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FISH AND WILDLIFE
COMPENSATION PROGRAM

BRIDGE/SETON RIVER WATERSHED

WATERSHED PLANS

FINAL DRAFT

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Table of Contents

1	Introduction.....	2
1.1	Fish and Wildlife Compensation Program.....	2
	Vision	3
	Principles	3
	Partners	3
	Policy Context	3
	Program Delivery	4
	Project Investment Criteria	5
2	Bridge-Seton Watersheds.....	6
2.1	Setting	6
2.2	Footprint issues	7
2.3	FWCP Accomplishments to date	8
3	Strategic Objectives for FWCP	10
4	Priorities	11
4.1	Introduction.....	11
4.2	Priority setting in the Coastal Region and Bridge-Seton Watersheds	11
4.3	Priority Action Plan Summaries.....	13
	Salmonid Action Plan.....	13
	Riparian and Wetlands Action Plan	14
	Species of Interest Action Plan.....	14
5	References.....	16
	Habitats.....	17
	Fish	18
	Mammals	20
	Birds.....	22
	Amphibians, Reptiles and Turtles	23

Table of Figures and Tables

Figure 1:	Relationship between the FWCP Strategic Framework, basin strategic plans and action plans.....	2
Figure 2:	The Bridge-Seton hydropower project.....	7

Bridge-Seton Watersheds Plan

1 INTRODUCTION

This Bridge-Seton Watersheds Plan sets forth the strategic direction for the Fish and Wildlife Compensation Program: Coastal Region.

It begins by briefly outlining the vision, principles, policy context and strategic objectives that form the foundation of the FWCP. A description of the Bridge-Seton setting includes an overview of the hydroelectric facilities and footprint impacts created by those facilities.

The priority setting process is described, followed by a short direction-setting synopsis of a set of priority Action Plans. Taken together, this Watershed Plan and the accompanying Action Plans present the FWCP: Coastal priorities for investments in compensation activities within the Bridge-Seton Watershed.

1.1 FISH AND WILDLIFE COMPENSATION PROGRAM

The Fish and Wildlife Compensation Program (FWCP): Coastal Region evolved from its origin as the Bridge-Coastal Restoration Program (BCRP), a program initiated voluntarily by BC Hydro in 1999 to restore fish and wildlife resources that were adversely affected by the original footprint of the development of hydroelectric facilities in the Bridge-Coastal generation area. Footprint impacts include historical effects on fish and wildlife that have occurred as a result of reservoir creation, watercourse diversions and the construction of dam structures.

In 2009, the program developed a strategic framework that guides overall planning for compensation investments (MacDonald, 2009). The framework has guided the development of strategic plans for each watershed within the FWCP program area, which are in turn informing action plans that focus on specific priorities within each watershed (Figure 1).

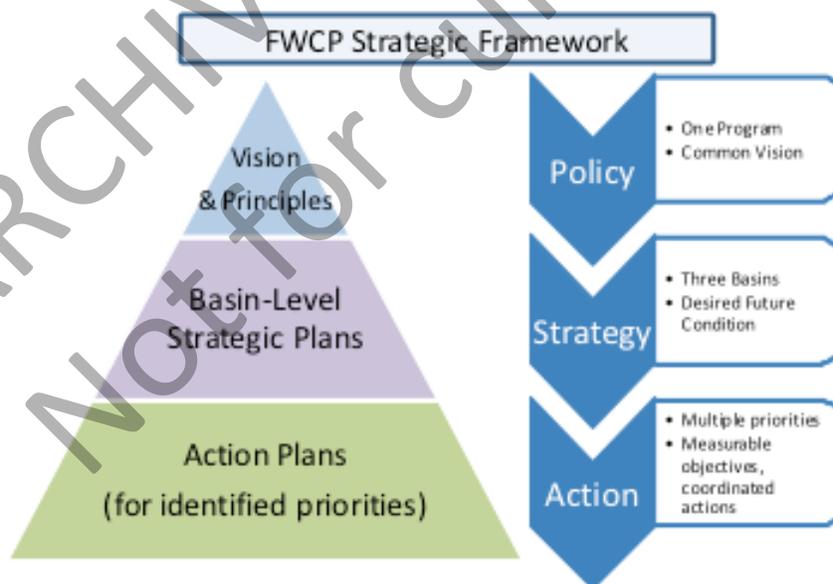


Figure 1: Relationship between the FWCP Strategic Framework, basin strategic plans and action plans.

Delivery of the program as a whole is guided by a vision, set of principles and policy priorities as developed by the program's partners.

VISION

Thriving fish and wildlife populations in watersheds that are functioning and sustainable.

An effective program will support the maintenance of healthy fish and wildlife populations in basins significantly altered by hydroelectric development. Actions taken should satisfy both the conservation and sustainable use objectives and, where possible, restore ecosystem function, making species more resistant to emerging pressures such as climate change.

PRINCIPLES

Approach - The program has a forward-looking, ecosystem-based approach that defines the desired outcomes and takes actions to restore, enhance and conserve priority species and their habitats.

Decision Making - The program efficiently uses its resources and works with its partners to make informed and consensus-built decisions that enable the delivery of effective, meaningful and measurable projects that are supported by the impacted communities.

Geographic Scope - Within the watersheds, basins and ranges of the populations of species affected by generation facilities owned and operated by BC Hydro.

Objectives - The program defines and delivers on compensation objectives that reflect the partnership's collective goals, and that align with local provincial and federal fish and wildlife conservation and management objectives in the areas where we work.

Delivery - The program strives to be a high performing organization with skilled and motivated staff and partners delivering efficient, effective and accountable projects.

PARTNERS

The program is a partnership between BC Hydro, the BC Ministry of Environment, Fisheries and Oceans Canada, First Nations and public stakeholders. Our goal is to have engagement and participation of all the partners in priority setting, approval, review and delivery of the program.

POLICY CONTEXT

The FWCP addresses the policy requirements and social commitments to compensate for impacts to fish and wildlife associated with the development of BCH's generating facilities. The core responsibilities of the agencies are:

Ministry of Environment

The Ministry of Environment manages and delivers a wide range of programs and services that support the Province's environmental and economic goals¹. The Ministry encourages environmental stewardship, develops innovative partnerships, engages First Nations, stakeholders and the public and actively promotes the sustainable use of British Columbia's environmental resources. Within this broader context, the Ministry has a number of responsibilities that are particularly relevant to the development and implementation of actions under the FWCP including:

- Management and conservation of the province's biodiversity;
- Protection of fish, wildlife, species-at-risk and their habitats;
- Protection and restoration of BC's watersheds; and,
- Provision and management of fish and wildlife-based recreation.

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

A number of policies and plans guide the Ministry in delivering on these goals and objectives. The **Conservation Framework**² is British Columbia's approach for maintaining the rich biodiversity of the province, providing a set of science-based tools and prioritized actions for conserving species and ecosystems in B.C. **Program Plans for Freshwater Fisheries, Wildlife and Ecosystems**³ articulate a clear set of strategies supported by actions to achieve both conservation-based outcomes and the provision of recreational opportunity. **Recovery Strategies and Management Plans** have been developed to guide the maintenance, recovery and/or use of specific species and ecosystems. These plans may include specific performance measures and targets.

Fisheries and Oceans Canada

Under the **Fisheries Act**, DFO is the primary agency responsible for conserving and managing Canada's fisheries, including Pacific salmon. It does so through management and monitoring of fisheries, protection of fish habitat, and pollution prevention. The **Policy for the Management of Fish Habitat** (1986) has an overall objective of 'net gain' of fish habitat and helps guide the implementation of fish habitat protection through collaboration with relevant provincial agencies. The **Species at Risk Act** mandates protection of geographically and genetically distinct populations. The principle goal of the **Wild Salmon Policy**⁴ is "to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity". This is achieved through safeguarding genetic diversity, maintaining ecosystem integrity and managing for sustainable fisheries.

BC Hydro

As a Crown Corporation, BC Hydro is committed to producing, acquiring and delivering electricity in an environmentally, socially and financially responsible manner,⁵ through managing impacts from its operations, and weighing environmental values with social and economic interests. Where negative impacts cannot be avoided, it will work to mitigate or offset them, enhance affected habitat and sustain resources over the long term. As part of its water licenses to operate its facilities, BC Hydro is required to undertake compensation programs in different regions of the province. Through the compensation program, it is committed to developing positive projects, such as investments to improve fish stocks, and building relationships to encourage stakeholder and aboriginal community engagement, particularly where their input can contribute to better decisions.

PROGRAM DELIVERY

The overall vision and common principles drive the FWCP program and projects, and provide a foundation for determining strategic priorities at the watershed level (Watershed Plans) which are developed into Action Plans. The bulk of projects undertaken by the FWCP will be delivered under Action Plans that lay out a suite of key actions to achieve specific goals associated with species and ecosystems. Actions could include research, implementation activities, monitoring and evaluation activities, and communication mechanisms. Applicants are encouraged to use the Watershed Plans and Action Plans to develop projects that meet the overall objectives of the FWCP program. Technical Committees, staff and the management board will reference the plans to ensure that the highest priority projects are invested in.

A portion of the FWCP program activities will include small-scale, short-duration strategic projects that target specific issues identified by program partners or others (e.g., community members). These could include projects not yet identified in any action plans, as well as lower priority Action Plan items that require timely response in order to take advantage of an investment or partnership opportunity.

² <http://www.env.gov.bc.ca/conservationframework/>

³ <http://www.env.gov.bc.ca/esd/>

⁴ Canada's Policy for Conservation of Wild Pacific Salmon, 2005.

⁵ BC Hydro Social Responsibility Policy.

PROJECT INVESTMENT CRITERIA

At the level of individual project investment and implementation decisions, the FWCP applies the following criteria to further define its role and actions within defined program areas:

- FWCP does:
 - Fund actions to create, restore, or otherwise improve the function of ecosystems that have been impacted by BC Hydro activities;
 - Fund actions to create, restore, or otherwise improve the function of alternate ecosystems that provide a better opportunity for investment;
 - Participate as a team member in species of interest planning;
 - Fund specific management actions for species of interest as identified by recovery teams and action/implementation groups;
 - Fund baseline inventory that contributes to the development of habitat or species based actions within Action Plans;
 - Fund monitoring programs designed to measure the effectiveness of FWCP funded habitat and species actions; and,
 - Contribute to all aspects of managing co-operatively managed conservation lands.
- FWCP does not:
 - Fund core activities of government or non-government agencies or programs;
 - Lead the development of species recovery goals;
 - Fund, co-ordinate or lead National Recovery Teams for species at risk;
 - Develop policy related to land or wildlife management;
 - Administer government regulations;
 - Engage in enforcement and compliance activities, except in relation to co-operatively managed conservation lands; and,
 - Fund programs designed exclusively to address government harvest objectives.

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2 BRIDGE-SETON WATERSHEDS⁶

2.1 SETTING

The watersheds of the Bridge and Seton rivers are located in the rain shadow of the southern Coast Mountains, about 200 km northeast of Vancouver. The two watersheds are adjacent and separated by the Bendor Range and Mission Ridge. Together, they drain an area of approximately 3700 km². Elevations range from 236 m at the confluence with the Fraser River to rugged peaks of about 3000 m, and steep-sided slopes and broad lower valleys predominate (Figure 1). The Bridge River flows into the Fraser River just north of the town of Lillooet, and the Seton River meets the Fraser immediately south of the town.

The Bridge Seton watershed has a total human population of approximately 4500, of which almost 3000 are located near Lillooet. Other communities include Gold Bridge, near the La Joie Dam, and Yalakom on the lower Bridge River. It is within the traditional territory of the St'at'imc Nation and indigenous people from the majority of the population. The watersheds contain the Spruce Lake protected area.

The Bridge and Seton rivers are primarily affected by continental and modified maritime weather producing high snow pack in the winter and occasional short-duration rainfall between June and July. The hydrograph is dominated by snowmelt between May and August. Inflow is usually low from September to April, but autumn storm events result in occasional large inflows. The source of Bridge River is the Bridge Glacier covering 140 km² of the upper watershed.

The Bridge River project consists of La Joie Dam, which impounds Downton Reservoir, and Terzaghi Dam, which impounds Carpenter Reservoir. Water is diverted through tunnels and penstocks from Carpenter Reservoir to two powerhouses on the shore of Seton Lake Reservoir. Downton Reservoir has a total average inflow of 40 m³/s. Additional inflow to Carpenter Reservoir is 51 m³/s for a total diversion of about 91 m³/s into Seton Lake; the licensed diversion from Bridge River is 147 m³/s.

When Terzaghi Dam was completed in 1960 (and the Mission Dam before it in 1948), no continuous releases from Carpenter Reservoir were required, and any flows in the lower Bridge River derived exclusively from groundwater and inflow from tributaries. With the exception of occasional spills over the dam to manage unpredictable high inflows, a 4 km stretch of channel immediately below the dam was left essentially dry, and the other 15 km experienced a more than hundred-fold reduction in flow (Failing et al. 2004). In the late 1990s, Terzaghi Dam was modified to allow continuous flow release, and since August 2000 BC Hydro has implemented an average release of about 3 m³/s. The magnitude of the release is being managed under an adaptive management program. The dam remains impassable for fish.

The Seton project consists of Seton Dam at the outlet of Seton Lake, where water is diverted by canal then penstock to a powerhouse on the banks of the Fraser River downstream of the natural Seton-Fraser confluence. The Cayoosh Dam (owned and operated by Walden North) diverts water from Cayoosh Creek via tunnel to Seton Lake near its outlet. About 80% of the total discharge through the Seton powerhouse comes from the Bridge River diversion. The Seton Dam incorporates fish passage structures, which allow anadromous salmon to ascend beyond the outlet of Seton Lake.

Seton Lake has a total average inflow of about 117 m³/s: 19 m³/s comes naturally from within the Seton basin, 16 m³/s from the Cayoosh Creek diversion, and 91 m³/s from the Bridge River diversion. The seasonal flow regime of the Bridge River watershed dominates the operation of Seton Lake Reservoir.

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

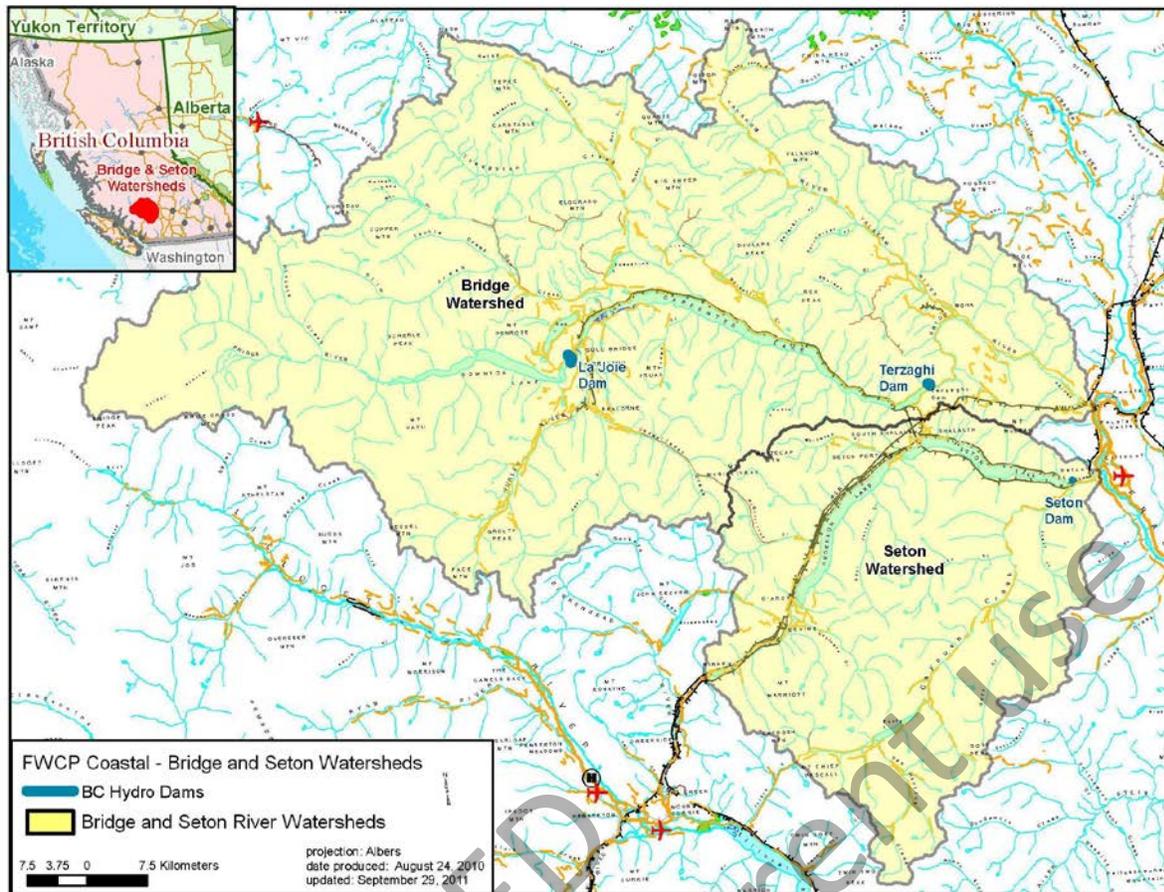


Figure 2: The Bridge-Seton hydropower project.

2.2 FOOTPRINT ISSUES

Fish and Wildlife habitat and species have been significantly altered due to the construction of the dams, the development of hydro-power, and alterations in the hydraulic regimes of the systems. The following summary of the primary footprint impacts is derived from:

- Bridge-Coastal Restoration Program: Strategic Plan, Volume 2: Watershed Plans, Chapter 10: Bridge River and Chapter 11: Seton River (December 2000);
- Bridge River Water Use Plan Consultative Committee Report (December, 2003); and
- Findings in the Community Workshop (Lillooet, March 26, 2009).

Inundation: The total area flooded by Downton Reservoir is 2,234 ha of river and valley bottom, and the reservoir shoreline length is 60 km.

The total area flooded by Carpenter Reservoir is 4,669 ha of river and valley bottom, and the reservoir shoreline length is 112 km. This included 55 km of tributary channel habitats in valuable lower reaches, plus their associated riparian zones.

Reservoir impoundment raised the elevation of the original Seton Lake by about 2 m. The reservoir area measures 2,530 ha after flooding 27 ha of land. The lake and reservoir shoreline length are equal, at 52 km.

Habitat loss: Inundation of valley bottoms resulted in loss of valley bottom and valley side coniferous, deciduous, and wetland (including riparian) habitats. Associated losses include the loss of marsh and

wetland feeding/breeding habitat for birds, bats and furbearers, the loss of feeding habitat for bears & ungulate and the loss of valley side habitat for bighorn sheep, other ungulates, and carnivores. Dams have stopped the recruitment of gravel and large woody debris downstream which have resulted in decreased spawning and rearing habitat.

Migration barriers: The Terzaghi dam created a barrier to salmon migration. Loss of the salmon resource above Terzaghi has had a negative effect on predators and scavengers upstream. Inundation of main river and tributaries (Carpenter and Downton reservoirs) created a barrier to the movement of large mammals (bears and ungulates). The present fishway (canal) in Seton does not allow the passage of larger fish like Chinook, and low fish flows restrict instream habitat quantity and access to former off-channel habitat; spawning channels offset this to some degree.

New Habitat: Inundation created open water for waterfowl and osprey. The flooding of shoreline trees created snags for cavity nesting birds. There is more area for lake species. The species composition is basically unchanged; however, kokanee are stocked in Carpenter Reservoir.

Altered Flow Regime. The changed flow regimes have had unknown effects on downstream aquatic wildlife (e.g., American Dipper, Harlequin). Spills have scoured existing gravel downstream and may temporarily increase TGP. Reduced flows in the lower bridge has limited access to tributaries and spawning areas. Backwatering and dewatering of tributaries leading to reservoirs increases the risk of egg mortality and restricts access for spawning.

Diversions. Diversion of water from the Bridge and Cayoosh systems into the Seton system has altered flow regimes (see above) and temperature in all systems, as well providing increased sediment into Seton and altering its water chemistry. Bridge River migratory stocks are attracted to the Seton tailrace due to large proportion of home-stream water that is diverted from Bridge to Seton.

Entrainment. Fish may be impinged on the fish screens at the power canal intake structure in Seton, or on woody debris at other intake structures.

Non-Hydro: Other impacts in the Bridge-Seton watersheds include mining (particularly in the area of Gold Bridge around Ferguson Creek), forestry, and rail and road construction, in particular rail construction near Seton Lake likely filled limited shoal areas. Also, the slides in the Fraser River at Hell's Gate in 1913 and 1914 negatively affected anadromous fish passage into the Bridge-Seton watersheds. Fish passage at Hell's Gate was established in 1945 and extended in 1956; however, fish stocks took a long time to recover. The effects of the Hell's Gate slides are thought to have contributed to underestimating the productivity of Bridge-Seton fish stocks during evaluation of hydro-development in the watersheds. Urban development has not been a significant factor in the area.

2.3 FWCP ACCOMPLISHMENTS TO DATE

Since 1999, the Bridge Coastal Restoration Program has invested approximately \$4.4 million in the watersheds of the Bridge and Seton rivers.

Restoration work includes:

- Gates Creek spawning channel gravel replacements and upgrades to the channel.
- Seton spawning channel complexing.
- Seton River foreshore restoration.
- Carpenter watershed prescribed burning.

Conservation and enhancement work includes:

- Purchase of Gates Creek properties.

Research work includes:

- Mule deer migration studies.

- Riverine bird response to re-establishment of flows in the Lower Bridge River.
- Grizzly bear habitat use and distribution in the Bridge-Seton watersheds.
- Kokanee (Gwenish) population survey in Anderson Lake and Seton Reservoir.
- Fish passage feasibility at Terzaghi Dam.
- Fish passage efficiency at Seton Dam fish ladder.
- Owl population and habitat surveys (various sp.).

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3 STRATEGIC OBJECTIVES FOR FWCP

Strategic objectives for the Fish and Wildlife Compensation Program reflect a synthesis of the core objectives and mandates of the partner agencies as they relate to mitigating impacts associated with hydro-power generation in British Columbia.

Conservation and sustainable use are core objectives for both the Ministry of Environment and Fisheries and Oceans. Conservation is addressed in terms of maintaining specific species or habitats both in terms of their importance for diversity (including genetic diversity), as well as their importance for ecosystem functions, integrity and productivity. For example, a species such as White Sturgeon may be important in terms of species diversity, while Pileated Woodpeckers may be important for maintaining ecosystem functioning and integrity by creating habitat for other species. Sustainable use incorporates the human interest in utilizing species for sustenance, commercial, recreational, or cultural purposes. Consequently, species such as coho, moose or bald eagles (wildlife viewing) could be considered important from a sustainable use perspective.

Community engagement is a core objective for BC Hydro under the compensation program and is driven by its social responsibility policy. It also reflects the 'shared stewardship' goal of the Ministry of Environment and those of Fisheries and Oceans' Stewardship and Community Involvement program. It reflects the importance of incorporating local values and interests in determining and implementing projects.

The FWCP strategic objectives are therefore:

Conservation

- **Maintain or improve the status of species or ecosystems of concern.**
This focuses on the conservation goals for ecosystems, habitats or ecological communities, and specific species. Priorities may be identified through the provincial Conservation Framework, or at the Conservation Unit level under the federal Wild Salmon Policy. Conservation priorities may also be identified at the watershed level based on local conditions.
- **Maintain or improve the integrity and productivity of ecosystems and habitats.**
This addresses the concept of ecosystem integrity, resiliency and the functional elements of ecosystems, including efforts to optimize productive capacity.

Sustainable Use

- **Maintain or improve opportunities for sustainable use, including harvesting and other uses.**
This objective focuses on the program's role in restoring or enhancing the abundance of priority species and in providing information to resource management decision makers related to providing opportunities for harvesting and other uses. Harvesting includes First Nations, recreational, sport and commercial harvests. Other uses may include cultural, medicinal, or non-consumptive uses.

Community Engagement

- **Build and maintain relationships with stakeholders and aboriginal communities.**
This objective stems from BCH's social responsibility policy, MOE's shared stewardship goal and the approach of DFO's Stewardship and Community Involvement Program. This recognizes the importance of engaging aboriginal communities, local stakeholders, and other interest groups to contribute toward making good decisions and delivering effective projects.

4 PRIORITIES

4.1 INTRODUCTION

Across all watersheds where the FWCP operates, the general process of identifying priority action plans involves three steps:

Step 1 – Identification (Candidate Priority Species and Ecosystems)

The first step involves identifying and prioritizing the species and ecosystems against the core strategic objectives, and how they have been impacted by footprint issues associated with hydro-power generation.

Step 2 – Preliminary Planning

This step consists of reviewing the identified priorities with consideration to identifying candidate action plans. It may involve grouping species or ecosystems together for coordinated action. Key considerations include: addressing limiting factors, exploring the opportunity for multiple benefits, addressing any specific local threats, the practicality of implementing actions, and the plan's consistency with existing agency programs.

Step 3 - Prioritization

This step consists of a final prioritization of candidate action plans (and their priority areas) according to cost effectiveness and technical feasibility criteria:

- **Technical Feasibility.** – The program should generally seek out investments that are the most technically feasible. Considerations generally include the use of proven methods and availability of technical resources. Innovative approaches should be considered but they must have a credible technical foundation and reasonable expectation of success. The potential interrelationship with system operations and programs being implemented by the Water License Requirements program must also be considered.
- **Cost Effectiveness.** – The program should generally seek out investments that are the most cost effective. This includes issues or actions which may benefit multiple species, areas where there is an opportunity to leverage additional funds for activities, issues where previous work has been conducted and incremental expenditure may have substantive benefits, actions that are closely related to on the ground actions with measurable impacts, amongst others.

4.2 PRIORITY SETTING IN THE COASTAL REGION AND BRIDGE-SETON WATERSHEDS

In the Coastal region of the FWCP, Step 1 involved a review of existing Watershed Restoration Plans, interviews with agency staff, a series of community workshops and a final evaluation.

In 2000, specific restoration objectives were originally articulated in the Watershed Restoration Plans.⁷ These plans contain details of the major footprint impacts, objectives and limiting factors for productivity and have guided the work of the FWCP Coastal for the past decade.

Priorities for FWCP Coastal were reviewed in 2009 through a multi-stage process involving BC Hydro, Fisheries and Oceans Canada (DFO), Canadian Wildlife Service (CWS), Ministry of Environment (MOE), local First Nations, and local communities. Initial priority setting was developed through consultation with agency staff. These were then reviewed and discussed at a series of open houses to allow First Nations, public stakeholders, and interested parties to comment and elaborate on the priorities.

⁷ Watershed Restoration Plans may be obtained at the FWCP website:

<http://www.bchydro.com/bcrp/projects/watersheds.html>

The results from the Bridge-Seton Watersheds workshop are summarized in Appendix A, highlighting the species, habitats, and specific activities as priorities for further work. On the aquatic side, Chinook, coho salmon, and steelhead were viewed as the highest priority fish species in the lower Bridge and Seton rivers. Bull trout and rainbow trout were also noted to be a high priority in the upper areas reservoirs of the two systems. Gwenish Kokanee were also seen as high priority in Seton Lake and a lower priority in Anderson Lake.

Species at Risk were also identified as priorities, in particular the need to improve the overall understanding of which species exist in the watershed, and to identify appropriate actions to conserve them. For example no amphibian species were mentioned as high priority as there is so little known regarding their abundance and distribution in the area. Specific species of high priority included the Mule deer and moose from a sustainable use perspective; fishers; grizzly bears and mountain goats. The highest priority birds were riverine birds, such as mergansers, American Dipper and Harlequins; and Western Screech and Spotted owls. First Nations noted the importance of riparian raptors, in particular bald eagles and the connection was made between enhancing fish and benefiting their predators.

The priorities emerging from the workshops were subsequently reviewed by BCH and Agency staff in relation to how well they addressed the strategic objectives, the extent to which species were impacted by footprint impacts, and what activities could provide multiple benefits to multiple species. The resulting direction for the Bridge-Seton Rivers Watershed is to focus the next five year period on the development and implementation of three priority *Action Plans* for priority topic areas: Salmonids, Riparian / Wetlands and Species of Interest.

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4.3 PRIORITY ACTION PLAN SUMMARIES

The Salmonid and Riparian / Wetlands Action Plans focus on overall ecosystems in support of multiple fish and wildlife species. The objectives and sub-objectives within these two plans reflect the overall ecosystem focus, and the plans include primarily habitat-based actions, supported as required by research/information acquisition, assessments and monitoring/evaluation actions.

The Species of Interest Action Plan focuses on species of conservation concern (including species-at-risk) or other regionally important species for management planning process. The objectives, sub-objectives and actions within this plan reflect this focus on individual species.

All three priority action plans in the Bridge-Seton watersheds provide broad support to the FWCP strategic sustainable use objective.

The three priority action plans for the Bridge-Seton watersheds are summarized below. The full plans can be accessed on the FWCP website ([provide](#)).

SALMONID ACTION PLAN

Rationale

Salmonids have been highly impacted by the creation of dams and hydroelectric facilities in the Bridge-Seton system. Limiting factors for salmonids in the watersheds vary among species and include useable habitat, access to habitats (i.e., passage), and altered flows, diversions and sedimentation. As enhancement work has been done, understanding its effectiveness will help inform future opportunities. This overall action plan for salmonids includes integrated habitat restoration planning and analysis to determine actions that provide the most benefit to multiple species.

The conservation and enhancement priorities depend upon the species and the watershed, however, in general they include coho, steelhead, bull, Chinook, kokanee in Seton Lake, and assessing sockeye enhancement at Gates, and pink in the lower spawning channels. It should be noted that particular attention should be paid to conservation efforts for steelhead, coastal cutthroat, bull trout and interior coho, the latter having been assigned 'endangered' status under COSEWIC.

FWCP has invested to enhance salmonid habitat in the Bridge-Seton, and further work would be able to build on previous success. Moreover, assessment of existing work will guide future enhancement opportunities

Focus

1. Assessment of the effectiveness of existing habitat enhancements in terms of adult returns and escapement.
2. Implementation of habitat restoration actions for priority areas (Horse Shoe Bend, Apple Springs, lower Bridge up stream of Yalakom), including off channel opportunities, gravel placement etc.
3. Assess increased fish passage for Seton Dam, and upstream of Yalakom River.

Expected outcome

- Improved habitat capacity and productivity in multiple stream systems.
- Sustained abundance of anadromous and resident salmonid populations at target levels over time.
- Improved targets for both habitat capacity (pre-development) and abundance for all salmonid species.
- Improved understanding of the implications of increased fish passage in the Seton system and in the up-stream of the Yalakom.

RIPARIAN AND WETLANDS ACTION PLAN

Rationale

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

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

Focus

1. Mapping of current wetlands and riparian areas, and categorization of areas into healthy and functioning systems (Category 1), and degraded or sub-optimal areas that would benefit from restoration (Category 2).
2. Assessment of opportunities for securement (conservation) and protection (from potential degradation) of Category 1 areas. This includes assessment of legal status, ownership, land use, etc.
3. Assess threats to category 1 and 2 areas and address threats.
4. Assessment of opportunities to enhance and restore Category 2 areas, with a subsequent view to conserve and protect them.

Expected outcome

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

SPECIES OF INTEREST ACTION PLAN

Rationale

'Species of interest' are defined as species of conservation concern (including species-at-risk) or other regionally important species.

Grizzly bears are the first species being considered under "Species of Interest". They have been impacted by dams through loss of foraging habitat as well as food sources with the building of Terzaghi dam. They are of particular concern for the Ministry of Environment as both the South Chilcotin and Stein-Nahatlatch population units are considered *threatened*. Both the public and the First Nations view grizzly bears as a high priority. Habitat is believed to be limiting and the area has seen greater human-wildlife interaction in recent years.

Between 2004-2008 BCRP invested approximately \$600,000 in determining bear populations and movement in the area. However, population trends are not conclusive. Further studies and work will likely yield on the ground actions, such as limiting access to key foraging areas or enhance migration corridors. There are possibilities of multiple benefits associated with habitat enhancement, as actions that support foraging and increased movement of grizzly bears will likely have positive effects on ungulates and other predators

Other species of interest work has been conducted in the area with respect to bats and owls. To build on previous efforts, more information is needed regarding how effective past efforts have been. Additionally, more knowledge is needed regarding what species exist, in what habitats, and the opportunities available for their protection. Also, needed is a strategy for evaluation and monitoring that will support the ongoing process of renewing species plans and priorities in the Bridge-Seton system.

Focus

1. Build upon the past efforts associated with the identified FWCP priority species of concern in the Bridge-Seton watersheds, with a focus on grizzly bears.
2. Conduct mapping and prioritization of activities for additional species of concern.

Expected outcome

- Improved knowledge and status of FWCP priority species of concern.
- Improved habitat mapping for species of concern.
- Identification and prioritization of species, locations and potential future actions for conservation and protection.
- An updated and detailed Species of Interest Plan, with specific prioritized actions for grizzly bears.

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APPENDIX A

The following list of species, ecosystems and actions were identified by agencies, First Nations and communities as being the top priorities for activities under the FWCP program. Following initial input from agencies, a multi-stakeholder workshop was held in Lillooet (26 March, 2009) to identify priorities. Two breakout groups, for fish and wildlife, identified priorities which were reviewed in plenary to allow all participants to comment on the findings.

HABITATS

Habitat	FWCP Rank	Comments
SARA plants and ecosystems	High	<p>Conservation covenants and restoration of damaged sites.</p> <p>Permanent loss in Bridge-Seton watershed may require compensatory habitat in other watersheds as options are limited in BS.</p> <ul style="list-style-type: none"> • Re-ranked as a “VERY HIGH” priority. • Range use has impacted a lot of streams, how can that be managed or restored? Can’t fence it all... • Land use planning is important. See above general comment regarding harmonisation of LRMP, Conservation Strategy, St’at’imc LUP. • Focus on success at small scale actions initially (examples of range management in other districts – Kamloops). • Horseshoe Bend is a key area for work (possibility to purchase mineral license). • Participants want the focus to remain on restoration where possible before compensatory habitat elsewhere, except in the case of grizzly bears where compensatory habitat away from human activity would be preferable to restoring habitat in high human-use areas due to mortality risk.
Wetlands and riparian areas	Very High	<p>The focus is on conservation (category 1) and restoration (category 2) to more natural conditions and long term conservation. Permanent loss in BS watershed may require compensatory habitat in other watersheds as options are limited in BS.</p> <ul style="list-style-type: none"> • Re-ranked as a “Very High” priority due to rareness in the Bridge-Seton. • Need a wetland inventory because there are few wetlands and there needs to be a better inventory of those that exist and their importance - perhaps a list of priority wetlands.
Grassland Habitats	High	<p>The participants mentioned the importance of grasslands for grazing and ungulates and its lack of conservation or protection in the area.</p>

		<ul style="list-style-type: none"> • ID of key areas, covenants, 'AOI' designation etc.
Invasive Plant Species	High	<p>Management of invasive plant species was added to the priorities table because of a previous project (01.W.13) on invasive plants and because it was felt that invasive plant species are affecting many of the high priority habitats (such as ungulate winter range).</p> <ul style="list-style-type: none"> • Project: restoration. • Project: invasive species management.

FISH

Species	FWCP Rank	Comments
Bridge River		
Coho Salmon	high	<ul style="list-style-type: none"> • Focus should be on off-channel developments to increase rearing and spawning capacity downstream of the Yalakom confluence (outside the WUP study area). • The Apple Springs off-channel site and the Horseshoe Bend off-channel sites are important restoration areas.
Chinook Salmon	high	<ul style="list-style-type: none"> • The partial barrier on Yalakom should be removed to restore historic access to the upper watershed. • Spawning platforms in Bridge River upstream of Yalakom should be re-established. • There is a good opportunity to increase egg survival by changing gravel composition. Assessments should be conducted in the restored channel downstream of Terzaghi to determine if gravel should be augmented or replaced.
Sockeye Salmon & Pink Salmon	low	<ul style="list-style-type: none"> • The species are of low restoration priority in Bridge River, no targets set. • Available habitats are fully utilized and populations are sustainable.
Fish Passage	low	<ul style="list-style-type: none"> • Available habitats are limited due to inundation. • The Seton Band consider fish passage at Terzaghi Dam a high priority, although the ministries do not agree.
Upper Bridge River, above Terzaghi Dam		
Bull Trout & Rainbow Trout	high	<ul style="list-style-type: none"> • These species are the highest priority in the Upper Bridge River. While no formal targets have been set for bull trout, the species is still a conservation concern. • There are important potential restoration projects in Hurley River and Cadwallader Creek (e.g., the potential dam removal project on Cadwallader Creek).

Species	FWCP Rank	Comments
		<ul style="list-style-type: none"> Limiting factors in Gun Creek and Tyaughton Creek need to be assessed. Lake outlets on Mowson Pond and Pearson Pond should be re-established.
Kokanee	med	<ul style="list-style-type: none"> As there is limited information available on the species, no targets or restoration opportunities have been identified.
Mountain Whitefish	low	<ul style="list-style-type: none"> No targets have been set, however the species may be an important forage species for bull trout.
Lower Bridge River, below Terzaghi Dam		
Steelhead Trout	high	<ul style="list-style-type: none"> The species is the highest priority in the Lower Bridge River. Their habitat area is not limiting at present, but would be were they to reach target populations.
Bull Trout	med	<ul style="list-style-type: none"> Current escapements are low, but no targets or restoration opportunities have been identified, because habitat is not a limiting factor.
Rainbow Trout	med	<ul style="list-style-type: none"> As spawning populations appear stable, no restoration projects have been identified.
Fish Passage	low	<ul style="list-style-type: none"> Fish passage is not currently a priority below Terzaghi Dam.
Seton River		
Coho Salmon	high	<ul style="list-style-type: none"> Focus should be on off-channel developments to increase rearing and spawning capacity downstream of the Yalakom confluence (outside the Water Use Planning study area). Species composition and use of original Seton pink salmon channels should be assessed. Restoration work should begin in the lower Seton channel, then move into the upper channel. Restoration opportunities need to be identified in Gates River.
Chinook Salmon	high	<ul style="list-style-type: none"> The high priority is consistent with coho and steelhead. Mainstem spawning options in Seton River should be assessed.
Sockeye Salmon & Pink Salmon	Low	<ul style="list-style-type: none"> The species are of low restoration priority in Seton River, with no targets set, however the ongoing success of the internationally funded Gates spawning channel is a high priority. Available habitats are fully utilized and populations sustainable.
Steelhead and Rainbow Trout	high/med	<ul style="list-style-type: none"> The high priority for steelhead is consistent with coho and Chinook. Restoration work/habitat complexing in former pink channels is of high priority, including instream works and riparian planting. Feasibility studies on the possible construction of mainstem spawning platforms in the Lower Seton River are of medium priority.

Species	FWCP Rank	Comments
Bull Trout	high	<ul style="list-style-type: none"> The species is a high management priority throughout the river system, although limited information is available. There is potential for restoration projects in the Portage River area, specifically in Spyder and Whitecap Creeks. The irrigation intake on Spyder Creek needs to be relocated or screened to stop entrainment. Feasibility studies are necessary to assess restoration opportunities in Gates River and its tributaries (this would also benefit rainbow trout).
Kokanee	high	<ul style="list-style-type: none"> The species is a high restoration priority in Seton Lake, and a lower priority in Anderson Lake. The impacts of sedimentation from Bridge River and the locations of spawning sites need to be determined in order to improve spawning success.
Dolly Varden & Mountain Whitefish	low	<ul style="list-style-type: none"> The species are of low management and restoration priority.
Fish Passage	high	<ul style="list-style-type: none"> Assessments are needed to determine how to improve fish passage in Seton River.

MAMMALS

Species	FWCP Rank	Comments
Species at Risk (SAR) in general	high	<ul style="list-style-type: none"> All wildlife agencies consider SAR a high priority. Some possible Species at Risk in the Bridge-Seton Watersheds are listed in the following section. <p>Species at risk in the area include*: Wolverine (SC), Grizzly Bear (SC), Lewis's Woodpecker (SC), Peregrine Falcon (SC), Western Screech-Owl (E), Pallid Bat (T), Spotted Bat (SC), Short-Eared Owl (SC), Common Nighthawk (T), Rusty Blackbird (SC), Olive-Sided Flycatcher (T), Barn Owl (SC), Flammulated Owl (SC), Spotted Owl (E), Long-Billed Curlew (SC), Gopher Snake (T), Rubber Boa (SC), Western Yellow-Bellied Racer (SC), Coastal Tailed Frog (SC) and Western Toad (SC).</p> <ul style="list-style-type: none"> Two insect species at risk may occur in the area: Monarchs (SC) and Dun Skippers (T). Little may be known about these species and thus greater knowledge, protection of denning or roosting, nesting habitats, hibernacula for bats, etc. are of great importance.
Mule Deer	high	<ul style="list-style-type: none"> Participants agreed mule deer are a high priority. They are a low conservation priority but a high management priority. Priorities include studies on use, mapping, access management (particularly in relation to IPPs), conservation of the migration corridor through buffers and habitat enhancement, investigation into

Species	FWCP Rank	Comments
		<p>factors that may limit health</p> <ul style="list-style-type: none"> • Enhancement and conservation of the winter and spring range considered important, but not a priority as it is unlikely to be able to secure sufficient range to have much impact.
Moose	high	<ul style="list-style-type: none"> • Priorities include population and habitat inventory, enhancement and increasing of the winter range and foraging habitat and access management.
Bighorn Sheep	Med	<ul style="list-style-type: none"> • Priorities include, access and disturbance management, and implementation of the recommendations made by the radio-tracking study conducted in the William's Lake Forest District. • Securement of winter range is important, but it was felt that not enough could be secured to make much difference. • First Nations have noted that there was a movement corridor at Tommy Creek before the flooding, which bighorn sheep can no longer cross. The canal also blocks bighorn sheep movement. • Lungworm and bacterial infection are a big problem for this species; work on these issues would be valuable.
Fisher	high	<ul style="list-style-type: none"> • Inventory and landscape-level habitat management are needed. • Birthing and denning habitat (cottonwoods) need to be retained, as it cannot be recreated.
Grizzly Bear	high	<ul style="list-style-type: none"> • Priorities include the enhancement and increasing of foraging & denning habitat, the conservation of movement corridors to prevent genetic isolation, population and habitat inventory, access and disturbance management and mortality risk reduction (through Bear Aware and Bear Smart. Enhancement of habitat should be away from human access (other valleys etc.). • Projects should link to the provincial Grizzly Bear conservation Strategy and to the St'at'imc Resource Management Plan. • Compensatory habitat should be away from human activity due to mortality risk. • Whitebark pine is important forage for grizzly bears.
Mountain Goat	med	<ul style="list-style-type: none"> • While mountain goats have a medium overall priority ranking, the Mission Ridge and Bridge River goats are of high priority. Projects that identify why mountain goat populations are declining are also of high priority. • First Nations have identified two areas where mountain goats used to be but aren't seen anymore: Mission Ridge and Bridge River. • Priorities include population and habitat inventory, enhancement of the winter range, conservation of the movement corridor through buffers and habitat enhancement, access management (including disturbance by ground and air) documentation and conservation of mineral lick sites and investigation into whether transmission lines

Species	FWCP Rank	Comments
		and access roads affect populations.
Wolverine	med	<ul style="list-style-type: none"> • Inventory is important (there are likely fewer than grizzly bears) • Access to their habitat is a problem, in particular disturbance at winter (snow-mobiles and heli-skiing).

BIRDS

Species	FWCP Rank	Comments
Riverine Birds	high	<ul style="list-style-type: none"> • BC Hydro operations have had multiple, cumulative effects on riverine birds, including Mergansers, American Dipper, and Harlequin Duck. • Riparian conservation is important for these species, including water quality, stream productivity and fisheries relationships. • Priorities include research on genetics and the dispersal of birds between river systems, including the connectivity of populations over larger scales, and expansion and restoration beyond the Bridge River watershed.
Western Screech-Owl	high	<ul style="list-style-type: none"> • Western screech owl are a riparian dependent species at risk with habitat restoration and securement potential. • Conservation Framework ratings are dependent on which subspecies is in the Bridge-Seton. • Priorities include inventory in areas where there is none, the implementation of nest box programs, and inventory and protect of known nesting sites.
Spotted Owl	high	<ul style="list-style-type: none"> • The Bridge-Seton Watershed comprises some of the little remaining habitat for the species. • Landscape-level management is necessary. • Projects should link with the Recovery Strategy. • Due to the extent and causes of the problem (such as the large-scale land use issue) there is limited ability for FWCP Coastal restoration activities to address it.
Riparian Associated Raptors	priority not known	<ul style="list-style-type: none"> • The group is important to St'at'imc. • The group includes western screech-owl, but encompasses other species as well.
Sharp-tailed Grouse	priority not known	<ul style="list-style-type: none"> • There is breeding and winter habitat enhancement potential for this species. • There was debate about whether this species should remain a priority, since they are located farther out in the grasslands (a threatened ecosystem) on the Fraser (outside of the footprint) and are affected by ungulate and cattle grazing.

Species	FWCP Rank	Comments
		<ul style="list-style-type: none"> They remain a priority as there is a high need for inventory.

AMPHIBIANS, REPTILES AND TURTLES

Species	FWCP Rank	Comments
Coastal Tailed Frog	High	<ul style="list-style-type: none"> Priorities include the conservation of streams, riparian habitats and covenants on private lands, water quality initiatives, inventory on secondary and tertiary streams, and baseline studies on existing streams to determine the extent of species habitat and distribution. Research is important as the species lives in fishless streams that have received little attention to date. Need for inventory on secondary and tertiary streams before IPP development.

Wildlife Species at Risk that occur or could occur in the Bridge River and Seton River Watershed

	COSEWIC	CF
Mammals		
Pallid Bat ⁸	Threatened	3,6,2
Spotted Bat	SC	5,2,3
Mountain Goats		4,1,2
Grizzly bear	SC	3,2,3
Wolverine	Special Concern	3,2,3
Grey Wolf	NAR	3,6,5
Big Horned Sheep		4,3,4
Fisher		4,6,2
American Badger	Endangered	6,6,1
Great Basin Pocket Mouse		4,6,2
Mule Deer		6,6,6
Moose		6,6,6
Birds		
Lewis' Woodpecker	Special Concern	3.6.2
Peregrine Falcon	SC	5,2,3
Peregrine Falcon (<i>anatum</i> sub-sp)	SC	5,6,2
Prairie falcon		6,6,2

⁸ The Pallid Bat was identified in interviews and the workshop however CF listing places it in the Okanagan-Shuswap forest district and the Okanagan-Similkameen Regional District only.

	COSEWIC	CF
Bald Eagle		6,6,6
Band Tailed Pigeon	Special Concern	5,2,3
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Common Nighthawk	Threatened	6,2,4
Northern Harrier		4,2,4
American Dipper		
Harlequin duck		
Barn swallow		6,2,3
Rusty Blackbird	SC	3,2,3
Olive-sided fly catcher	Threatened	5,2,3
Great Blue Heron (herodias subspecies)		6,2,3
Long Billed Curlew	SC	4,2,3
Sharp tailed Grouse (columbianus sub-sp)		2,6,2
Sooty Grouse		5,2,3
Spotted owl	Endangered	5,6,2
Flammulated Owl	Special Concern	5,2,3
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Barn Owl	Special Concern	6,2,3
Short-Eared Owl	Special Concern	6,2,3
Western Screech Owl (kennicottii sub-sp)	Special Concern	3,1,2
Western Screech Owl (macfarlanei sub-sp)	Endangered	4,6,1
Amphibians and reptiles		
Western Toad	Special Concern	3,2,4
Pacific Tailed Frog	Special Concern	4,1,2
Western yellow bellied racer	Special Concern	6,2,3
Northern Alligator Lizard		5,3,4
Gopher Snake		6,6,2
Gopher Snake, (<i>deserticola</i> sub-sp)	Threatened	6,6,2
Columbia Spotted Frog		3,2,4
Insects		
Dun Skipper	Threatened	4,2,3
Monarch	Special Concern	
Nevada skipper		4,2,3
Rockslide checkerspot		3,4,4