Sát`atqwa7 - The River
Powerhouse Foreshore Restoration Project
2014 Final Report

Project Number
14.W.SON.03

Prepared For
Fish and Wildlife Compensation Program

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Executive Summary

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1. Introduction

1.1 PROPONENT INFORMATION

Splitrock Environmental is an aboriginal business owned by Sekw'el'wás (Cayoose Creek Indian Band). We specialize in eco-cultural restoration, including restoration management, planning, and implementation, ecosystem and cultural surveys, and mapping. Splitrock Environmental began as a partnership between the Lillooet Naturalist Society and Sekw'el'wás in 2007. Together, we worked to restore the eleven-hectare Powerhouse Foreshore Restoration Site along the Fraser River. In 2014, Splitrock Environmental became a limited company. We operate a native plant nursery on reserve land to provide regionally specific native plants for our restoration work. We have been mentoring band members in restoration principles and nursery operations since our inception. Our goal is to develop a sustainable business that links our community to its past while providing opportunities for the future. In all activities, we work with provincial experts to ensure that our surveying and restoration work is both technically sound and provides useful information to the scientific community.

1.2 HYDROELECTRIC IMPACTS

In the late 1950's the Seton watershed was subject to major alterations from hydroelectric development. The 2014 Powerhouse project addresses habitat loss resulting from construction of the BC Hydro Cayoose Canal project, which was completed in 1956. Seton Lake was dammed in 1953 to create the Seton Lake Reservoir. At Seton Dam, power flows are diverted from Seton Lake Reservoir through a gated intake structure into a 3.7km concrete-lined power canal (Figure 1). This canal delivers water to a small intake forebay (BC Hydro, 2011). The powerhouse tailrace discharges into a semicircular basin approximately that was excavated from a fluvial terrace of the Fraser River, about 1.5 km downstream of the Seton River confluence (Fish & Wildlife Compensation Program, 2011). The tailrace is situated at the south end of the study site.

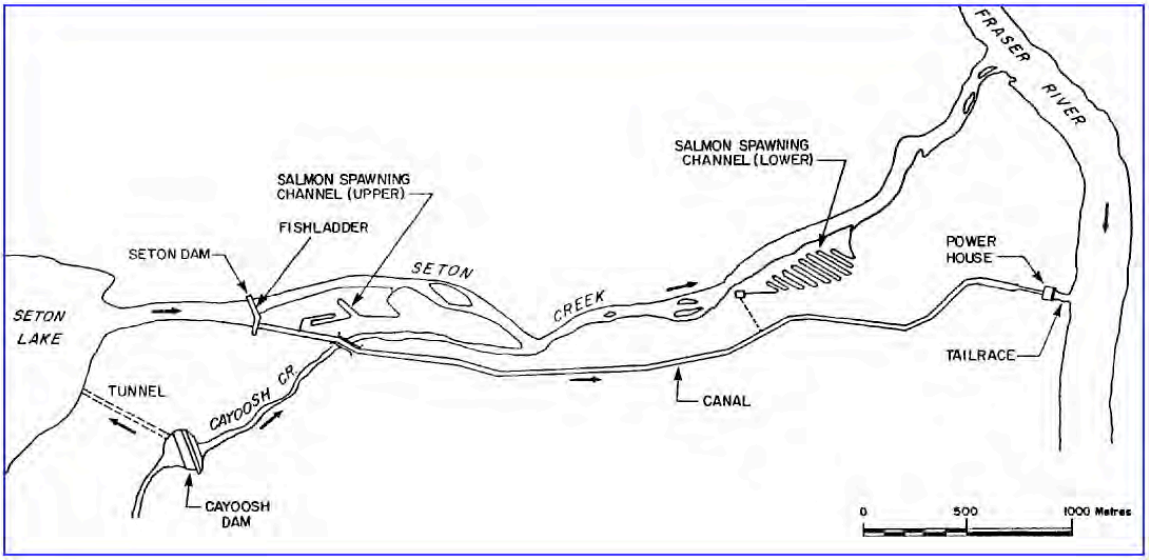


Figure 1: Seton Project Facilities (Bridge Coastal Restoration Program, 2000)

Extensive development of the Powerhouse site occurred during construction of the Seton power system. Excavation of the canal and forebay required the movement of vast amounts of earth, which fragmented habitats at the Powerhouse site and riparian ecosystems along the Fraser River. Construction altered the flow of the Seton River, which disturbed the original habitats and destroyed “an area of low marshy habitat [that] existed near the Fraser confluence” (Bridge-Coastal Restoration Program, 2000). Historic photographs of the area show the extent of industrial use of the Powerhouse site by BC Hydro, including use for Hydro operations and for leasing to other industrial users. Figure 2 shows a number of large buildings occupying the Powerhouse site and indicates the scale of the operations that took place on the site during the 1950’s. These operations have left a huge legacy of disturbance on the area.

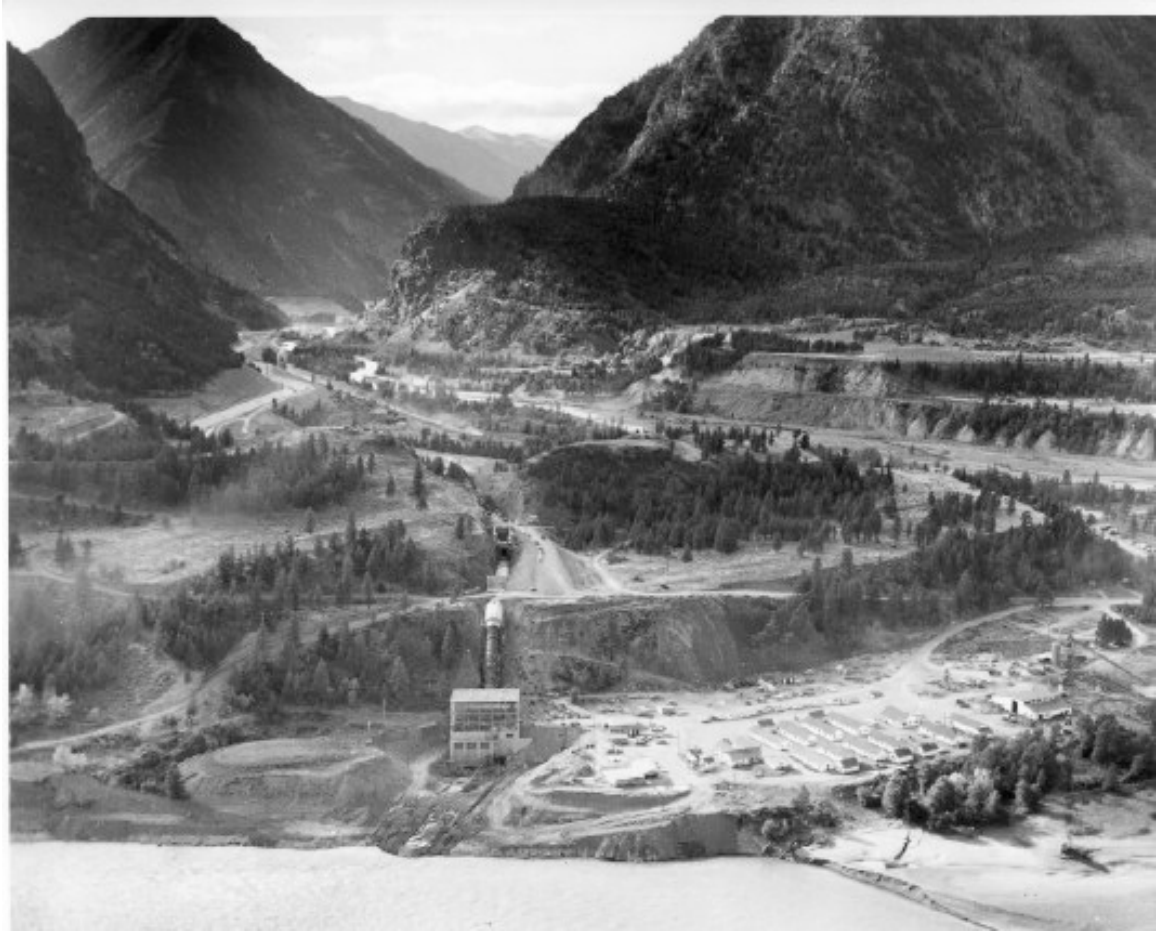


Figure 2: Cayoose Canal and forebay construction in the 1950s.

2. Goals and Objectives

In 2006 and 2007 the Lillooet Naturalist Society undertook a feasibility study for restoring the Foreshore restoration site. The feasibility study examined how to mitigate impacts on wildlife habitat within the site. A restoration plan was developed by the Lillooet Naturalist Society, the Cayoose Creek Indian Band, and a local Restoration Advisory Committee. We have worked hard since 2008 to carry out the restoration plan. The goals of this restoration project are to:

- create diverse and healthy habitat for wildlife; and
- provide an educational resource for the community of Lillooet with a focus on stewardship.

The objectives in 2014 were to:

- Focus on removal of invasive species over entire site based on our Weed Management Plan. The aim is to gradually, over time, remove the large seed-bank and to ensure native species can establish and compete with invasive species.
- Replace sage seedlings with grass seedlings in areas worked by machine in 2008, 2009, 2010, 2011 and 2012. Sage species have naturally grown in and are now the predominant species on site. Sage is out-competing other native species that we have planted. By thinning the sage we aim to diversify plant communities and wildlife habitat within the site.
- Continue to monitor plants and wildlife as per monitoring methods set up in previous project years. Monitoring will continue to provide data for evaluating the success of the project and for implementing adaptive management strategies.
- Include the Powerhouse Site in the Seton River Corridor planning process.
- Offer outreach and volunteer opportunities to the public, including weeding blitzes, sage thinning, and revegetation activities.

Splitrock Environmental has met the goals and objectives set out in Application 14.W.SON.03.

3. Study Area

3.1 SITE LOCATION

The Seton River basin is located in the rainshadow of the southern Coast Mountains, about 200 km northeast of Vancouver. Seton River flows into the Fraser River in Lillooet, B.C. The study area is located in St'at'imc traditional territory, and falls within the District of Lillooet boundaries and the Cascades Forest District. The Powerhouse site lies along the western shores the Fraser River, between the mouth of Seton River and the Cayoose canal outlet. UTM coordinates are 10 U 575980 x 5614321. The site is bordered by Powerhouse Road to the west and Cayoose Creek Reserve Lands to the north-west (see Map 1). The project site is currently zoned 'Industrial', with a Wildlife Habitat Area for the Western Screech-owl established over the riparian ecosystem along the Fraser River.

Map 1: Aerial photograph of the study area.

3.2 BIOPHYSICAL DESCRIPTION

The Powerhouse site ranges in elevation from 190 - 205m, and falls within the Ponderosa Pine biogeoclimatic zone. The Ponderosa Pine zone occurs in the dry valley bottoms of major river valleys of the southern interior. It is the driest forested zone in British Columbia, with very hot summers and annual rainfall between 280 - 500mm (Lloyd et al, 1990). The Powerhouse site is classified as

the very dry hot subzone (PPxh). Many microclimates exist in the Lillooet region due to localized weather patterns dictated by converging mountains and valleys. For the purpose of this study, the project site was broken into three ecological Zones (See Map 2 for a site sketch showing the ecological zones):

Dry upland bench

The area under BC Hydro ownership includes a fluvial bench above the river. The bench has been degraded by decades of industrial use. Many roads crisscrossed the site until they were closed through this project. The ecosystem is dominated by herbs and low shrubs, including big sagebrush *(Artemisia tridentata*), bunchgrasses and a few ponderosa pines (*Pinus ponderosa*). This area was the major focus of 2009 - 2012 work.

Figure 3: Photo of dry upper bench

Riparian zone

The crown land portion of the site is a riparian band dominated by tall deciduous shrubs and trees. Plants include Saskatoon (*Amelanchier alnifolia*) and prickly rose (*Rosa acicularis*), as well as a small stand of black cottonwood (*Populus balsamifera* spp. *trichocarpa*). A ponderosa pine forest is located at the northern end of this zone. The area has been used as a party site, racetrack and dumping ground for garbage. Despite this, osprey and many riverine birds inhabit the site, as well as deer, bear, coyote and bobcats, and reptiles. This area was focused on during 2008 -2009.

Figure 4: Photo of riparian zone

Fraser River gravel bar

The beach portion includes a large gravel bar on the shores of the Fraser River with minimal vegetation. Heron, eagles, gulls and sandpipers are frequent visitors. Vehicles can access the beach, and some weeds have encroached into the site.

Figure 5: Photo of Fraser River gravel bar

Map 2: Sketch of site showing three ecological zones: Dry upland bench (brown), riparian zone (green), and Fraser River gravel bar (yellow).

4. Partnerships

Splitrock Environmental, the Lillooet Naturalist Society and Cayoose Creek Indian Band have been working in partnership on this restoration project since 2006. From the outset, we have recognized the importance of garnering support from the traditional owners of the land, the St'at'imc people, as well as the Lillooet community as a whole. We have worked hard to ensure that this vision has become a reality. We have involved all levels of government, including First Nations, federal, provincial, regional and local governments.

Numerous other groups have supported this project in 2014. BC Nature leveraged funds for a summer student. The Lillooet Fire Zone (Ministry of Forests, Lands and Natural Resource Operations) assisted with the prescribed burn, providing equipment and personnel. The Rivershed Society of BC and the Native Plant Society of BC assisted by providing advice, encouragement and participation in events. First Nations elders provided ethnobotanical knowledge. Volunteers contributed many hours of work to the project during 2014, especially with the reptile board monitoring.

Other sources of funding obtained by Splitrock that went towards the 2014 project include:

- Lillooet Naturalist Society cash and in-kind contributions
- Canada Summer Jobs
- Aboriginal Fund for Species at Risk
- Splitrock Environmental cash and in-kind contributions

5. Methods

The Powerhouse Foreshore Restoration Project is a multi-faceted project that was carried out from 2005 - 2012. We are now in the maintenance phase of the project. Maintenance requires long-term commitment and a practical plan to ensure the work that was carried out continues to meet the project goals. The work carried out to date includes:

- 2005: Initial idea conceived and Bridge-Coastal Restoration Program seed funding application submitted
- 2006: Restoration and Enhancement Feasibility Study completed (06.W.BRG.07)
- 2007: Restoration Plan Developed (07.W.BRG.05)
- 2008: First year of ground work with focus on riparian zone (08.W.BRG.02)
- 2009: Second year of ground work with focus on upland bench (09.W.SON.01)
- 2010: Third year of ground work and increased monitoring (10.W.SON.01)
- 2011: Fourth year of ground work and monitoring (11.W.SON.01)
- 2012: Fifth year of ground work and monitoring (12.W.SON.01)
- 2013: No support received by funders. Volunteers and in-kind donations from Splitrock partially maintained the site.

Key players in the 2014 fieldwork are Kim North, Project Manager, and Odin Scholz, BSc., Restoration Specialist. Odin is responsible for mapping and fieldwork supervision at the restoration site, in partnership with Kim North. Reptile monitoring was done by volunteer Bob Deadman. The Lillooet Fire Zone assisted with the prescribed burn. The Splitrock restoration crew was involved in all other activities.

This report presents the methods and results of the work carried out in 2014. For more detailed information on previous years' work refer to the final reports for those years.

5.1 RESTORATION FIELDWORK METHODS

5.1.1 Weed Management

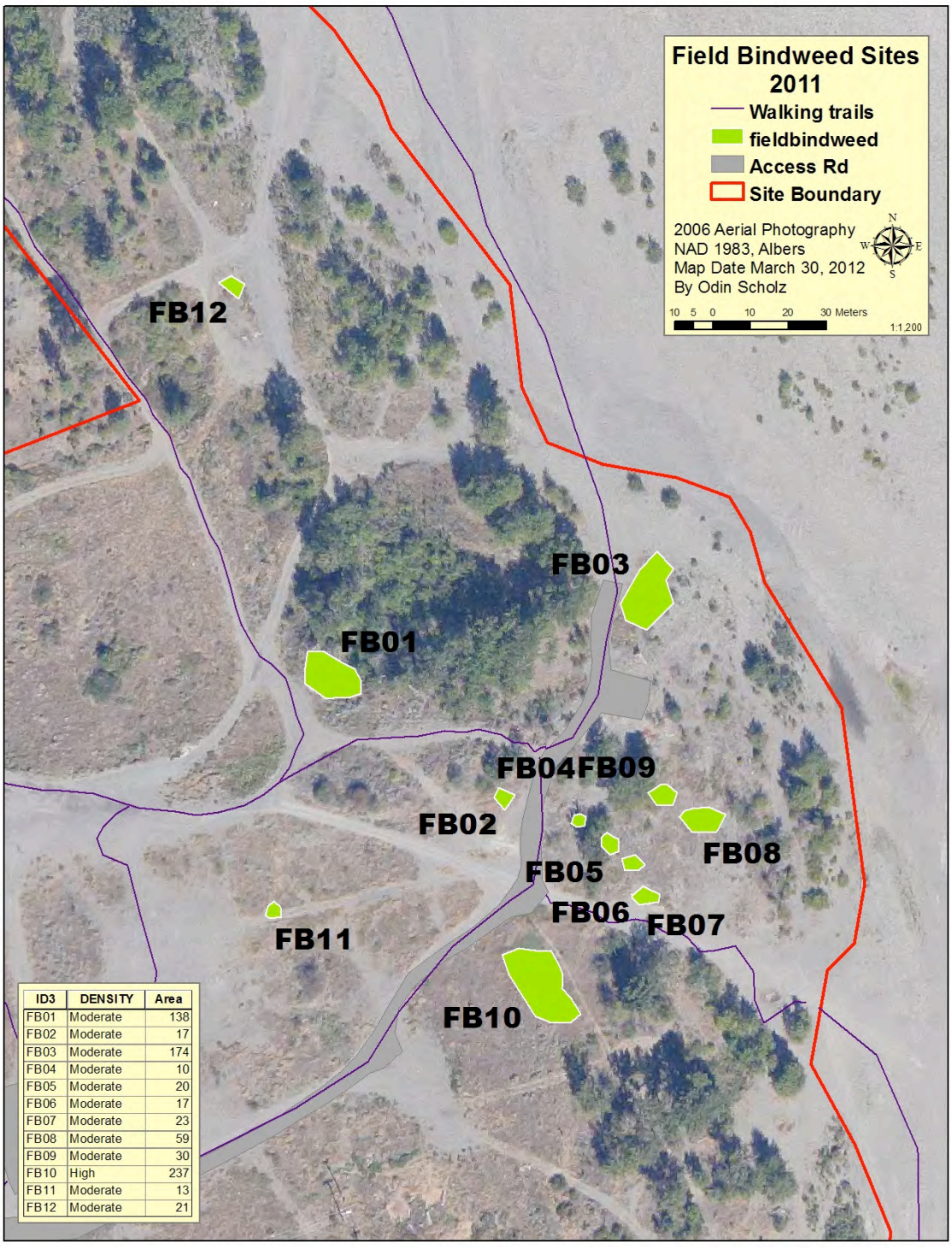
Invasive weed removal is a large part of the restoration work that is required to maintain the restoration investment. Invasive plants such as diffuse knapweed (*Centaurea diffusa*) and alfalfa (*Medicago sativa*) easily invade sites and prevent the establishment of native species, including those that we have planted. This year, we focused on removing weeds from the dry upper bench.

We accomplished most of the work through three weeding blitzes, where a large number of people removed weeds for a day. The weed blitzes were timed

according to the emergence and blooming time of invasive species in the site. We aimed to remove invasive species just as they emerged or during flowering, but always before seeding.

In addition to the weeding blitzes, the site was weeded (by hand pulling) approximately once per week, as needed, by a team of 2-4 staff members. Alfalfa (*Medicago sativa*) was mowed several times throughout the summer to prevent flowering and seed spread. We focused on areas of field bindweed (*Convolvulus arvensis*) that were identified in 2011 (see Map 3)

Weeds were left on site, composted, or taken to the dump, depending on whether the plant would spread seed if composted or left on site.



ID3	DENSITY	Area
FB01	Moderate	138
FB02	Moderate	17
FB03	Moderate	174
FB04	Moderate	10
FB05	Moderate	20
FB06	Moderate	17
FB07	Moderate	23
FB08	Moderate	59
FB09	Moderate	30
FB10	High	237
FB11	Moderate	13
FB12	Moderate	21

Map 3: Field bindweed sites

Figure 6: A weeding blitz. 15 May 2014

Figure 7: Hand pulling mustard. 15 May 2014

5.1.2 Native Plant Revegetation

In early spring, a three-person crew of environmental technicians planted cuttings along the beach in the riparian zone in a location where an old party site was used on a regular basis and mud-bogging occurred. In 2008, vehicle access through this area was blocked off. Since restricting vehicle access, riparian vegetation has grown in, both naturally and through planting cuttings and seedlings. In 2014, we noticed that a vehicle had crossed the boundary and damaged the vegetation, opening access for other vehicle use. Our goal in this activity was to use cuttings to exclude vehicles and restore the natural vegetation of the site.

Cuttings included cottonwood (*Populus trichocarpa*), red-osier dogwood (*Cornus stolonifera*), and Pacific willow (*Salix lucida* ssp. *Lasiandra*). 3m long cuttings were collected in the Seton River corridor earlier in the year and stored in freezing conditions until planting. The cuttings were planted using heavy iron planting bars to dig narrow holes. The cuttings were planted at a depth of 0.5 - 1.0 m. A total of 178 cuttings were planted.

5.1.3 Sagebrush Management

In the years since our initial plantings at the restoration site, big sagebrush (*Artemisia tridentata*), pasture sage (*Artemisia frigida*), and rabbitbrush (*Chrysothamnus nauseosus*) have grown in and are overtaking many of our planted grasses. Historically, the shrub and grassland ecosystems within the Fraser Canyon were characterized by frequent low-intensity fires, which would maintain open grasslands with scattered sage. The absence of fire has allowed for in-growth of sage, which is overtaking our planted grasses.

We undertook a prescribed burn and a weeding trial to determine how to best remove sagebrush and encourage the establishment of other native plants, including grasses.

Sagebrush thinning and planting grass plugs

We hand-pulled or cut down sage species in a 25x25m area until we achieved approximately 10% cover of sage species. Species pulled included big sagebrush (*Artemisia tridentata*) and pasture sage (*Artemisia frigida*). We planted 1200 plugs of bluebunch wheatgrass (*Pseudoroegneria spicata*). Grasses were watered weekly during hot, dry weather. In addition to planting plugs, we scattered a native dryland grass seed mix on the site in early spring of 2015. Species for the seed mix are described in Table 1.

Table 1: Seed mix for sage thinning and prescribed burn areas

Common Name	Latin Name	% of Mix
Trees		
Ponderosa pine	*Pinus ponderosa*	2%
Shrubs		
Shrubby penstemon	*Penstemon fruticosus*	1%
Herbs		
Brown-eyed Susan	*Gaillardia aristata*	10%
Golden-aster	*Heterotheca villosa*	5%
Holboell's rockcress	*Arabis holboellii*	1%
Large-fruited desert parsley	*Lomatium macrocarpum*	2%
Mariposa lily	*Kalochortus macrocarpus*	0.5%
Nodding onion	*Allium cernuum*	2%
Spikelike goldenrod	*Solidago spathulata*	5%
Upland larkspur	*Delphinium nuttallianum*	0.5%
Yarrow	*Achillea millefolium*	10%
Yello mountain-avens	*Dryas drummondii*	2%
Grasses		
Bluebunch wheatgrass	*Pseudoroegneria spicata*	40%
Giant wildry	*Leymus cinereus*	2%
Junegrass	*Koeleria macrantha*	10%
Needle-and-thread grass	*Stipa comata*	2%

Sand dropseed	*Sporobolus cryptandrus*	1%
Sandberg's bluegrass	*Poa secunda*	1%
Stiff needlegrass	*Achanatherum lemmonii var lemmonii*	2%
Red three-awn	*Aristida longiseta*	1%
	Total	100%

Prescribed Burn and Seeding Trials

Historically, the shrub and grassland ecosystems within the Fraser Canyon were characterized by frequent low-intensity fires, which would maintain open grasslands with scattered sage. Grasslands are fire dependent ecosystems, which means that they require fire in order to persist. The plants are highly fire adapted, and ecosystems recovery rapidly after fire. Without fire, forests encroach on grasslands. We are seeing this at the Powerhouse site, with the invasion of sage species that are pushing out grassland species.

Many of the plants at the Powerhouse site are fire dependent. Fire dependent species require frequent, low intensity fires in order to thrive (Thomas & McAlpine, 2010). Lily bulbs (family *Liliaceae*) become larger and more abundant with frequent fire. The below-ground seedbank of snowbrush (*Ceanothus velutinus*) is stimulated to germinate following fire. Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) is poised to invade a site following fire, with its seeds easily blown into burned sites. Buds on the root collar of Saskatoon (*Amelanchier alnifolia*) are stimulated by fire.

Ecological processes related to fire include habitat patterning, succession, species dispersal, and nutrient cycling. Many components of these processes cannot be replicated using restoration techniques other than prescribed fire (Hebda, 2015).

Our goals with the prescribed burn were to experiment with methods for reducing the invasion of *Artemisia* and seeding in with native plant seeds. We focused on removing big sagebrush (*Artemisia tridentata*).

Three trial grids were established on the upper bench. Grids were 25m wide and approximately 50m long (See Map 4). Treatments for the grids are described in Table 2.

Map 4: Prescribed burn grid layout

Table 2: Description of restoration treatments in prescribed burn grids

Grid No.	Treatment
1	Hand-pulling sage followed by seeding.
2	Control site; no treatments applied.
3	Prescribed burn followed by seeding.

The grids were laid out by Odin Scholz, Restoration Specialist, and a crew technician. Following the fire and sage removal, the sites were to be seeded in with a native grassland seed mix.

Before the burn, we salvaged healthy sagebrush seedlings and planted them in pots at our native plant nursery. These seedlings may be used in the future for other restoration projects.

Trained wildland firefighters from the Ministry of Forests, Lands and Natural Resource Operations were brought in to conduct the burn. A five-person Splitrock crew assisted the firefighters. Odin Scholz, Restoration Specialist, and Kim North, Project Manager were also on site. The Ministry firefighters provided training and mentorship to the Splitrock crew members. See Table 3 for notes on the personnel at the site.

Table 3: Personnel involved in the prescribed burn trials

Task	Person Hours	Notes
Grid layout and photo point setup	4	Completed by the Restoration Specialist and an environmental crew technician.
Sage salvage for nursery	10	Completed in-kind work by the Splitrock “Job Creation Partnership” crew.
Prescribed burn	27.5	Completed in-kind by three wildland firefighters and the Job Creation Partnership crew.

Trail Clearing

Trails throughout the site were becoming brushy and hard to navigate due to the in-growth of sage. We spent one morning pulling sage along the trails to widen them and make them more accessible.

5.1.4 Watering

Young plants were watered once per week during hot, dry weather. Areas watered included the pine trees surrounding the parking area, the shrub area at the south end of the site, and newly planted grasses near the parking area.

Watering was done using the water trailer, which has a 900 litre water tank with a pump and hoses attached. When possible, the water tank was hooked up to sprinklers and drip irrigation to allow staff to weed while an area was being watered.

5.2 RESTORATION MONITORING METHODS

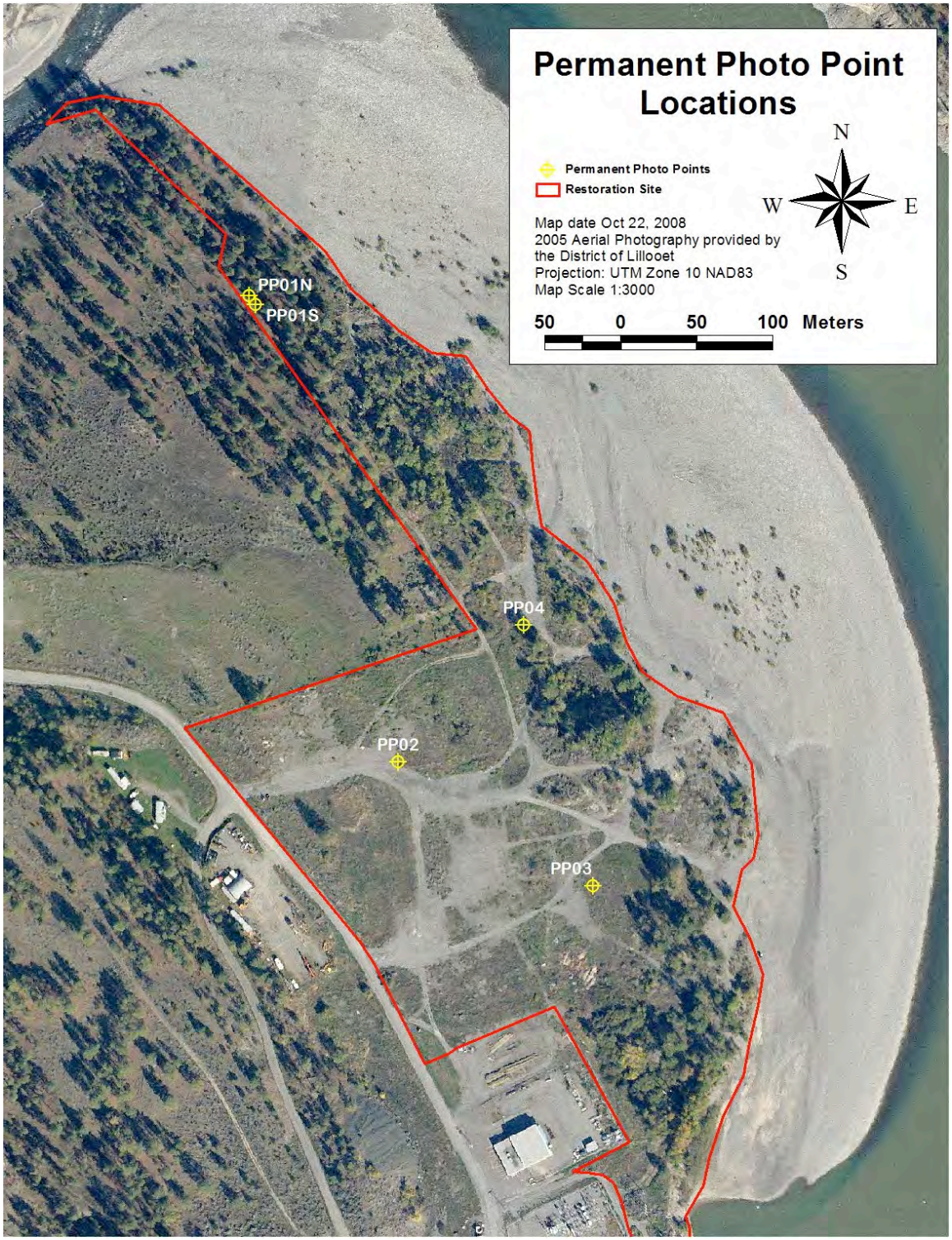
5.2.1 Permanent Photo Monitoring

In 2008, five permanent photo monitoring points were established in the Powerhouse site. The five photo points include representative sites for each major ecosystem type at the site:

- Ponderosa pine dominated ecosystem to the north-west of the site (PP01)
- Upland bench along the “grassland trail” (PP02)
- Intermediate zone between upland and riparian near Lower Snag Area (PP03)
- Riparian zone within the old “pit” area (PP04)

2014 is our seventh year of photographing the site using the photo point stations. See Map 5 for locations of the photo point stations. We use a point-and-shoot camera, a tripod, and a meter board to ensure that the photos are the same each year. The protocol for taking the photographs is as follows:

1. Locate the central photo point pin (a rebar stake) and centre a tripod over it. Set the tripod so that the camera lens is at 1.0m or 1.3m height (depending on the height used in previous years).
2. Set the meter board 10 meters to the north of the camera.
3. Set the camera at its widest angle (zoom out all the way), and centre the meter board in the view finder.
4. Take the photo, and then zoom in all the way and take another photo.
5. Re-set the equipment to take photos at the other cardinal directions (East, South, West).



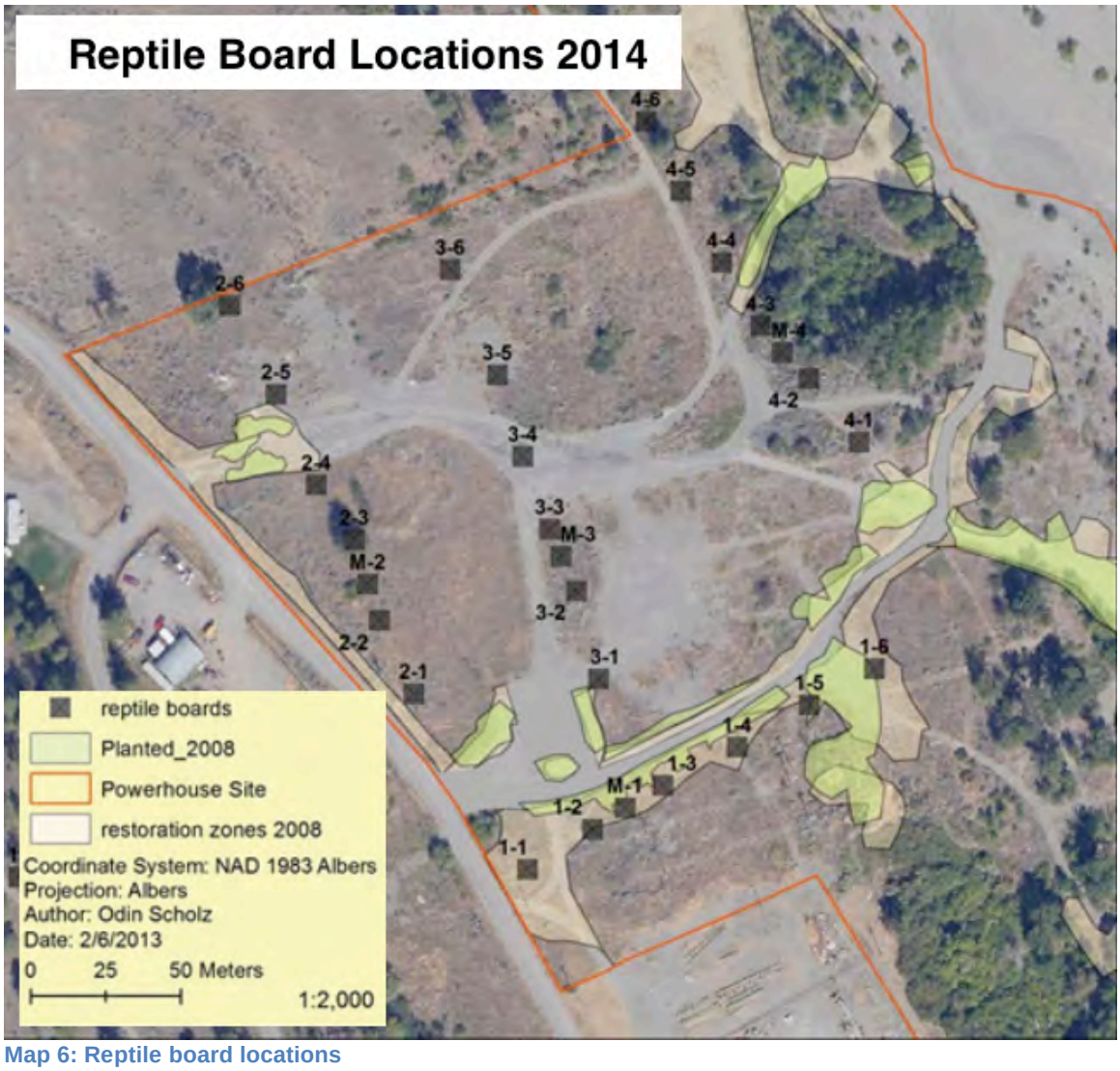
Map 5: Permanent Photo Point Locations

In addition to the photo points, we monitor the site using a wildlife camera, which is set up in the riparian zone. The camera takes photographs or videos when it detects motion. The camera was in place year round, and the data was downloaded every few months.

5.2.2 Reptile Monitoring

Monitoring the reptile cover boards at the Powerhouse site continued through 2014. The purpose of the monitoring is to identify the reptile species using the area, and their distribution across the landscape. This is our seventh year of monitoring, which allows for interesting comparisons of data from 2008 to now.

There are 28 cover boards distributed throughout the Powerhouse site; 24 are made of painted plywood, and 4 made of metal. Cover boards are placed at 25m intervals along four transects that intersect the upper bench portion of the site (see Map 6). The cover board monitoring protocol was designed with the assistance of Elke Wind, R.P. Bio (amphibian specialist), and Leslie Anthony Lowcock, PhD (reptile specialist).



Map 6: Reptile board locations

The boards were monitored weekly by Bob Deadman, a local naturalist, from April 14 to November 2, 2014. Snake and wildlife species that were seen underneath the boards were recorded in the data form (see Figure 8: Reptile monitoring data sheet). Data collected included species, number, life stage, estimated length, and weather conditions. Photographs were taken of snake species if possible. Data was compiled by crew technicians for mapping and analysis.

Cover Board Data P. 1 / 2 Reptile Data Sheet

Date: _____ *Recorder:* _____ POWERHOUSE SITE
(dd/mm/yy)

Conditions: Cloud Cover (CC) _____ Air Temp. _____ Wppd Board Temp: _____ Metal Board Temp: _____
Wind _____ Precip. _____

Cover Board No.	Species	Number	Life Stage	Approx. length	Photo Taken?	Comments
.1-1						
.1-2						
M1						
.1-3						
.1-4						
.1-5						
.1-6						
.2-1						
.2-2						
M2						
.2-3						
.2-4						
.2-5						
.2-6						

KEY

Conditions: ***CC*=1**(clear),**2**(<50%),**3**(>50%),**4**(unbroken); ***Wind*=0**(calm),**1**(light air),**2**(leaves rustle),**3**(leaves&twigs in constant motion),**4**(small branches move, dust rises),**5**(small trees sway),**6**(large branches moving,wind whistling); **Air Temp.** (in degrees C); **Precip.**=**N**(none),**F**(fog),**MD**(misty drizzle),**D**(drizzle), LR(light rain),**HR**(hard rain),**S**(snow)

Species: *salamanders* = **RSNE** (Rough-skinned Newt), **LTSA** (Long-toed Salamander), **UNSA** (unknown salamander); *frogs/toads* = **WETO** (Western Toad), **GBSF** (Great Basin Spadefoot), **CSFR** (Columbia Spotted Frog), **PTFR** (Pacific Treefrog), **WOFR** (Wood Frog), **UNFT** (unknown frog or toad)
snakes = **RUBO** (Rubber Boa), **RACE** (Racer), **GOSN** (Gopher Snake), **COGA** (Common Gartersnake), **WEGA** (Western Gartersnake), **WERA** (Western Rattlesnake), **UNSN** (unknown snake),
lizard = **NALI** (Northern Alligator Lizard)

Life Stage: M = metamorph (amphibians only); J = juvenile; A = adult **Comments:** malformations, behaviour, etc.

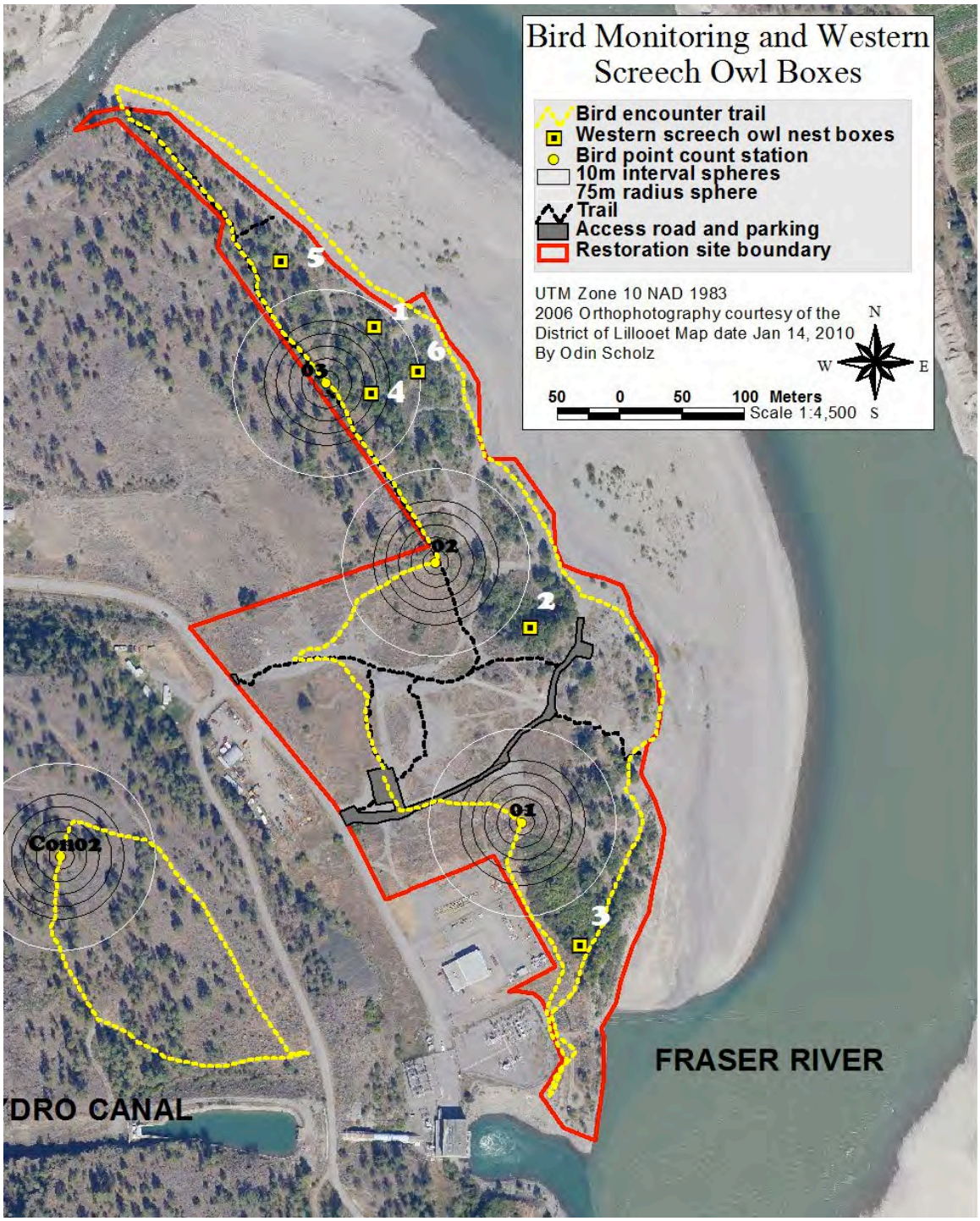
Figure 8: Reptile monitoring data sheet

5.2.3 Interior Western Screech-owl Monitoring

Interior Western Screech-owl, (*Megascops kennicottii macfarlanei*) is the primary bird species that is targeted in the riparian zone restoration. Western Screech-owl is facing a number of threats in Canada, and the population is probably declining (Western Screech-Owl Recovery Team, 2008). The species relies on mature, large-diameter trees with natural or woodpecker-excavated cavities for nesting - this habitat requirement is a limiting factor to the species (Western Screech-Owl Recovery Team, 2008) and there is a lack of nesting habitat in the Powerhouse site.

Nest Box Monitoring

In 2008, six nest boxes were installed in the riparian zone of the restoration site, and one was installed at the Mariposa Flats reference site (see Map 7). In November 2014 one of our crew technicians checked the boxes to see if any were used by birds or wildlife. The technician used a ladder to access the boxes, took photographs of what was inside, and made repairs to the nest box, if needed.

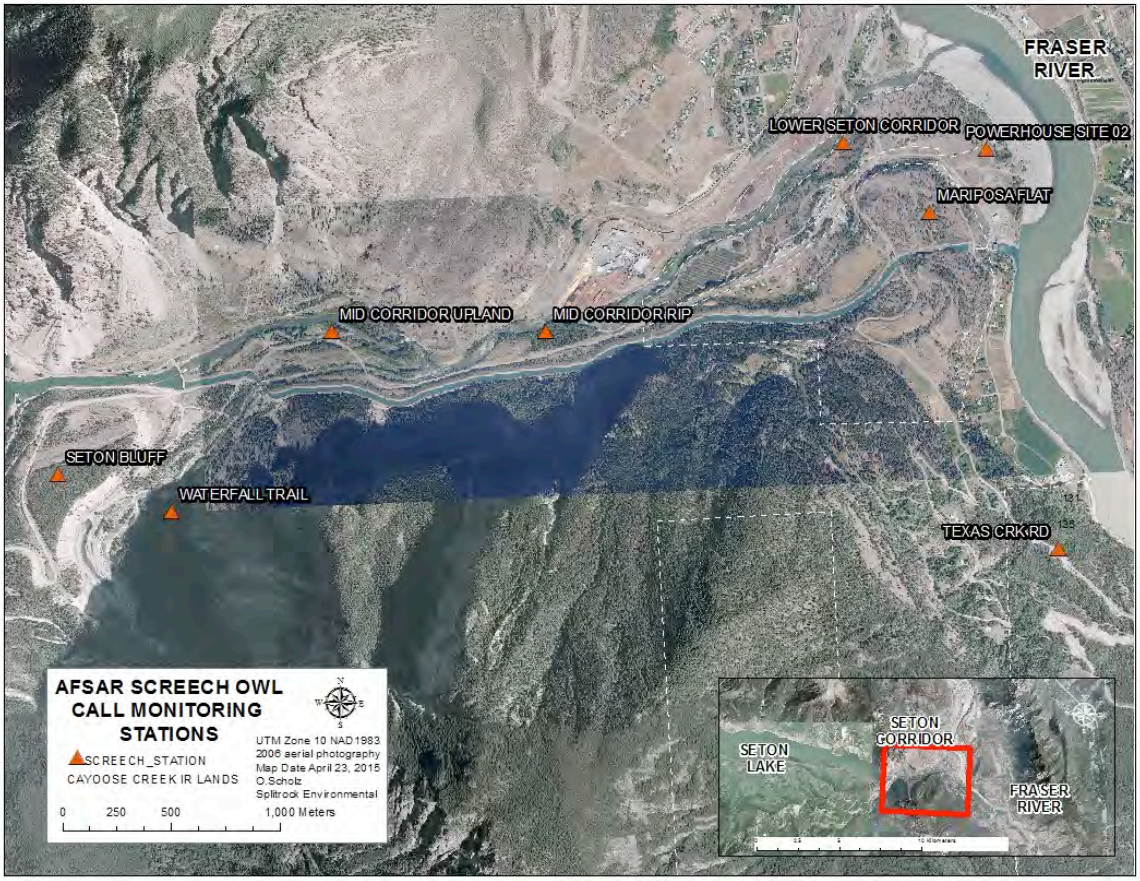


Map 7: Western Screech-owl nest box locations

Call-playback Surveys

In March 2014 we conducted call-playback surveys targeted to Western Screech-owl throughout the Seton corridor, including survey stations at the Powerhouse site and Mariposa Flats. Eight monitoring stations were surveyed in 2015; these

stations have been monitored for the past 7 years. See Map 8 for the locations of the stations.



Map 8: Call-playback stations for Western Screech-owl

Four teams of surveyors undertook the surveys, each doing two surveys per night. The stations were divided as follows:

Table 4: Survey teams and stations 2015

Team	Station #1	Station #2
1	Seton Bluff	Control Lower Seton Corridor
2	Cayoose Waterfall Riparian	Control Mariposa Flat
3	Mid Corridor Upland	Powerhouse 02
4	Mid Corridor Riparian	Control Texas Creek Road

Each team surveyed Station #1 first, then Station #2. Start time was half an hour after sunset, rounded to the nearest five minutes. Using this method, four stations

were surveyed simultaneously, allowing for detection of multiple owls at the same time.

Call-playback surveys followed provincially standardized methodologies for call-playback surveys outlined by Resource Inventory Standards Committee (RISC) (Hausleitner, 2006). Surveys were conducted in March of 2015 on clear, calm nights. Upon arrival at the site, the surveyor waited until the survey start time, and then completed the following protocol:

- Listen passively for 15 minutes
- Broadcast for one minute
- Listen for four minutes
- Broadcast for one minute
- Listen for four minutes
- Broadcast for one minute
- Listen for four minutes
- Move to second survey site and repeat protocol.

Passive listening for 15 minutes is a requirement of the Lillooet Naturalist Society to minimize disturbance to owls. If a Western Screech-owl was detected, call-playback was ceased.

For each owl detection, the species code, call time, call duration, distance, and direction was recorded. Additional data recorded for each survey included date, survey station, sunset time, temperature, cloud cover, wind, and precipitation.

5.2.4 Bi-weekly Walk Through

Kim North walked through the entire restoration site on a bi-weekly basis to visually inspect the site and determine which areas needed work in the following weeks. The walkthroughs are a good way of seeing which plants need watering, which weeds are emerging, flowering, or seeding, and monitoring garbage or motorist use in the restoration area.

6. Results

6. 1 RESTORATION FIELDWORK RESULTS

6.1.1 Weed Management

Three weeding blitzes were completed in 2014. Weed blitz days are listed in Table 5, with invasive species that were removed. Burdock (*Arctium lappa*) was targeted in June before the burrs formed, partly to ease in hand pulling, but also because of the risk the burrs to bats. Our crew technicians have seen several bats trapped and dead in the burrs.

Table 5: Dates of weeding blitzes

Date	Invasive species targeted	Amount of weeds removed	# of staff
May 14 and 15	mustard species salsify (*Tragopogon dubius*) alfalfa (*Medicago sativa*)	4 pickup truck loads	13
Jun 10	diffuse knapweed (*Centaurea diffusa*) Dalmatian toadflax (*Linaria dalmatica*) sulpher cinquefoil (*Potentilla recta*) burdock (*Arctium lappa*)	4 pickup truck loads	11
Sep 10	Russian thistle (*Salsola kali*) kochia (*Kochia scoparia*) morning glory (*Convolvulus arvensis*) mustard species salsify sulpher cinquefoil alfalfa	3 dump truck loads	10

Figure 9: Hand-pulling mustard: before. 15 May 2014

Figure 10: Hand-pulling mustard: after. 15 May 2014

Hand pulling and mowing was done for seven days over the summer - see Table 6 for dates. The crew would sweep through the entire site and pull any weeds that were about to go to seed. Morning glory was targeted three times throughout the year, corresponding with its seeding times. In early summer, one truckload of weeds was pulled each day, but as the season went on we only needed to pull one or two garbage bags of weeds per day.

Table 6: Dates of weeding 2014

Date	**Invasive species targeted**	**Amount removed**	**# of staff**
Jun 16	All	2 pickup truck loads	6
Jun 23	All	3 pickup truck loads	6
Jul 3	Mustard Burdock Alfalfa	2 pickup truck loads	6
Jul 10	All	1 pickup truck load	3
Jul 31	All	3 bags	2
Aug 14	All	4 bags	2
Aug 21	Alfalfa (*Medicago sativa*)	1-2 ha mowed	2

Figure 11: Mowing alfalfa: before. 15 May 2014

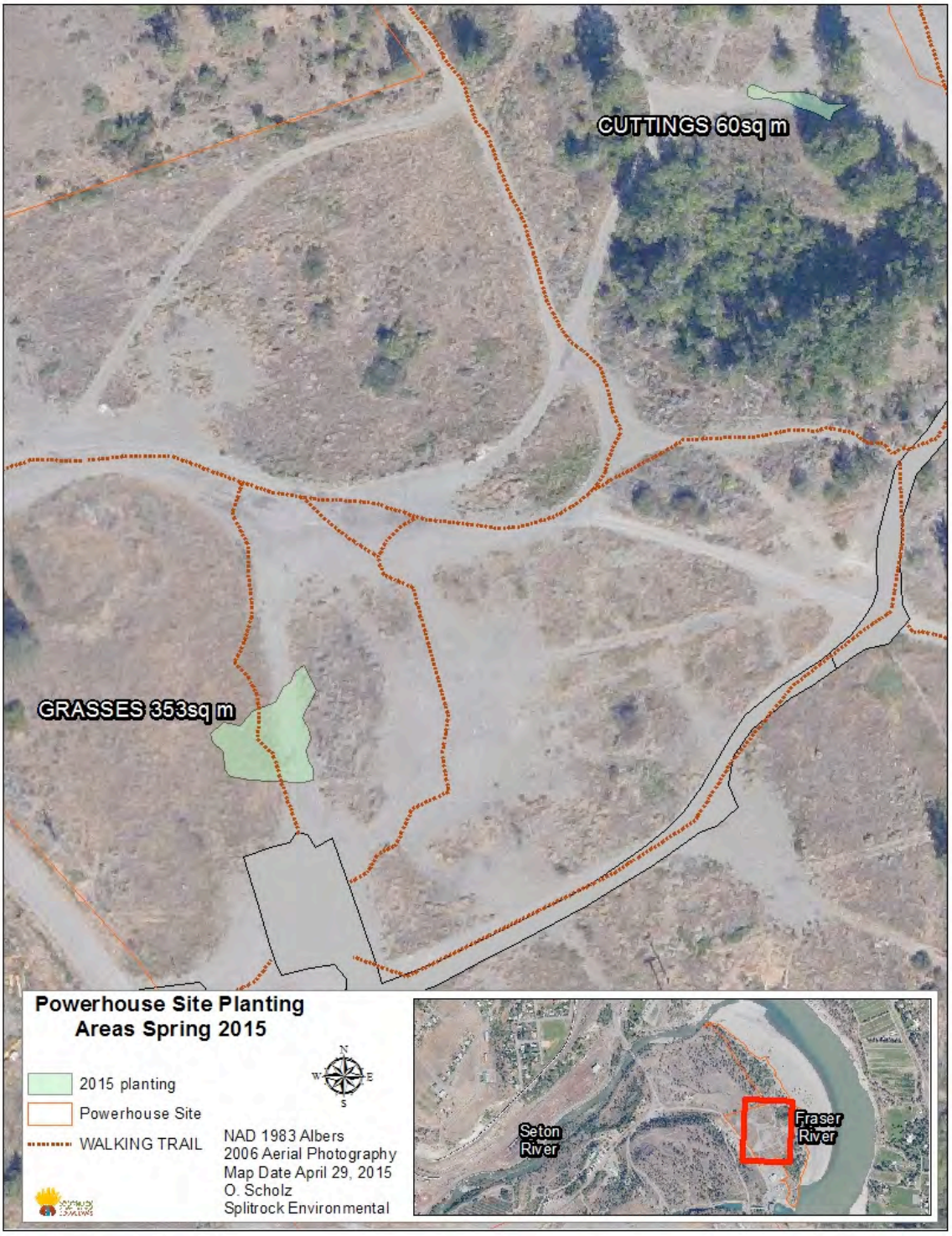
Figure 12: Mowing alfalfa: after. 15 May 2014

The weeding blitzes and weekly weeding kept the majority of the site weed-free throughout the summer. One weed we had trouble with was salsify (*Tragopogon dubius*). This species covered the entire site at a very high density, and young plants emerge throughout the year. In some areas we weren't able to pull all of the plants before they went to seed. In order to tackle this weed we will need to have more weeding blitzes in late spring and early summer.

Alfalfa is another species that is hard to control once established. The long taproot makes it difficult and time consuming to pull, so we mostly mowed the species to prevent seed spread.

6.1.2 Native Plant Revegetation

178 cuttings were planted in the pit area (see Map 9 and Table 7). Cuttings were planted at approximately 0.5 m spacing, with a total planted area of 60m^2. The cutting collection and planting took one day for the three-person crew.



Map 9: Planting areas 2015 - grasses and cuttings

Figure 13: Planting cuttings. 01 April 2014

The area was flooded for a large part of the year due to the natural freshet of the Fraser River. Because of this, we didn't water the cuttings at all during the year. In the spring of next year we will monitor the cuttings to determine a survival rate and amount of growth.

The cuttings were effective at excluding vehicles from the site and re-directing traffic onto the beach road.

Table 7: Description of cuttings planted at the Pit area

Species	**# of cuttings**	**Planting depth (m)**
Black cottonwood (*Populus balsamifera* ssp *trichocarpa*)	59	1.0
Red-osier dogwood (*Cornus stolonifera*)	40	0.5
Coyote willow (*Salix exigua*)	79	0.5 - 1.0

6.1.3 Sagebrush Management

Figure 14: Sagebrush is taking over the restoration site. 27 April 2015

Sagebrush thinning and planting plugs

An area of 353m^2 was thinned and planted (See Map 9). Thinning reduced the cover of sagebrush from almost 100% to 10% cover. 1200 grass plugs were planted, all bluebunch wheatgrass (*Agropyron spicatum*). Native seed mix was scattered throughout the thinned area. The seed mix is described in Table 1. The thinning and seeding took 42 hours of work, completed over two days by three staff members (see Table 8). Since such a small area took almost two days to weed and plant, we concluded that hand pulling sage is not a timely method of removal. Mowing the sage down with a weed eater greatly reduced the time, but left many jagged stumps poking out of the ground, which are a hazard for wildlife and people, as well as being unsightly. Next year we will monitor the success rates of the planted and seeded grasses, as well as the in-growth of sage that was left on the site.

Table 8: Dates of sage thinning

Date of sage removal and grass planting	# of staff	total worker-hours
Jun 16	3	21
Jun 23	3	21

Figure 15: The area where sage was hand-pulled. Around this area, the sagebrush has grown in to almost 100% cover. 23 June 2014

Figure 16: The trail was cleared of sage to improve access to the site. 23 June 2014

Prescribed Burn and Seeding Trials

The prescribed burn was conducted on 30 March 2015, after two false starts the previous week due to windy conditions. Weather conditions and the early green-up of the restoration site made for challenging burning conditions. The fire crews used drip torches to light the sage on fire, but found that the new growth on the plants prohibited the fuel from carrying the fire through the grid. Crews tried using a propane torch to light the fire, but very little was burned.

A small area outside of the grids was burned successfully. However, the control grid is not similar to this area, so it cannot be used to monitor the burned area. We plan to monitor this area in 2016 to determine the fire effects.

The grids were not seeded in because the fire was not effective at removing the sage. The seeding is scheduled for directly after the burn during the 2015-16 restoration season. The seed mix to be used is outlined in Table 1.

Figure 17: The prescribed burn. 30 March 2015

Figure 18: The prescribed burn. 30 March 2015

Figure 19: The prescribed burn. 30 March 2015

Figure 20: The prescribed burn. 30 March 2015

6.1.4 Watering

The restoration site was watered 8 times over the course of the summer, coinciding with the hottest, driest weather (see Table 9). Areas that needed the most watering were the areas where seedlings were planted in 2013 and 2014, including the sage thinning area.

Table 9: Watering dates 2014

Dates of watering
May 15
Jun 16
Jun 24
Jul 3
Jul 10
Jul 31
Aug 14
Aug 21

6. 2 RESTORATION MONITORING RESULTS

6.2.1 Permanent Photo Monitoring

The most significant results that we see from the photo point monitoring is the increase in sage species in the upper bench (Photo Point 02) (see Figure 21, Figure 22, Figure 23, and Figure 24). Species that are growing in include big sage (*Artemisia tridentata*), rabbitbrush (*Crysothamnus nauseosus*), and pasture sage (*Artemisia frigida*). The sage has all self-seeded (we didn't plant any), and it has spread surprisingly quickly, to the point where it is out-competing native vegetation.

Figure 21: Photo Point 02 South. May 2010

Figure 22: Photo Point 02 South. 1 June 2011

Figure 23: Photo Point 02 South. 25 April 2012

Figure 24: Photo Point 02 South. 13 November 2014

Photopoint 03 is located in an area that we focused on planting native grasses and shrubs. 2014 is the first year that we are able to see well-established shrubs, herbs, and grasses, including giant wildrye (*Elymus cinereus*) and tarragon (*Artemisia dracunculus*). Sage in-growth is not as big of a problem here, possibly because we have been mowing the alfalfa in this area, which would result in the mowing of sage seedlings that are coming up through the alfalfa.

Figure 25: Photo Point 03 South. November 2010

Figure 26: Photo Point 03 South. June 2011

Figure 27: Photo Point 03 South. June 2012

Figure 28: Photo Point 03 South. 13 November 2014

There is little change noted in the Photo Points 01 and 04. Ponderosa pine (*Pinus ponderosa*) in PP01 has been protected from the pine beetle by the ongoing use of pheremone bags, and we did not see tree mortality in 2014. Mowing treatments for alfalfa has remained successful in this area.

Figure 29: Photo Point 01 South. 6 June 2008

Figure 30: Photo Point 01 South. 4 November 2010

Figure 31: Photo Point 01 South. 14 September 2012

Figure 32: Photo Point 01 South. 13 November 2014

Figure 33: Photo Point 04 North. 2 July 2008

Figure 34: Photo Point 04 North. November 2010

Figure 35: Photo Point 04 North. 4 September 2012

Figure 36: Photo Point 04 North. 13 November 2014

6.2.2 Reptile Monitoring

The reptile cover boards continue to be a useful reptile monitoring tool at the Powerhouse. This year is our sixth year of monitoring reptiles on the site. A total of 24 snakes were found under the boards, the most found since the monitoring started in 2008 (see Table 10). We were happy to find two species that had not been previously detected under the boards: four Western Terrestrial Gartersnakes (*Thamnophis elegans*) and one Great Basin Gophersnake (*Pituophis catenifer deserticola*). In addition, we found 14 North American Racers (*Coluber constrictor*).

Most of the snakes were small, but we found two Racers and two Gartersnakes that were estimated at 1m long. The Gopher Snake was also large at approximately 1 m. Snakes were discovered between April 27 and October 5, with over half of the sightings in June; this is consistent with the timing of sightings since 2009. There were no incidental sightings at the restoration site this year.

Table 10: Reptiles found under cover boards in 2014

Species	Count	Cover board	Life Stage	Length (m)	Date (mm/dd/yy)
Great Basin Gophersnake	1	3-6	Adult	1.00	9/7/14
North American Racer	1	4-1	Adult	1.00	4/27/14
North American Racer	1	1-5		0.35	5/11/14
North American Racer	3	2-6	Adult		5/24/14
North American Racer	2	3-3			5/24/14
North American Racer	1	4-2	Juvenile		6/1/14
North American Racer	2	1-4	Adult	0.25	6/15/14
North American Racer	1	2-1	Adult	0.35	6/15/14
North American Racer	1	4-4	Adult	0.25	6/15/14
North American Racer	1	1-5			6/22/14
North American Racer	1	4-1			6/22/14
North American Racer	2	4-4			6/25/14
North American Racer	1	4-3	Adult	1.00	7/27/14
North American Racer	1	M4		0.30	9/29/14
North American Racer	1	1-6	Juvenile	0.15	10/5/14
Western Terrestrial Gartersnake	1	4-3	Adult		6/1/14
Western Terrestrial Gartersnake	1	4-3	Adult	1.00	6/8/14
Western Terrestrial Gartersnake	1	4-3	Adult	1.00	6/15/14
Western Terrestrial Gartersnake	1	4-2			6/22/14

The number of snakes found under the cover boards has increased over the years, correlating with the increased cover (%) of native plants and the establishment of healthy grassland plant communities. These results suggest that the restoration techniques are resulting in increased use of the site by snakes. However, there are dynamics other than the restoration work that could influence these results, including an increase of snake population in the region. It can take several years after installing cover boards for snakes to start using them, which could also factor into the increase in snake sightings, particularly in 2012.

Table 11 shows the increase in snake sightings and species under the cover boards since 2009. 2008 data was not included as the number of cover boards was not the same as later years. Incidental sightings are not included in this data.

Table 11: Reptile survey results from 2009 - 2014

Species	**2014**	**2012**	**2011**	**2010**	**2009**
Great Basin Gophersnake	1	0	0	0	0
North American Racer	19	22	7	9	0
Western Terrestrial Gartnersnake	4	0	0	0	0
Total Snake Counts	**24**	**22**	**7**	**9**	**0**

Great Basin Gophersnake is a federally-listed threatened species. Sightings are rare in the Powerhouse site and Seton corridor, with only two confirmed sightings since 2008, one of which was a dead snake (Odin Scholz, personal communication, and John Surgenor, personal communication). After speaking with the provincial herpetofauna specialist, Purnima Govindarajulu, we understand that finding a gophersnake under a cover board is a rare and exciting find (personal communication, September 2014). Cover boards aren't typically used for monitoring this species, and the efficacy of cover boards for monitoring gophersnakes is not well known. Jared Hobbs, RP Bio and reptile expert, suggested that the gophersnake was using the cover board because of a lack of natural cover objects in the area (personal communication, September 2014).

The gophersnake was discovered in early September, when the snakes are migrating to their den sites. The cover board (3-6) is located in an area that has been challenging to restore to a native plant community, and is rife with cheatgrass (*Bromus tectorum*) and alfalfa (*Medicago sativa*). Interestingly, a study conducted in Utah in 2009 found a negative correlation between cheatgrass cover (%) and the relative abundance of Great Basin gophersnake

(Hall, Mull & Cavitt, 2009). This suggestion, that invasions of cheatgrass reduce the relative abundance of gopher snake, points to a need to continue efforts in reducing invasive species in the restoration site, in order to improve habitat conditions for this threatened species.

The four Western Terrestrial Gartersnakes were discovered under boards 4-2 and 4-3, which are located on the edge of the dry upper bench, near the riparian ecosystem along the Fraser River. The sudden detection of garter snakes since monitoring began in 2008 suggests that garter snakes are starting to use the habitat features in the restoration site. However, the garter snakes may have always been in the restoration area, and just discovered and started using the cover boards. This seems unlikely though, as the cover boards have been in place for six years, and snakes seem to find the boards within two or three years of installation.

In 2009 we installed four metal cover boards alongside the existing plywood cover boards, as a way to experiment with materials. In 2014, only one snake was found under a metal cover board (a racer), as opposed to 23 snakes that were found under plywood cover boards.

Naturalist volunteer Bob Deadman has monitored the cover boards since 2008. This year, he completed 28 days of monitoring, amounting to approximately 45 hours of volunteer time.

Figure 37: Great Basin Gopher Snake found under board 3-6. 7 September 2014

Figure 38: Racers found under board 3-3. 24 May 2014

Figure 39: Volunteer Bob Deadman checking a reptile board.

Figure 40: A North American Racer shed found in the Powerhouse site. 22 September 2014

6.2.3 Interior Western Screech-owl Monitoring

Nest Box Monitoring

The screech-owl nest boxes were opened on 13 November 2014. See the photos below for the contents of each nest box.

Figure 41: Nest box contents. 14 November 2014

Figure 42: Nest box contents. 14 November 2014

Figure 43: Nest box contents. 14 November 2014

Figure 44: Nest box contents. 14 November 2014

Figure 45: Nest box contents. 14 November 2014

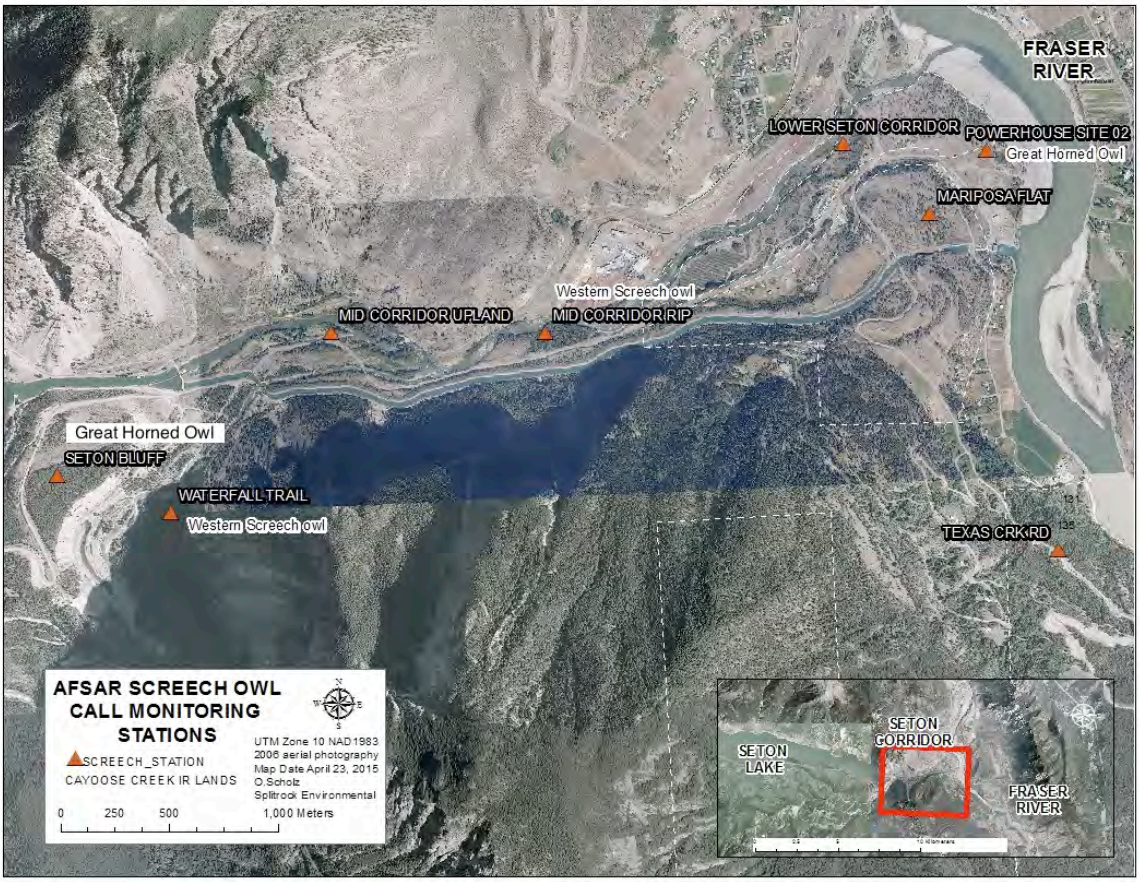
Figure 46: Nest box contents. 14 November 2014

Call-playback Surveys

Call-playback surveys were carried out on March 3 and March 31, 2015. Total survey time at the Powerhouse and Mariposa Flats sites was 2 hours. Great Horned Owl (*Bubo virginianus*) was detected on March 31 at the Powerhouse site. Western Screech-owl was detected three times in the Seton corridor, but not at the Powerhouse or Mariposa Flats. See Table 12 and Map 10.

Table 12: Call-playback results

Location	Spp Code	Projected Easting	Projected Northing
Seton Bluff	GHOW	571458	5613037
Powerhouse 02	GHOW	576118	5614320
Seton Bluff	GHOW	571729	5612985
Mid Corridor Riparian	WSOW	573921	5613704
Cayoosh Waterfall Riparian	WSOW	572166	5612933
Mid Corridor Riparian	WSOW	574051	5613718
GHOW = Great Horned Owl *WSOW = Western Screech-owl, Macfarlanei subspecies*			



Map 10: Owl detections 2015

6.2.4 Bi-weekly Walk Through

The site was walked through by Kim North or a crew member at least every two weeks. Photos from the walk throughs are found below.

Figure 47: Native shrubs on the upper bench. 21 September 2014

Figure 48: Habitat features in the riparian zone. 21 September 2014

Figure 49: Native shrubs growing in the riparian zone. 21 September 2014

Figure 50: Ponderosa pine planted in the early years of the project is thriving. 21 September 2014

7. Discussion and Recommendations

The maintenance of the Powerhouse restoration project is extremely important to ensuring that the restoration work continues to provide wildlife habitat, recreational opportunities, and environmental services. This year, we were able to undertake a considerable amount of work using the funds available. Most of the funding went towards controlling invasive species on the site. Invasive species are the biggest factor that is preventing the restoration site from becoming a self-sustaining ecosystem. The ongoing weeding is reducing the seed bank in the soils and minimizing the cover of invasive species, but we will need to continue to weed the site for many years to come.

Weeding blitzes, where a large number of people weed the site for one or two days, seem to be the best method for weeding the site. It is much more encouraging to weed a site when it goes quickly, and it is easier on the crews to have everyone involved in weeding instead of only one or two people picking away at it. It's also cost-effective to hire casual labourers for weeding, rather than using our skilled environmental technicians for weeding.

We have been noticing a trend in invasive species since beginning the project, with one species being the biggest offender for a few years, then being replaced by another species. For example, in the early years, kochia (*Kochia scoparia*) was our most invasive and problematic weed, but after years of hand pulling, Kochia is not much of a problem. Instead, salsify (*Tragopogon dubius*) and mustard species have become the most prolific species on site.

Cheatgrass (*Bromus tectorum*) is one of our worst offenders, and it is known that an increase in cheatgrass is correlated with a decrease in gopher snake populations (Hall, Mull & Cavitt, 2009). We need to continue to find ways to control cheatgrass on the site - this is a very difficult weed to control once established. Bulbous bluegrass (*Poa bulbosa* spp *vivipara*) is a new site invader that we need to keep ahead of.

The prescribed burn was somewhat disappointing, given the challenges lighting it due to weather and early green-up. The trial grids remain in place for a burn in the autumn of 2015 or spring of 2016. The exact timing of the burn will be dependent on the advice from the Lillooet Fire Zone. Seeding of native grassland species will be done following the burn.

Monitoring is one of the most important aspects of restoration. Without monitoring, there is no way of knowing if the restoration work is succeeding or failing. With effective monitoring, we will understand how the restoration work is affecting plant and wildlife species, and which techniques are the most

successful. Monitoring allows us to share technically sound results with other organizations that are doing similar things.

We have planned the monitoring activities to be low-intensity (and therefore low-cost), using standardized methods that are recognized by professionals throughout the province. For example, reptile monitoring takes about 1 hour per week and provides us with reliable and consistent data that is comparable to studies done by other reptile specialists.

Reptile monitoring has led to some exciting results, with record number of sightings and two new species found, including the threatened Great Basin Gophersnake (*Pituophis catenifer* spp. *deserticola*). We are not sure if the gopher snake sighting is a chance occurrence, or if it is indicative of greater relative abundance of the species or use of the restoration site by the species. We need to continue to monitor for gopher snake in future years.

It is recommended that we carry out intensive vegetation monitoring program in 2015 and beyond, using past data to guide the methodology for each restored area. This year, photo point monitoring and visual observations were the only monitoring methods employed, which do not provide a complete picture of the vegetation.

The rapid increase in the cover of sage species (*Artemisia* spp) is a concern that we would like to address in the next year. We believe that the sage is out-competing native grasses and forbs, and that the changes to the natural disturbance regime at the site, in particular the lack of fire, has led to this imbalance. Thinning the sage by hand-pulling is very time consuming and not feasible for the entire site. In 2015 we plan to trial prescribed burning as a method for reducing the sage cover and rejuvenating the grass species. We know that prescribed burning affects plant species differently, and can encourage the growth of invasive species, depending on the burn intensity, the season, and the species. Before conducting a burn, we will carefully consider all of the potential results.

Call-playback surveys cannot definitively assess the presence of owls. An owl may not respond to call playback, even after repeated surveys. The two surveys we conducted this year give us 90% confidence that we have detected all of the owls in the corridor (Jared Hobbs pers. comm.). However, there may be more residing in the area.

Annual owl surveys should be continued to detect new owls and document site persistence. If possible, surveys should be passive (i.e. no call playback used), to minimize disturbance to the owls.

8. Acknowledgements

The maintenance and monitoring of the restoration site in 2014 was completed with the financial support of the Fish and Wildlife Compensation Fund. The project was brought to life through initial funding from Bridge Coastal Restoration Program. We are grateful for the ongoing funding that these two funds have provided for this project. This project could not have been completed without the help of countless volunteers and partner organizations.

We would like to thank our partners: Cayoose Creek Indian Band Chief and staff for their assistance throughout the project, and the Lillooet Naturalist Society for dessiminating information and providing volunteers.

Other groups that we would like to thank include:

- Lillooet Fire Zone for operational support during the prescribed burn
- Ministry of Environment staff for sharing their expertise with us on species at risk
- The Rivershed Society of BC and the Native Plant Society of BC for providing advice, encouragement and participation in events
- First Nations elders who provided ethnobotanical knowledge
- Volunteer Bob Deadman for monitoring the reptile boards and providing assistance at the native plant nursery
- local businesses who provided in-kind support and/or donations and discounts on materials; in particular Lillooet Feed & Garden, Lillooet Contracting, Rev-it-up, Lillooet Timber Mart, and Buy-low Foods.

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- Lillooet Naturalist Society cash and in-kind contributions
- Canada Summer Jobs
- Aboriginal Fund for Species at Risk
- Splitrock Environmental cash and in-kind contributions
- Fish and Wildlife Compensation Program

We would like to thank the crew technicians who weeded, salvaged plants, weeded, collected and propagated seeds, weeded, planted… and weeded! Thank you.

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PERSONAL COMMUNICATIONS

Purnima Govindarajulu, Small Mammal and Herpetofauna Specialist, BC Ministry

of Environment. September 11, 2014.

Odin Scholz, Restoration Specialist, Splitrock Environmental. July 17, 2014.

John Surgenor, Wildlife Biologist, BC Ministry of Forests, Lands and Resource Operations. July 17, 2014.

Appendix I: Financial Summary

Attached.

Appendix II: Performance Measures

Attached.

Appendix III: Confirmation of FWCP Recognition

Splitrock Environmental recognizes the important contributions made to the Powerhouse project by Fish and Wildlife Compensation Program. This year, we recognized FWCP at three meetings and several outreach events. The three meetings included:

- Meeting with T'it'qet First Nation to discuss conservation options within the Seton River Corridor
- Cayoose Creek Indian Band community meeting
- BC Hydro meeting

In these meetings, we verbally recognize FWCP, and we include the FWCP logo in PowerPoint presentations (see Figure 51 and Figure 52). Outreach events included field walks with volunteers, and events that featured the Splitrock outreach trailer, such as the Farmers Market. The FWCP logo is painted on the Splitrock Outreach trailer.

Figure 51: Example of FWCP recognition in PowerPoint presentation

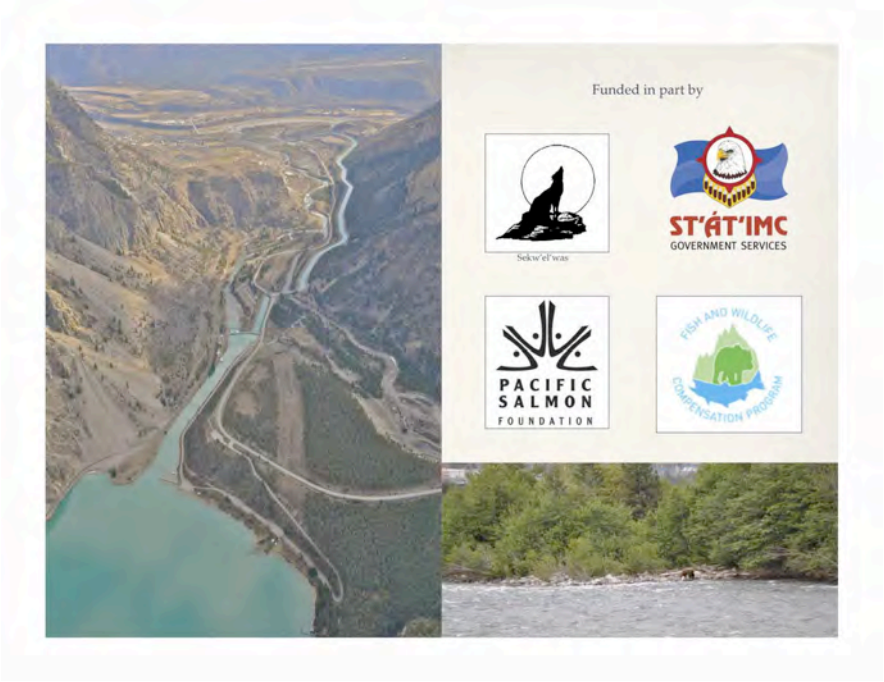


Figure 52: Example of FWCP recognition in PowerPoint presentation

Appendix IV: Project Support

Letters of support for this project were received from:

- Department of Fisheries and Oceans (Figure 53)
- Lillooet Naturalist Society (Figure 54)
- Lillooet Regional Invasive Species Society (Figure 55)
- Salmon Talks Lillooet (Figure 56)
- Rivershed Society of BC (Figure 57)

Fisheries and Oceans | Pêches et Océans

Pacific Region
Judy E. Hillaby
Resource Restoration Unit
Fisheries and Oceans Canada
280C Third Avenue North
Williams Lake, B.C. V2G 4T5

October 31, 2013

To Whom It May Concern

This is to express DFO support for Splitrock Environmental and its partners, the Cayoose Creek Indian Band and the Lillooet Naturalists Society, for work in the Seton River corridor, and the Fraser River foreshore at Lillooet. In collaboration with our colleagues in Lillooet, the lower mainland and Kamloops, DFO expects to continue its professional involvement in this area.

Seton River Corridor Conservation and Restoration Project
It is important to recognize that the Seton River Channels have the appearance of a natural stream, but are in fact carefully engineered structures. Due to this unique environment, there is an opportunity for complimentary design, construction, fine-tuning, study, evaluation, and continuing development that is leading to a good understanding of the mechanisms of stream and riparian restoration that will serve the salmon resource well. At DFO, we know that the channels are already productive for a number of salmonids, and that this is due in large part to the continuing involvement of the local community. To this end, the proponent and partners have done an excellent professional job, and their proposed activities for 2014 are a welcome continuation.

Powerhouse Foreshore Restoration Project
This project is a model of multidisciplinary collaboration. Ultimately there will be a long-lasting, positive effect on fish and aquatic organisms that will provide benefits over a wide area. Restoration work at this site has involved the ecological impacts of soils, wildlife, plants, river hydrology and pollutants, among other fields. In some areas of B.C., restoring riparian plant communities has been challenging, and as this is an important part of watershed restoration we recognize that fisheries workers must work collaboratively with other specialists. A directed effort is required and this project is an appropriate way of addressing this.

Judy Hillaby
250-305-3000

Canada

Figure 53: Letter of Support from Department of Fisheries and Oceans

To: Patrice Rother, Program Manager
Fish and Wildlife Compensation Program
BC Hydro, 6911 Southpoint Drive
Burnaby, B.C. V3N 4X8

October 29, 2013

Support letter for the maintenance application for the Restoration site, Lillooet BC

The Lillooet Naturalist Society supports this application from Cayoose Creek Indian Band **Splitrock Environmental** to maintain the successful restoration efforts at the Powerhouse Restoration site in the Lillooet area in the Seton watershed within the St'át'imc Nation territory and BC Hydro footprint area

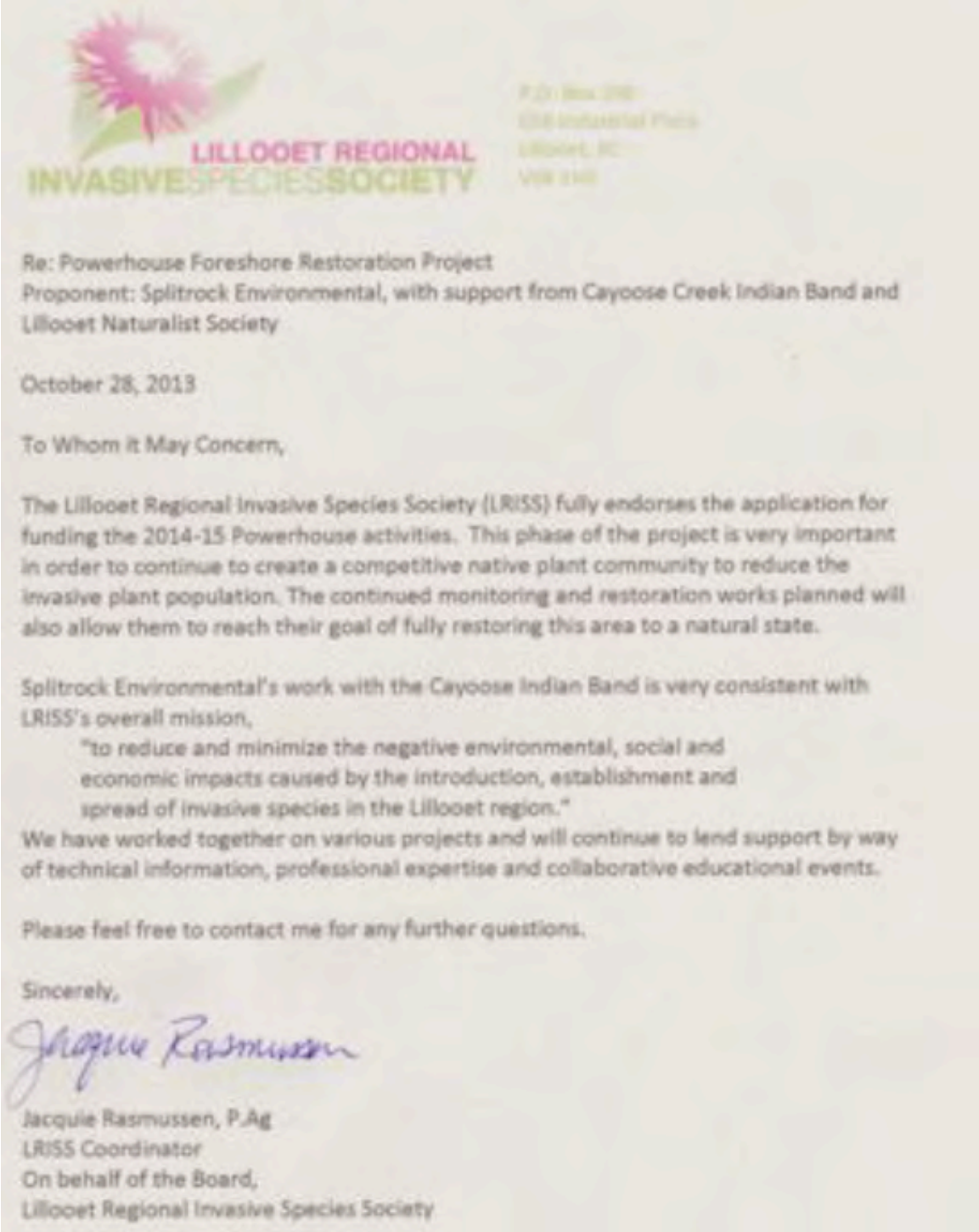
Over the past seven years the Lillooet Naturalist Society and Cayoose Creek Indian Band have successfully completed the restoration work at the Powerhouse site – this work has been funded in large part by the BC Hydro Fish and Wildlife Compensation Program. The restoration site is featured in the Lillooet Hiking Guide and is a popular place for walking. The positive public relations for BC Hydro and the FWCP have been very great as a result of this project.

The project has garnered incredible public participation and led to productive working relationships. We need to protect this investment into the future, both for all the species that have come to rely on this habitat, as well as for the enjoyment of the public. A small investment over the next few years will ensure that the ecosystem continues to function in a healthy and natural way.
Splitrock Environmental is a business that has grown out of the restoration project and it is now successfully completing restoration work projects for the District of Lillooet, private landowners and other businesses such as our local winery. Splitrock is more than capable of protecting our investment at the restoration site and seeing it goes into the future as a healthy restored natural site for all to enjoy.

Removal of invasive species and continued promotion of the native species will ensure the ongoing health of the site. The Naturalist Society is ready and willing to contribute volunteer hours towards this as well as in kind through promotion and advertising costs of events at the site. We support the funding of this application.

Jeff O'Kelly, Director,
Lillooet Naturalist Society, Box 1065, Lillooet BC, V0K 1V0
CC: Larry Casper and Matt Manuel, St'át'imc Government Services

Figure 54: Letter of Support from Lillooet Naturalist Society



LILLOOET REGIONAL
INVASIVESPECIESSOCIETY

Re: Powerhouse Foreshore Restoration Project
Proponent: Splitrock Environmental, with support from Cayoose Creek Indian Band and Lillooet Naturalist Society

October 28, 2013

To Whom it May Concern,

The Lillooet Regional Invasive Species Society (LRISS) fully endorses the application for funding the 2014-15 Powerhouse activities. This phase of the project is very important in order to continue to create a competitive native plant community to reduce the invasive plant population. The continued monitoring and restoration works planned will also allow them to reach their goal of fully restoring this area to a natural state.

Splitrock Environmental's work with the Cayoose Indian Band is very consistent with LRISS's overall mission,

> "to reduce and minimize the negative environmental, social and economic impacts caused by the introduction, establishment and spread of invasive species in the Lillooet region."

We have worked together on various projects and will continue to lend support by way of technical information, professional expertise and collaborative educational events.

Please feel free to contact me for any further questions.

Sincerely,

Jacquie Rasmussen

Jacquie Rasmussen, P.Ag
LRISS Coordinator
On behalf of the Board,
Lillooet Regional Invasive Species Society

Figure 55: Letter of Support from Lillooet Regional Invasive Species Society

SALMON TALKS LILLOOET

Box 1599, Lillooet, B.C. V0K 1V0

October 31, 2013

Powerhouse Foreshore Restoration Project

To whom it may concern:

We are very impressed by the work that has been done at the Powerhouse Foreshore Restoration Project by Splitrock Environmental and we sincerely hope that they will receive the full funding required for them to continue with their valuable work in 2014/15.

It is important to protect the past investment in financial as well as by human resources on this project.

Thanks also to Lillooet Naturalist Society and Sekw'el'was/Cayoose Creek Indian Band for their on-going support of this project and the people at Splitrock Environmental.

Eleanor Wright on behalf of Salmon Talks Lillooet

Figure 56: Letter of Support from Salmon Talks Lillooet

Rivershed Society of BC
A river runs through us

October 30, 2013

To whom it may concern:

Re: Powerhouse Foreshore Restoration Project - Maintenance Program
and;
Seton River Corridor Conservation and Restoration Project - Phase 3

The Rivershed Society of British Columbia (RSBC) is pleased to continue to support the Powerhouse Foreshore Restoration Project and Seton River Corridor Conservation and Restoration Project.

We have worked with Cayoose Creek Indian Band and Lillooet Naturalist Society over the past seven years and are aware of the work they have undertaken, first at the Powerhouse site and then extending up into the Seton River Corridor. It is rewarding to see the changes in the ecological of the sites and to be part of the community capacity building that has taken place over the years.

We held our Rivershed Forum in Lillooet this past year and provided the opportunity to participants to tour the restoration sites and the native plant nursery. These projects, and Splitrock Environmental, have encouraged other organizations to implement similar projects in their own watersheds.

The RSBC is pleased to support both the Seton River Corridor Restoration Project - Phase Three, and the Powerhouse Foreshore Restoration Project - Maintenance Program. These projects will target the endangered Gates Creek salmon, Interior Western Screech-owl, Lewis' woodpecker, Spotted Bat, Yellow-bellied Racer and other species. A number of focuses have been identified, but we believe the most important is the development of a long-term watershed management plan for the corridor in collaboration with various stakeholders. In-stream gravel assessments, fish and wildlife assessments and vegetation mapping are all required to gain greater knowledge on which to build a cohesive restoration plan. Removal of invasive weeds and replanting with native plant species along the riparian zones of the river and channels is also necessary to mitigate diel water temperature fluctuations. Educational watershed outreach activities will promote sustainability and stewardship.

Our Board of Directors and program participants have provided advice and support for these projects and participated in a number of outreach events. We believe Splitrock Environmental crews and volunteers from the community have the passion and dedication to continue this work.

We ask that you give Splitrock Environmental your full consideration with their applications. If I can be of further assistance in your deliberations, please do not hesitate to contact me at fin@rivershed.com.

Sustainably yours,

Fin Donnelly
Chair of the Board

The RSBC has a vision of salmon flourishing in our rivers, people flourishing in our communities. Our mission is to inspire people to care for, and care about Riversheds. At RSBC we see our role as helping to protect, conserve and sustain our most valuable Riversheds for the benefit of present and future generations.

Figure 57: Letter of Support from Rivershed Society of BC