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FISH AND WILDLIFE
COMPENSATION PROGRAM

CAMPBELL RIVER WATERSHED WATERSHED PLAN FINAL DRAFT

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Campbell River Watershed Plan

1 INTRODUCTION

This Campbell River 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 Campbell River 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 Campbell River 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).

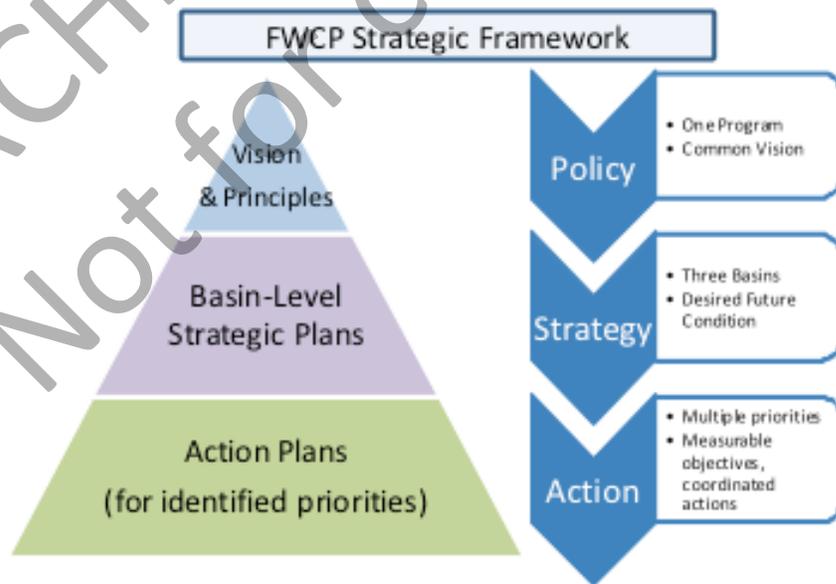


Figure 1: Relationship between the FWCP Strategic Framework, basin strategic plans and action plans.

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;
- Protection of fish, wildlife, species-at-risk and their habitats;

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

- 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.

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

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.

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 CAMPBELL RIVER WATERSHED⁶

2.1 SETTING

The Campbell system, including the upper sub-basins of the Heber, Salmon and Quinsam, straddles the Vancouver Island mountain range near the town of Campbell River (Figure 2). Elevations range from sea level in the Campbell and Salmon river estuaries to rugged peaks with small areas of permanent snowpack over 2200 m. Inflows are typical of British Columbia coastal basins, with high inflows from snowmelt in May through July, low flows in August and September and high precipitation from October to March with mixtures of snow and heavy rain. The average precipitation in November is 420mm, but may reach 800mm. A more detailed explanation of the system and the hydro facilities can be found in BC Hydro (2000).

The Campbell River system lies within the traditional territory claimed by the Mowachaht/Muchalaht First Nation and Hamalga First Nations. The Lower Campbell River flows through the community of Campbell River before discharging into the Georgia Strait. The Upper Campbell River watershed lies within Strathcona Provincial Park and adjoins the Upper Puntledge River and Ash River watersheds.

The Campbell River hydro-electric development consists of three dams on the Campbell mainstem and one diversion on each of the Salmon, Quinsam and Heber rivers. On the mainstem, John Hart Dam (1953), is the lowermost facility, impounds John Hart Reservoir and diverts water to a powerhouse located 2km downstream of Elk Falls. John Hart has the lowest discharge capacity (124 m³/s) and the system is usually operated to optimise production at its generating station. The local basin area behind John Hart Dam is relatively small, only 24 km², and inflows are dominated by upstream releases.

Ladore Dam (1958) is the middle facility, which impounds Lower Campbell Lake Reservoir, and has a powerhouse adjacent to the dam with a discharge capacity of 161.5 m³/s. The terrain consists of rolling heavily forested hills, the mean basin elevation is 250 m and the local basin area behind Ladore Dam is 243 km². Inflows are primarily influenced by upstream releases at Strathcona Dam, and from diversions from the Salmon and Quinsam rivers.

Strathcona Dam (1958) is the uppermost facility, impounds Upper Campbell Reservoir and Buttle Lake, and has a powerhouse located at the toe of the dam with a discharge capacity of 175.6 m³/s. The upper most reservoir was formed by impounding Upper Campbell and Buttle lakes, and is about 50 km long and up to 5 km wide. The creeks feeding the reservoir tend to be short and steep. The Elk River sub-basin contains the longest watercourse, which is 24 km long and falls roughly 760 m. The mean basin elevation is 950 m and the basin area is 1192 km². Natural hydraulic inflows from the basin are augmented by diverting water from the Heber River. During periods of high inflow when it is necessary to control rising levels in Upper Campbell Lake, Strathcona discharges are often increased to 175.6 m³/s resulting in spills downstream at the Ladore and John Hart facilities.

The Salmon River Dam diverts water from the upper Salmon River and Paterson Creek into Brewster, Gray, Whympier and Fry lakes and then into Lower Campbell Lake. The Salmon diversion contributes to power generation both at the Ladore and John Hart power stations.

The Quinsam project includes the Quinsam Dam at the outlet of Wokas Lake and a diversion dam further downstream on the Quinsam River. Water is diverted through Gooseneck and Snakehead lakes, Miller Creek and into Lower Campbell Lake Reservoir. The Quinsam diversion contributes to power generation at both Ladore and John Hart power stations.

The Heber River Dam diverts water from the upper Heber River into Crest Lake then through the Drum lakes into the Elk River, which enters Upper Campbell Lake Reservoir. Crest Creek, a former

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

tributary to Heber River, is also diverted into the Drum lakes. The Heber-Crest diversion contributes to power generation at all three power stations on the Campbell mainstem.

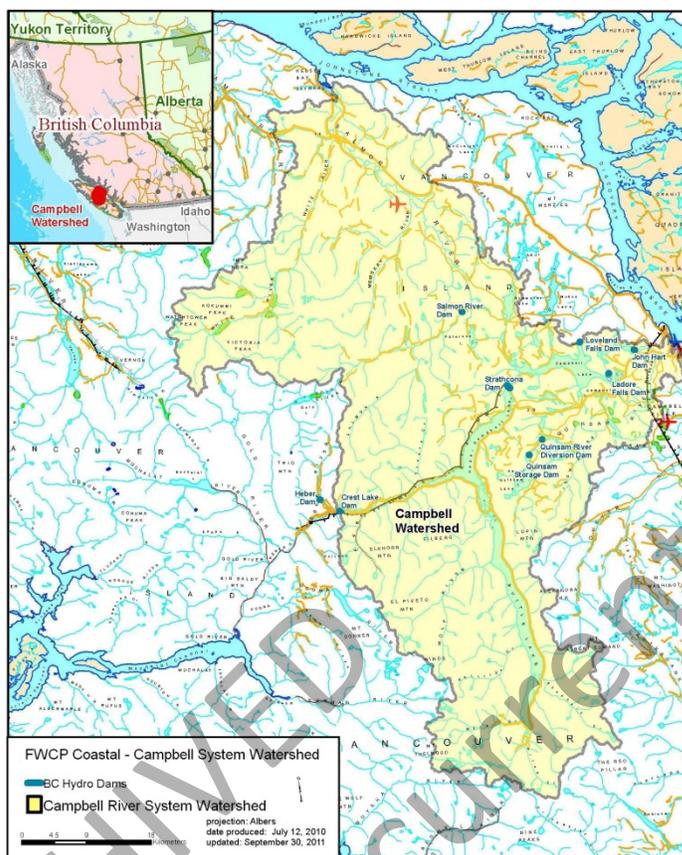


Figure 2. The Campbell River hydropower project.

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 2: Campbell River (December 2000);
- Campbell River Water Use Plan Consultative Committee Report (August, 2004); and
- Findings in the Community Workshop (Campbell River, May 28, 2009).

Inundation: The reservoir area of the combined project is 9,725 ha, and inundated 5,208 ha of land (riparian and woods) and 4517 ha of natural lakes. The current total reservoir shoreline length is 282 km (Figures 2)

Habitat loss: Infrastructure footprint caused significant loss of instream, riparian/floodplain and coniferous lowland habitats along the entire Campbell River mainstem and lake system. Important losses of aquatic and riparian habitat also occurred in the original westward flowing portion of the diverted Crest Creek channel, downstream of Crest Lake. Structures have reduced large woody debris and gravel recruitment, particularly notable for Strathcona and Ladore in the Campbell River and the Salmon River diversion in the Salmon River. Loss of habitat has had corresponding effects on wildlife, notably winter range habitat for elk.

Migration and access barriers: Reduced access for fish using channels where flows are diminished due to diversions (Heber, Salmon and Quinsam) or where historic access has been blocked by dams or tailrace channels (Mainstream Campbell, Salmon and Quinsam). Reservoir drawdowns in Upper Campbell reduce access to spawning habitat in alluvial fans.

Conversion of Campbell and Elk rivers to reservoir have resulted in barriers to migration of ungulates and bears; and increased mortality/predation along barrier edge (e.g., during ice conditions).

New Habitat: Increased spawning habitat for cutthroat in Mud Creek and Drum Lakes system due to increased flow from the Crest Creek diversion. Also a general increase in lake and shoreline habitat for aquatic wildlife.

Altered Flow Regime: Regulated flows due to dams and diversions have altered the flow regimes in the mainstem Campbell River and diversion streams significantly altering the natural conditions for fish spawning, incubation and rearing. Examples of site-specific issues include: i) the gravel deposits that are transported into the Lower Campbell from the Salmon River diversion, ii) the periodic spills from John Hart that cause sedimentation of spawning habitat and induce migration of steelhead and subsequent stranding, and iii) the high rate of flushing through Lower Campbell Lake that has reduced plankton and littoral productivity.

In general the effects of altered flow regimes on wildlife are unknown.

Diversions: Diversions at Heber, Salmon River and Quinsam River have reduced annual flow volumes in their downstream channels and increased volumes in the new channels; these altered flows have affected the wetted channel area, habitat, debris and gravel recruitment, migration, seasonal temperatures and stream productivity. Loss of spawning area and stranding has occurred in the bypassed channel between Elk Falls and the John Hart tailrace reduced the hydraulic flow below the diversions as well as increased the flow within the diversions. Reduced flows have had potential affect on aquatic related wildlife such as water fowl, furbearers, and elk.

Entrainment: The extent and influence of entrainment from Strathcona, Ladore and John Hart dams are unknown but currently under study.

Non-Hydro: Other impacts in the Campbell River watershed include historic effects of logging, mining (at the head of Buttle Lake), flood protection and urbanization. A significant portion of the upper watershed is protected within Strathcona Provincial Park. Historic logging in the Elk watershed has increased the rate of sediment delivery to the main channel, and has contributed to channel instability in the Elk River. Logging is also implicated in increased debris and sediment delivery to the upper Salmon River. Activities at Western Mines near the head of Buttle Lake increased concentrations of toxic metals. Biological communities in Buttle Lake have returned to their former abundance after remedial measures were applied in the early 1980s

2.3 FWCP ACCOMPLISHMENTS TO DATE

Since 1999 the Bridge Coastal Restoration Program has invested approximately \$ 4.2 million in the Campbell system watershed.

Restoration work includes:

- Numerous salmon spawning gravel placements (e.g., Eberts Road, First Island, Elk Falls canyon).

- Side- or off-channel aquatic habitat (e.g., Elk Falls #3 side-channel upgrades, Salmon River/Big Tree Main side-channel).
- Salmon River nutrient enrichment.
- Baikie Island reclamation.

Conservation work includes:

- Vancouver Island marmot re-introductions to Strathcona Park (Greig's Ridge, Mt. Adrian).
- Roosevelt elk winter range – prescribed burn.
- Baikie Island and Salmon River estuary land purchases.

Research work includes:

- Salmon River fish passage efficiency.
- Owl distribution and habitat usage (various sp.).
- Vancouver Island water shrew distribution and habitat use.
- Amphibian (e.g. Red-legged frog) distribution and habitat use.
- Use of strobe lights as fish deterrent to reduce entrainment at John Hart dam.

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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 AND CAMPBELL RIVER WATERSHED

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 region 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 priorities were developed

⁷ Watershed Restoration Plans: <http://www.bchydro.com/bcrp/projects/watersheds.html>

through consultation with agency staff. These priorities were then reviewed and discussed at a series of workshops to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities.

The results from the Campbell River Watershed workshop are summarized in Appendix A, highlighting the species, habitats, and specific activities as priorities for further work. On the aquatic side, Chinook, pink, and coho salmon were viewed as priority species in different areas of the Campbell system. Steelhead and cutthroat trout were also viewed as highest priority fish species in the lower river systems, along with Dolly Varden, cutthroat and rainbow trout in the Upper and Lower Campbell reservoirs.

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. Species of high priority included the Vancouver Island marmot and the Roosevelt elk along with a number of birds including Northern Pygmy, Western Screech owls and the Great Blue heron. The Red-legged frog was also noted as a high priority amphibian species. Finally, specific ecosystems of interest included wetlands and riparian areas, as well as old growth/upland areas for ungulates, and the estuary.

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 Campbell 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 the estuary (focus on investigation and inventory to determine management options), reservoir fisheries (focus on improving opportunities for recreation and sport fishing), and uplands (focus on habitat enhancement).

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 Campbell River Watershed provide broad support to the FWCP strategic sustainable use objective.

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

SALMONID ACTION PLAN

Rationale

Salmonid species have been heavily impacted by the creation of dams and hydroelectric facilities in the Campbell system. Limiting factors for salmonids in the watershed vary among species and include useable habitat, access to habitats (e.g., passage), and altered flows. This overall action plan for salmonids includes integrated habitat restoration planning and analysis to determine actions that provide the most benefit to multiple species.

Priorities for anadromous salmonids focus on conservation actions for Chinook, steelhead, cutthroat, pink, and coho. Inventory and priority setting, primarily in the reservoirs, is the near term priority for resident salmonid species.

The bulk of money spent in the Campbell system to-date has been towards habitat restoration and conservation activities for salmonid species. Given the extent of these prior investments, the plan incorporates effectiveness monitoring that will help inform future implementation activities. The plan directs new habitat and restoration activities toward opportunities in off channel habitats in the Salmon and Quinsam Rivers, and in nearby systems such as the Tsitika River. These locations represent the highest potential for cost effective gains in compensation habitat.

Focus

1. Assessment of the effectiveness of existing habitat enhancements in terms of adult returns and escapement.
2. Implementation of habitat restoration actions for priority areas, including off channel opportunities, gravel placement etc.
3. Assessment of fish passage opportunities for the Salmon and Quinsam Rivers.

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.
- Improved understanding of the implications of increased fish passage in the Salmon and Quinsam in the Rivers.

RIPARIAN AND WETLANDS ACTION PLAN

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 Campbell system. 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.

Expected outcome

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

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 of conservation concern are a priority for all agencies and partners. Some, such as the Vancouver Island Marmot and Red-legged frog, are known to exist in the Campbell Watershed, their habitats have been fairly well identified, and in some cases management actions have been identified. The Vancouver Island marmot for instance has a Provincial Recovery Strategy. 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.

In the past, the FWCP has invested in projects supporting the re-introduction of the Vancouver Island marmot to upland areas and improving winter habitat for Roosevelt Elk. Support has also been directed toward distribution studies for owls and amphibians which have resulted in some actions (e.g., nest boxes) and potential projects (understanding the effects of reservoir operations on amphibian habitat).

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 Campbell River system.

Focus

1. Build upon the past efforts associated with the identified FWCP priority species of concern in the Campbell River watershed.
2. Conduct mapping and prioritization of activities for additional species of concern.

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.

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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 Campbell River (28 May, 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

Habitat	FWCP Rank	Comments
Riparian Habitat	high	<p>Riparian habitats are of high value for many birds, mammals and amphibians.</p> <p>Important areas of focus include the restoration of damaged riparian areas, the establishment of covenants on private lands for long-term habitat conservation, low grade riparian sites, and the restoration/securement of off-site land to compensate for the permanent loss of valley-bottom riparian zones.</p> <p>There are not many opportunities to restore riparian habitats, so emphasis should be placed on identification and conservation of habitat remnants. Once remnants are identified and evaluated for quality, landowners should be contacted. To prevent habitat fragmentation, an overarching strategy that includes municipality participation is needed.</p> <p>A strategy needs to be developed that begins with mapping, followed by inventory to determine what can be conserved and which factors may limit conservation efforts.</p> <p>There are major issues with data privacy that will make it difficult to conduct an assessment of priority habitats for conservation.</p>
Old-growth Forest	high	<p>Old-growth forests are high value habitats for some mammals and birds.</p> <p>In order to justify putting effort into projects, land status must first be secured.</p> <p>There is currently no rotation age (<50 years); rotation is determined by economic feasibility.</p> <p>Logical pieces of land must be purchased that link areas of high restoration priority (e.g., old growth around wetlands).</p> <p>The possibility of purchasing old growth patches left behind in places where logging companies are selling land (i.e., TimberWest) should be considered as a means to achieve conservation goals.</p> <p>A partnership approach to land acquisition is needed, but it is also important to move forward quickly.</p>

Habitat	FWCP Rank	Comments
		Silviculture treatments of younger forests stand to speed attainment of the mature/old-growth characteristics that benefit many wildlife species.
Wetlands	high	<p>Wetlands are a high value habitat for many birds, mammals, amphibians.</p> <p>Wetlands need to be restored to more natural conditions.</p> <p>Off-site areas need to be restored/secured to compensate for the permanent loss of valley-bottom wetlands.</p> <p>A multi-tiered approach to the restoration and conservation of wetlands should be followed. It is easier to restore existing wetlands than to create new ones.</p> <p>Opportunities may exist in the wetlands surrounding Campbell Lake.</p>
Estuaries	high	<p>Investigation is needed into whether there are sufficient amounts of estuary habitat.</p> <p>Development is a threat to estuaries.</p>

FISH

Species	FWCP Rank	Comments
Lower Campbell River		
Chinook	high	<ul style="list-style-type: none"> There is an ongoing priority on gravel placement to encourage egg to fry survival in the mainstem upstream of Second Island. A more 'native' mix/size gravel specification should be used, with a higher coarse sand content. Restoration opportunities in the estuary need to be assessed, including fry use analysis and mapping of the area and vegetation. This assessment could be integrated with the Fish & Wildlife Management Areas process that is already underway. Support is needed for the hatchery project to incubate Chinook eggs and imprint fish to spawn in the Campbell River. Assessment of adult returns is needed to determine the project's success.
Steelhead	high	<ul style="list-style-type: none"> Steelhead are an extreme conservation concern, as there are only a few fish per kilometre. Support is needed for the fish culture project to enhance a sports fishery based on Tsitika stocks that have been showing up in the

Species	FWCP Rank	Comments
		Lower Campbell River.
Cutthroat Trout	high	<ul style="list-style-type: none"> There is a general lack of good baseline information and a need for data gathering and assessment before restoration opportunities can be identified. Assessments can be combined with Coho assessments.
Chum	med/ high	<ul style="list-style-type: none"> While the general priority ranking for the species is medium, there is a high priority on the project to reduce stranding downstream of Second Island. Proposed Chinook projects will benefit chum spawning.
Coho	med	<ul style="list-style-type: none"> Coho projects are linked with the Wild Salmon Policy Rearing habitat is limiting, and off-channel projects offer the best restoration opportunities. Before off channel projects can begin there must be: <ul style="list-style-type: none"> an assessment of the effectiveness of existing channels an assessment of the feasibility of potential new channels (e.g., Bjornason Channel)
Pink Salmon	low	<ul style="list-style-type: none"> There are no targets set, and very limited opportunities, since gravel requirements are not suitable in the Lower Campbell River.
Sockeye Salmon	low	<ul style="list-style-type: none"> There are no targets set, since there are very few of the species present (less than 100 spawners per year).
Quinsam River		
Steelhead	high	<ul style="list-style-type: none"> The species is an extreme conservation concern. Improved use of upstream habitats is a priority. Habitat complexing is necessary in the Quinsam mainstem and Cold Creek. Anadromous fish use of the Middle Quinsam needs to be assessed.
Pink Salmon	high	<ul style="list-style-type: none"> Improved access over Cascade Falls has provided 14 km of spawning habitat. The effectiveness of the fishway needs to be assessed, which would provide valuable information on Coho and steelhead smolt production. Chinook restoration works would also benefit pinks.
Coho	high	<ul style="list-style-type: none"> There is a priority on habitat capacity and restoration feasibility assessments for Coho and Chinook.
Chinook	med/ high	<ul style="list-style-type: none"> There is a high priority on habitat productivity assessments, as habitat factors may be the cause of low Chinook returns. Feasibility assessments of restoration opportunities should follow habitat assessments, and are of medium priority.
Chum	low	<ul style="list-style-type: none"> Projects directed at chum are of low priority.

Species	FWCP Rank	Comments
Salmon River		
Coho	high	<ul style="list-style-type: none"> Restoration opportunities need to be assessed, including those in the Upper Salmon watershed (assuming the fish passage issues there could be eventually resolved/improved). Works to improve access for multiple species would be beneficial, provided consideration is given to the potential impacts on steelhead. There is priority on the complete fish passage assessment at the Salmon River diversion that is currently underway. There are potential groundwater channels near Big Tree Creek Main. Issues related to smolt migration and connectivity above and below the diversion dam need to be evaluated.
Steelhead	high	<ul style="list-style-type: none"> Restoration opportunities need to be assessed, including those in the Upper Salmon watershed (assuming the fish passage issues there could be eventually resolved/improved). Nutrient augmentation upstream of the diversion dam is a priority Side channel development (particularly of the Big Tree side channel) is necessary.
Chinook, Pink & Chum	low	<ul style="list-style-type: none"> There are limited opportunities for restoration gains in the watershed. Chinook are a high fish management priority, but a low restoration priority. As pink and chum access is likely restricted to areas below the canyon, they have probably not been affected by footprint impacts.
Upper and Lower Campbell Reservoirs		
Dolly Varden, Cutthroat Trout, and Rainbow Trout (sport fish)	high	<ul style="list-style-type: none"> Development of fisheries management plans and Water Use Planning studies should be completed before restoration projects are undertaken. Channel and bank stabilization works are needed, as well as habitat restoration projects and nutrient enrichment in the chain of lakes and creeks associated with the Salmon River diversion (Brewster, Graym Whympier and Fry Lakes). Restoration projects directed at Cutthroat and Dolly Varden are of high priority. Instream complexing (placement of large woody debris) in Drum Creek is of medium priority.

MAMMALS

Species	FWCP Rank	Comments
Species at Risk in General	high	<ul style="list-style-type: none"> All wildlife agencies consider SAR a high priority. Species at Risk in the CBR River Watershed are listed in the following section.
Vancouver Island Marmot	high	<ul style="list-style-type: none"> VI marmots are a very high priority under the Conservation Framework (CF), higher than spotted owls (which are considered a peripheral species). The species is a very high social priority due to all the PR they've received. Projects must be coordinated with the VI Marmot Recovery Team. Priorities include the restoration of populations to their former range, population monitoring, and research into the effects of human activities, global warming and predator/prey interaction.
Roosevelt Elk	med/ high	<ul style="list-style-type: none"> Focus should be on winter range conservation, securement, enhancement, access management, population inventory/monitoring, and controlled burns in 2nd growth forests to enhance spring range foraging habitat. It is unclear whether the Roosevelt elk population has returned to historic levels, as there is no reliable historic information. Priority for elk did not reach consensus, however, there was support for ranking this species at either a high or medium priority.
American Water Shrew	med	<ul style="list-style-type: none"> The species is rare and requires a riparian habitat. Because inventory is very difficult, suitable habitat should be managed for this species wherever possible. Habitat should be managed using existing Best Management Practices (BMPs) for riparian areas.
Furbearers	low	<ul style="list-style-type: none"> The highest furbearing species of concern is ermine, which is of medium priority on the SAR list. Inventory and landscape-level habitat management are priorities.

BIRDS

Species	FWCP Rank	Comments
Northern Pygmy Owl	high	<ul style="list-style-type: none"> Inventory specific to pygmy owls is needed, as they are not well served by the multi-species inventory that has been previously conducted.

Species	FWCP Rank	Comments
Western Screech Owl	high	<ul style="list-style-type: none"> • Western screech owl are a riparian-dependent Species at Risk with habitat restoration and securement potential. • Inventory is needed in areas where there is none. • Long-term monitoring is needed. • The effectiveness of the nest box program needs to be evaluated. • CBR projects may be linked to other areas (e.g., Shuswap).
Great Blue Heron	high	<ul style="list-style-type: none"> • Estuaries are an important habitat for great blue heron (especially the Salmon River Estuary). • Priorities include monitoring of nesting colonies, securement/conservation of nesting sites, and conservation of intertidal foraging areas.
Northern Goshawk	med	<ul style="list-style-type: none"> • Breeding habitat conservation and landscape-level land management are priorities. • Stand treatments (thinning, fertilizing) to speed up old-growth characteristics (larger trees, larger branches for nests, more open stands, higher canopy cover) • Land set aside under Wildlife Habitat Areas (WHAs) is protected and would be worth enhancing. • Inventory is of lower priority than conservation, but it would be useful to determine the locations of breeding territories. • If more was know about the species, nest territory enhancement would be beneficial as there is a long-term forest management agreement is in place.
Band-tailed Pigeon	Med-High	<ul style="list-style-type: none"> • Consensus could not be reached on priority for this species, but support was shown for both medium and high priority. • While numbers are decreasing drastically in other places, it is unknown whether this is the case in CBR. • Mineral sites that are close to breeding sites need to be identified, which could be accomplished through radio-telemetry monitoring. Critical mineral sites could then be secured/conserved. Efforts could partner with other (including Federal) agencies.
Osprey	med	<ul style="list-style-type: none"> • The species has a medium priority ranking, but is of high social value. • The addition of nest platforms would be beneficial.
Riverine birds (Common Merganser, American Dipper, Harlequin Duck)	med/low	<ul style="list-style-type: none"> • Riverine birds are affected by multiple BC Hydro operations. • Common Merganser and American Dipper are of low priority, however Harlequin Ducks were directly affected by the reservoirs and are of medium priority. Efforts should aim to keep these common species common. • Research needs to be done on the effects of water quality, stream

Species	FWCP Rank	Comments
		<p>productivity and fisheries relationships on productivity, and the genetics and dispersal of birds between river systems.</p> <ul style="list-style-type: none"> • Conservation, stewardship and management of riparian habitat is necessary along rivers. • Landscape level assessments of BC Hydro's effect on riverine birds are needed.
Bald Eagle	low	<ul style="list-style-type: none"> • Bald eagles are of very high social value, but are a low conservation concern. • Conservation of the winter roost and nesting habitat, riparian covenants, and management of nest trees are priorities. • There has been a lot done in terms of pole placement and Baikie land acquisitions. All fish stock increases benefit eagles.

AMPHIBIANS, REPTILES AND TURTLES

Species	FWCP Rank	Comments
Red-Legged Frog	high	<ul style="list-style-type: none"> • Amphibians are of high priority because they are a footprint impact species that have been directly affected by inundation. • Priorities include conservation/enhancement of breeding sites, research on the effects of reservoir operations on breeding success/populations, and identification of key habitat for conservation purposes (such as Strathcona and Patterson). • Bullfrog expansion and Chytrid fungus sampling are important.

Wildlife Species at Risk that occur or could occur in the Campbell River Watershed

	COSEWIC	CF Ranking
Mammals		
Keen's Myotis	Special Concern	1,6,1
Vancouver Island Marmot	Endangered	1,6,1
Townsend's Big Eared Bat		5,2,3
Ermine	Threatened	6,6,6
Birds		
Marbled Murrelet	Threatened	1,6,1
Northern Goshawk (laingi subspecies)	Threatened	1,6,1
Great Blue Heron (fannini subspecies)	Special Concern	3,6,1
Sooty Grouse	Extirpated	5,2,3
Barn Owl	Special Concern	6,2,3
Short-Eared Owl	Special Concern	6,2,3
Western Screech Owl (kennicottii subspecies)	Special Concern	3,1,2
Amphibians		
Red-legged Frog	Special Concern	3,1,2