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FISH AND WILDLIFE  
COMPENSATION PROGRAM

**STAVE WATERSHED  
SPECIES OF INTEREST  
ACTION PLAN  
FINAL DRAFT**

The FWCP is a partnership of:

**BC Hydro**  
FOR GENERATIONS



**Canada**  
Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

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# Stave 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 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).

This Species of Interest Action Plan sets out priorities for the Fish and Wildlife Compensation Program to guide projects in the Stave River Watershed. As many species of interest, such as Roosevelt Elk, or Great Blue Heron, may have ranges that extend beyond the watershed boundaries, the action plan may also consider actions in areas beyond the Stave River system. Also, as the headwaters of the Stave River system are adjacent to the headwaters of the Alouette River system, some activities may be considered jointly between the two systems, such as inventory and mapping.

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 Stave 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<sup>1</sup> to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities. In addition to general mapping and inventory of species of concern, priority species included in this plan are:

- Pacific Water Shrew

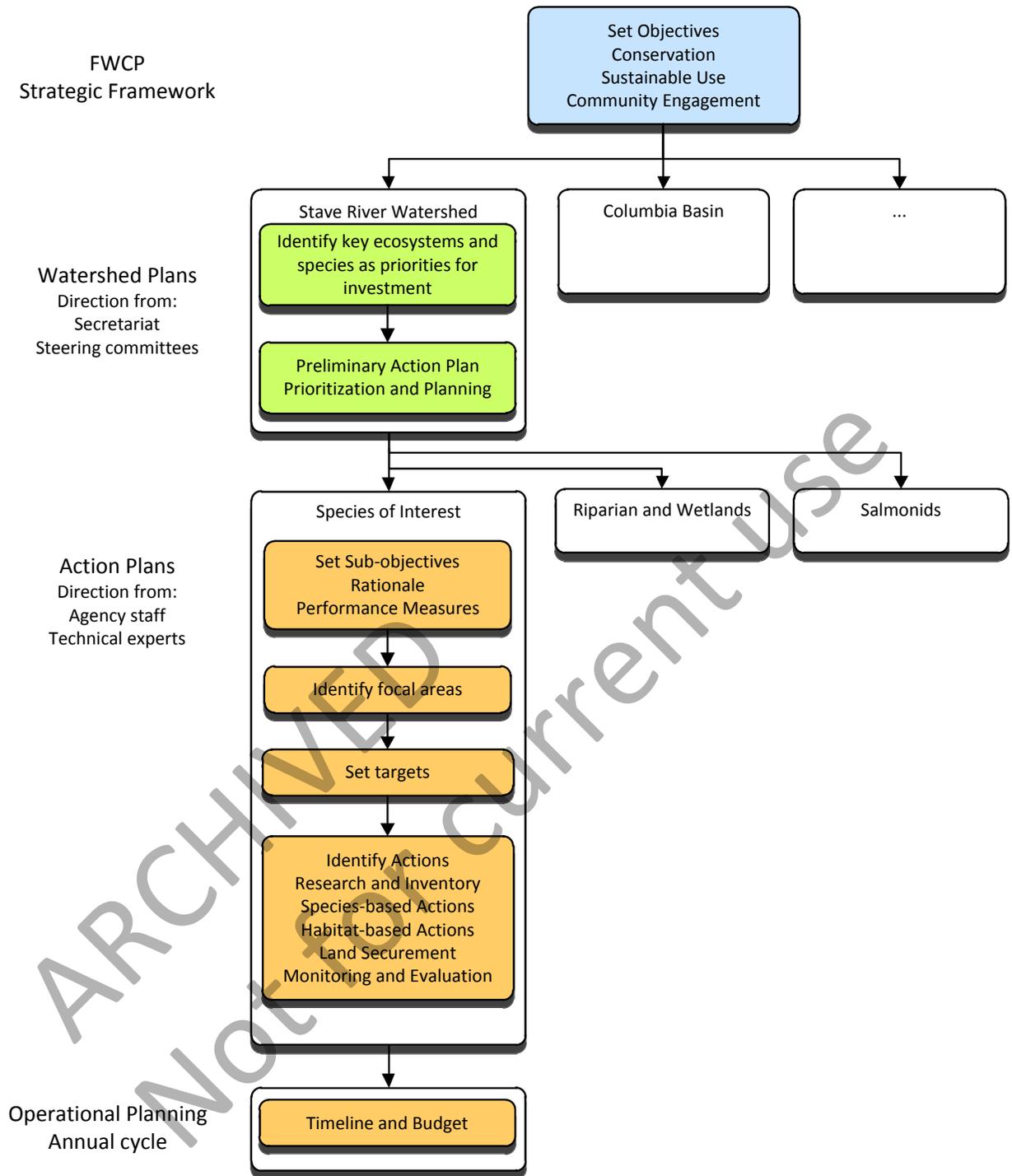
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<sup>1</sup> Mission, 27 March, 2009

- Black-tailed deer
- Mountain goat
- Roosevelt elk
- Western Screech Owl
- Great Blue Heron
- Spotted Owl
- Red-Legged frog
- Western toad

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.

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

## 2 OVERVIEW CONTEXT

The Stave watershed is located approximately 70 km east of Vancouver, next to the Alouette watershed on the north side of the Fraser Valley (Figure 2). The Stave River flows predominantly south and discharges directly into the Fraser River. Inflows to Stave Lake Reservoir come primarily from two weather patterns: heavy rain in the fall from Pacific frontal systems and snowmelt in the spring.

The Stave River system lies within the traditional territory claimed by the Katzie and Kwantlen First Nations. The lower Stave River is between the communities of Maple Ridge and Mission. The northern part of Stave Reservoir borders Golden Ears Provincial Park.



Figure 2: The Stave River hydropower project.

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

## 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 7: Stave River (December 2000);
- Stave River Water Use Plan Consultative Committee Report (October, 1999); and
- Findings in the Community Workshop (Mission, 27 March, 2009).

**Hydro-related Impacts** — The impacts that occurred are based on location in the watershed as follows:

*Stave Falls Dam, Blind Slough Dam, and Upstream of Stave Falls.*

1. The reservoir flooded 22.4 km of mainstem and 32 km of tributary channels and their associated riparian zones, 1676 ha of forest and 241 ha of wetland.
2. Drawdown of the reservoir reduces littoral productivity, strands fish and reduces access for resident fish to historic tributaries.
3. Attraction of fish to Alouette powerhouse increases susceptibility to angling harvest.
4. Dam footprint caused loss of instream, riparian and upland habitat. Initial construction likely sluiced a large volume of sediment that degraded downstream habitat.
5. The dam has reduced LWD and gravel recruitment to downstream reaches.
6. Blind Slough Dam cut off flows to 1 km of downstream channel.

7. Entrainment mortality occurs but is not quantified. Entrainment is limited to reservoir species as there is no fish passage at Ruskin or Stave Falls dams.

*Ruskin Dam and Upstream to Stave Falls.*

8. Hayward Reservoir flooded 6 km of mainstem and 2.7 km of tributary channels and their associated riparian zones. The biological community was changed from river-type to lake-type.
9. Drawdown of the reservoir reduces littoral productivity and reduces access for fish to historic tributaries. Its high flushing rate also affects productivity.
10. The dam blocked migration of anadromous salmon and migration of resident fish.
11. Entrainment mortality occurs but is not quantified. Entrainment is limited to reservoir species as there is no fish passage at Ruskin or Stave Falls dams.

*Lower Stave River.*

12. Water diversions from Alouette and occasional spills at Ruskin Dam alter habitat characteristics in this reach.
13. The Alouette diversion and water storage have altered the flow regime and affected habitat availability and morphology of this river reach.
14. Ramping rates have historically stranded fish.

**Non-Hydro Impacts** — Other impacts on fish populations in the Stave watershed include historic effects of logging, flood protection and urbanization.

## 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 neo-tropical migrants.

**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

In general there is little information regarding species of concern in the area. The most up to date information is found within some of the FWCP project reporting, the Conservation Framework data base and the South Coast Conservation Program Atlas at [www.sccp.ca](http://www.sccp.ca).

Table 1 shows a list of potential species of conservation concern which could occur in the Stave River watershed. It is based on species with CF<sup>2</sup> ratings of 1-2 for any goal known to occur in both the Chilliwack Forest District and the GVRD.<sup>3</sup>

Priority species for FWCP investment were based on the results of interviews and workshops with agency staff and stakeholders (see the *Stave Watershed Plan*) and were reconciled among the Alouette, Coquitlam and Stave watersheds.

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

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<sup>2</sup> 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.

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

**Table 1: Species of conservation concern which are likely to be present in the Stave River Watershed (This is based on species with a CF rating of 1 or 2 for Chilliwack Forest District and the GVRD).**

Animal	COSEWIC	CF List	FWCP Priority	Comments
<b>Mammals</b>				
Mountain Beaver, <i>rufa</i> subspecies	SC (May 1999)	5,2,3		Terrestrial.
Townsend's Big-eared Bat		5,2,3		Wetland; terrestrial
Wolverine, <i>luscus</i> subspecies	SC (May 2003)	3,2,3		Terrestrial; alpine. Disturbance of natal sites must be minimized. Would benefit from projects that increase their prey (ungulates).
Snowshoe Hare, <i>washingtonii</i> subspecies		4,6,1		Terrestrial
Southern Red-backed Vole, <i>occidentalis</i> subspecies		4,6,1		Terrestrial
Keen's Myotis	DD (Nov 2003)	1,6,1		Wetland; terrestrial
<b>Pacific Water Shrew</b>	E (Apr 2006)	5,6,1	High	Estuarine; wetland; riparian; terrestrial. Projects should link to Recovery Team objectives and existing Best Management Practices. Recovery habitat assessment in the watershed is necessary. Suitable habitat should be managed for the species wherever possible. Restoration and enhancement possibilities exist in the Blue Mountain and BCIT woodlots, but inventory is necessary first.
Olympic Shrew		3,6,1		Terrestrial
Trowbridge's Shrew		6,2,3		Wetland; terrestrial
Grizzly Bear	SC (May 2002)	3,2,3		Wetland; riparian; terrestrial

Animal	COSEWIC	CF List	FWCP Priority	Comments
<b>Roosevelt Elk</b>		2,3,2	High	<p>The species was recently transported into the Stave watershed, as it was extirpated prior to hydro construction. Monitoring is required.</p> <p>Grazing is an important factor in population maintenance Winter range enhancement and conservation for elk can be accomplished by thinning, spacing and prescribed burns.</p> <p>Riparian forest conservation for elk and deer is also a high priority</p>
<b>Black-tailed deer</b>		6,6,6	High	<p>Winter range enhancement and conservation for black-tailed deer can be accomplished by thinning, spacing and prescribed burns.</p>
<b>Mountain Goat</b>		4,1,3	High	<p>Winter range enhancement and conservation for mountain goat at NW end of Stave Lake</p>
<b>Birds</b>				
<b>Northern Goshawk, <i>laingi</i> subspecies</b>	T (Nov 2000)	1,6,1	Medium-high	<p>Terrestrial.</p> <p>Breeding habitat conservation and landscape-level management are necessary.</p> <p>Stand treatments in young forests (i.e., thinning, fertilizing) to speed up the old-growth characteristics (i.e., larger trees with larger branches for nests and canopy closer for flight paths) would be beneficial. While the species was previously thought of as old-growth dependent, they have started to use older second-growth forests as well.</p> <p>The species could have been greatly affected by the inundation of Stave River.</p>
<b>Great Blue Heron, <i>fannini</i> subspecies</b>	SC (Mar 2008)	3,6,1	High	<p>Estuarine; lake; wetland; riparian; terrestrial. Riparian nesting and foraging habitat restoration potential.</p> <p>The Lower Stave River is an important feeding site for herons</p> <p>A rookery exists in Silverdale, but whether it is active is unknown.</p> <p>The impact of declining of cottonwoods in the Lower Stave River should be investigated, as it may present a good restoration opportunity.</p>
<b>Short-eared Owl</b>	SC (Mar 2008)	6,2,3		<p>Estuarine; wetland; terrestrial</p>

Animal	COSEWIC	CF List	FWCP Priority	Comments
American Bittern		5,2,3		Estuarine; wetland
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, <i>anatum</i> subspecies	SC (Apr 2007)	5,6,2		Estuarine; terrestrial
Bald Eagle	NAR (May 1984)	6,6,6	Medium-high	<p>Winter roost, and nesting habitat conservation are priorities, as are riparian covenants.</p> <p>Monitoring is needed, as the species may become endangered again (e.g. from ingesting pollutants).</p> <p>Consensus on priority could be reached for this species, however, support was give for both medium and high priority</p> <p>Bald eagles are directly linked to chum, as chum are their main food source.</p> <p>Would benefit from the cottonwoods project directed at herons.</p>
Osprey		6,6,6	Low-medium	Numerous nests on stilts have been raised in the Stave reservoir, as well as an active nest on the Stave River on pilings. Enhancement of nest sites could be beneficial on Stave Lake and in the Lower Stave River.
Barn Swallow		6,2,3		Estuarine; lake; wetland; riparian; terrestrial
Caspian Tern	NAR (May 1999)	4,2,3		Estuarine; lake; marine; wetland; riparian; terrestrial

Animal	COSEWIC	CF List	FWCP Priority	Comments
Western Screech-Owl		6,2,4		
<b>Western Screech-Owl</b> , <i>kennicottii</i> subspecies	SC (May 2002)	3,1,2	High	Wetland; terrestrial. Species is a riparian-dependent secondary cavity nester, requiring minimum diameter trees. Inventory is necessary A nest box program would be beneficial
Band-tailed Pigeon	SC (Nov 2008)	5,2,3	Medium-high	Wetland; terrestrial. Band-tailed pigeon is a migratory, hunted, blue-list species that relies on sodium from mineral sites (in sloughs and muddy areas) during the breeding season. Securement of these critical mineral sites is necessary. Some sites may be on private land.
Double-crested Cormorant	NAR (May 1978)	6,2,3		Estuarine; lake; marine; wetland; riparian; terrestrial
<b>Spotted Owl</b>	E (Mar 2008)	5,6,2	High	Terrestrial. The species is a high conservation priority, but a low restoration priority (restoration feasibility is low due to the lack of old-growth forest left in the watershed.) Projects should link to the Recovery Strategy. Landscape-level management is necessary.
Barn Owl	T (Nov 2010)	6,2,3		Terrestrial
Harlequin Duck <sup>4</sup>		4,1,3	Medium	Water quality, stream productivity, fisheries relationships and riparian conservation are important. Research is needed on genetics, the dispersal of birds between river systems, and the connectivity of populations over larger scales.

<sup>4</sup> This species did not appear during the search of the CF data base but was mentioned in the workshop. This represents other lower priority riverine birds including: mergansers and American Dipper.

Animal	COSEWIC	CF List	FWCP Priority	Comments
<b>Amphibians and Reptiles<sup>5</sup></b>				
Northwestern Salamander	NAR (May 1999)	5,1,3		
<b>Western Toad</b>	SC (Nov 2002)	3,2,4	High	
Pacific Tailed Frog	SC (May 2000)	4,1,2	Medium	
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		Lake; wetland; riparian
Common Ensatina	NAR (May 1999)	6,2,4		
<b>Northern Red-legged Frog</b>	SC (Nov 2004)	3,1,2	High	Wetland. Red-legged frog projects tie in with some salmon projects in the watershed
Oregon Spotted Frog	E (May 2000)	1,6,1		Lake; wetland; riparian
<b>Fish</b>				
Green Sturgeon	SC (May 1987)	4,6,2		Estuarine; marine; riparian
White Sturgeon	E (Nov 2003)	4,6,2		

<sup>5</sup> Reduction of Bull Frog habitat is important and should be incorporated into stream and riparian habitat enhancement.

Animal	COSEWIC	CF List	FWCP Priority	Comments
White Sturgeon (Lower Fraser River population)	E (Nov 2003)	1,6,2		Estuarine; lake; marine; riparian
Salish Sucker	E (Nov 2002)	1,6,1		Lake; riparian. Determining presence.
Cutthroat Trout, <i>clarkii</i> subspecies		4,2,3	High	Estuarine; lake; marine; riparian. Maintenance of the Thompson Creek habitat and access to the habitat are of high priority.
Coho Salmon	E (May 2002)	4,2,4	High	Maintenance of the Thompson Creek habitat and access to the habitat are of high priority.
Nooksack Dace	E (Apr 2007)	2,6,1		Riparian.
Bull Trout		2,2,3	Low	Lake; riparian
Dolly Varden		4,2,3	Low	Estuarine; lake; marine; riparian
Pygmy Longfin Smelt	DD (Nov 2004)	1,6,2		Lake
Eulachon		5,6,2		Estuarine; marine; riparian

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A comprehensive inventory of the species present in the in the Stave River system does not exist. However, some research has been conducted by FWCP (BCRP) to map the Red-legged frog distribution and habitat use.

It should be noted that there is particular concern regarding invasive species such as bull frogs and canary reed grass. Any projects directed at riparian and wetland species should mitigate invasive species benefiting from restoration efforts.

#### KNOWLEDGE GAPS

While some mapping has been done for 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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### 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 Stave River system as a whole.

### **Objective 1: Maintain or improve the status of species of interest in the system.**

**Rationale** — There is a high priority placed on improving the population and distribution of species of concern that are found within the Stave 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 heron 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, 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.

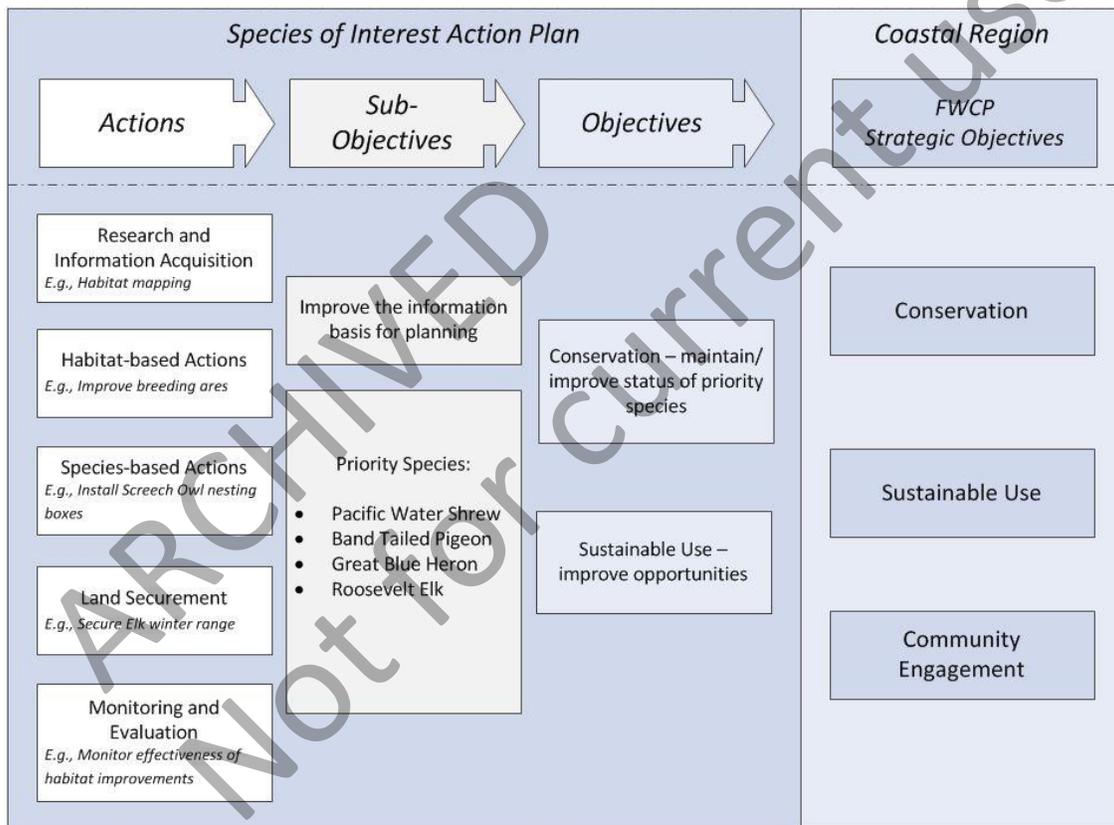
As part of their overall management responsibilities, MOE periodically collects information regarding abundance trends, hunter reports, catch per unit effort (CPUE) and number of hunting licences sold in the region.

## 4 ACTION PLANNING

### 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 Stave River Watershed Plan.**

## 4.2 COMPONENTS

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

- Pacific Water Shrew
- Black-tailed deer
- Mountain goat
- Roosevelt elk
- Western Screech Owl
- Great Blue Heron
- Spotted Owl
- Red-Legged frog
- Western toad

Specific actions have been proposed in this watershed for Pacific Water Shrew, Great Blue Heron and Roosevelt elk. 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 that 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 synergy.

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.

### PACIFIC WATER SHREW

**Rationale** — The Pacific Water Shrew is critically endangered and listed in Schedule 1 of the federal Species at Risk Act ( COSEWIC-Endangered/ CF-

5,6,1). It has a recovery strategy for management actions.<sup>6</sup> It has been noted in the area.

**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			
1	Assess habitat (mapping) with high potential for shrews and determine opportunities for restoration and securement. May conduct mapping in conjunction with Stave Species of Interest Action Plan.	Water shrew inventories are intensive, but mapping that leads to habitat rehabilitation and securement can be effective and assist multiple species.	1
2	Determine correlation between habitat mapping and occupancy	The habitat model requires further verification through field sampling for water shrews.	1
3	Assess opportunities to address shrews under other restoration activities.	Work being conducted for fish may have benefits for water shrew habitat.	2
Species-based actions			
4	Implement actions outlined in the Pacific Water Shrew recovery strategy	A recovery strategy exists and should be supported.	1
Habitat-based actions			

<sup>6</sup> Available at

[http://www.env.gov.bc.ca/wld/documents/recovery/rcvrystrat/pacific\\_water\\_shrew\\_rcvry\\_strat040609.pdf](http://www.env.gov.bc.ca/wld/documents/recovery/rcvrystrat/pacific_water_shrew_rcvry_strat040609.pdf)

#	Action	Rationale	Priority
Land Securement			
Evaluation and monitoring			

## GREAT BLUE HERON

**Rationale** — Great Blue Heron are a species of conservation concern (COSEWIC Special Concern/CF-3,6,1). The Lower Stave River is an important feeding site for herons. A rookery exists in Silverdale, but whether it is active is unknown. The impact of declining of cottonwoods in the Lower Stave River should be investigated, as it may present a good restoration opportunity. Enhancing cottonwood and riparian growth will benefit other species as well, such as Western Screech Owl.

**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	Inventory of nesting sites in the Lower Stave.		1
2	Develop plan for habitat restoration and conservation.	The area around Silvermere and east of the dam footprint areas should be assessed as cheap farmland is available there, and would be a good alternative to Stave habitats. Benefit to other species.	2

#	Action	Rationale	Priority
Species-based actions			
Habitat-based actions			
Land Securement			
Evaluation and monitoring			

## 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 in including having recently reintroduced elk into the watershed. It should be noted that activities affecting Elk would also likely affect black deer and mountain goats.

**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	Determine current distribution and abundance	While there is knowledge around the population, a more detailed understanding of the abundance	2

#	Action	Rationale	Priority
		and distribution would inform the development of actions related to habitat restoration and management.	
Species-based actions			
Habitat-based actions			
2	Enhance winter range (including thinning, spacing and prescribed burns).	<p>There are likely potential areas for enhancement at the NW end of Stave Lake. There will be benefits to other ungulates such as black tailed deer.</p> <p>Prescribed burns can be very beneficial – but can also be very expensive.</p>	1
Land Securement			
3	Secure winter range.	Securing habitat for wintering will have beneficial effects on the population.	1
Evaluation and monitoring			

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