FISH AND WILDLIFE
COMPENSATION PROGRAM

CAMPBELL RIVER WATERSHED

SPECIES OF INTEREST ACTION PLAN

FINAL DRAFT

The FWCP is a partnership of:

BC hydro
FOR GENERATIONS

BRITISH COLUMBIA

Canada
Fisheries and Oceans Canada
Pêches et Océans Canada

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Campbell River Species of Interest Action Plan

1 INTRODUCTION

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 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).

This Species of Interest Action Plan sets out priorities for the Fish and Wildlife Compensation Program to guide projects in the Campbell River project area, which for the purposes of this planning document includes the Salmon and Quinsam rivers. As many species of interest, such as Roosevelt Elk may have ranges that extend beyond the watershed boundaries, the action plan may also consider actions in areas beyond the Campbell River system. Also, as the headwaters of the Campbell River system are adjacent to the headwaters of the Puntledge and Ash River systems, some activities may be considered jointly between the three systems, such as activities supporting the Vancouver Island marmot recovery strategy.

The plan focuses on species of conservation concern (including species-at-risk) or other regionally important species for management planning process. The plan builds on the FWCP's strategic objectives and the Campbell River Watershed Plan (FWCP, 2011). Action plans have also been developed for riparian and wetland areas and salmonids; and some actions may be complementary across the different plans.

The actions and priorities outlined in this plan have been identified 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 through consultation with agency staff. These priorities were then reviewed and discussed at a workshop[1] to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities In addition to mapping and inventory of species of concern in general, priority species included in this plan are:

[1] Campbell River, 28 May 2009.

- Roosevelt elk
- Vancouver Island Marmot
- Great Blue Heron
- Northern Pygmy-owl
- Western Screech-owl
- Band-tailed Pigeon
- Northern red-legged frog

It is important to understand, however, that planning priorities within action plans 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, not just within action plans. The process of selecting which actions will be implemented in any given year will occur during the annual implementation planning cycle.

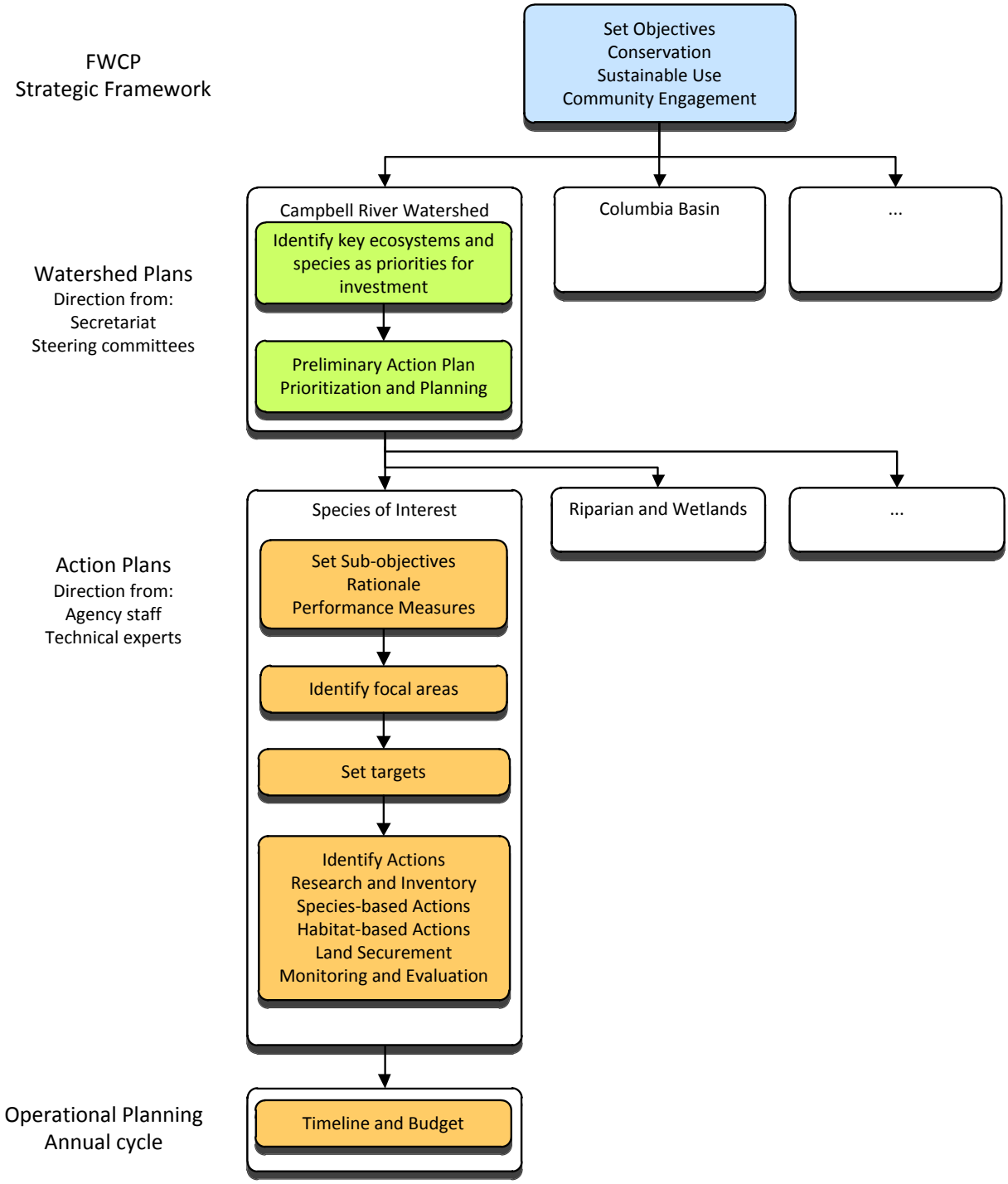

Figure 1: Relationship between the Species of Interest Action Plan and higher level planning and objectives.

2 OVERVIEW CONTEXT

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 Hamalta 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 m^3/s) and the system is usually operated to optimize production at its generating station. The local basin area behind John Hart Dam is relatively small, only 24 km^2, 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 of161.5 m^3/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 km^2. Inflows a 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 m^3/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 km^2. 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 m^3/s resulting in spills at the Ladore and John Hart facilities.

The Salmon River Dam diverts water from the upper Salmon River and Paterson Creek into Brewster, Gray, Whymper 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 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.

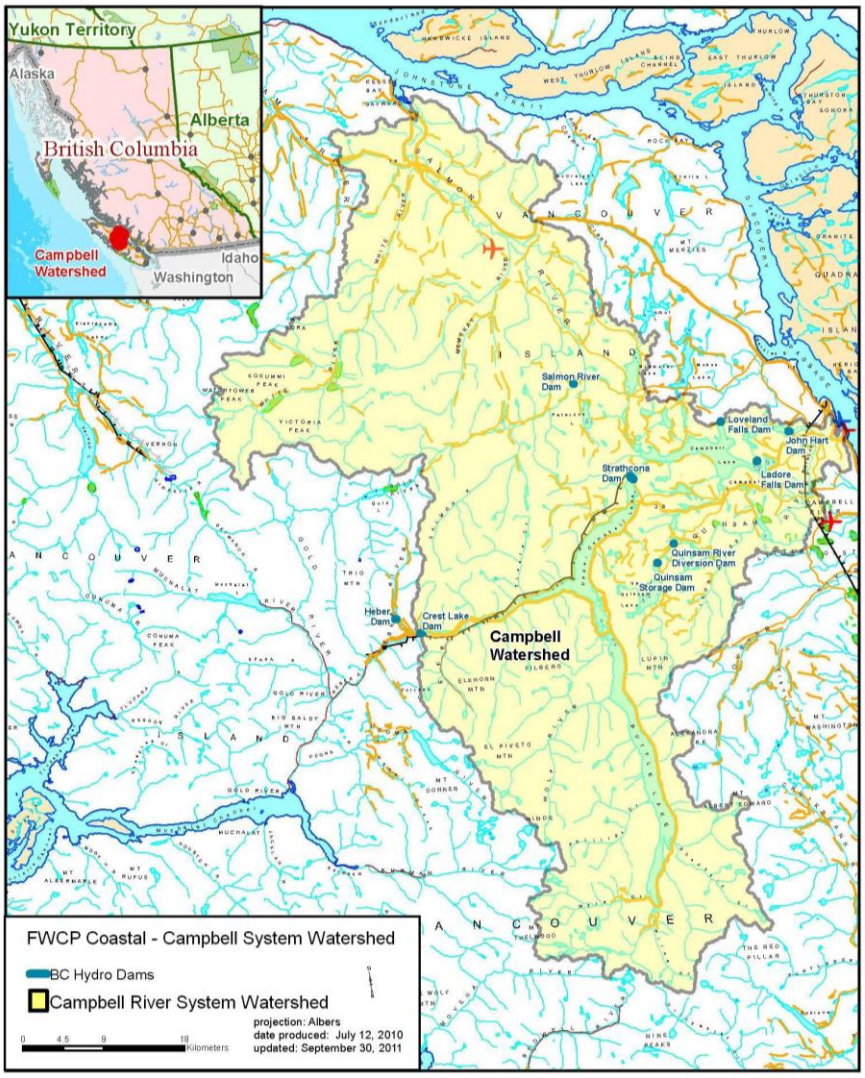

Figure 2. The Campbell River hydropower project.

2.1 IMPACTS AND THREATS

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).

Hydro-related Impacts — All dams in the Campbell system were constructed upstream of anadromous fish barriers, but construction affected habitats for resident stocks and operations affect both upstream and downstream habitats. Impacts are described here by location within the Campbell system. Area calculations are based on GIS analyses done for BC Hydro (2000).

Upstream of Strathcona Dam (Upper Campbell Reservoir and Buttle Lake).

1. The impoundment flooded:
    - 3583 ha of lake,
    - 3186 ha of land,
    - 252 ha of mainstem channel and 143 ha of adjacent riparian area,
    - 21 km of tributary habitat and 65 ha of adjacent riparian area, and
    - 695 ha of wetland.
2. Annual drawdowns reduce littoral productivity and affect the viability of spawning habitats in reservoir tributaries. Fluctuations in reservoir level effects vegetation and riparian development, as well as posing threats to nesting birds.
3. Increased lake size has created a barrier to the movement of animals, potential for increased mortality/predation along the margins.

Upstream of Ladore Dam to Strathcona Dam (Lower Campbell Reservoir).

4. The impoundment flooded:
    - 934 ha of lake,
    - 1676 ha of land,
    - 81 ha of mainstem channel and 77 ha of adjacent riparian area,
    - 20 km of tributary habitat and 61 ha of adjacent riparian area, and
    - 241 ha of wetland.

5. Annual drawdowns reduce littoral productivity and affect the viability of spawning habitats in reservoir tributaries. Annual fluctuations are considerably less than in Upper Campbell Reservoir. Fluctuations in reservoir level effects vegetation and riparian development, as well as posing threats to nesting birds.
6. Structures and operations may pose a hazard to wildlife.
7. The flooding of the mainstem poses barriers to migration.
8. High flushing rate through Lower Campbell Reservoir reduces plankton and littoral productivity.

Upstream of John Hart dam to Ladore dam (John Hart Reservoir).

9. The impoundment flooded:
    - 346 ha of land,
    - 62 ha of mainstem channel and 60 ha of adjacent riparian area, and
    - 4 km of tributary habitat and 11 ha of adjacent riparian area.
10. High flushing rate through John Hart Reservoir reduces plankton and littoral productivity.

Lower Campbell River.

11. Water diversions and occasional spills alter habitat characteristics in this reach. The draft Campbell Water Use Plan assessed issues associated with operations, and some procedures have been altered to offset certain impacts. The Water Use Plan has not yet been approved by the Water Comptroller.
12. Upstream dams have reduced recruitment of gravel and large woody debris, which are important for spawning and rearing, respectively. Spills from John Hart have affected availability of spawning gravels downstream of the dam.
13. About 2 km of prime rearing habitat in Elk Falls canyon was dewatered as flows were diverted to the John Hart Generating Station. As part of the Water Use Plan, flows are now being released from the dam to make this habitat more functional.
14. The structures (including the 2.8 km flume) have inhibited movement of animals and has even resulted in drowning. Alteration of habitat along flume has also affected wildlife.
15. Spills induce adult steelhead to move upstream into the canyon past the tail race and become stranded when spills cease. Flows now being released as part of the Water Use Plan may mitigate this effect.

16. The modified flow has an unknown effect on riparian vegetation and estuarine wildlife.

Heber Diversion

17. The Heber Dam footprint led to losses of instream and riparian habitat.
18. Increased flows in the receiving channels changed channel hydraulics, with possible negative and positive effects.
19. The Crest diversion dewatered a tributary of the Heber River, with unknown effects.
20. Reduced flows in the Heber have had potential affect on aquatic related wildlife such as water fowl, furbearers, and elk.

Quinsam Diversion

21. The Quinsam Diversion Dam footprint led to losses of instream and riparian habitat, and some loss of spawning habitat.
22. The Diversion Dam reduced gravel and LWD recruitment to downstream habitats.
23. Increased flows in the receiving channels changed channel hydraulics, with possible negative and positive effects. Redds are dewatered when diversion ceases, but there would be a benefit if flow was maintained.
24. Decreased flows in the mainstem affect downstream fish populations.
25. The Quinsam Diversion Dam and Wokas Dam restrict movements of resident fish populations.
26. Reduced flows have had potential affect on aquatic related wildlife such as water fowl, furbearers, and elk.

Salmon Diversion

27. The Salmon Diversion Dam footprint led to losses of instream and riparian habitat.
28. The dam reduced gravel and LWD recruitment to downstream habitats.
29. Increased flows in the receiving channels changed channel hydraulics, with possible negative and positive effects.
30. Decreased flows in the mainstem affect downstream fish populations.
31. Entrainment into the diversion leads to loss of juveniles and adults.
32. Reduced flows have had potential affect on aquatic related wildlife such as water fowl, furbearers, and elk.

Non-Hydro Impacts — Other impacts on wetlands in the Campbell system include historic effects of logging, dyking and channellling 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. Limiting factors

2.2 LIMITING FACTORS

The limiting factors for species of interest are dependent upon the specific species of interest. Suitable and productive habitat, is, in general, a key limiting factor for most species. Species are therefore greatly impacted by activities affecting habitat and its associated food supply.

The factors are summarized here.

Loss of Habitat: Loss of riparian and wetland habitats has occurred in flooded valley bottoms. Potential effects include availability of habitat for amphibians, water shrews and other small mammals and their predators, foraging and overwintering habitat for ungulates, and breeding habitat for some species of neotropical migrants. There is also, loss of side channel and riparian habitat downstream of diversions.

Habitat Alterations: Altered flow regime has changed riparian and wetland habitats, either increasing the period or extent of inundation or drying. This leads to changes in the composition and structure of the ecological community, precipitating changes in the suitability of the habitat for wildlife. Potential effects on wildlife include changes to habitat quality and quantity for species, including a lack of seasonal nesting sites, a lack of snags and for cavity nesters, or potential structures for raptors, etc. Also, the lack of riparian vegetation in drawdown zones affects ungulates, furbearers, small mammals and several species of passerines including some neo-tropical migrants.

Wildlife Migration: Structures, reservoirs and diversions can create impediments to wildlife movement.

2.3 TRENDS AND KNOWLEDGE STATUS

SPECIES

Table 1 shows a list of potential species of conservation concern which could occur in the Campbell River watershed. It is based on species with CF[2] ratings of 1-2 for any goal known to occur in both the Campbell River District and Vancouver Island MOE region.[3]

Priority species for FWCP investment were based on the results of interviews and workshops with agency staff and stakeholders (see the *Campbel River Watershed Plan*) and were reconciled among the Campbell, Puntledge and Ash watersheds.

Note that while fish are reported in Table 1 they are addressed in the Campbell River Salmonid Action Plan.

A comprehensive inventory of the species present in the in the Campbell River system does not exist. However, some research has been conducted by FWCP (BCRP) to map the owl and bat distribution and habitat use. Likewise, studies have been undertaken to identify the habitat and distribution of red-legged frogs.

FWCP has contributed to the protection and conservation of the Vancouver Island Marmot by supporting activities under the Provincial Recovery Plan. The marmot population appears to be improving. There is some knowledge related to elk and other ungulate use in the Campbell River system where activities such as prescribed burns have been conducted to improve winter range habitat and have had a positive effect.[4]

KNOWLEDGE GAPS

While some mapping has been done for owls, bats and amphibians, in most cases there is limited knowledge regarding the population and distribution of species at risk or of conservation concern.

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[2] Conservation Framework (CF) Goals are 1- contribute to global efforts for species & ecosystem conservation;2- prevent species & ecosystems from becoming at risk;3- Maintain the diversity of native species & ecosystems. They are rated between 1-6, where 1 is high priority and 6 is low priority.

[3] The search was performed using the Provincial Conservation Data Base at http://www.env.gov.bc.ca/atrisk/toolintro.html

[4] Campbell River Watershed Update (BCRP), Campbell River 28 May, 2009.

Table 1: Species of conservation concern that are likely to be present in the Campbell River Watershed (This is based on CF rating 1 or 2 for Campbell River District and Vancouver Island MOE region). High priorities for FWCP investment are in bold.

Animal	COSEWIC	CF List	FWCP Priority	Comments
Mammal				
Roosevelt Elk		3,2,3	Medium-high	Terrestrial. 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.
Townsend's Big-eared Bat		5,2,3		Wetland; terrestrial(riparian foraging[5])
Wolverine, *luscus* subspecies	SC (May 2003)	3,2,3		Terrestrial
Wolverine, *vancouverensis* subspecies	SC (May 1989)	2,6,2		Alpine
Vancouver Island Marmot	E (Mar 2008)	1,6,1	High	Alpine. The species is a very high social priority due to all the PR they have 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

[5] Fellers, G. and D. Pierson (2002) Habitat use and foraging behaviour of Townsend's Big-Eared Bat in Coastal California, Journal of Mammalogy, 83 (1);176:177.

Ermine, *anguinae* subspecies		2,2,3	Low	Terrestrial.
Keen's Myotis	DD (Nov 2003)	1,6,1		Wetland; terrestrial
American Water Shrew, *brooksi* subspecies		1,6,2	Medium	Lake; wetland; riverine. 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.
Birds				
Northern Goshawk, *laingi* subspecies	T (Nov 2000)	1,6,1	Medium	Terrestrial. 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.
Great Blue Heron, *fannini* subspecies	SC (Mar 2008)	3,6,1	High	Estuarine; lake; wetland; riverine; terrestrial. 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.
Short-eared Owl	SC (Mar 2008)	6,2,3		Estuarine; wetland; terrestrial
Marbled Murrelet	T (Nov 2000)	1,1,2		Estuarine; lake; marine; terrestrial
Common Nighthawk	T (Apr 2007)	6,2,4		
Northern Harrier	NAR (May 1993)	4,2,4		
Olive-sided Flycatcher	T (Nov 2007)	5,2,3		Wetland; terrestrial

Sooty Grouse		5,2,3		
Peregrine Falcon	SC (Apr 2007)	5,2,3		
Peregrine Falcon, *pealei* subspecies	SC (Apr 2007)	2,1,2		Estuarine; lake; marine; riverine; terrestrial
Northern Pygmy-Owl, *swarthi* subspecies		1,3,3	High	Terrestrial. Inventory specific to pygmy owls is needed, as they are not well served by the multi-species inventory that has been previously conducted.
Bald Eagle	NAR (May 1984)	6,6,6	Low	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
Barn Swallow		6,2,3		Estuarine; lake; wetland; riverine; terrestrial
White-tailed Ptarmigan, *saxatilis* subspecies		2,4,4		Terrestrial
Western Screech-Owl		6,2,4	High	Wetland; terrestrial [6] 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)
Western Screech-Owl, *kennicottii* subspecies	SC (May 2002)	3,1,2	High	Wetland; terrestrial. As above.
Band-tailed Pigeon	SC (Nov 2008)	5,2,3	Medium-high	Wetland; terrestrial. 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,

[6] Species has used nest box near Strathcona Dam on Upper Campbell Lake (Madrone Consulting Report, 2006)

				which could be accomplished through radio-telemetry monitoring. Critical mineral sites could then be secured/conserved. Efforts could partner with other (including Federal) agencies.
Double-crested Cormorant	NAR (May 1978)	6,2,3		Estuarine; lake; marine; wetland; riverine; terrestrial
Purple Martin		6,6,3		Estuarine; lake; wetland; terrestrial
Cassin's Auklet		3,6,2		Marine; terrestrial
Barn Owl	T (Nov 2010)	6,2,3		Wetland; terrestrial
Common Murre		6,6,2		Marine; terrestrial
Osprey		6,6,6	Medium	It is has high social value and would benefit from nest platforms.
Harlequin Duck [7]		4,1,3	Medium	Riparian and riverine. Water quality, stream productivity, fisheries relationships and Riparian conservation are priorities. Research is needed on genetics, the dispersal of birds between river systems, and fisheries relationships. May be studied as an indicator species. Conservation, stewardship and management of riparian habitat is necessary along rivers.
Amphibians, reptiles and turtles				
Northwestern Salamander	NAR (May 1999)	5,1,3		
Western Toad	SC (Nov 2002)	3,2,4		
Common Ensatina	NAR (May 1999)	6,2,4		
Northern Red-legged Frog	SC (Nov 2004)	3,1,2	High	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

[7] This species did not appear during the search of the CF data base but was mentioned in the workshop. This also represents other lower priority riverine birds including: mergansers and American Dipper.

				success/populations, and identification of key habitat for conservation purposes (such as Strathcona and Patterson). Bullfrog expansion and Chytrid fungus sampling are important.
Northwestern Garter Snake	NAR (May 2003)	5,3,4		
Fish				
Cutthroat Trout, *clarkii* subspecies		4,2,3	High	Estuarine, lake, marine, riverine
Coho Salmon	E (May 2002)	4,2,4	High	
Dolly Varden		4,2,3	High	Estuarine, lake, marine, riverine

3 ACTION PLAN OBJECTIVES, MEASURES AND TARGETS

Clear and realistic management objectives are necessary to guide information acquisition and prioritize management actions. Priority actions and information needs will change as both improvements to the system are realized and information is gained. The current plan reflects the information available and values expressed by stakeholders (FWCP partners, First Nations and local communities) through reports, interviews and regional workshops held between 2009 and 2011.

3.1 OBJECTIVE SETTING

The following terminology is used in this report.

Objectives:	Objectives are high-level statements of desired future conditions (outcomes), consistent with FWCP partner mandates and policies.
Sub-objectives and Status Indicators:	Sub-objectives are detailed statements of desired future conditions within objectives, from which status indicators can be derived and alternative management actions evaluated. Sub-objectives and indicators provide the details necessary to translate policy into actions and to evaluate their consequences. They may be arranged hierarchically within objectives, and usually indicate conditions necessary to attain the objective to which they refer.
Measures:	Measures are specific metrics whose values indicate the degree to which desired future conditions have been achieved. They can be either qualitative or quantitative. There is a preference to develop the latter where possible for ease of monitoring.
Targets:	Targets are the values of measurable items that indicate the attainment of a desired condition. In the current context these may be expressed as a single value or as a range to acknowledge the inherent variability of ecosystems.
Actions:	Management actions, plans or policies for achieving the objectives.

Objectives are the “ends” or the outcomes we ultimately care about. Actions are the “means,” or the things we do to achieve them. This report focuses on describing the actions required to achieve the objectives in relation to species of interest. Complementary actions may also be identified in the separate Salmonid and Riparian and Wetland Action Plans.

3.2 OBJECTIVES, MEASURES AND TARGETS

There are two management objectives for the Campbell River system as a whole.

Objective 1: Maintain or improve the status of species of interest in the Campbell River system.

***Rationale* —** There is a high priority placed on improving the population and distribution of species of concern that are found within the Campbell River system. Limiting factors for species of concern may be specific in nature, such as a lack of suitable nesting sites, or may be broader in scope. Consequently, action to improve the status of species may include improvements in the habitat and ecosystems they depend upon.

***Measure* —** Measures may differ between species in term of success due to the nature of the species. For example marmots may be relatively easy to measure the absolute number and their distribution, while goshawks are more difficult and might require a different quantifier, such as ha of habitat suitable for breeding.

***Targets* —** Specific targets will be developed for specific species focused projects.

Objective 2: **Maintain or improve opportunities for sustainable use.**

***Rationale* —** Several species of interest are the focus of sustainable use activities by First Nations and non-first nations people. For example some species are hunted (e.g., elk), while bird and wildlife viewing is also a popular recreational use in the watershed. Consequently, any actions aimed at achieving the above objectives indirectly support this sustainable use objective. Although there are no direct actions aimed at improving sustainable use at this time, it is conceivable that projects aimed at generally improving opportunities for sustainable use activities could be identified by the program partners in the future.

***Measures and Targets* —** There are no specific measures or targets required at this time aside from those associated with the above objectives.

As part of their overall management responsibilities, MOE periodically collects information regarding abundance trends, hunter reports, catch per unit effort (CPUE) and number of hunting licences sold in the region.

4 ACTION PLAN

4.1 OVERVIEW OF PLAN

Management for species of interest ultimately rests with the provincial and federal environment Ministries, but FWCP contributes resources towards planning and implementation of management actions that benefit species within its program area, usually based on the outcomes of multi-agency planning processes. FWCP's mandate limits its involvement in species of interest management to activities that meet FWCP objectives.

The Action Plan has several individual actions for each species, which are presented in Section 4.2. Some actions support multiple sub-objectives, which in turn support multiple objectives. Figure 3 provides an overview of the link between actions and objectives.

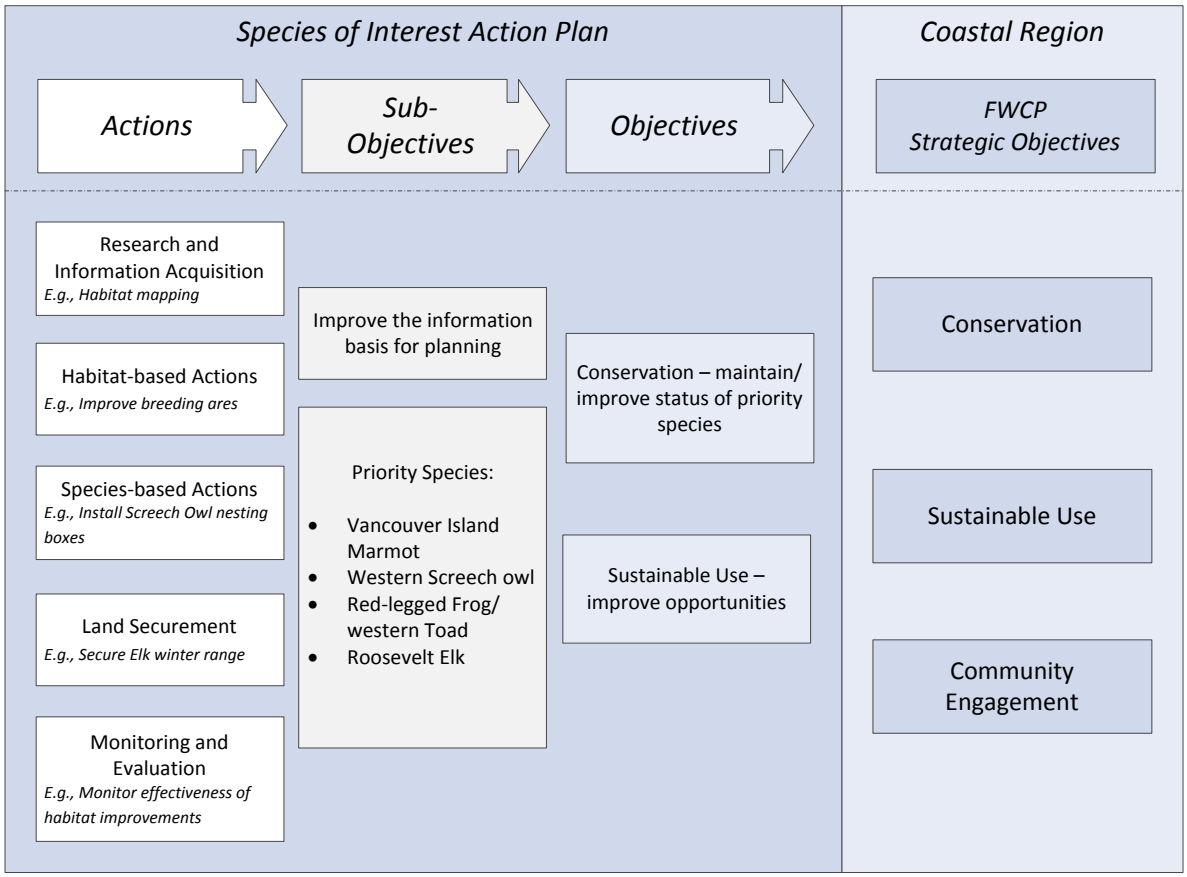

Figure 3: Relationship between actions, sub-objectives and objectives in this Species of Interest Action Plan and the FWCP strategic objectives in the Campbell River Watershed Plan.

4.2 COMPONENTS

The FWCP is most interested in receiving proposals to address the high-priority species listed in Table 1:

- Roosevelt elk
- Vancouver Island Marmot
- Great Blue Heron
- Northern Pygmy-owl
- Western Screech-owl
- Band-tailed Pigeon
- Northern red-legged frog

Specific actions have been proposed in this watershed for Roosevelt elk, Vancouver Island marmot, Western Screech-owl, and northern red-legged frog. The species-focussed actions are aimed at mitigating key limiting factors. Where actions address habitat limitations they do so in relation to specific factors affecting a specific species. There may of course be additional benefits for other species which depend upon the habitat in question. Many species of concern are related to streams, wetlands and riparian areas. In implementing actions under the Species of Interest Plan close coordination should be maintained with actions under the Riparian and Wetlands Plan and the Salmonid Action Plan to ensure compatibility and to develop synergies.

Actions are organized under five broad categories: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement and Monitoring and Evaluation. Also provided are priority ratings to guide investment planning efforts.

INVENTORY AND ACTION DEVELOPMENT

Tables of actions have yet to be developed for several high-priority species. For these, proposals that address inventory requirements as well as the development and implementation of management actions are encouraged.

VANCOUVER ISLAND MARMOT

***Rationale* —** The Vancouver Island marmots is critically endangered and listed in Schedule 1 of the federal *Species at Risk Act* (COSEWIC-Endangered/ CF-1,6,1). It has a recovery strategy for management actions. Several projects have already been undertaken as part of the FWCP program and these should be continued and supported.

***Measure* —** Measures for specific projects will be aligned with the recovery plan.

***Targets* —** Targets for specific projects will be aligned with the recovery plan.

#	Action	Rationale	Priority
	Research and information acquisition		
	Species-based actions		
1	Support the Vancouver Island Marmot recovery strategy	A recovery strategy exists and should be supported.	1
	Habitat-based actions		
	Land Securement		
	Evaluation and monitoring		

WESTERN SCREECH OWL

***Rationale* —** Western screech owls are of conservation concern (COSWIC-Special Concern / CF-3,1,2). Inventory has already occurred[8] and a small nest box project has been undertaken; however the species would likely benefit from increased actions. Also, knowledge about the success of the nest box program would assist other similar programs.

***Measure* —** The measure will be related the abundance and distribution of the species.

[8] Over 300 surveys have been conducted for Great Horned, Barred, Western Screech, Northern Saw-whet and Northern pygmy owls in Campbell River (Salmon and Quinsam rivers?) by Madrone Env. Services. 160 nest boxes have placed.

Targets — The number of breeding pairs be increased by XX% (amount to be determined). Review and conduct nest box program by 2012, monitor existing program success over 3-4 years.

#	Action	Rationale	Priority
Research and information acquisition			
1	Inventory may still be needed in some areas (including Salmon and Quinsam rivers?)	Not all the Campbell river system has been adequately mapped, and mapping may be done for multiple species at the same time.	1
	Species-based actions		
2	Enhance the existing nesting box program if monitoring indicates it is effective, with particular emphasis on wetlands in upper Campbell Reservoir.	160 nest boxes have been installed but effectiveness is not known.	3
	Evaluation and monitoring		
3	Evaluate the effectiveness of the nest box program. Link monitoring to other programs such as in the Shuswap.	The effectiveness of nesting boxes is not known and will provide information for future programs.	2

NORTHERN RED-LEGGED FROG

Rationale — Amphibians have been highly impacted by hydro power development, and these species are of conservation concern. The Red legged frog in particular is of conservation concern (COSWIC – Special Concern / CF-3,1,2). FWCP has funded activities for Red-legged frog in the Campbell system and the species would benefit from additional actions related to breeding sites, research and monitoring of the results.

Measure — The measure will be related the abundance and distribution of the species.

Targets — To be determined.

#	Action	Rationale	Priority
	Research and information acquisition		
1	Investigate opportunities for habitat restoration through reservoir operations.	Reservoir operations influence habitat suitability and breeding success.	1
	Species-based actions		
	Habitat-based actions		
2	Conserve and enhance breeding areas.	Breeding sites have been identified under previous BCRP inventory project.	1
	Evaluation and monitoring		
3	Monitor the effects of previous work.	Determine the effectiveness of past management actions.	2

ROOSEVELT ELK

***Rationale* —** Elk are a species of interest, both from a conservation point of view (CF-3,2,3 / CDC- Blue) and from a sustainable use point of view. They are of particular interest to First Nations and the Ministry of Environment. Work has been undertaken in the past to improve their populations.

***Measure* —** The measure will be related the abundance and distribution of the species.

***Targets* —** *To be determined.*

#	Action	Rationale	Priority
	Research and information acquisition		
1	Population and distribution inventory	While there is knowledge around the population, a more detailed understanding of the abundance and distribution would inform the development of actions related to habitat restoration and management.	2
	Species-based actions		
	Habitat-based actions		
	Determine if specific controlled burns in 2nd growth forests to enhance spring range and foraging habitats should be conducted and where.	Prescribed burns can be very beneficial – but can also be very expensive	2
	Land Securement		
	Secure winter range, possibly in Thelwood and spring ranges around Campbell Lakes.	Securing habitat for wintering and breeding will have beneficial effects on the population.	1
	Evaluation and monitoring		

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