.

MAMMALS

Species	FWCP Priority	CF Rank	Comments
Bats	High	1	General inventory. Need to find roost trees and hibernacula.
Trowbridge's Shrew	Medium	6,2,3	The species gets caught when you inventory for Pacific Water Shrew.
Pacific Water Shrew	High	5,6,1	Improvement of degraded streams, riparian restoration. Recommended restoration activities are listed in Pacific Water Shrew BMPs.
Mountain Beaver	Medium	5,2,3	One WHA in place there already (S end of lake). Inventory. Habitat protection. Could be high priority.
Grizzly Bear	Medium	3,2,3	In North Cascades GBPU (Threatened). Needs inventory (hair snagging) to determine occupancy. GBPU is of very high conservation significance to adjacent populations and a very high priority for population trend monitoring (Apps 2010).
Wolverine	Medium	3,2,3	Research study going on to the east of this lake, could be using the Wahleach watershed. Funding could support the existing research project.

Mountain Goat	High	4,1,3	Low density, no hunting. There are goat winter ranges in area, designated as UWRs but not a lot of inventory done on species. Washington state doing genetic work on them. Deer winter ranges are far away and are not a priority in Wahleach. Human access management an issue (goats don't do well with disturbance).
Carnivore monitoring	Medium		US Forest Service wants to do cross-border carnivore monitoring through remote-cameras. Funding could help support that effort.

BIRDS

BCR=Bird Conservation Region (CWS)
 PCJV=Pacific Coast Joint Venture (CWS)
 NAWMP=North American Waterfowl Management Plan (CWS)
 PIF=Partners in Flight (CWS)
 CF=Conservation Framework

Species	FWCP Priority	CF Rank	Comments
Great Blue Heron <i>fannini</i> ssp.	High	3,6,1	Species impacted by loss of nesting and foraging habitats due to hydroelectric development. Loss of habitat and predation by Bald Eagles are high magnitude threats. Projects: inventory and protection of nest sites, restoration/replacement of potential cottonwood nest trees. A few colonies in eastern Fraser Valley have been abandoned. Not sure where they went. A priority species in BCR 5.
Green Heron	Low	6,6,4	MOE interested in sightings. A priority species in BCR 5.
Harlequin Duck	Medium	4,1,3	Population data: no trend (NAWMP). A priority species for PCJV and BCR 5 (CWS). A species that is definitely impacted by hydroelectric development.
Bald Eagle	Low	6,6,6	A priority landbird species in BCR 5.
Northern Goshawk (<i>laingi</i> ssp.)	High	1,6,1	A priority landbird species in BCR 5 for CWS. Inventory for nests, then designation of WHAs.
Peregrine Falcon (<i>anatum</i> ssp.)	Low	5,6,2	Peregrines are found in the area. A priority landbird species in BCR 5.
Gyrfalcon (non-breeding)	Low	6,6,4	Population trend: low vulnerability (PIF). A priority species in BCR 5.
Spotted Owl	Low	5,6,2	A priority landbird species in BCR 5. No WHAs for spotted owls in Wahleach, not much habitat (old growth forests) left for them there. Any forest restoration work would be beneficial.
Band-tailed pigeon	Medium	5,2,3	Need inventory and identification and protection of mineral licks. A priority species in BCR 5.

AMPHIBIANS, REPTILES AND TURTLES

Species	FWCP Priority	CF Rank	Comments
Oregon Spotted Frog	High	1,6,1	May not have the habitat for them, need to assess habitat and decide if inventory is needed. If they are there they are a high priority.
Coastal Giant Salamander	High	5,6,1	Inventory needed.
Other Amphibians (Pacific tailed frog, red-legged frog, western toad)	Medium	1	Need presence data and evidence of breeding. Assess whether there is habitat for each species, inventory for those that have suitable habitat, decide on restoration opportunities.
Painted Turtle (Pacific coast)	High	4,6,2	May not have the habitat for them, need to assess habitat and decide if inventory is needed. If they are there they are a HIGH priority. Good opportunity to do restoration work for them.
Rubber Boa	Medium	5,1,3	Inventory needed.

PLANTS

Species	FWCP Priority	CF Rank	Comments
Tall bugbane	High	1,6,1	Inventory. Have recovery team and strategies in place.
Phantom Orchid	High	5,6,2	Inventory. Have recovery team and strategies in place.
Cliff Paintbrush	High	3,4,4	Inventory. Have recovery team and strategies in place.
Rare plants	High		General inventories of rare and endangered plants.

Note that no specific invertebrates were identified as a high priority, but they may be in future plans.