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FISH AND WILDLIFE
COMPENSATION PROGRAM

MIDDLE SHUSWAP WATERSHED *RIPARIAN AND WETLANDS ACTION PLAN*

FINAL DRAFT

The FWCP is a partnership of:



Fisheries and Oceans
Canada

Pêches et Océans
Canada

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Shuswap River Riparian and Wetlands 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 Riparian and Wetlands Action Plan sets out priorities for the Fish and Wildlife Compensation Program to guide projects in the Shuswap River project area. It identifies actions to be undertaken in the Shuswap River above Mable Lake. The plan builds on the FWCP's strategic objectives and the Shuswap River Watershed Plan (FWCP, 2011). Action plans have also been developed for species of interest 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 workshop¹ to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities.

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.

¹ Vernon, B.C. (18 May, 2010)

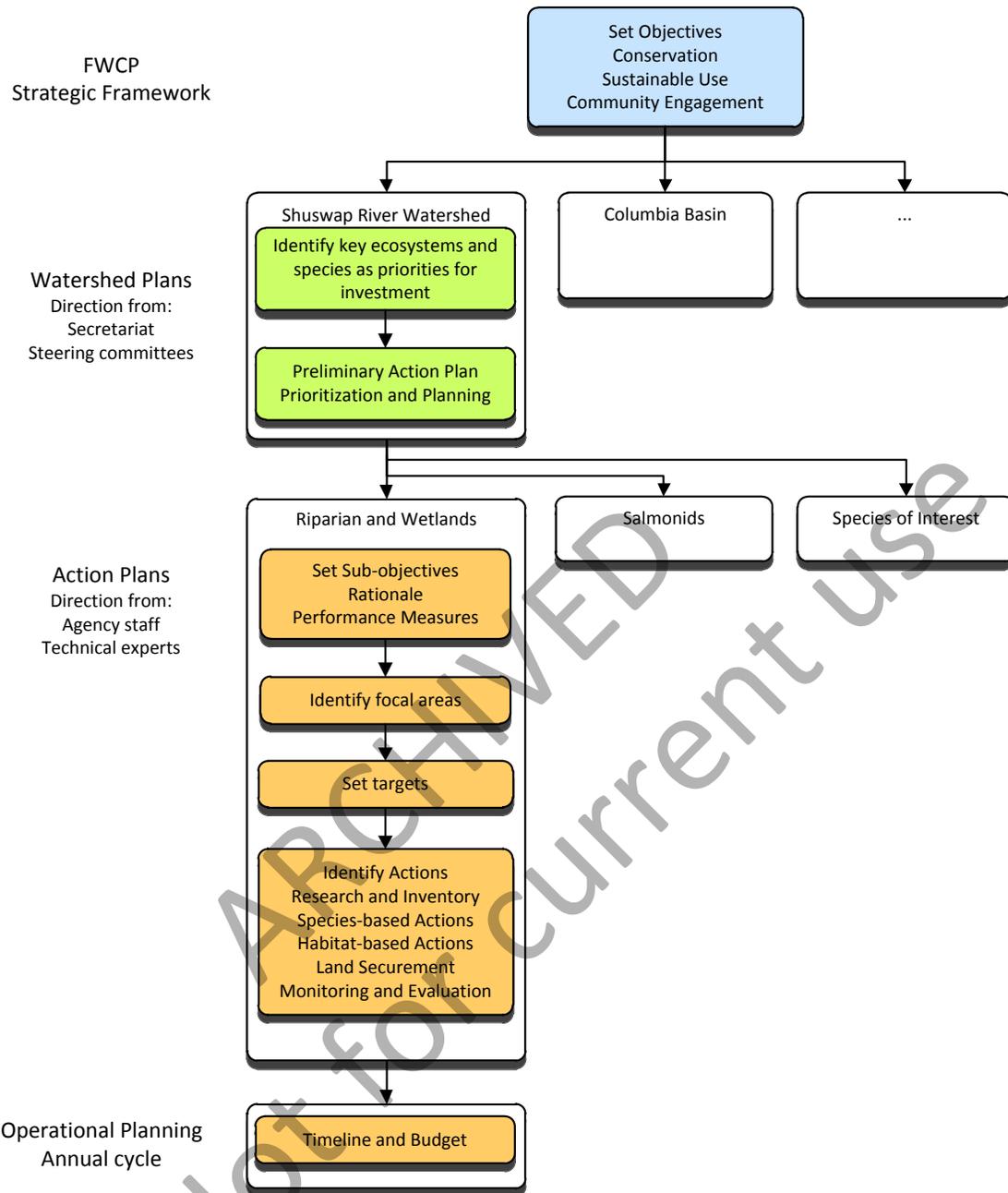


Figure 1: Relationship between the Riparian and Wetlands Action Plan and higher level planning and objectives.

2. OVERVIEW CONTEXT

The middle Shuswap River is located upstream of Shuswap Falls in the dry interior of British Columbia, near the town of Lumby (**Figure 2**). The basin area above Shuswap Falls is 1,969 km², with elevations ranging from 450 m to 2,680 m. The Shuswap River basin is climatically within the southern interior region of BC, which is affected by both continental and modified maritime conditions. Temperatures are also affected by continental air from the south (warm) and from the north (cold). Runoff is dominated by snow melt from the surrounding mountains. The November to January period has the highest precipitation, with an average of 120 mm/month, and as much as 250 mm/month (BC Hydro, 2005).

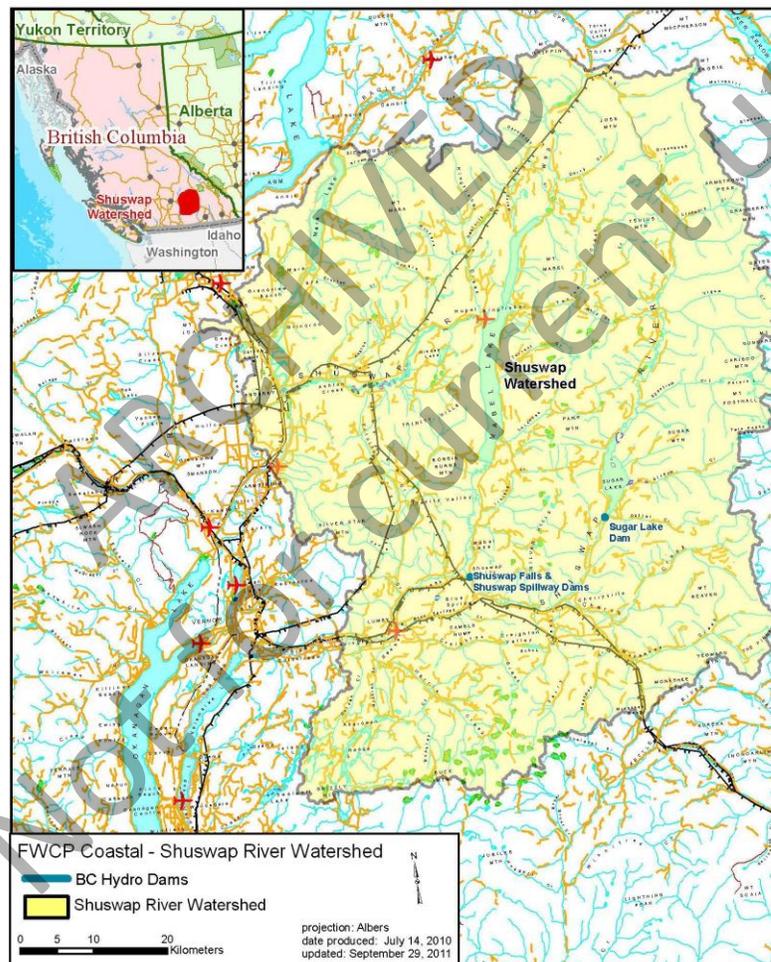


Figure 2. The Shuswap River hydropower project.

The Shuswap River watershed is in the Shuswap Nation territory. The closest provincial park is on Shuswap Lake some 80 km downstream of Wilsey Dam, and the largest nearby communities are Lumby, Enderby and Armstrong. There is a small community that resides on Sugar Lake.

The Shuswap River project was completed in 1929 by West Canadian Hydroelectric Corporation. The project consists of two dams, Peers Dam, which impounds the Sugar Lake Reservoir, and Wilsey Dam at Shuswap Falls. The dams are separated by 31 km and power is generated only at Wilsey Dam. The project is run-of-river, with very little storage.

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 12: Shuswap River (December 2000);
- Shuswap River Water Use Plan Consultative Committee Report (December, 2003); and
- Findings in the Community Workshop (Vernon, 18 May, 2010).

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

Peers Dam and Sugar Lake Reservoir.

1. The dam flooded 7 km of mainstem and 4 km of tributary channels, as well as their associated riparian areas.
2. The dam inundated 1,564 ha of lake habitat including a spawning area at Sugar Lake outlet, and 653 ha of riparian and upland habitat.
3. Drawdown of Sugar Lake Reservoir (7 m) reduces littoral productivity and connection to riparian areas.
4. Peers Dam footprint caused a loss of instream, riparian and upland habitats.
5. Peers Dam blocked migration of resident river species and may have blocked migration of anadromous fish as well.
6. Entrainment occurs at Peers Dam, but effects are unquantified.

Shuswap River between Peers and Wilsey dams.

7. Rapid flow alterations are thought to have negatively affected benthic insect production.
8. Peers Dam reduced recruitment of gravel and large woody debris to this section of the Shuswap River.
9. Loss of carcasses at the lake outlet spawning area have reduced nutrient inputs to the river.
10. TGP may be elevated by spills at Peers Dam, but magnitude is unknown.
11. Wilsey Dam headpond flooded about 1 km of mainstem Shuswap River habitat.

Wilsey Dam and Downstream

12. Wilsey Dam footprint led to loss of instream, riparian and upland habitats.
13. Wilsey dam blocked access for anadromous salmonids (Chinook, sockeye and possibly coho) to at least 20 km of spawning and rearing habitat above Shuswap Falls, as well as blocking resident river species.
14. Wilsey Dam reduced recruitment of gravel and large woody debris to this section of the Shuswap River, most notably downstream to Bessette Creek.
15. Diversion to the powerhouse dewaterers 180 m of stream channel immediately downstream of Wilsey Dam during low flows.
16. Dredging of the headpond at Wilsey Dam has caused downstream siltation and degrading of water quality through increased BOD. Sand deposition in the headpond may have improved spawning habitat.
17. TGP may be elevated by spills at Wilsey Dam, but magnitude is unknown.
18. Entrainment occurs at Wilsey Dam, but effects are unquantified.
19. Altered flow regime has contributed to stranding of fish and dewatering of incubating eggs.

Non-Hydro Impacts — Other impacts on fish populations in the Shuswap River watershed include historic effects of fish harvest, logging, public access and road construction. The slides in the Fraser River at Hells Gate in 1913 and 1914 negatively affected anadromous fish passage into the Shuswap watershed. Fish passage at Hells Gate was established in 1945 and extended in 1956; however, fish stocks took a long time to recover. Urban development has not been a significant factor in the area.

2.2 LIMITING FACTORS

The limiting factors for wetland and riparian areas are predominantly related to extent of the available habitat, connectivity and distribution of the habitat, and its productivity.

1. Extent

The contribution of riparian and wetland habitats to broader ecological function is predominantly limited by the extent of the habitats on the land base. Habitats are lost through inundation and conversion to other land uses, and often detrimental fluctuations in water levels.

2. Distribution

Connectivity among riparian and wetland habitats, and between these habitats and other habitats and features, are important for dispersal of plants and animals and for seasonal movements of some species. Wetland and riparian habitats that are isolated will likely have decreased diversity to those which experience a healthy connectivity between areas. Distribution is therefore related not only to the extent of healthy riparian and wetland habitats, but also to adjacent land uses.

3. Productivity

Even where riparian and wetland habitats are adequately represented and connected, there are several factors that can affect their productivity:

- Hydrologic conditions such as water level variability and flow rates are among the most important variables driving riparian and wetland habitat development, structure, functioning and persistence (National Research Council 2001). Hydrologic conditions also influence the extent and distribution of habitats. For example reduced peak flows in a river, due to regulation, result in succession to upland habitat types. Also, Extreme fluctuations both in timing and extend, such as in a drawdown zone of reservoirs, can reduce the ability of plant communities to be established and thus the establishment of wetlands.
- Stressors such as invasive species or disruptive human access can affect community structure and function.
- Loss of specific habitat features can affect life requisites of specific species, e.g., dense nesting cover for waterfowl, suitable tree cavities for nesting owls or waterfowl, loafing sites to turtles.
- Poorly understood factors limit the productivity of created wetlands. These are generally thought to be related to unnatural hydrologic regimes, soil conditions, and/or cattle grazing (e.g., Atkinson et al. 2010).

2.3 TRENDS AND KNOWLEDGE STATUS

HABITAT TRENDS

Basin-wide trends in the abundance, distribution and productivity of riparian and wetland habitats have not been completely compiled (other than direct BC Hydro footprint impacts). However, extensive mapping has been done.

The area of inundation has not increased since dam construction, but the productivity of adjacent habitats has continued to be affected, either directly or indirectly as a result of BC Hydro operations.

High priority habitats in the Shuswap watershed have also been identified by MOE, including wetlands, riparian habitats and at-risk ecological communities. Draft Terrestrial Ecosystem Mapping (TEM) was completed for a 4,833 ha area within 1 km of the Shuswap River (ground-truthing of the mapping was not completed), showing several rare ecosystems that are important for a variety of wildlife species. The most significant ecosystem is late-successional cottonwood riparian floodplain forests, both “old-forest” and “mature-forest” IDFmw1/05 (CwFd - Dogwood; cottonwood floodplain). This ecosystem is essential habitat for screech-owls and is a very rare ecosystem which is on the provincial “blue” list. Other rare ecosystems and seral stages are present:

- mature-forest IDFmw1/04 (Fd - Pinegrass – Feathermoss; CF priority=2)
- mature-forest IDFmw1/01 (zonal: FdCw - Falsebox - Prince's pine; CF priority=2)

The importance in these riparian ecosystems is magnified by the existence of some later seral stages that are rare and under-represented in protected areas in BC. Developing conservation covenants on lands owned by BC Hydro, especially those with riparian habitats, are suggested as high priorities.

FWCP partners have not conducted any significant restoration work associated with riparian and wetlands in the Shuswap area.

KNOWLEDGE GAPS

Habitat mapping has been conducted; however, verification of the draft TEM mapping is also a high priority. Also, knowledge is needed regarding land status to develop appropriate options for management.

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 riparian and wetland species and habitats. Complementary actions may also be identified in the separate Species of Interest Action Plan.

There are three general categories of riparian and wetland habitats defined for setting objectives:

Category 1 Natural riparian or wetland habitat:	Largely intact ecosystems with natural disturbances sufficient to maintain subclimax communities and processes characteristics of wetlands and riparian ecosystems.
Category 2 Disclimax or degraded wetland or riparian habitat, or creation of habitat	Formerly natural wetland or riparian ecosystems that have lost most or all of their natural disturbance regime and are no longer functioning effectively as wetland or riparian habitat. These areas are candidates for restoration or creation of wetlands.
Category 3 Restored or created riparian or wetland habitat:	Ecosystems resulting from water impoundments, diversions or other artificial disturbances that require active management to maintain productivity and function.

The categories contrast different levels of ecosystem function that require different management approaches. Note that there are no category 3 wetlands in the Shuswap River area at this time.

3.2 OBJECTIVES, MEASURES AND TARGETS

There are two riparian and wetlands management objectives for the Shuswap River area as a whole.

Objective 1. Ensure productive and diverse wetland and riparian ecosystems.

Rationale — This objective addresses overall ecosystem integrity and directs compensation activities to develop productive, useable habitats. Riparian and wetland areas have been heavily impacted by the creation of dams, and continue to be severely degraded in the remaining areas. They may be the limiting factor for many species, including fish, which depend upon them, either for the majority of their lifecycles or for key periods such breeding. Riparian and wetland areas are the most diverse and biologically rich terrestrial ecosystems in BC and are considered as highly valuable from an ecological standpoint. They are often critical in terms of maintaining function and structure for natural system, including helping to support trophic level functioning, genetic diversity, as well as providing key ecological services such as erosion control, flood control and assimilation of nutrients.

To date, FWCP has not significantly funded restoration of riparian areas or wetlands in the Shuswap River area. However, these areas have a high restoration potential and would benefit from restoration activities.

This objective is supported by three sub-objectives:

Sub-objective 1: Secure remaining Category 1 riparian and wetland habitat.

Rationale —Wetland and riparian areas can be heavily impacted by conversion to other lands uses, such as agriculture development or forestry, amongst others. Securing remaining habitat to prevent loss is very important. Habitat is considered secure if it is protected from conversion to other land use, for example by purchasing the land or negotiating a covenant agreement.

Fortunately, there remain viable options for securing category 1 riparian and wetland habitat in the Shuswap area. The largest intact piece of cottonwood riparian floodplain habitat within the Shuswap project area is owned by BC Hydro and thus presents a potential for protection.

Measure — Hectares (or percentage) of Category 1 riparian and wetland habitat secured or conserved over a 5-year period.

Targets — Specific targets will be developed as part of the action plan implementation as current areas are not known.

Sub-objective 2: Reduce threats to Category 1 riparian and wetland habitat.

Rationale — Wetlands and riparian areas are subject to a variety of threats both internally and externally. Many naturally functioning riparian and wetland habitats (Category 1) can benefit from management actions that reduce specific threats (e.g., treatment for invasive species, access control, forestry in adjacent areas etc.).

Measure — Hectares (or percentage) of Category 1 riparian and wetland habitat improved annually.

Targets — Specific targets will be developed as part of the action plan implementation as current areas are not known.

Sub-objective 3: Restore degraded or create new riparian and wetland habitat (Category 2).

Rationale — While conservation of existing high quality habitat is always preferable, category 1 habitat may be limited or the opportunities for conservation are difficult. Restoration opportunities may be more available in areas where changes in water regime have altered successional pathways in pre-existing riparian and wetland ecosystems. Typically the regime in managed watersheds becomes more stable. Riparian and wetland ecosystems require the disturbances caused by fluctuating water levels to maintain their productivity. When these disturbances are reduced or eliminated, riparian and wetland ecosystems transition to other ecosystem types. Projects can be designed to restore the original ecological function of these areas, or to create new riparian or wetland

habitats that differ from what was present historically, but still represent an improvement in function.

Measures — Hectares of riparian and wetland habitat that are restored or created over 5 year period.

Targets — Specific targets will be developed as part of the action plan implementation as current areas are not known.

Objective 2. Maintain or improve opportunities for sustainable use.

Rationale — Many wetland and riparian species are the focus of sustainable use activities by First Nations and non-first nations people. For example some riparian and wetland dependant 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 PLAN

4.1 OVERVIEW

The Action Plan has several individual actions 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.

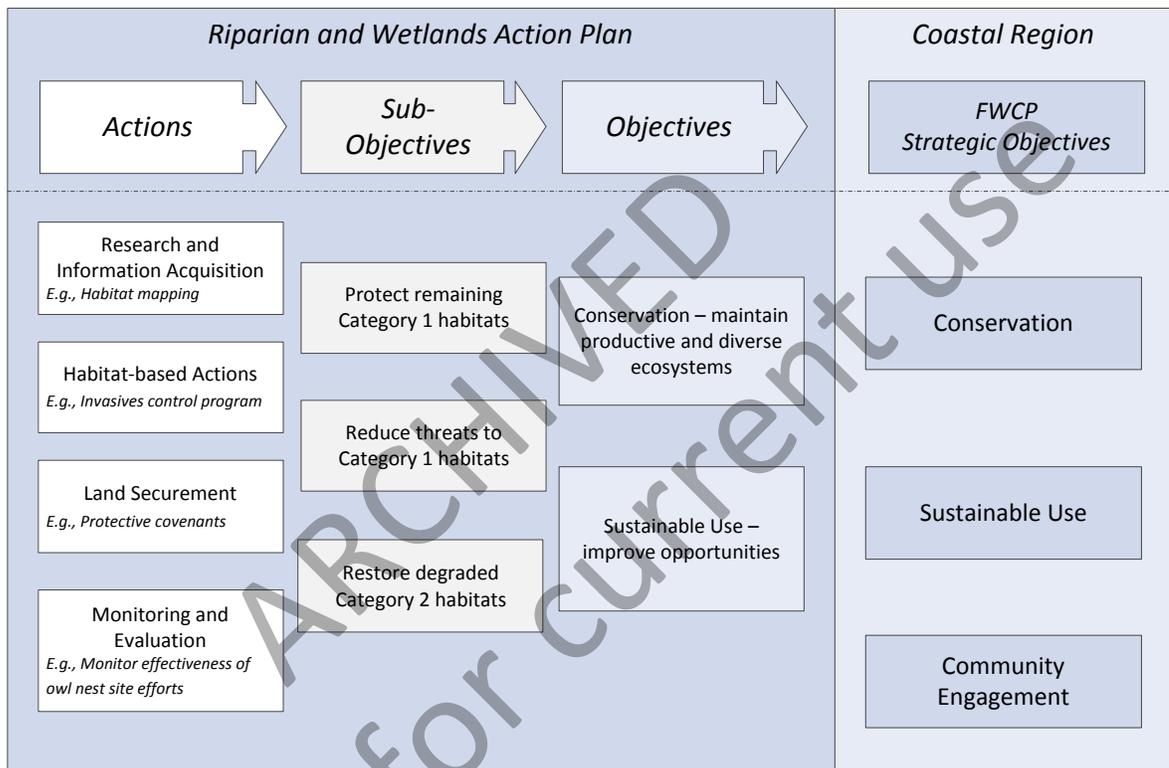


Figure 3: Relationship between actions, sub-objectives and objectives in this Riparian and Wetlands Action Plan and the FWCP strategic objectives in the Shuswap River Watershed Plan.

4.2 COMPONENTS

This section presents the main actions identified for riparian and wetland areas in the Shuswap River system along with the supporting rationale for why the action is required and what it will achieve (Table 1 below).

Currently, knowledge exists regarding riparian and wetland habitats in the Shuswap River project area. Draft Terrestrial Ecosystem Mapping (TEM) has been conducted and requires some verification. Also, some work has been

conducted on determining the status and identifying opportunities for riparian and wetland conservation in the area.

Consequently, the initial focus of this action plan is to build upon the work to date, implement activities that have been identified by community and agency staff, and conduct further research and information acquisition as necessary. The action plan should be revisited and updated with opportunities for habitat-based actions, land securement and monitoring and evaluation. Also provided are priority ratings to guide investment planning efforts. Actions are assigned priorities from 1-3. Note that low priority actions are not included in the table.

Table 1: Actions for wetlands and riparian areas in the Shuswap River Watershed

#	Action	Rationale	Priority
Research and information acquisition			
1	Verify existing TEM mapping, and conduct additional mapping where necessary to determine abundance, distribution, and categories of riparian and wetland habitat.	Some mapping has been conducted and should be verified and extended where necessary.	1
2	Identify additional opportunities to secure category 1 areas in the system.	Once Category 1 areas have been identified, coherent plans need to be made to secure them. Legal status of different lands must be known to determine appropriate actions for protection.	2
3	Identify opportunities to secure off-site category 1 areas.	There may be more cost effective opportunities off-site.	3
4	Determine threats and potential mitigation strategies to improve category 1 areas	There may be potential threats reducing category 1 area productivity	2
5	Identify opportunities for restoration or creation of category 2 areas.	The Shuswap has been highly regulated and there is likely potential for restoration of degraded areas.	2

#	Action	Rationale	Priority
Habitat-based actions			
6	Implement riparian and wetland restoration projects that are identified as high priorities through inventory, mapping or assessment.	Primary target is Category 2 areas.	2
Land securement			
7	Advance the placing of a covenant (or land stewardship) over appropriate BC Hydro lands	BC Hydro owns significant areas of category 1 and 2 riparian and wetland habitat in the project area.	2
Monitoring and adaptive management			

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