



Powerhouse Foreshore Restoration Project

FINAL REPORT Phase Two - 2009



Project No: 09.W.SON.01

Prepared for: Lillooet Naturalist Society
Box 1065
Lillooet BC V0K 1V0

Compiled by: Kim North
Canyon Contracting
Box 2171
Lillooet BC V0K 1V0

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Executive Summary

The Lillooet Naturalist Society has successfully implemented Phase Two of the Restoration Plan for the Powerhouse Foreshore Restoration site. The Society initiated a Feasibility Study in 2006, carried out research to develop a long-term restoration plan during 2007, and have now completed two years of on-the-ground work (2008 and 2009).

The aim of the restoration project is to create a more diverse and healthy habitat for wildlife, with a special focus on species-at-risk, at the confluence of the Seton and Fraser Rivers. Public education promoting the beauty of our area and the need for healthy wildlife habitat, leading to stewardship opportunities, are also important components of the Powerhouse Foreshore Restoration Project.

The Powerhouse Foreshore Restoration project will mitigate site damage caused by the construction and operations of the BC Hydro Seton Dam and Cayoosh Creek Canal complex.

The Lillooet Naturalist Society is working in close partnership with the Cayoose Creek St'at'imc. The Department of Fisheries and Oceans, Ministry of Environment, BC Nature, Rivershed Society of BC and the District of Lillooet are supporting the project by providing both expertise and in-kind support. The Lillooet Naturalist Society has also been successful in generating local community interest, in-kind support, volunteer hours and donations throughout this project.

The focus of 2009 Phase Two work was to build on the work carried out in 2008. Various roads within the site were decommissioned during 2008, redirecting traffic to one roadbed. During 2009 we continued deactivating old roadbeds on the upland bench above the Fraser River, complexing the site by mounding, placing coarse woody debris and standing snags. As during 2008, we have continued to remove invasive plant species and restock with native trees, shrubs, herbs and grasses that have been propagated in the nursery established for the restoration project. We have continued with ponderosa pine protection, flora and fauna studies and related monitoring. Extension activities have been explored with the community, including the idea of a nature centre and a wildlife corridor from the Fraser River to the Lower Seton Spawning Channels.

The restoration crew have held numerous public outreach activities including presentations, information booths, field walks, volunteer opportunities and the 4th Annual Salmon in the Canyon Festival. The restoration project has been featured in the Bridge River-Lillooet News, the St'at'imc Runner and on Radio Lillooet broadcasts. As well we have been honoured by various organizations with requests for presentations on our project, and assistance in their own work.

The Lillooet Naturalist Society has developed a Restoration Plan for Phase Three (2010) based on the successes of the past two years.

The Lillooet Naturalist Society is eager for Spring 2010 to see the impact of the plantings on the site. This is a large project with some challenges. However, with community support, and the expertise of the Department of Fisheries and Oceans and the Ministry of Environment, and with guidance from a qualified restoration specialist, the Powerhouse site could provide enhanced habitat for wildlife, in particular species-at-risk with a focus on the Western Screech-owl and Racer. It will also provide a community "commons" for the citizens of Lillooet and surrounding areas, where education on the importance of healthy and diverse habitats will be showcased.

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1. INTRODUCTION

1.1 Proponent Information

The Lillooet Naturalist Society (Society # S-44937) is a non-profit organization, which has been active since 2001.

The goals of the Society are to:

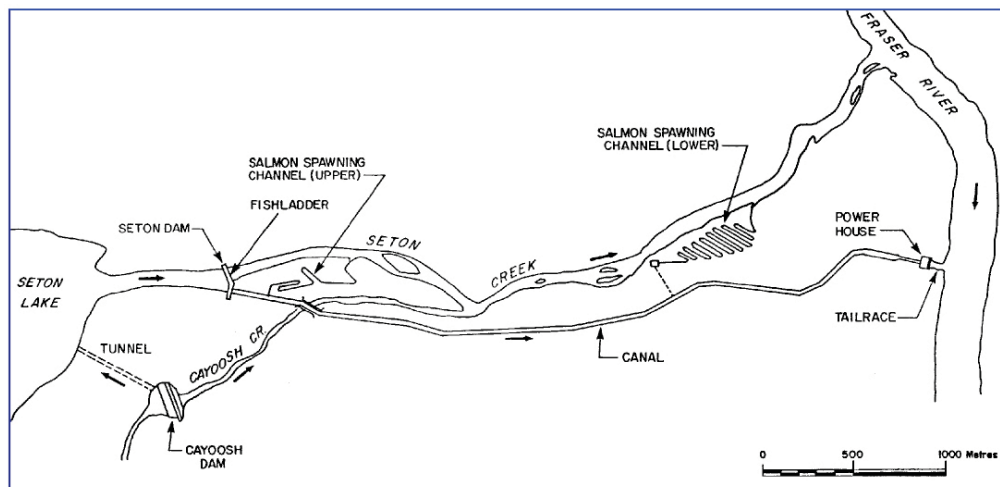
- ⇒ promote the enjoyment and understanding of nature
- ⇒ to encourage the establishment of protected natural areas
- ⇒ defend the integrity of existing sanctuaries
- ⇒ engage in the funding and research needed for protecting the integrity of natural ecosystems; and
- ⇒ to encourage and engage in the protection and restoration of threatened and endangered species with special attention to the preservation of essential habitats.

The Society's commitment to this project will assist us in meeting all five goals that we have set. This project was chosen as a showcase community project which would generate an interest in restoration and foster a greater appreciation of the river and its foreshore ecosystems.

1.2 Hydroelectric Impact

In the late 1950's the Seton watershed was subject to major alterations from hydroelectric development. The Powerhouse Project relates directly to the historical loss of habitat due to construction of the BC Hydro Cayoosh Canal mega-project. This project was in service 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 long concrete-lined power canal. This canal delivers water to a small intake forebay (Bridge River Water Use Plan, 2003). The powerhouse tailrace discharges into a semicircular basin approximately 100m x 75m that was excavated in a gravel bench of the Fraser River about 1.5 km downstream of the Seton River confluence (*Bridge-Coastal Fish & Wildlife Restoration Program, Strategic Plan - Volume 2*). The tailrace is situated at the south end of the study site.



Map 1 Seton Project Facilities (map from BCRP, Strategic Plan - volume 2)

The development that took place at the Powerhouse site was extensive. The digging of the canal and forebay required the movement of vast amounts of earth and effectively fragmented the Powerhouse site from the riparian zone and the shores of the Fraser River.

During this construction the flow of the Seton River was altered. It is also noted “that the original habitats in Seton River were very different than those that occur today. An area of low marshy habitat existed near the Fraser confluence” (Bridge-Coastal Fish and Wildlife Restoration Program, Strategic Plan - Volume 2).

Historical photographs of the area show that BC Hydro also made full use of the upper bench, both through their own work yard operations and through leasing to other industrial users.

Figure 1 below 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.

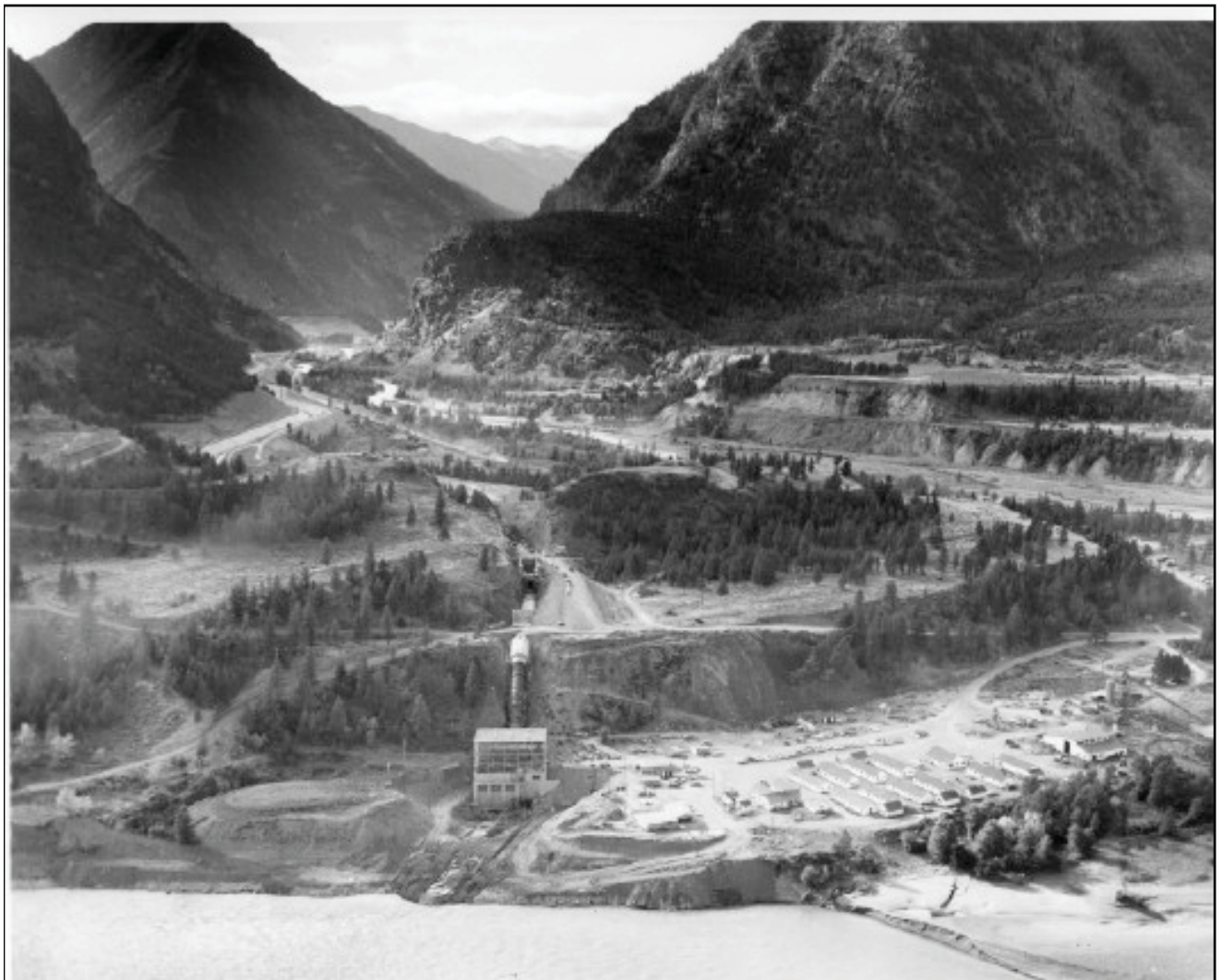


Figure 1 Cayoosh Canal and Forebay Construction 1950's

2. GOALS AND OBJECTIVES

The Powerhouse Foreshore Restoration Feasibility Study of 2006 and the continuing research undertaken during 2007, looked at how the Society could address and develop a plan to mitigate the footprint impacts on wildlife habitat at the work yard site, within the surrounding riparian zone and along the shores of the Fraser River. During 2008 and 2009 we carried out the first two phases of that plan.

The Goals of this restoration project are to:

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

The Objectives during Phase Two (2009) were to:

- ⇒ involve partners and work with an Advisory Committee who provide direction and support;
- ⇒ continue deactivation of all roads within the site, with a focus on two large portions of the upper bench;
- ⇒ remove invasive plant species in selected areas;
- ⇒ protect the existing ponderosa pine stand;
- ⇒ propagate native plant species from local stock;
- ⇒ replant with native plant species in selected areas;
- ⇒ carry out wildlife studies and continue monitoring protocols;
- ⇒ provide educational and volunteer stewardship opportunities;
- ⇒ research extension activities: nature centre and Seton River wildlife corridor; and
- ⇒ monitor progress.

We believe the Society has met the goals and objectives set out in Application 09.W.SON.01.

3. STUDY AREA

3.1 Site Location

The Seton River basin is located in the rainshadow of the southern coastal mountains about 200 km northeast of Vancouver, and drains into the Fraser River at Lillooet (*Bridge-Coastal Fish & Wildlife Restoration Program, Strategic Plan – Volume 2*).

The study area is located within the traditional territories of the St'at'imc and within the District of Lillooet boundaries. The site is also within the Cascades Forest District. The Powerhouse site lies along the west bank of the Fraser River, 240 kms northeast of Vancouver.

The study area boundaries run along the foreshore of the Fraser River, from the mouth of Seton River to the Cayoosh Canal Outlet. It is here that the Seton basin and Fraser River valleys meet. The site is bordered by Powerhouse Road to the west and Cayoose Creek Reserve Lands to the north. *Map 2* provides an aerial photograph map of the site.

The project site is currently zoned 'Industrial' and 'Unsurveyed Crown Land'. Designation of a Wildlife Habitat Area for the Western Screech-owl has now been approved within the riparian zone.

3.2 Site Map



Map 2 Aerial Photographic Site Map showing boundaries – Seton River, Cayoosh Canal tailrace, Powerhouse Road and Cayoose Creek IR I

3.3 Biophysical Description

The site (50.673930N, 121.92429°W) ranges in altitude from 190m to 205m above sea level. “The town of Lillooet falls into the Ponderosa Pine (PP) biogeoclimatic zone (Meidinger and Pojar 1991). The PP zone occurs in the dry valley bottoms along major river valleys of the southern interior and is the driest forested zone in British Columbia with very hot summers and annual rainfall between 280-500mm. The Lillooet area falls into the Ponderosa Pine very dry hot sub zone (PPxh) of the biogeoclimatic zone classification. Many micro climates exist in the area due to the localized weather patterns dictated by the converging mountains and valleys at this location” (*Preliminary Restoration Study of the Powerhouse Site, Odin Scholz, 2006*).

For the purpose of this study, the project site was broken into three specific ecological Zones (see *Map 3* for site sketch showing zones):

- ⇒ The area under BC Hydro ownership is largely a damaged flat bench above the river with many old roads crisscrossing the site. It is a dry upland bench dominated by herbs and low shrubs, including Big Sagebrush and bunch grass and a few ponderosa pines. This area is a prime candidate for reclamation and creation of new and diverse habitat.



Figure 2 Dry Upland Bench

- ⇒ The crown land portion of the site is a riparian band dominated by taller deciduous shrubs and trees. Plants include Saskatoon and Prickly Rose bushes, as well as a beautiful small cottonwood stand. A ponderosa pine forest is located on the border of the site at the northern end. The area has been degraded and was used as a party site, racetrack and dumping ground for garbage. Old abandoned machinery and batteries littered the area. However, screech owl, osprey and many riverine birds inhabit the site. Deer and bear have also been known to use the area. This section of the site is ideal for invasive weed eradication and habitat enhancement.



Figure 3 Riparian Zone

- ⇒ The beach portion includes a large gravel bar, with minimal vegetative cover, on the shores of the Fraser River. Heron, eagles, gulls and sandpipers are all frequent visitors to this area. Vehicle traffic accesses the beach, and some weeds have encroached into the site. Again, this is an area that benefits from a general clean up and habitat enhancement.



Figure 4 Fraser River Gravel Bar

3.4 Site Sketch



Map 3 Site Sketch showing the three ecological zones – dry upland, riparian and Fraser River gravel bar

4. PARTNERSHIPS

The Lillooet Naturalist Society felt it was very important to ensure we had the support of the St'at'imc, the traditional owners of the land, and the local community as a whole. We worked hard to ensure this became a reality.

The Lillooet Naturalist Society and Cayoose Creek St'at'imc have been working in partnership on this restoration project since 2006 when preliminary planning began. We have also involved all levels of government – First Nations, Federal, Provincial and Local.

A Restoration Advisory Committee was set up in early March 2008 to guide the restoration work and provide advice to the restoration crew. The Advisory Committee meets once a month during the restoration season to discuss progress at the site and provide direction for the coming month. The expertise provided by the Advisory Committee has been invaluable and assisted the restoration crew to implement groundwork. Members of the Advisory Committee during 2009:

- ⇒ Michelle Edwards, Councillor, Aboriginal Land Steward, Cayoose Creek St'at'imc
- ⇒ Wayne Redan, Councillor, Cayoose Creek St'at'imc
- ⇒ Charmaine John, Band Project Administrator, Cayoose Creek St'at'imc
- ⇒ Sean Bennett, MSc, RPBio, Senior Restoration Biologist, Fisheries and Oceans
- ⇒ Francis Iredale, B.Sc., BIT, Wildlife Biologist, Ministry of Environment
- ⇒ Pat St. Dennis, Councillor, District of Lillooet
- ⇒ Jeff O'Kelly, Secretary, Lillooet Naturalist Society
- ⇒ Scott Bodaly, Director, Lillooet Naturalist Society
- ⇒ Marg Lampman, Community representative
- ⇒ Gillian Smith, BSc., Community representative

The Lillooet Naturalist Society was also supported in this project by BC Nature, who assisted us in leveraging additional funds for summer students and provided assistance in bookkeeping, as well as promotion and volunteer labour. The Rivershed Society of BC also assisted by providing advice, encouragement and participation in events.

We have worked hard over the last three years to include the local community in this project and have been rewarded with donations and/or discounts from local businesses and organizations. Volunteers have also contributed over 896 hours of work to the project during 2009, including cleanup of the site, seed collection, salvage work, nursery work, trailer upkeep, and assisting at field walks and community events.

In addition to the funding secured from the BCRP, the Lillooet Naturalist Society and Cayoose Creek St'at'imc were able to leverage funding from the following organizations:

- ⇒ District of Lillooet - mapping, use of equipment, outreach and event funding
- ⇒ Service Canada – Summer student placement wages
- ⇒ Fraser Salmon and Watershed Program - outreach supplies and facilitator wages
- ⇒ Public Conservation Assistance Fund – tools and outreach supplies
- ⇒ TD Friends of the Environment - outreach supplies
- ⇒ Local Fundraising efforts

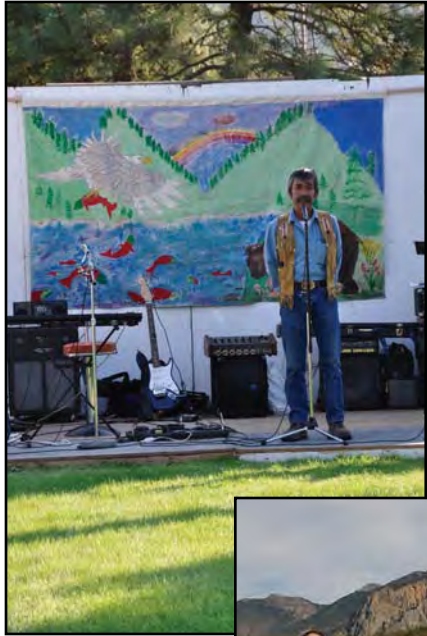


Figure 5 – Chief Perry Redan, Cayoose, speaking at Salmon in Canyon Festival



Figure 6 Fisheries & Oceans involved since 2006

Figure 7 Rivershed Society visit



Figure 8 BCRP Board & Staff visit



Figure 10 FSWP & Fraser Basin visit



5. RESTORATION METHODS and RESULTS

The Powerhouse Foreshore Restoration Project is a multi-faceted project, that has been developing over the last five years, and is projected to require continued restoration work for the next four years. However, maintenance of the site will need a long-term commitment and plan to ensure the work carried out is meeting its goals.

The work carried out to date includes:

- ⇒ 2005: Initial idea conceived and BCRP 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

A Restoration Plan is in place and builds on the successes and challenges of the preceding years experiences. The site has been mapped and information presented in various formats and locations.

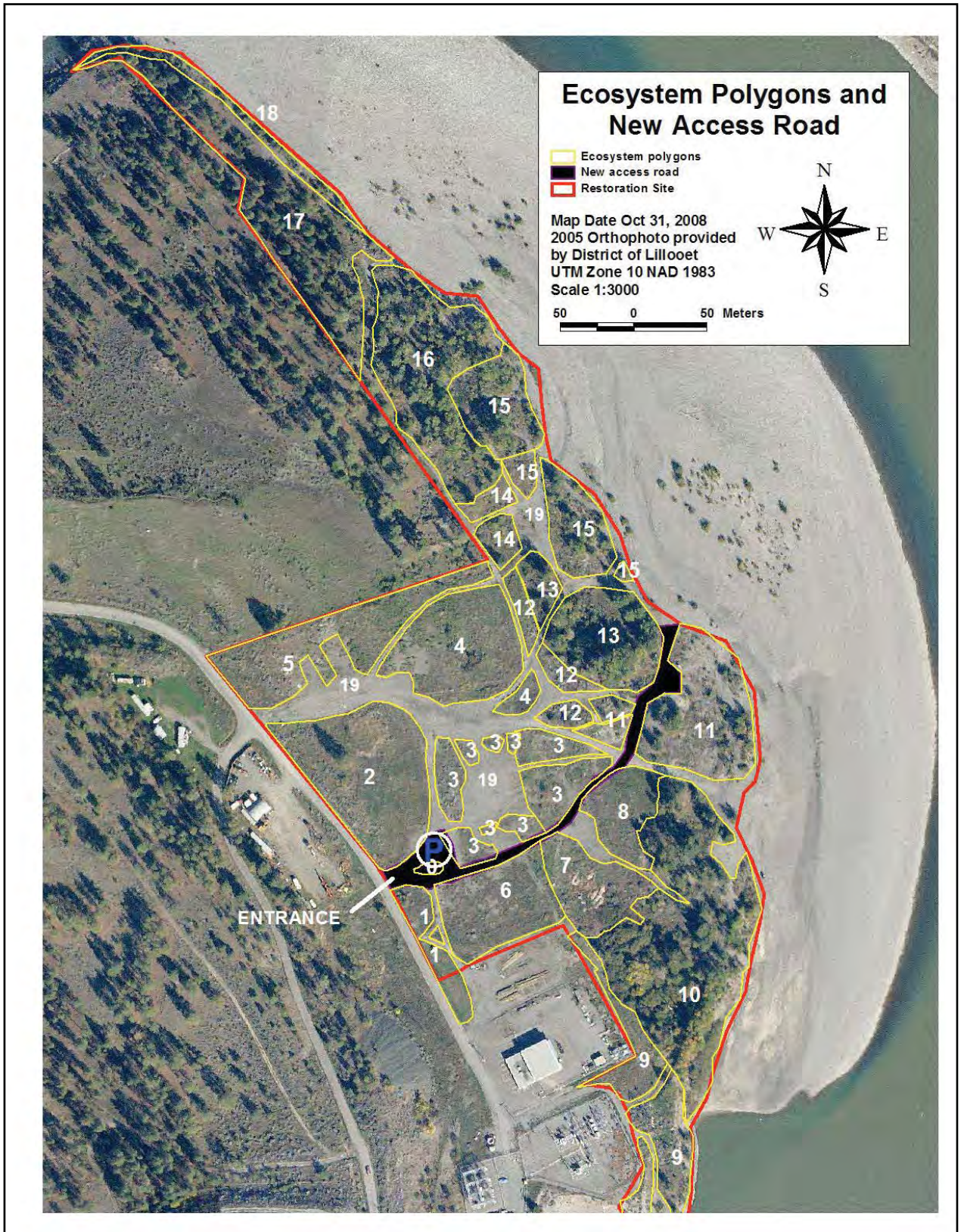
Various contractors have been hired to assist the Lillooet Naturalist Society and Cayoose Creek St'at'imc to implement the Restoration Plan. Odin Scholz, BSc., restoration contractor, has worked in close partnership with the Advisory Committee and Project Manager and is responsible for all the mapping and field work supervision at the restoration site. Tommy Hancock, local machine operator, has completed all the machine work on site under the direction of Odin Scholz. Wildlife studies and monitoring have been carried out by Kenneth G. Wright, Jeff O'Kelly, Doug Burles, Bob Deadman and the restoration crew.

This reports summarizes some of the work undertaken to reach the current restoration year, and presents the methods and results of the work carried out in 2009. For more detail information on previous years' work refer to the final reports for each of the above years.

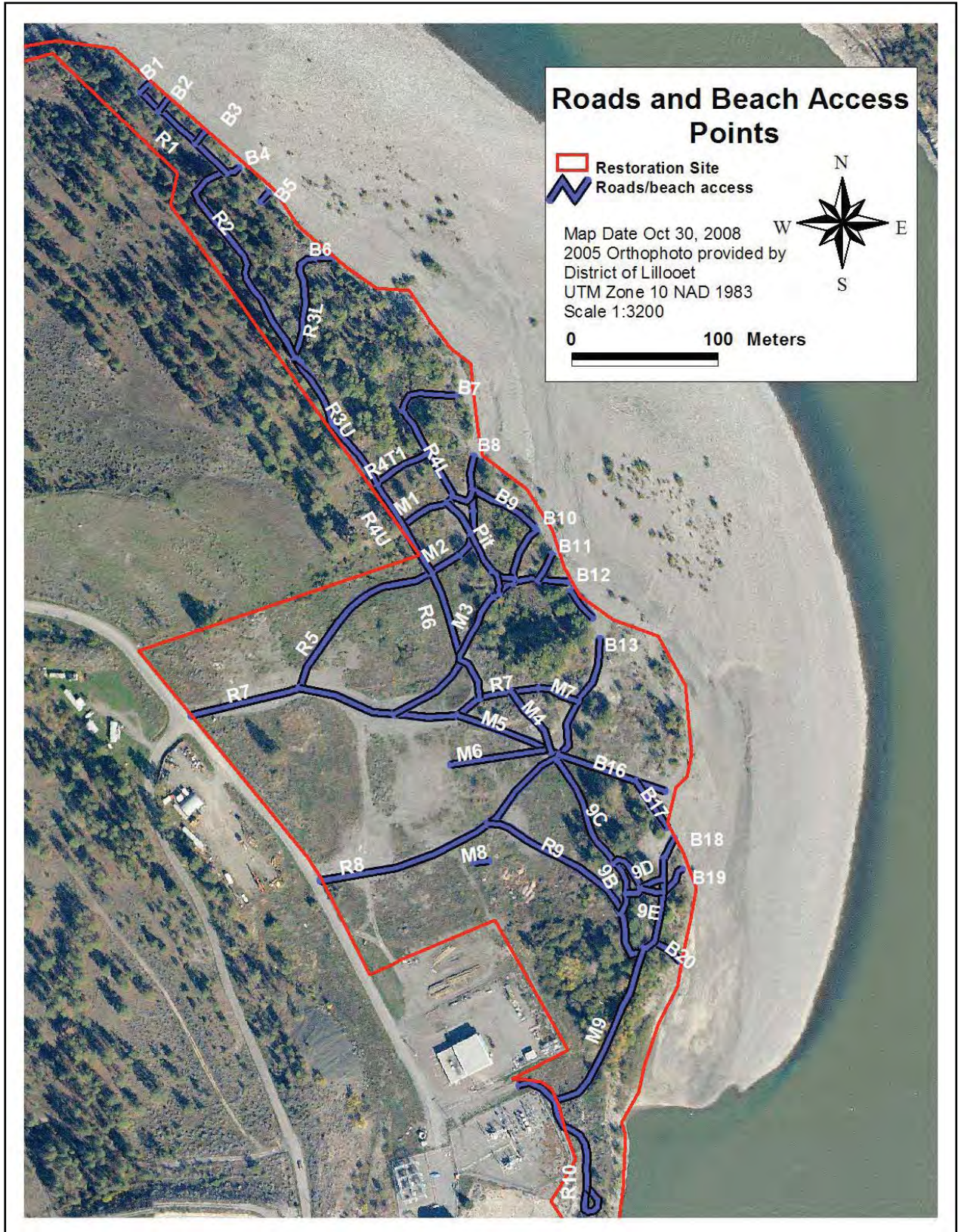


The following maps shown below are referred to throughout this report:

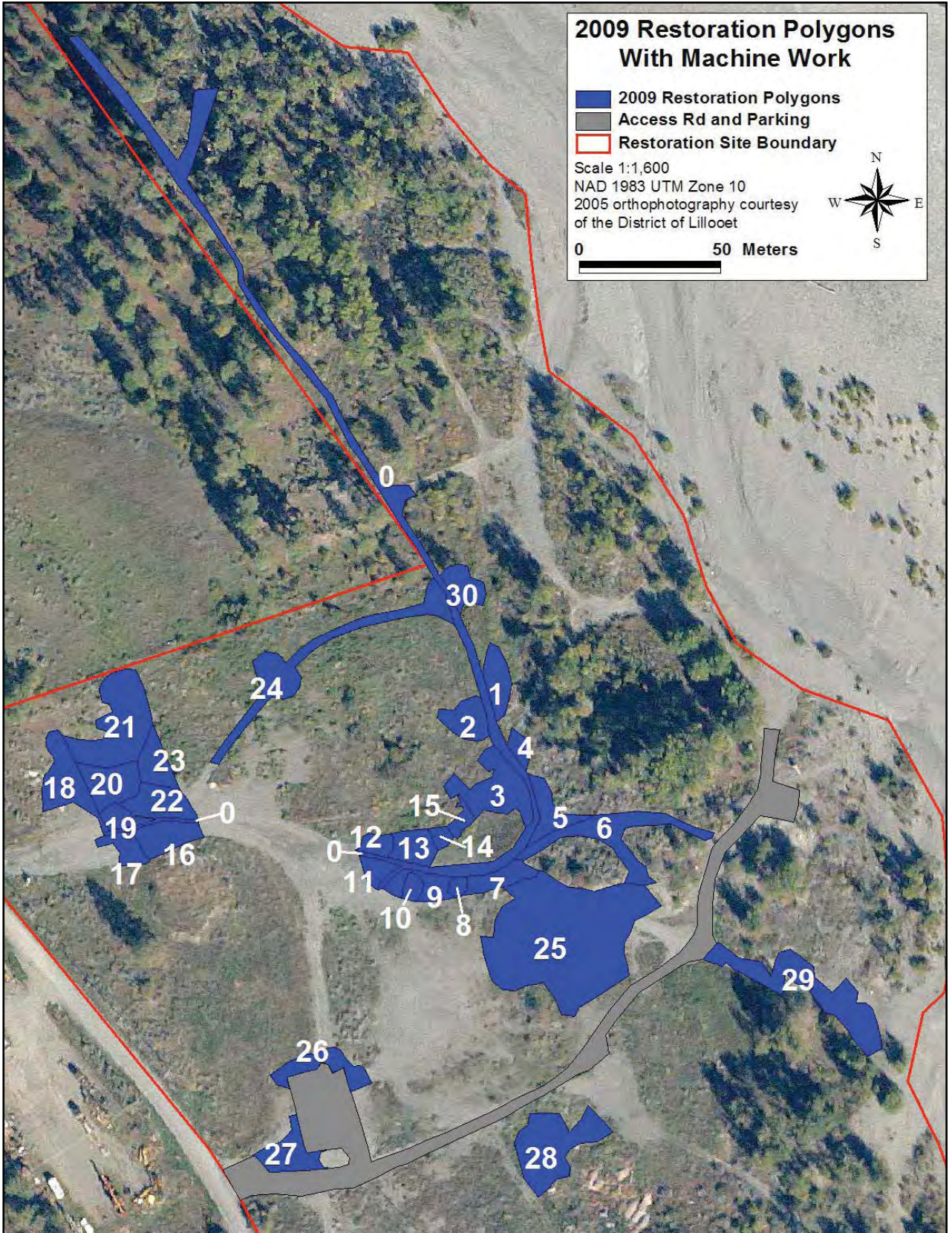
- ⇒ Map 4 Ecosystem Polygons
- ⇒ Map 5 Road and Beach Access Information
- ⇒ Map 6 2009 Machine Work Polygons
- ⇒ Map 7 2008 - 20010 Restoration Zones



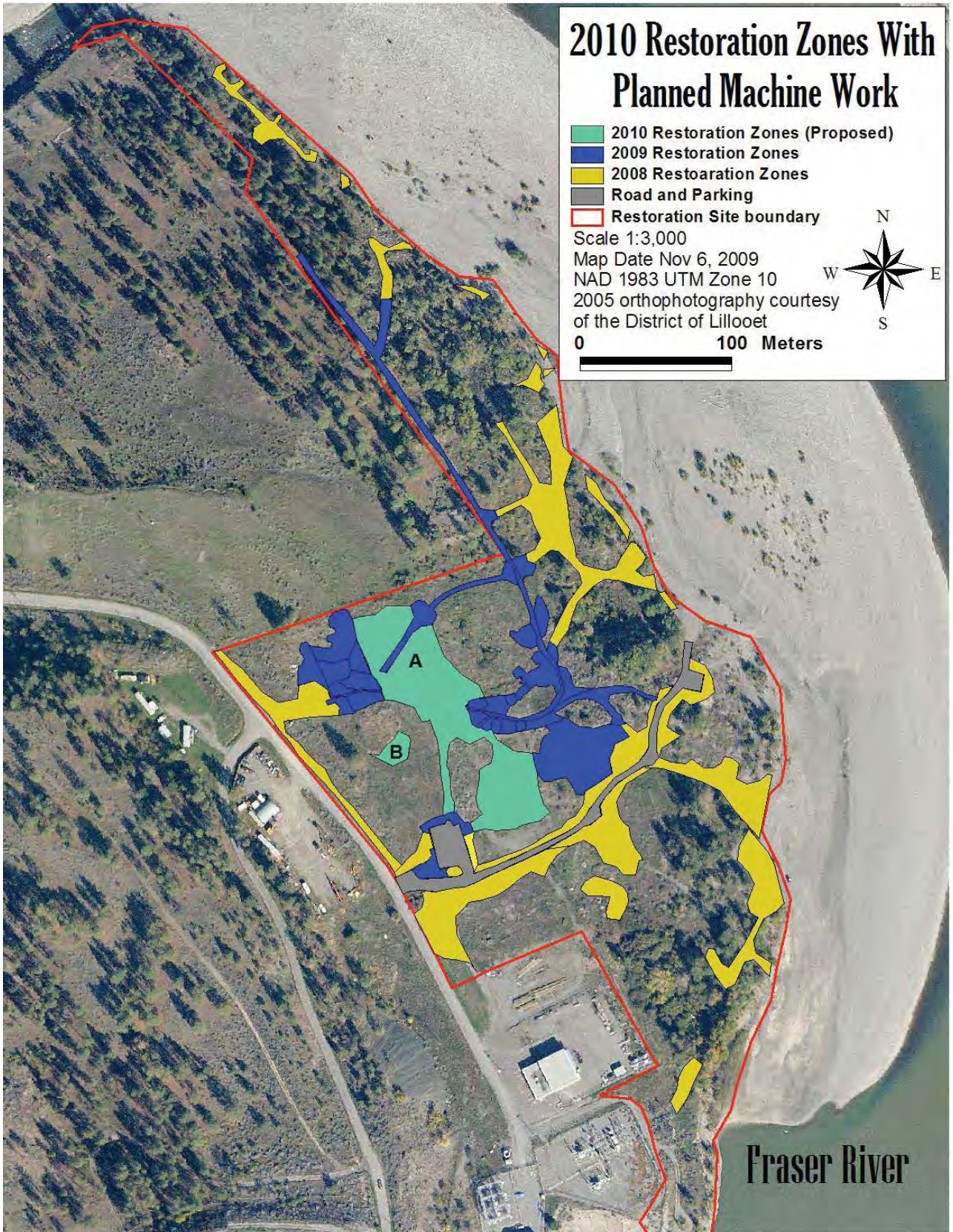
Map 4 Ecosystem Polygons established in 2006. Detailed vegetation cover and restoration prescriptions were included for each polygon (see Final Report 2006).



Map 5 Road and Access Information Map, first completed in 2007 and refined in 2008.



Map 6 2009 Restoration Polygon Map indicating the machine worked areas completed during 2009.



Map 7 2008 - 2010 Restoration Zones, also showing 2008 and 2009 restoration areas.

5.1 Road Designations

The restoration site has been heavily impacted by vehicle use. Throughout 2006 and 2007, community consultations were conducted to gauge the local community's willingness to have this extensive road system deactivated. We felt that restoration would be impossible without the closure of the roads, and public buy-in was essential to moving forward in this direction.

“The Powerhouse road site is a collection of vegetative islands surrounded by roads. Fragmentation weakens ecosystems making them more vulnerable to natural and artificial disturbances including invasion by exotic species. Removing the roads will allow the reconnection of vegetative communities, thus strengthening the overall ecosystem health and function.” (Odin Scholz, 2006)

Roads were mapped on the ground during 2007 using a GPS and 1:2000 orthophoto of the site and restoration prescriptions developed “to initiate healing of the site by de-fragmenting to create a more integral ecosystem” (Odin Scholz, 2008). *Map 5* indicates all access points to and from the beach and along the top bench.



Figure 11 Road through Riparian



Figure 12 Road through dryland bench

Through the community visioning sessions and outreach activities, consensus was achieved in designating one road access to the beach, while considering habitat fragmentation, road length and road substrate. One road (R8 - B13) was maintained and upgraded to allow traffic to flow through the edge of the site and out onto the sandbar (*Fig 13*).

All other roads were closed during 2008 using large logs, boulders and plantings that served the dual purpose of providing habitat for wildlife while “naturally” closing off access to the roads (*Fig 14*). Over 230 logs and 320 boulders were used in the natural fencing and complexing. As many of these logs were closing roads in the riparian zone, they were secured to boulders so they would not float away during high water events each spring. *Final 2008 report provides more detail of this work.*

A large parking area was created at the entrance to the site, with a small vegetation island marking the entrance, with the goal of encouraging people to Park-and-Walk.

Figure 13 One road access to river



Figures 14 Machine deactivating roads 2008



5.1.1 River Access Road and Parking Area: During 2009, we monitored the success of the road designations that were undertaken in 2008. “It was apparent from on-site observations that people adjusted to using the new road and continue to use the site from spring to fall” (*Odin Scholz, Summary Report of Ecological Restoration Activities at the Powerhouse Road Site, 2009*). Use of the road increased throughout the year as more people visited the site. Most users still park out on the gravel bar while accessing the river for swimming, fishing and hiking; however, it has been observed that some people are now beginning to use the parking area and trail system while visiting. It is important to note that “as a rule, prior to demarking the main parking lot very few site visitors ever parked on the upper bench” (*Odin Scholz, 2009*). Comments by visitors for not using the parking area mainly centre around the fact that users have always driven out onto the sandbar in the past, and that the parking area lacks shade.

The condition of the access road surface remained intact during the 2008 season, but over the winter and early spring 2009, potholes have been observed. These will need to be repaired in the coming season, and a strategy put in place for ongoing maintenance and responsibilities. The road access to the river has also resulted in compaction of gravels in certain areas of the bar, and visual impacts. “Although unattractive, the annual high water of the Fraser River will erase these tracks as the coarse cobbles and gravels are shifted around” (*Odin Scholz, 2009*).

The small vegetation island created in 2008 that marked the parking area entrance apparently provided an irresistible place to perform ‘donuts’. A few vehicles churned up the parking lot gravels while turning around the island at fast speeds, creating deep ruts in the road surface (*Fig15*). The restoration crew meet with the Advisory members, a local surveyor and Department of Transport representation to find a solution to this problem.

“It was decided one access from the main road (into the parking area) and space enough for at least a dozen vehicles should be provided. The island was turned into a peninsular creating more area for planting native plants (*Fig 16*). The north south running section of the parking area was separated in two with the placement of three large boulders. Trees and shrubs were planted around the parking lot with the intention to provide future shade and encourage more parking in the future” (*Odin Scholz, 2009*)



Figure 16 Peninsular extended from Island showing shade plantings October 2009

Figure 15 Parking lot island showing tire ruts in background



After a few outreach activities were held at the site, we became aware that the parking area was causing some confusion, and did not allow for sufficient parking.

“The first reconfiguration had vehicles parking facing N-S with two opposing islands splitting the north and south parking spaces. This configuration was determined to be confusing, so the lot was re-organized to allow one line of vehicles to park facing east-west with enough space for fourteen vehicles. This modification has been applauded as a much more inviting and smooth layout” (Odin Scholz, 2009)



Figure 17 Aerial view of entrance and parking area October 2009

The importance of focusing on a well-developed parking area has been made to encourage use of the space. Vehicles entering the site are a major vector for weed dispersal and cause compaction of the gravel bar.



Parking areas may have to be considered in relation to signage and any proposed nature centre on the site in the future. Through education, a functioning parking area, and a good trail system, the public may rethink their vehicular access to the river.

5.1.2 Riparian Protection

Roads crossing the riparian zone were causing fragmentation of the site, erosion of road beds during high water each spring, and were a potential vector for weeds. Map 5 above indicates ten access points along the upper bench (R1 - R9) and twenty access points from the sandbar (B1 to B20). “These roads and access points varied in age and degree of disturbance and needed to be deactivated to ensure the integrity of the riparian zone” (*Odin Scholz, 2008*).

During 2007, all roads were mapped and restoration prescriptions developed to guide work in closing off access points into the riparian zone and for deactivating the roadbeds (*see Final Report 2007 Table 7*).

During 2008, nineteen access points coming from the river-side of the riparian zone were closed using large logs and boulders placed by the excavator. Logs were secured to the boulders with cable to prevent them being swept away by the annual high water events.



Fig 18 Sean Bennett DFO assisting in securing logs to boulders 2008

Fig 19 Road deactivation at north end of site 2008



Protection of the riparian zone is critical in allowing defragmentation of the area for wildlife use, and to allow native plant species to reestablish within the area. Old roadbed edges were contoured down to mitigate erosion from the Fraser River and the compacted roads loosened to allow for reestablishment of native plant species.

Monitoring of the placed boulders was undertaken during 2009 to:

- ⇒ access the effectiveness of their placement in restricting vehicular access into the riparian zone
- ⇒ monitor the effects of the Fraser River spring runoff on the installed objects; and
- ⇒ monitor the effects of high water and how it reacts with the installed objects and plants.



Fig 20 Riparian Road R8L and Access Point B16 BEFORE June 2008



Fig 21 Same Road after log and boulder placement, and decompaction AFTER July 2008



Fig 22 Same Road after planting AFTER September 2009

Visual inspections of the site were undertaken at various times throughout the season to monitor the success of the 2008 work undertaken to protect the riparian zone.

In late February 2009, the visual inspection revealed that there was a breach into the riparian zone at the north end of the site. From evidence, it seems that the breach happened on only one occasion and were the actions of one vehicle. Visible 'donuts' could be seen in the fine sands. These were racked out to discourage a repeat of the actions.

The most rewarding time where no access was breached, was post high-water. This was usually a time where ATVs and 4X4s enjoyed 'mud-bogging' in the wet soil of the riparian zone. No such incident occurred during 2009. However, over the summer a motorcycle did pass through the site on two occasions, but the rider stayed on the trails and caused no damage, and did not return again.

The visual inspections showed that the motorized vehicles had breached the riparian zone at six different locations (*see Map 8*).



**Map 8
Sites of Vehicle
Access
Reinforcement**

“Actual damage to any restoration work was minimal and damage in general was limited to several ‘donuts’ being spun in the northern end of the riparian zone. It was decided to reinforce these locations by placing additional boulders. This work was carried out in early September” (*Figs 23 and 24*).

“Three dump truck loads of boulders were delivered to separate locations along the beach zone, and the excavator used to place the boulders in strategic locations to dissuade further vehicle access into the riparian zone. The points of access were largely places where the native vegetation was a little sparse” (*Odin Scholz, 2009*).



Figure 23 and 24 Breached area September 2009 BEFORE and AFTER treatment



As an additional reminder to the public regarding the restoration process, a sign was erected at the entrance asking people to respect the work being carried out by keeping vehicles to the designated road (Fig 25).



Figure 25 Tread Lightly sign

Movement of one log occurred in the pit area (old road B12) when a cable snapped during high water. No damage was reported. The volume and level of the 2009 high water event was much lower than the preceding year, and no detrimental effects were observed with the interaction between the water and the barriers. No logs were lost to the current and no additional work was needed.



Figure 26 High water 2009 showing the large gravel bar underwater.



Figure 27 High water flowing through riparian zone in Pit Area (B12)

Results of the main road designation and road closures in the riparian zone have been successful. Many site users are accepting and appreciative of the efforts being undertaken to protect the area. Most people still drive out onto the sandbar to enjoy fishing and swimming, but more people have been seen using the parking area.

Exclusion of vehicles from the riparian zone has resulted in some dramatic changes, with native vegetation re-colonizing the old roadbeds.

“In the roughly 200m² pit area (Polygon 19) the site is being rapidly colonized by coyote willow (*Salix exigua*), cottonwood (*Populus balsamifera ssp. Trichocarpa*), and notably Indian hemp (*Apocynum cannabinum*) along with prairie pepper-grass (*lepidium densiflorum*) and Canada wildrye (*Elymus canadensis*). There are also a number of exotic species moving in including quack grass (*Elytrigia repens*), kochia (*Kochia scorparius*), and two small patches of field bindweed (*Convolvulus arvensis*). The exotic species were hand pulled” (Odin Scholz, 2009).



Fig 28 Pit area Polygon 19

BEFORE

June 12, 2007

Fig 29 Same area

AFTER

August 17, 2009



Another benefit of the road closures is the native plants that were stocked into the site during 2008 have been protected from vehicular traffic.



Fig 30 Northern Riparian zone (Polygon 17) roadbed *BEFORE* *October 11, 2007*
Fig 31 Same area after road closures *AFTER* *October 27, 2009*



5.2 Soil Remediation

Highly disturbed soils are widespread throughout the Powerhouse site, especially on the upland bench. Through years of disturbance much of the topsoil on the various roads that fragment the site were

“either removed or buried under a six inch to two foot deep layer of coarse fill Below the fill lies a layer of finer sandy soil, and original soil horizon” (Odin Scholz, 2008).

While machine work to designate site boundaries and close off road access into the riparian zone during 2008 was undertaken, site complexing was also taking place with a focus on the riparian zone and the edges of the access road (*see 2008 Final Report*).

During 2009, this work continued on the upland bench. The goals of 2009, were to de-compact, remediate and re-contour soils on a .93 hectare area of the dryland bench, as well as add structure and habitat to the site using snags, coarse woody debris, boulders and rock piles.

During 2008, three test plots to investigate soil remediation and planting methods on the highly disturbed dryland bench (*Fig 32*) were carried out, to guide the major work planned for 2009 in this area . The ground was prepared by the excavator on an old roadbed in the far north-west corner of the site (R7 - Upper Snag area). Three different techniques were used to test native plant response to soil treatments:

- ⇒ One 125m² area had the insitu surface material decompacted to several feet as the only treatment.
- ⇒ One 125m² area had fill removed in varying depths of four inches to a foot. The sandy soil under this layer was decompacted and left as its.
- ⇒ One 125m² area had fill removed again in varying depths. Fifteen yards of sandy loam were trucked in and spread over the existing soil.

Each of the three areas had logs and snags planted to create wildlife habitat and planting spots. Each of the three areas were also planted in the fall of 2008 with comparable numbers and species of native herbs, grasses, shrubs and trees.

Visual monitoring of the area once a week during 2009, revealed that soil treatment at this time did not make any considerable difference in the health of the 2008 planted species. Visually, the test plot that had the top surface material removed and the sandy soil mixed blended with the site more esthetically. The test plot that had loam trucked in proved to have a small clay content that cracked during the dry summer (*Figs 33 and 34*).



*Fig 32 Site of the three initial test plots R7
BEFORE June 13, 2008*



Fig 33 Soil Test Plot established on R7 after site complexing

AFTER July 12 2008

Fig 34 2008 plants in test plots after one year's growth. No visible difference observed. July 16, 2009



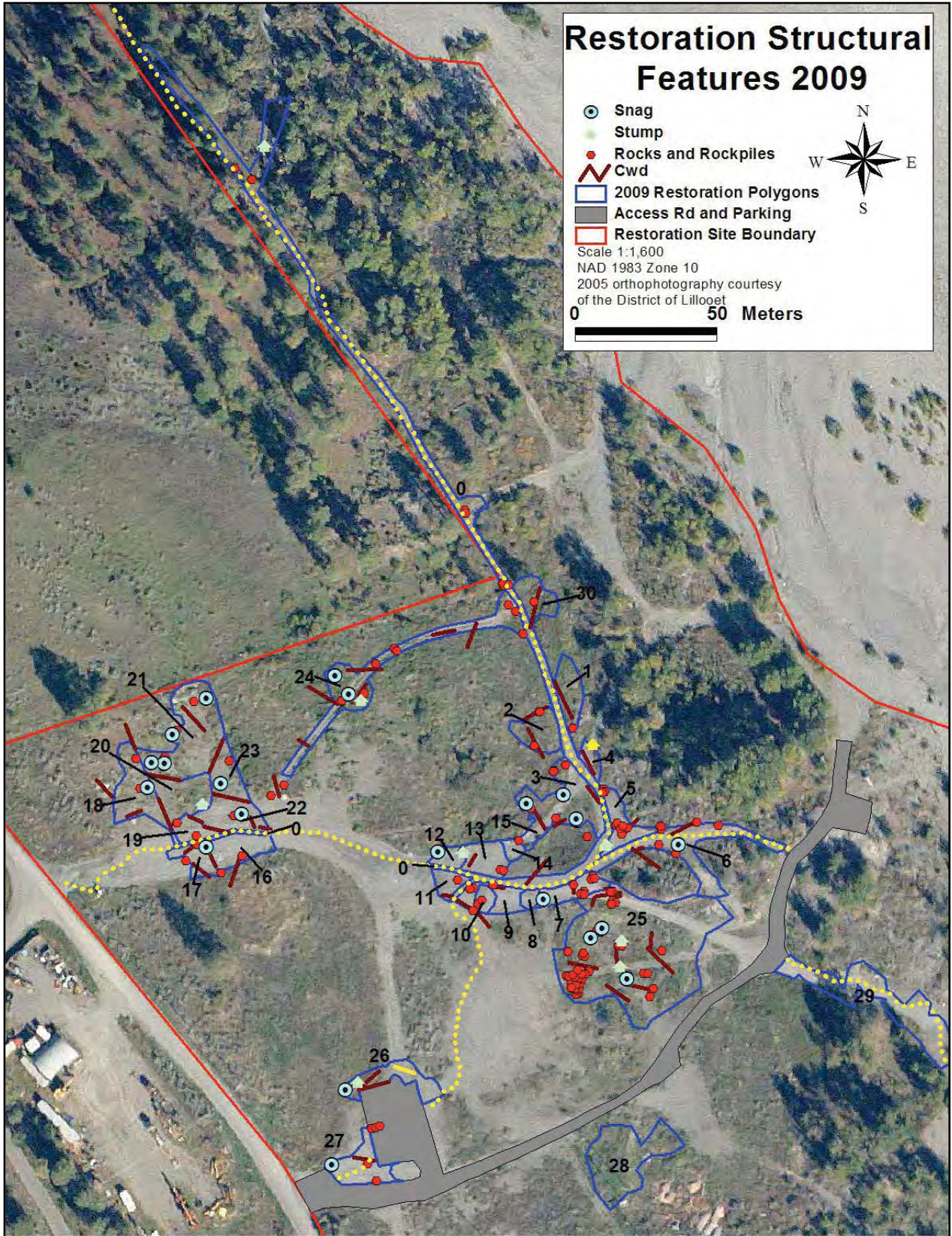
The results of the 2008 test plots guided work in 2009. It was deemed unnecessary to remove all the gravels from the old roadbeds, instead existing soil materials were used in different ways throughout the upland bench.

“During the late summer of 2009, a .93 hectare area of the upper dry bench soil was worked by a 160 Komatsu excavator cat. Using a three-foot wide toothed bucket the excavator was employed to de-compact, mix and re-contour the land. The majority of the area was heavily compacted road or trail surfaces. Soil decompaction and contouring varied from site to site (*Table 01 and Map 06 above*)” (*Odin Scholz, 2009*).

Table 2009 Restoration Polygons and Features							
ID	AREA M²	Decompaction	# PLANTS	# Snags	# CWD	Boulders	Stumps
Trail	41.1	Shallow/contouring	0			0	
Trail	1378.89	Shallow/contouring	0			8	1
1	180.38	Deep mixing/ heavy Asphalt screening	55		1	1	
2	187.26	Mod	71		2	3	
3	335.06	Mod/ Asphalt screening	107	3	2	7	
4	64.28	Mod	23		1	0	1
5	179.91	Mod Heavy contouring	82		1	12	1
6	445.94	Mod	83	1	2	4	
7	153.8	Mod/ Heavy contouring	143	1	1	7	
8	37.62	Deep/ exposed subsoil	15			0	
9	148.9	Mod/ Heavy contouring	161		2	4	
10	56.81	Deep/ exposed subsoil	59		1	2	
11	87.53	Deep /exposed subsoil	28		1	1	
12	80.91	deep/ exposed subsoil /chunks of cement	32	1		1	1
13	166.85	Mod	111		1	2	
14	47.11	Deep exposed subsoil	12			1	
15	62.63	Deep	41		1	1	
16	208.12	Mod mixing/Contouring	131	1	2	2	
17	118.34	Mod mixing/Contouring	147		2	2	
18	320.17	mod	92	1	2	2	
19	97.04	Mod/ Asphalt screening	74		2	2	
20	255.61	Mod	62		1	0	1
21	597.56	deep mixing/contouring	167	4	4	3	
22	229.03	deep mixing/contouring	103	1	3	1	
23	173.85	deep mixing/contouring	54	1	1	1	
24	602.79	mod mixing	49	2	7	10	1
25	1786.86	deep mixing/ heavy Asphalt screening	142	3	10	42	2
26	220.83	Deep mixing	0	1	3	1	
27	221.24	Deep mixing	59	1	1	2	
28	537.93	No	104			0	
29	599.81	No	46			0	
30	159.27	Mod/ Asphalt screening	0		1	1	
TOTAL	9783		2253	21	55	123	8

Table 01
Restoration Polygons 2009

Decompaction details. Depth of digging (shallow- 30cm, Mod- 75cm, Deep 100cm+.) Mixing- sub soil brought to surface and mixed with upper layer, exposed subsoil- subsoil uncovered for planting, Asphalt screening- sites where large amount of Asphalt was dug up and screened and removed. Contouring- reshaping of microtopography



Map 09 Restoration Structural Features 2009

As indicated on Map 06 above, the areas to be worked were mapped into polygons. Work carried out in each polygon differed depending on the condition of the soil and site impacts (see Table 01).

Polygon 0 - Old Road along fence-line: Machine work began at the north end of the site on an old roadbed that has been designated a walking trail going towards the Seton River confluence with the Fraser River.

“This old road was shallowly decompacted and contoured to erase the tire ruts and blend the topsoil levels with adjacent land. Alfalfa plants were removed by the machine during the decompaction process. Structural features including stumps, boulders and cwd were placed with the machine. The soil was then hand raked to soften the machine work and help define a foot trail. Dozens of smaller pieces of wood were hand carried and placed along the trail”. Odin Scholz, 2009



Fig 35 Road in Polygon 0 in June 2008

Fig 36 Same road after work July 2009



Fig 37 Installing cwd

Polygons 1-6, 25 and 30: These polygons are on the upland bench, just above the riparian zone. Again, the excavator decompacted old roadbeds through this area and contoured the land. Polygon 1 was an obvious area where dumping of asphalt, presumably from the old Department of Transport yard, was found. Asphalt was also found and removed in Polygons 3, 19, 25 and 30.

“Some of the asphalt was in huge chunks and much of the soil had to be screened to remove as much of the asphalt as possible (*Fig 38 - 39*). Large chunks of asphalt were loaded into a dump truck by the excavator, while smaller chunks were raked and hand picked into steel drums, and then loaded into the dump truck. The loads of asphalt contaminated soil were trucked to the local landfill.” *Odin Scholz, 2009*

The Squamish-Lillooet Regional District was contacted and the material was approved to be moved to the landfill as an in-kind contribution. Local school children also volunteered some time to picking up small pieces of the asphalt left behind after the screening process.



Fig 38 Asphalt chunk being dug up and loaded

Fig 39 Smaller chunks of asphalt being screened out of soil



Fig 40 Student volunteers collecting asphalt left behind after the screening process



Polygons 7 - 15: These polygons are approximately in the middle of the upland bench. Most of this area was worked deeply to depths between 75 to 100cm+. While decompacting soils in these areas, large slabs of concrete, possibly from the old PGA Railway works or buildings from BC Hydro works, were excavated and removed from the site (*Fig 41*).



Fig 41 Concrete slabs being uncovered

Polygons 16 - 23: These polygons are found at the north-east end of the upland bench and fan out from the soil test plots established in 2008. Soils here were mostly dug to moderate depths between 30 cm and 75 cm, and brought to the surface while being mixed with the upper gravel layer. Some asphalt again was found and removed in Polygon 19 while this work was taking place.

Polygon 24: This was a small roadbed running along the northern end of the upland bench with very little gravel on its surface. The excavator quickly decompacted the roadbed while mixing the soils.

Polygons 26 and 27: These polygons surround the enlarged parking area. One of the entrances into the carpark (Polygon 27) was decompacted and planting space made so that it joined the planted parking island that was established in 2008. Both areas were dug deeply and soils mixed. Polygon 26 shows some of the best soils found on the top bench to-date.

Polygons 28 and 29: These two areas were old roadbeds decompacted in 2008. One is known as the Lower Snag Area (R9) and the other is the trail area to the high-water pools (B16). No further machine work was carried out here this year; however, digging by hand loosened soil for planting.

At the same time that roads were being deactivated and soils remediated, the flattened surface of the site was contoured. The excavator moved soil into mounds, depressions or ridges to break up the surface.

“By contouring the soil we created micro-sites adding structural complexity to the site. Contouring also allowed the piling of coarser top soil and the uncovering or exposing of the finer sub-soils to diversify the site by varying the character of the surface soils.” (Odin Scholz, 2009)

All machine work was undertaken after the breeding season to ensure no impacts to wildlife occurred during the nesting season. It is also important to note that machine work did not impact any native plant species, as the targeted areas were mostly old roadbeds or areas that contained invasive species. The goal of this project is to build out from areas of strength that already exist on the site. The Restoration Plan for work on the upland bench was staggered over two years to ensure we had sufficient native plant species ready for restocking the site as soon as possible after machine work and weed removal techniques were completed.



Fig 42 Machine work being carried out on old roadbed, showing native species in foreground

5.3 Site Complexing

After road decompaction, soil remediation and contouring was finished in each area, structural habitat features were added, continuing on the work begun in 2008. The Powerhouse site, in particular the upper bench, had few habitat features. As our goal is to increase wildlife habitat we needed to increase structural complexity on site. We did this by installing snags to emulate wildlife trees, and placed coarse woody debris, stumps, boulders and rock piles in designated areas (*Table 01 and Map 09 above*).

Wildlife Trees: Based on the success of 2008 placement of snags and the resulting observed use by birds, twenty-one additional snags were installed over the .97 hectare area on the upland bench during 2009.

“Snags, also called wildlife trees, provide critical habitat features for seventy species of birds, mammals and amphibians in British Columbia (Fenger et al, 2006)”.

We were able to source trees from a pine-beetle infested property, which were provided as a donation to the project. These trees, unlike the snags planted in 2008, had bark, branches and some root wads. The tree needles were all dead on the trunk and through conversations with Ed Senger, R.P.F, it was “concluded that there was no risk of introducing the mountain pine beetles to the site from these trunks” (Odin Scholz, 2009).

The logs were brought to the site by the machine operator and unloaded into a pile on an old roadbed that is targeted for work in the coming year. The snags were on average 30 cm diameter.

The machine operator used his excavator to dig holes approximately four feet deep. Under the direction of Michelle Edwards, Councillor and Aboriginal Land Steward from Cayoose Creek St’at’imc, a portion of the excavated material from each snag hole was sifted through 1/2 inch hardware cloth screens to sample for archaeological artifacts. Again no artifacts were found during this process.



Fig 43 Trees being delivered



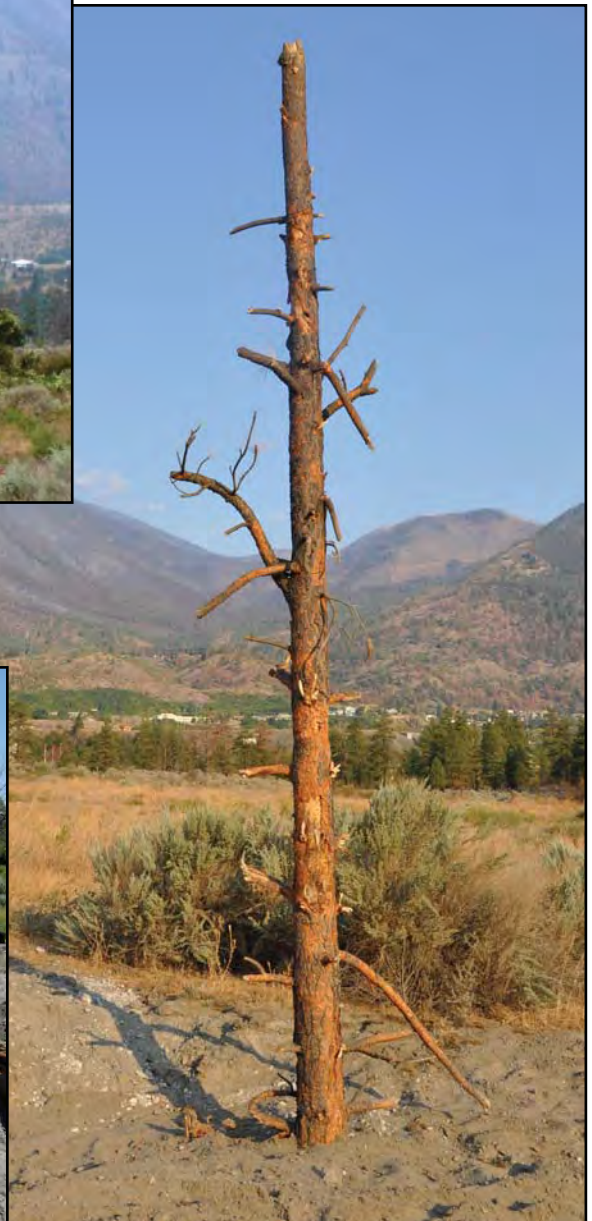
Fig 44 Sifting soil for artifacts

The snags were placed in the hole by the excavator. Having logs with root wads proved useful in anchoring planted snags.

“The approach to snag installation was modified slightly from the previous year to take advantage of the root wad as underground ballast adding stability to the tree. In addition, after the snag was installed and the soil tamped by hand and pounded by the excavator bucket, two or three large boulders were placed straddling the snag and pounded into the ground by the excavator, to make the structure solid.”
(*Odin Scholz, 2009*).



Fig 45 - 47 Snag being lifted for planting, soil being backfilled and installed snag
Polygon 05



Coarse Woody Debris: Fifty-five logs and eight stumps were placed around the machine treated areas to add cwd structure and to improve habitat (*Map 09 and Table 01*). Again the excavator placed the logs and stumps, burying some partially in the ground and laying others on the surface of the mounded areas.

“Having root wads on the logs and stumps provided the opportunity to simulate the ‘pit and mound’ micro-sites associated with natural wind-throw A combination of machine and hand shoveling and tamping was employed to remove potentially hazardous air-pockets around the stumps” (*Odin Scholz, 2009*).



Figs 48 & 49 Stump being moved and showing it planted

Fig 50 Log mimicking natural wind-throw

Boulders: Ten dump truck loads of boulders were donated to the project, and transported to the site by the machine operator.

“Over 123 boulders were distributed around the site to further increase site structural diversity. Boulder distribution was varied to include one placements, groups, and smaller chunk piles to diversity habitat” (Odin Scholz, 2009).

In polygon 25, rock piles were placed on south and south-east facing slopes to simulate reptile denning habitat. Boulders and rock piles also provide micro-sites for planting.



Fig 51- 53 Rock piles of various sizes, south-facing rock slope, single rock



The **results** of the soil remediation and site complexing have created soil conditions that will be able to support a wider diversity of native plant species and structures that have created various conditions that are conducive to both plants and wildlife.

The contouring of the site has loosened and mixed soils, and provided micro-sites for planting. The variety of soil types will increase the chance of native planting success. As well, the snags, cwd, boulders and rock piles provide organic and inorganic structures further diversifying the site. These structures also create sheltered 'spots' for plants - from the hot sun, wind and any human encroachment. Wildlife also benefit from the installed features.

“Soon after installation many bird species were observed using the installed snags. Bird droppings were observed around the bases of snags and on cwd. A Racer (*Coluber constrictor*) skin was found under cwd pieces that were placed in the riparian zone during the summer of 2008 in Polygon 11. The boulders and rock piles provide micro-sites for vegetation and provide cover for small mammals and reptiles” (Odin Scholz, 2009).

As well as the increased complexity and more diverse habitat, the structures provide a more aesthetically appealing site. The 'look' of the site is slowly being changed from a barren landscape to a more 'natural' condition with areas of interest.

Fig 54 Flicker using installed snag Oct 02, 2009



Fig 55 Killdeer using cwd as a perch June 08, 2008

Fig 56 Planted shrub being sheltered by snag Nov 01, 2009



5.4 Ponderosa Pine Protection

Small but significant stands of Ponderosa Pine (*Pinus ponderosa*) are located within the restoration site. Due to their importance to the Western Screech-owl, it was deemed important to preserve the component of mature Ponderosa Pine trees found in the riparian zone. There are also two mature Ponderosa Pines on the upper dryland bench that have not been damaged by the Mountain Pine Beetle (MPB) and which will receive priority protection due to their age and suitability for seed collection.

An inventory of the Ponderosa Pines on the site was made in 2008, and a plan developed to help protect the pines from the MPB. On the advice of Ed Senger, it was decided to treat the Ponderosa Pine trees in Polygons 17 and 18 with Verbenone pheromone pouches. These trees are located within the northwest section of the riparian zone. The two lone trees on the dryland bench were also targeted for protection.

“Verbenone is a replica of what pine beetles use to communicate to each other to tell other beetles that the tree is full of beetles (No Vacancy). This is a survival technique to prevent too many beetles from attacking the tree and running out of food for the larvae under the bark” (*Pherotech pamphlet, 2007*).

During 2008, fifty trees were treated in May and late July as directed by the producer. Visual inspections in early 2009, revealed that the MPB had not attacked the pines within the restoration site. Trees on the other side of the fence line in the northern riparian zone showed damage. In discussions with Ed Senger, it was revealed that all pines treated within the Lillooet area had survived. Based on the successes seen, it was decided to continue with the protection method.

In early June and late August, Verbenone pheromone bags were installed on seventy-five trees in Polygons 17 and 18, as well as the two lone trees on the upper bench. Sixteen pouches were also installed on trees on the west side of the fence on IR property to build a buffer around the stand in the riparian zone.

Ladders were used to attach the pouches to the north side of the trees, as directed by the producer, at a height that would dissuade vandalism. Pouches were tacked to the trees using one-inch nails tapped into the tree's bark. Following last years guide, a grid application method was used in the concentrated areas of pine trees to provide broader coverage, and single-tree method was used to protect scattered individual trees.

Continued monitoring of the pines took place throughout the year and no damage from MPB was observed. Odin Scholz observed several pheromone pouches that had been knocked off the trees in October 2009. It is recommended that we investigate if this could be caused by birds pecking at the bags after being attracted to the scent of the pheromone, and whether this is a risk to them. Protection will continue until the MPB threat has subsided and/or the trees are affected.



Fig 57 Verbenone bag on tree

5.5 Weed Management

The entire restoration site was mapped during 2007 into Polygons (*Map 01*), and plant species within each polygon recorded (*see 2006 report for more details*). This mapping, and the resulting research into weed management techniques, guided the development of a Weed Management Plan. A summary of the plan is shown in Tables 02 and 03, updated in November 2009.

Exotics ranking by # of Polygon's

Common Name	Scientific Name	Priority WEED	# polys found in	PRIORIT Y Site	Overall Ranking
diffuse knappweed	<i>Centaurea diffusa</i>	high	18	high	1
summer cypress (Kochia)	<i>Kochia scoparia</i>	high	8	high	1
Dalmatian toad-flax	<i>Linaria genistifolia ssp. dalmatica</i>	high	8	high	1
Russian thistle	<i>Salsola Kali</i>	high	7	high	1
lambs quarters	<i>Chenopodium album</i>	high	6	high	1
field bindweed	<i>Convolvulus arvensis</i>	high	5	high	1
giant burr dock	<i>Arctium lappa</i>	high	2	high	1
spotted knappweed	<i>Centaurea diffusa</i>	high	2	high	1
white sweet clover	<i>Melilotus alba</i>	high	2	high	1
amaranth, pigweed	<i>Amaranthus retroflexus</i>	high	1	high	1
hoary cress (whitetop)	<i>Cardia pubescens</i>	high	1	high	1
parasitic dodder	<i>Cuscuta spp.</i>	high	1	high	1
white cockle	<i>Silene Latifolia</i>	high	1	high	1
common tansy	<i>Tanacetum vulgare</i>	high	1	high	1
alfalfa	<i>Medicago sativa</i>	high	17	med	2
cheat grass	<i>Bromus tectorum</i>	high	14	med	2
quack grass	<i>Elytrigia repens</i>	high	11	med	2
sow thistle	<i>Sonchus oleraceus</i>	high	7	med	2
Kentucky bluegrass	<i>Poa pratensis</i>	high-med	9	med	2
yellow salsify	<i>Tragopogon dubius</i>	med	14	med	2
crested wheat grass	<i>Agropyron cristata</i>	med	9	med	2
fringed brome	<i>Bromus inermis</i>	med	8	med	2
bulbous bluegrass	<i>Poa bulbosa</i>	med	3	med	2
Russian olive	<i>Elaeagnus angustifolia</i>	med	2	high	2
bull thistle	<i>Cirsium vulgare</i>	med	1	high	2
little hogweed	<i>Portulaca oleracea</i>	med	1	high	2
curly dock	<i>Rumex crispus</i>	med	1	high	2
wooly vetch	<i>Vica villosa</i>	low	1	med	2
Loesel's tumble mustard	<i>Sisymbrium loeselii</i>	low	12	low	3
asparagus	<i>Asparagus officinalis</i>	low	5	low	3
common dandelion	<i>Taraxacom officinale</i>	low	4	low	3
cherry (domestic)	<i>Prunus sp.</i>	low	2	low	3
domestic maple	<i>Acer Sp.</i>	low	1	low	3
sunflower	<i>Helianthus annuus</i>	low	1	low	3
lilac	<i>Syringa vulgaris</i>	low	1	low	3

Table 02 Exotic Weed Species found on site (updated Nov 2009)

This Table shows the number of Polygons that the invasive species can be found in, and their priority for removal.

Priority	Weed Management Objectives	Weed Species	Planned Weed Management Monitoring Methods	Action Dates	
				Time for Action	Action dates
High	Eliminate flowering on site, reduce seed bank	diffuse knappweed, spotted knappweed	Hand Pulling, Visual observation	June-September	
High	Eliminate flowering on site, reduce seed bank	summer cypress (Kochia)	Hand Pulling, Visual observation	Late June-July	
High	Shrink patches within 3 years	Dalmatian toad-flax	Hand Pulling, Visual observation	June-September	
High	Eliminate flowering on site, reduce seed bank	Russian thistle	Hand Pulling, Visual observation	July-August	
High	Eliminate flowering on site, reduce seed bank	lambs quarters	Hand Pulling, Visual observation	May-October	
High	Prevent flowering and seeding, eliminate 10 outlying patches within 3 years, reduce vigor of large patch over next 3 years	field bindweed	Burning, Vinager treatment, Hand Pulling, mapping sites spring and fall, density plots in large patches using 1X1m plots	Spring burning, May-October every 2 weeks	
High	eliminate flowering on site, eliminate from site within 5 years.	giant burr dock	Hand pulling, Visual observation of two main patches.	July-August	
High	Prevent establishment on site,	white sweet clover	Hand pulling, visual observation when in flower	July-September	
High	Prevent further establishment on site,	amaranth, pigweed	Hand pull, Vigourous visual monitoring especially Pit area	May-October	
High	Prevent further establishment on site,	hoary cress (whitewort)	Vigourous visual monitoring esp Poly 11, hand pull	June-September	
High	Prevent further establishment on site,	parasitic dodder	Vigourous visual monitoring esp Powerhouse roadside, hand pull (bag and destroy)	June-September	
High	Prevent further establishment on site,	white cockle	vigourous visual monitoring especially around hydro compound.	June-September	
High	Prevent further establishment on site,	common tansy	Vigourous visual monitoring especially in the Pit are Poly 15 West of Pit area	July-September	
Med	Shrink patches within 3 years replace with Native plants	alfalfa	hand dig pull, work out from restoration areas and in riparian zones, weed whack dense patches early in spring	April-May weed eat, May-Sept dig	
Med	Prevent establishment on resotration soils,	cheat grass	burning early in year before seed set, hand pulling before seed set, visual monitorin on restoration areas	April-June	
Med	Reduce vigour of patches over next 3 years, replace with native species	quack grass	burning in the fall where possible (spot torching), repeated mowing to prevent seeds and depleat rootstocks	May-October	
Med	Prevent further establishment on site,	sow thistle	Hand pull or cut lower than 20cm before flowering	June-October	
Med	Prevent further establishment on site,	Kentucky bluegrass	Visually assess popluations on site measure extent	June-July	
Med	Reduce extent of weed on site replace with native species	yellow salsify	Hand pull or cut to prevent flowering especially on Fresh restoration soils	Late May-June	
Med	Slowly replace with native species over next 3 years	crested wheat grass	hand dig pull, work out from restoration areas weed whack dense patches to prevent flowering Poly 08	June-September	
Med	Reduce patch vigour replace with native specie	fringed brome	Repeated mowing beginning in May (4 X at least)	May-July	
Med	Prevent establishment on fresh restoration soils	bulbous bluegrass	Vigourous monitoring and hand pulling when found, spot flaming in spring	May-September	
High	Remove from site within 3 years	Russian olive	repeated girdling and cutting of both trees, visual observation of resprouting.	May-October	
Med	eliminate from site within 3 years	bull thistle	Cut plants prior to flowering	June-	
Med	Prevent further establishment on site,	little hogweed	Hand pull, Pit area, not very persistent	June-	
Med	Prevent further establishment on site,	curly dock	Hand pull, one site Poly 03, visual monitor	June-September	
Med	Prevent spread on site	wooly vetch	Hand pull before seeding	June-September	

Table 03 Summary of Weed Management Plan



Figure 58 - 59
Diffuse Knapweed
Dalmatian Toadflax

Removal of exotic weed species was a significant proportion of the restoration work carried out in 2009. The method of weed removal most used was hand digging with shovels and pulling plants. Other methods used by the restoration crew included weed whacking, fire control and natural defoliant (pickling vinegar). The machine operator was also able to remove some plants in adjacent areas as he worked the soils. After the plants were pulled, they were loaded onto tarps or put into large canvas bags, ready for pick-up and removal to the local landfill. During 2008, we were able to burn the pulled exotics, but this was not possible during 2009 as the Ainsworth Mill was closed down.

The eradication of invasive exotic weed species requires vigilance and repeated treatments over the coming years, due to the persistent seed banks and root reserves of certain plants.

It is also important to note, that weeds on the site do provide habitat for wildlife in the absence of native species. All weed management techniques are taking into account best practices to ensure we do not impact wildlife using these spaces - critical weed habitat will remain until we have sufficient native plant species to replant as soon as possible on removal of the exotics.

Building on the success of weed removal techniques carried out in 2008, and further research into each exotic species growth patterns and eradication recommendations, work continued throughout the 2009 restoration season.

“Work during 2009 was a continuation of the exotic species treatment efforts begun in 2008 and some successes were already apparent. Several weed species that were observed and treated in 2008 did not appear in 2009 surveys (*Table 04*). It is likely these plants were new invaders to the site in 2008, and were caught before seeding and spreading in 2009. It is possible these plants could show up again and should be monitored for. As a part of the weed management strategy, weeds identified for the first time were targeted as high priorities for removal to prevent the introduction and spread of new species. Primary detections were also made in 2009 and the species were treated immediately” (Odin Scholz, 2009).

Common Name	Scientific Name	2008 location	2009 location
Hoary cress (Whitetop)	<i>Cardia Pubescens</i>	None	Poly 11
Parasitic dodder	<i>Cuscuta spp.</i>	None	Poly 02 Road Side
White cockle	<i>Silene Latifolia</i>	None	Poly 09
False acacia	<i>Robinia pseudo-acacia</i>	Lower Snag Area Poly 08	None
Sunflower	<i>Helianthus annuus</i>	Poly 10	None
Curly dock	<i>Rumex crispus</i>	Poly 03	None
Amaranth (Pigweed)	<i>Amaranthus retroflexus</i>	Poly 19 Pit Area	None
Little hogweed	<i>Portulaca oleracea</i>	Poly 19 Pit Area	None

Table 04 Results of survey of new weeds on site in 2009 and survey of weeds that have been removed in various polygons.

The weed management plan guided work done on the site during 2009. The plan rates weeds in order of priority from high, medium and low.

“This rating was determined based on a review of several databases including ‘A Guide to Weeds in British Columbia’ and E-flora BC, as well as on-the-ground experience. Weed treatments were carried out based on high priority sites and high priority weeds” (Odin Scholz, 2009).

High Priority Sites: Small populations of exotics were targeted for removal so that the risk of their spread on the site was minimized or halted. Roadsides and trails were also targeted as these areas are vectors for new introductions and spreading of weeds. The machine restoration work carried out in 2008 is also a potential vector for weeds as the soils have been disturbed and a soil bed made available for seeds. These areas were swept throughout the spring through fall and invasive species removed.

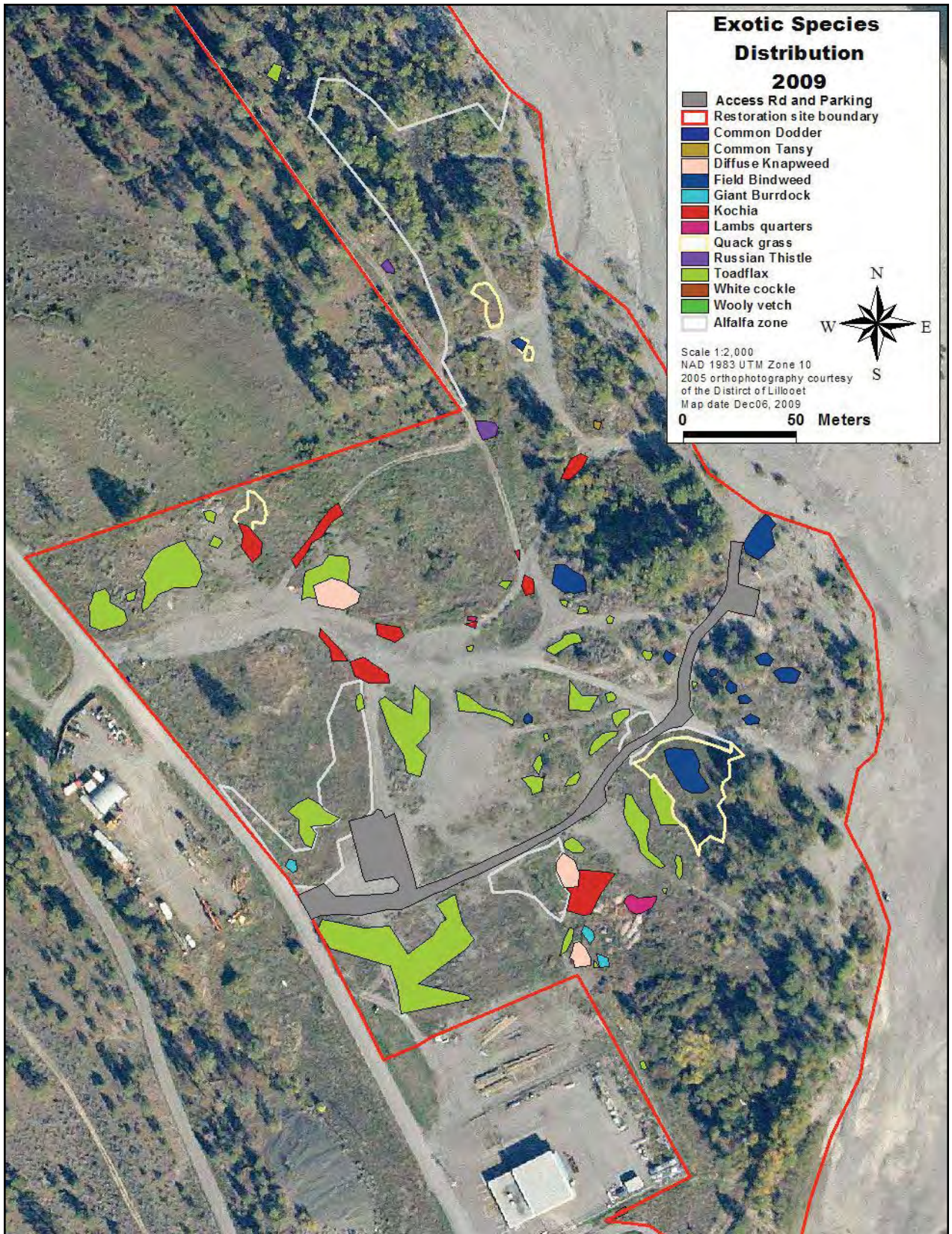
High Priority Weeds: To prevent the spread of high priority weed species and decrease the risk of increasing the invasive weed seed-bank, these species were targeted for removal across the entire site. Efforts were focused on controlling isolated patches of high priority species, such as field bindweed, giant burdock and lamb’s quarters. As well, high priority and wide-spread annual weeds such as Russian thistle, diffuse and spotted knapweed and kochia were targeted for removal throughout the site.

“Obvious dense patches of these annual species were mapped and then the plants were hand pulled, bagged and removed from the site as they came into flower. These annual species did also appear sporadically throughout the site, mostly on edges of the access road and other disturbed gravelly sites. They were removed from these locations as they were encountered. These sporadic occurrences were not mapped” (Odin Scholz, 2009).

Map 10 below shows the distribution of exotic weed species controlled during the 2009 restoration year.



Fig 60 Weeds being piled and bagged ready for removal



Map 10 Exotic Species Distribution 2009.

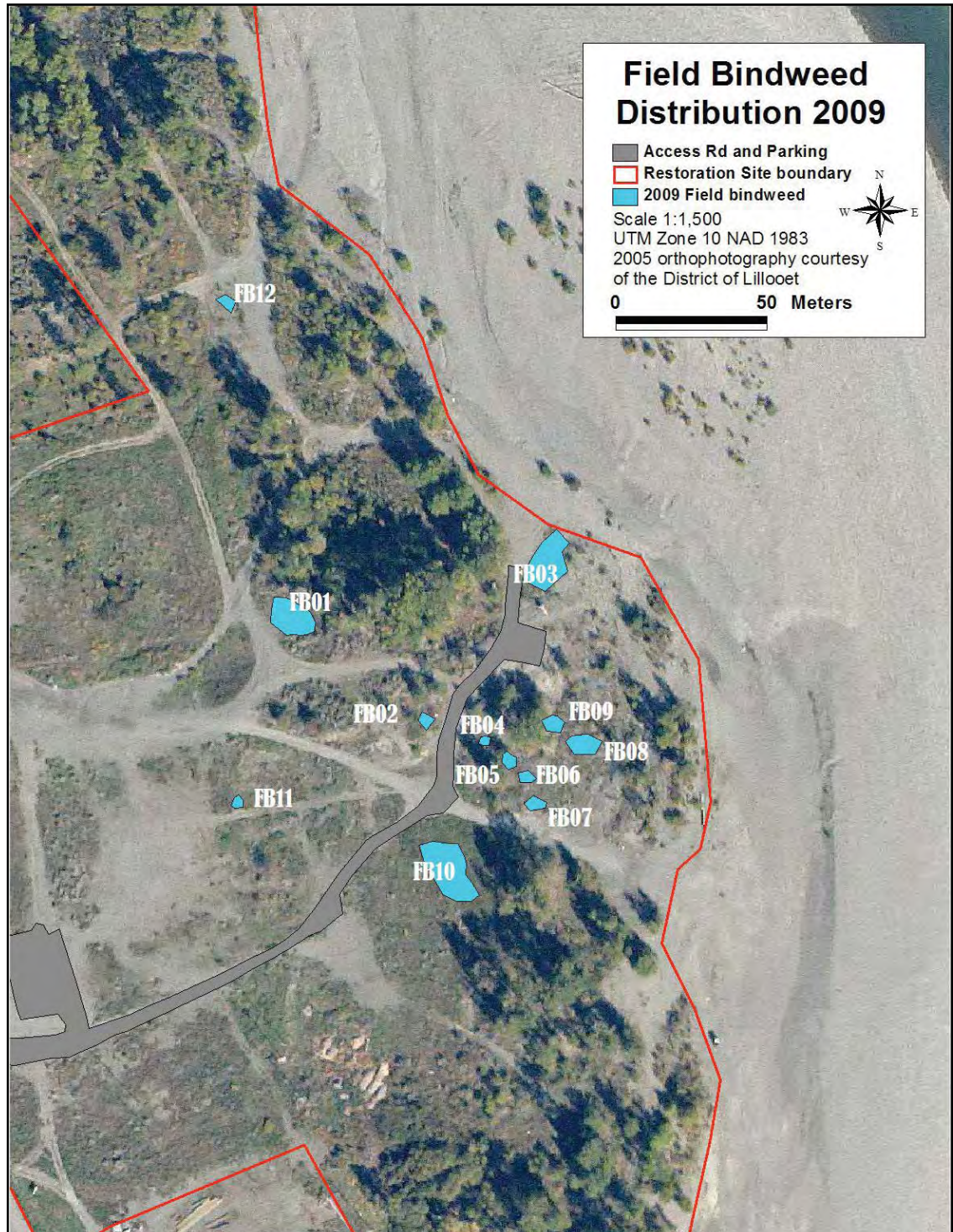
Dalmatian toadflax (*Linaria genistifolia* spp. *Dalmatica*): is a perennial that is listed on the Invasive Plant Alert of BC. It is an aggressive weed that crowds out desirable plant communities. Once established it can become an effective competitor, reducing the abundance of grasses and other forbs (Hansen, 2000). Dalmatian toadflax appears in large patches on the restoration site.

“Bio-control agent, Stem Mining Weevil (*Mecinus janthinus*) was observed on numerous toadflax plants in late spring 2009. The mapped toadflax distributions covered an area of 5200 m² in 2008 and only 3990 m² in 2009, a decrease in area size of over 1000 m². This decrease may be attributable to a number of variables including mapping accuracy; however, this decrease is significant and continued annual mapping of the distributions will serve as an indication of success of the restoration treatments” (Odin Scholz, 2009).



Map 11 Toadflax Distribution 2008-2009

Field Bindweed (*Convolvulus arvensis*): is another perennial that is highly persistent in the Lillooet area. It is regarded as a common nuisance weed and is not regulated by the British Columbia Weed Control Act. However, it is a deep rooted perennial which reproduces from seed dispersed mostly by water and equipment, and propagates by rhizomes (Parsons, 1973). Seeds can remain dormant in soil for up to 20 - 50 years. There are twelve locations mapped at the restoration site, both in 2008 and again in 2009 (Map 12).



In our attempt to eradicate field bindweed from the site, the management plan calls for repeated pulling of the plants throughout the growing season to slowly deplete the plant's root energy stores.

“The plant's top growth was repeatedly hand-pulled, using digging tools to get as much of the root up as possible. Because of the intensity of the effort in pulling the largest patch in FB10 (Polygon 08), we experimented with a mixture of pickling vinegar and dish soap (1 gallon to 1 tablespoon) as a natural herbicide. The mixture was applied as a fine mist using a 20 liter backpack sprayer. The effect was to kill the top growth of the plants. In total, the bindweed patches were hand weeded five times throughout the restoration season beginning in June and continuing into September. The only patch of bindweed to flower was the large grouping in FB10, and these flowers were pulled and removed, or treated with vinegar before they produced seeds. In October, as in 2008, part of the FB 10 area was burned to remove the re-sprouted top growth. The burning carried out in the fall of 2008 had an effect of reducing the cover and also appeared to reduce the density of the quack grass” (Odin Scholz, 2009).

Fig 61 Field Bindweed showing Vinegar treatment



Fig 62 Fire crew burning FB10 (Polygon 08) where Bindweed and Quack Grass are prevalent.

Knapweed (*Centaurea diffusa* and *Centaurea biebersteinii*): Knapweed is a biennial to a short-lived tap-rooted perennial. Diffuse knapweed was more common on the site. A few dense patches occurred in Polygons 04 and 07 and these were mapped. However, knapweed did also occur sporadically along roadsides and disturbed areas throughout the entire site.

“Many of the roots of diffuse knapweed housed root weevil bio-agents. All knapweed plants were pulled before going to flower and were removed from the site. New rosettes of knapweed were observed in October indicating another crop in 2010” (Odin Scholz, 2009)

Kochia (*Kochia scorparia*): is an erect, late season flowering annual growing up to 2 meters in height. It is easily removed by pulling. Several dense patches can be found in Polygons 02, 04, 05, 07 and 13. As with other species, sporadic occurrences were common throughout most polygons, and particularly along the roadside and recently disturbed sites. Some of the kochia were large enough to require the use of a leveraging weed tool to effectively pull the plants. Plants were pulled before setting seed and removed from the site.

Russian Thistle (*Salsola Kali*): is a summer annual which is considered very invasive, competing with native species and obstructing stream channels. It can also become a fire hazard. This annual can be easily removed by pulling and seed bank is not persistent, so there is a good chance of its removal from the site within three years. Two small patches were found in Polygons 14 and 16, and again sporadically within disturbed areas. They were hand pulled and removed from the site.

Giant Burdock (*Arctium lappa*): is a bushy biennial which is spread by wildlife and people as the burrs become entangled in fur, hair or clothing. One plant can produce up to 31,000 seeds (BC Ministry of Agriculture and Lands, 2009). There are only two patches of Giant Burdock on the restoration site in Polygons 02 and 06. During 2008, all plants were removed, but plants were found sprouting from a seed bank during 2009.

“ after each digging of the plants, more rosettes seem to form. Continuing to pull the plants on an annual basis will exhaust these two highly localized seed banks. The plants are highly visible and the limited distribution means this should be an easy noxious weed species to control and prevent spreading on the site” (Odin Scholz, 2009).

Alfalfa (*Medicago solidago*): is a perennial pasture crop with extremely deep taproots. The deep taproots make it very difficult to pull. It was one of the most prevalent weeds removed during 2008 in the northern riparian zone (Polygons 16 and 17). This area remained relatively free of new plants through 2009. Any re-sprouts or newly germinating plants in this area were removed by pulling. While the excavator worked on site complexing, the operator was able to pluck numerous plants out of the ground in soils adjacent to where he was working. Several thick patches of alfalfa near the entrance to the access road (Polygon 02), and beside the access road just before it enters the riparian zone (Polygon 03 and 08), were controlled throughout the summer using a weed whacker to ensure the plants did not flower.

Common Tansy (*Tanacetum vulgare L*): is another perennial that when established can form dense colonies, out-competing native species. It spreads mainly by seed, but also by creeping rhizomes. A small patch was found again in 2009, just above the pit area in Polygon 15. It was dug up with a shovel and removed from the area.

Cheat Grass (*Bromus tectorum*): is prevalent throughout much of the site and continues to be monitored for invasion into planted areas and other disturbed soils resulting from the restoration work. This species has not been mapped due to its wide range on site. No weed management took place in 2008. During 2009, cheat grass was monitored for spread into 2008 planted areas, particularly the upper and lower snag areas (Polygons 19 and 08). When cheat grass was found colonizing these sites, it was hand pulled.

Quack Grass (*Elytrigia repens*): is a perennial, spreading by both seeds and rhizomes. In an attempt to exhaust the root reserve, the largest patch in FB10 (Polygon 08) was mowed four times using a weed whacker. As stated above, quack grass in this polygon was also burned over in the fall. No seed heads were produced in Polygon 08. A small area of quack grass in the patch at the north end of the pit (Polygon 19) was hand cut around an existing area of Indian hemp (*Apocynum cannabinum*) to encourage the spread of the hemp.

Sow Thistle (*Sonchus alba*): is an annual, reproducing by wind-borne seeds and underground stems, and is found sporadically on site. It was hand pulled when encountered.

Crested wheatgrass (*Agropyron cristatum*): is a perennial bunch grass that has been sown in the past to prevent soil erosion on impacted sites. Crested wheatgrass can be found on the restoration site, especially in the Lower Snag Area (Polygon 07). This patch was dug up by hand, and immediately planted with native plant species.

Lamb's Quarters: There is a large patch growing in Polygon 07 which is being treated and monitored. This plant was also removed from old roadbeds on the top bench while machine work was being done.

Woolly Vetch (*Vica villosa*): is a perennial that spreads by seed dispersal. It was found sprawling in one small patch about 5m² just north-west of the entrance sign in Polygon 02. The vetch was cut down by the weed whacker.

Common Dodder and Hoary Cress: One plant of each of these two species was observed and removed immediately. The Common Dodder was found on the edge of the Powerhouse Road in Polygon 02. Hoary Cress was found in Polygon 11 beside the old roadbed leading to the river. Both species need to be observed to ensure they do not spread into the site.

Yellow salsify (*Tragopogon dubius*) and Loesel's tumble mustard (*Sisymrium loeselii*) are two of the most common weed species found throughout the restoration site.

"These species showed up in most polygons. Both species were pulled when encountered, but they were not tackled as intensively as the noxious or high priority species. The low priority ranking of salsify and tumble mustard was determined through the literature that regarded these species as nuisance weedy species that will shrink from dominance as perennial native species become established at the site. These species do provide valuable wildlife resources in an otherwise barren land" (Odin Scholz, 2009).

Another vector for exotic species establishing on the restoration site, is the close proximity of neighbouring properties that are harbouring invasive weed species. BC Hydro work yards and a property to the west of the restoration site (across Powerhouse Road) have been observed to contain dense concentrations of weeds.

BC Hydro is in the process of implementing a weed removal program within their work yards. The owner of the property across the road from the restoration site was approached with an offer of removing the dense concentrations of diffuse knapweed and kochia found there. It was a perfect opportunity to remove the plants thereby preventing more weed seeds being spread onto the freshly decompacted soils of the restoration site. At the same time, the owner learned more about the weeds growing on his land, and we were able to thank him for allowing use of his property for storing our restoration trailer throughout the season.

Exotic weed species have taken advantage of the highly degraded condition of the Powerhouse site caused by industry. The use of vehicles in the site and dumping of garden refuse have all caused weeds to become established. However, "most weeds do not compete well with healthy native vegetation communities. Therefore, management by removing invasive species while encouraging the existing native species, and adding more native plants to the site, will attain the goal of shifting the sites trajectory from weedy wasteland to successive native plant communities" (Odin Scholz, 2009).

A good example of the change that has taken place to-date is the area Polygon 17 in the north of the riparian zone. The forest floor has been opened up to native grasses and wildflowers. Brown-eyed susan was seen self-seeding in the area.



Fig 63 Northern Riparian Polygon 17 BEFORE June 2007



Fig 64 Weeding in same area May 2008



Fig 65 Forest floor opened up for grasses and wildflowers to spread Oct 2009



Fig 65 - 66 Crested Wheatgrass BEFORE AND AFTER removal ready for planting Sept 2009



5.6 Propagation of Native Plant Species

Lillooet Naturalist Society and Cayoose Creek St'at'imc have established a native plant nursery to ensure we have genetically appropriate plant species to use in the ongoing restoration project. There has been a growing awareness of the importance of plant genetics in restoration projects.

“Genetic variation within plant species can influence their long-term chances of survival and growth. An ecotype is a certain population of plants within a species that, due to different genetics, has a different form (height, leaf size, etc), flowering time, resistance to diseases/pests or hardiness that is adapted to certain local environmental conditions. Plant ecotypes are not different species because they can still interbreed. Taking plant species that are of one ecotype and moving them to an area with different environmental conditions, such as different freezing stresses or different moisture levels, can result in poor growth or death” (*excerpted from An Introduction to Using Native Plants in Restoration Projects, US Environmental Protection Agency*)

As well as the importance of ensuring a planted species ability to survive within a restoration site, there is also the concern that damage to local populations of native species can happen with the introduction of new genetic material. This may lead to inter-breeding and a weakening of the local population's long-time adaptation to the site.

Another rationale for the establishment of the native plant nursery, was to build community capacity in the identification and propagation of native plants for ongoing restoration projects within the territory, and to promote the planting of native species in local gardens as a way of attracting wildlife and conserving water. The native plant nursery could become a small commercial operation in the future for the Cayoose Creek Band.

Cayoose Creek St'at'imc donated space at the lower spawning channels for the nursery. During 2008, a shade house was established within a fenced area to protect from wildlife and vandalism. A water system was put in place and shelving built (*See Final Report 2008*).

By the end of 2008, it was clear that the 20' X 30' shade house and 2500 ft² area was insufficient space to propagate the number of plants needed for the restoration project. Therefore, we doubled the enclosed space and added a 20' X 40' greenhouse during 2009. This frame was erected mostly by volunteers, with the assistance of staff. Volunteers and staff also built twenty more plant tables. The greenhouse gives us the ability to start plants earlier in the season, with the intent of being able to plant some of the stock out in the late fall, and again in the following spring.



Fig 67 Propagated



Figures 68 & 69 Shade House in operation

Fig 70 Preparing space for greenhouse



Fig 71 Native Plant Nursery showing Shade House on the right & new greenhouse on left



Six methods of propagating native plant species have been identified - salvage, cuttings, live staking, layering, seed propagation at nursery and seed sowing directly into restoration site.

Salvage: In early spring, advertising and communication with local contractors was undertaken to inform the public that the Lillooet Naturalist Society would salvage native plant species that were going to be impacted by any building or garden work they were planning. We received six offers for salvaging plants, but due to staff capacity were only able to salvage plants from four locations.

In early spring, a member of T'it'q'et phoned to say we could dig plants up from an area she was going to convert into a vegetable garden. Four Choke Cherry, two Black Cottonwood and approximately six Prairie Rose bushes were dug up by shovel, weedy grasses removed, placed in buckets and transported to the nursery for potting up. At the same time, bear scat with sprouting Choke Cherry seeds was scooped up and planted into pots.

A landowner on the east side of the Fraser River provided an area where Bearded Anemone, Snowberry, Lemonweed, Brown-eyed Susan and Yarrow could be salvaged. The ground proved difficult to dig in, but approximately thirty plants were dug up and transported back to the nursery in buckets and bags filled with water. They were stored in a shady place awaiting transfer to pots.

A landowner on Texas Creek Road, just past the canal, had a horse pasture that was being reworked. We dug up eighteen Prairie Rose from this location, and again transported to the nursery for processing.

The Cayoose Band Office yards were being landscaped later in the season, and we were able to postpone that machine work until we had time to dig these plants up. Species included Choke Cherry, Snowberry, Hooshum, Showy Aster and Black Cottonwoods. Approximately fifty plants were salvaged and processed at the nursery.

Salvaged plants usually have a good root system in place when they arrive at the nursery. They are potted up into one gallon pots, or larger, and kept in a shaded area. The plants are placed in a boxed container that can be filled with water, enabling the plants to suck the moisture they require up through their roots. This process seems to mitigate the trauma of having their roots disturbed, however, not all plants survive the shock.

Many of the salvaged plants were planted into the restoration site in the fall of 2009.



Fig 72 Nursery salvage boxes

Cuttings: Propagation from cuttings involves removing certain parts of living plants and putting them in a growing medium so they form roots. Cuttings are a good way to obtain new plants, and they can produce useable plants more quickly than seeds. Plants best suited to cuttings include Red-osier Dogwood (*Cornus sericea*), Mock Orange (*Philadelphus lewisii*), Black Cottonwood (*Populus balsamifera*), all Willows and Snowberry (*Symphoricarpos albus*).

We received approval from BCTC and Cayoose Creek St'at'imc to collect cuttings from under the BC Hydro power lines. Plants under the power lines are routinely cut back and this provided us with the opportunity to collect cuttings without going into "wild" areas. These plants have greater sucker growth due to the cut back and this creates better material for cuttings.

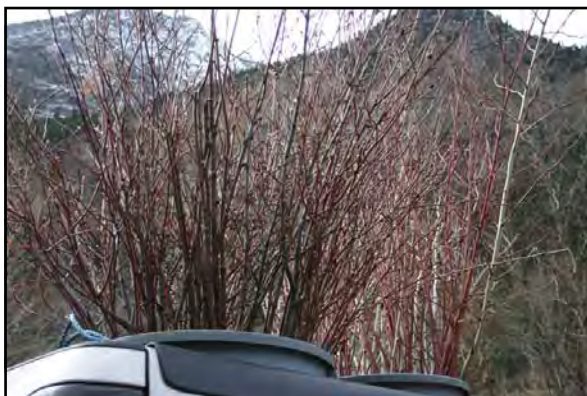
Cuttings gathered in the fall of 2008, had been placed in a sandy-soil mix in trays and left uncovered to overwinter at the nursery. In early spring 2009, they were covered with mini-greenhouses to promote growth. After their roots had established, they were transferred to one gallon pots.

Based on the cuttings taken early in 2008, and their successes at the nursery, we again collected Red-osier Dogwood, Black Cottonwood and Willows from an area close to the confluence of Cayoose Creek and Seton River in early 2009. Some willow cuttings were also taken from the restoration site. Mock Orange, and Snowberry were harvested in two different locations on the west side of Fraser River. New species tried in 2009 included Saskatoon (*Amelanchier alnifolia*), Prairie Rose (*Rosa Woodsii*) and Kinnikinnick (*Arctostaphylos uva-ursi*). These were harvested from under power lines on the bench above Seton Lake.

Our research has indicated that collection of cuttings should happen before the sap flows. Volunteers came out on a freezing February day to begin the process of collecting cuttings. Young, straight shoots growing up from the center of the plant, or from near the ground, were selected. Shoots around the diameter of a pencil were cut with clippers from ground level and placed into large garbage cans filled with damp sandy soil. These were then transported to a cool, dark basement where they were stored for approximately 30 days. Before storage, side branches were cut off and the main stem cut into pieces long enough to have at least two leaf nodes remaining.

In mid-March, the shoots were removed from the storage area, dipped in a rooting hormone and then planted into trays filled with either a sandy soil mix, peatmoss, or a combination of both. The plants were then misted and the trays covered with small plastic greenhouses or placed in cold frames to encourage growth. These mini-greenhouses were removed as the temperatures climbed. Later in the summer, the cuttings that survived were planted into one gallon pots.

Fig 73 & 74
Cuttings being
transported
for storage;
cuttings
placed in soil
under
greenhouses
30 days later.



Live Staking: Live stakes are three to six foot hardwood cuttings that are planted outdoors directly into the restoration site, without any rooting hormone. Live staking is best when the soil is fairly damp at the time of planting. The object is to have the live stakes develop roots and produce new plants directly on site.

Based on the challenges and successes of live staking on the site during both 2007 and 2008, we changed our tactics and timing of planting out the stakes. Plantings established in late fall and early spring have proven to be the most resilient. It is also important that the live stakes are thoroughly soaked after being planted to ensure the soil does not harbour any air-pockets.

Again cuttings were taken from under the BC Hydro power lines in late February and again in early April. The cuttings were stored in sandy loam for a week or more in plastic tubs and then transported to the restoration site, where volunteers planted them into the ground.

A hand-drill was used to make holes approximately 60 cm deep in the sandy portions of the riparian zone, and holes dug by a silviculture shovel in the rougher ground. The stakes were between 1.5 and 2.5 cm in diameter. They were planted into the holes, and the stem cut on an angle just above the second bud. The holes were then back-filled with soil, watered in by hose, and mulched with leaves found on site. During the summer, the cuttings were watered during the regular watering schedule (approximately once a week).



Based on additional research, the crew also collected larger cuttings between 4 to 6 cm diameter and approximately 200 - 250 cm long. Two test plots was established in Polygon 08 during May 2009. Two holes 122 cm deep were dug by hand and six stems planted. The soil was tamped back into the hole and watered in. These test plots were watered throughout the summer.

Fig 74 Planting cuttings in Riparian Zone

Figs 75 - 76 Test Plot using larger cutting material



Layering: Layering involves burying part of a living, attached branch into the surrounding soil to make it produce roots. This creates a new plant that can be cut from the parent plant. It is a good technique for multiplying native plants already established and is best done in early spring.

During 2007 and 2008, layering was carried out on some of the small roads that had cut through the riparian zone. The branch of the willow was bent over without breaking the stem and a portion buried in the sandy loam. This layering has resulted in faster regeneration of smaller fragmented areas. During 2009, layering of two plants occurred on the edges of Polygon 05. This was done during an outreach walk in April to demonstrate the technique.

Seed Collection and Propagation: Research has been ongoing in best practices for seed collection and propagation since 2007. Table 05 indicates the seeds and cuttings that were collected during 2008 and 2009. A Propagation Manual has been developed which indicates collection times and methods, propagation techniques, seeding times and information on breaking dormancy (including stratification and scarification). This information was gathered from online sources, books, journals, interviews with other growers, and personal experience.

The restoration crew and volunteers were enlisted in the gathering of seed at a few key collection sites that had been established during 2008. These collection sites included Cayoose Creek St'at'imc lands, the reference ecosystem site and private lands that had ecosystems similar to the Powerhouse site. All collection areas were within several kilometers of the restoration site and permission was obtained to gather seed and cuttings.

Crew and volunteers were instructed in the ethical collection of seed before work began to ensure no natural site was detrimentally impacted. *Fig 6 below* gives a summary of this information. The crew spread out across the landscape and no more than five percent of a particular species' seeds were collected in a given area. Seeds were collected by hand, being very careful to leave seed on each seedhead collected from and ensuring that no damage was done to the individual plants. Seed was collected in brown paper bags or small buckets. Records were made of collection date and location.

Collection of native plants took place from June to late November, based on availability of seed from the various species. Again, this portion of the project involved learning to identify local plant species and was a favourite activity of both crew and volunteers. Community capacity building is important to this restoration project, and the skills learned here are transferable.

Once the seeds were collected, they were separated from the seedpod or berry, dried and stored in brown envelopes and/or glass jars in a cool dark place. Some berry seeds went through the separation process by placing in a blender whose blades were covered with tape which helped separate the pulp from the seed.

A small portion of seed was sown directly out onto the restoration site in the fall. Approximately 50% of the remaining seed was planted into flats and covered to protect from mouse damage. Two trays of each species were planted in the greenhouse and four trays of each species planted outside, to overwinter at the nursery. The remaining seed will be sown in the early spring of 2010, at which time estimates of seed numbers collected and planted will be collated.

Our methods are building on the successes we achieved during 2008, where over 4,000 plants propagated at the nursery grew and survived the very hot, dry summer.

Table 05: Native Plant Species Propagation Methods (stock collected in 2008 are indicated with * & 2009 +)

Common name	Scientific Name	Code	ZONE DR-dry RI-Riparian	Propagation Method
Trees				
Ponderosa Pine +	<i>Pinus ponderosa</i>	Py	RI, DR	Seed
Interior Douglas-fir	<i>Pseudotsuga menziesii var glauca</i>	Fd	DR	Seed
Black Cottonwood * +	<i>Populus balsamifera ssp. Trichocarpa</i>	Act	RI	Cuttings/seed
Rocky mountain juniper *	<i>Juniperus scopulorum</i>	Rj	DR	Cuttings/seed
Shrubs				
Big sage +	<i>Artemisia tridentate</i>	Bs	DR	Salvage
black hawthorn * +	<i>Crataegus douglasii</i>	Bh	RI	Seeds
choke cherry * +	<i>Prunus virginiana</i>	Cc	DR, RI	Seed
common juniper * +	<i>Juniperus communis</i>	Cj	DR	Cuttings/Seed
coyote willow * +	<i>Salix exigua</i>	Cyw	RI	Cuttings
Douglas Maple * +	<i>Acer glabrum</i>	Md	RI	Seeds
hemp dogbane * +	<i>Apocynum cannabinum</i>	Hd	DR	Seed/Division
Kinnikinnick +	<i>Arctostaphylos Uva-ursi</i>			Seed/Cuttings
Mock orange +	<i>Philadelphus lewisii</i>			Cuttings/seed
Oregon grape +	<i>Berberis nervosa</i>			Cuttings/seed
Pacific willow +	<i>Salix lucida ssp. Lasianдра</i>	Pw	RI	Cuttings
Poison Ivy				
prairie rose * +	<i>Rosa woodsii</i>	Pr	RI, DR	Seed/cuttings
rabbit brush +	<i>Chrysothamnus nauseosus</i>	Rb	DR	Seed/cuttings
red-osier dogwood * +	<i>Cornus stolonifera</i>	Rod	RI	Seeds/cuttings
Saskatoon berry * +	<i>Amelanchier alnifolia</i>	Sas	RI, DR	Seeds
Shrubby penstemon * +	<i>Penstemon fruticosus</i>			Seeds
Snowberry * +	<i>Symphoricarpos albus</i>	Cs	DR, RI	Seeds/cuttings
Soopolallie * +	<i>Shepherdia Canadensis</i>	Soo	DR, RI	Seeds
white clematis +	<i>Clematis ligusticifolia</i>	Wc	DR, RI	Cuttings
Herbs				
arrow-leaved balsamroot * +	<i>Balsamorhiza sagittata</i>	Alb	DR	Seeds
brittle prickly pear cactus +	<i>Opuntia fragilis</i>	Bca	DR	Seed/Division
Brown-eyed susan * +	<i>Gailardia aristata</i>			Seed
Canada golden rod * +	<i>Solidago Canadensis</i>		DR, RI	Seed
Cutleaf Anemone * +	<i>Anemone multifida</i>			Seed
Cut-leaved Daisy * +				Seed
Field mint	<i>Mentha arvensis</i>	Fm	RI	Seed
Golden Aster * +	<i>Heterotheca villosa</i>			Seed
Hoebell's rockcress * +	<i>Arabis holboellii</i>			Seed
Large fruited desert parsley * +	<i>Lomatium macrocarpum</i>			Seed
Lemonweed * +	<i>Lithosperma ruderales</i>			Seed

Mariposa lily * +	<i>Kalochortus macrocarpus</i>			Seed
Nodding Onion * +	<i>Allium cernuum</i>			Seed
Pasture sage +	<i>Artemisia frigida</i>			Seed
Slender Hawksberd *				Seed
Small flowered blue-eyed Mary *	<i>Collinsia parviflorum</i>			Seed
smooth scouring rush	<i>Equisetum laevigatum</i>	Scr	RI	Division
Spikelike goldenrod *	<i>Solidago spathulata</i>	Cg	DR	Seeds
Sweet scented bedstraw	<i>Galium triflorum</i>			
Tarragon	<i>Artemisia dracunculus</i>	Tar	DR	Cuttings/Seed/Division
Timber milk vetch *				
tufted prairie aster * +	<i>Symphyotrichum ericoides var pansum</i>	Tpa	DR	Seed
Upland Larkspur	<i>Delphinium nuttallianum</i>			Seed
Umber Pussytoes * +	<i>Antennaria umbrinella</i>			Seed
Woody Plantain				
Yarrow * +	<i>Achillea millefolium</i>	Yar	DR	Seed/Division
Grasses				
bluebunch wheatgrass * +	<i>Pseudoroegneria spicata</i>	Bb	DR, RI	Seed/Tillers
Canada wildrye * +	<i>Elymus canadensis</i>		RI	Seed
foxtail barley	<i>Hordeum jubatum</i>	Fox	RI	Seed
giant wildrye * +	<i>Leymus cinereus</i>	Gw	DR	Seed
Indian ricegrass * +	<i>Stipa hymenoides</i>	Ir	DR	Seed
Junegrass * +	<i>Koeleria macrantha</i>	Jg	DR	Seed
needle and thread grass * +	<i>Hesperostipa comata</i>	N&t	DR	Seed
Prarie sedge *				Seed/Division
Sand dropseed * +	<i>Sporobolus cryptandrus</i>	Sd	DR	Seed
Sandberg's bluegrass * +	<i>Poa secunda</i>	Pse	DR	Seed
Stiff needlegrass * +	<i>Achanatherum lemmonii var lemmonii</i>		DR, RI	Seed



Fig 77 Overwintered planted trays



Fig 78 Black Cottonwood seed is easy to collect as it drops from the trees, but it needs to be planted within four days.

<i>Figure 6 Seed Collection Information</i>	
Do's and Don'ts of Seed Collection	Why?
Do match the donor and restoration site conditions as much as possible: slope, aspect, hydrology, soil type, frost dates, temperature patterns, elevation, etc.	Plants adapted to similar environmental conditions are more likely to succeed at the planting site.
Do collect in an area geographically near to planting site.	Locally adapted plants are more likely to succeed at the planting site.
Don't collect in sensitive areas.	Protect sensitive populations.
Do make sure none of the seeds collected are from rare species	Protect rare species.
Don't collect from ornamental plantings or near other exotics.	Ornamental varieties of the same species may not have the environmental adaptations needed for establishment at the planting site.
Do avoid collecting in weed infested areas. If collection must be done in those areas, be careful not to collect weed seed.	Helps keep weed seeds out of the seed mix.
Do obtain permission from the landowner to collect seed on private land or the required permit(s) for public lands.	This is legally required, as well as common courtesy.
Do try to collect dry seeds on a dry day. Wet fruits such as berries can be collected on wet or dry days.	Collected seeds with high moisture content will lose their viability more quickly than drier seed.
Do make sure to collect when seeds are mature. The seed should not dent under a fingernail and should detach easily from the plant.	Increases germination success.
Do use paper bags or other "breathable" containers for dry seeds. Berries and fruits can be collected in plastic buckets.	Helps the seed dry out more quickly so it will retain its viability longer.
Do collect from large populations.	Helps increase genetic diversity, thus increasing the chances of successful establishment.
Don't concentrate on one small area of the plant population, instead collect from a wider area.	Helps increase genetic diversity, thus increasing the chances of successful establishment.
Do collect from different microhabitats within the site.	Helps increase genetic diversity, thus increasing the chances of successful establishment.
Do know the factors affecting seed viability of the species before collecting and processing them.	Short-lived seed such as willows and alders need to be planted immediately after collection, and kept cool until planting.
Do collect a few seeds from many plants rather than many seeds from a few plants.	Helps increase genetic diversity, thus increasing the chances of successful establishment. Also protects intact populations.
Do collect from a wide range of plants: short or tall, scrawny or robust.	Helps increase genetic diversity, thus increasing the chances of successful establishment.
Do leave at least 2/3 of the available seeds.	Protect natural populations.
Do communicate with other local collectors about where collections are taking place.	Important to protect the intact natural population to make sure one site is not getting collected from too many times.
Don't harm donor populations.	Protect natural populations.
Do immediately clean and dry seeds after collection or treat wet fruits appropriately. <i>Dry seeds:</i> Spread out on paper or tarp in a dry place for a few days. <i>Wet fruits:</i> 1.) Separate seeds out of fruit by pressing through a metal screen. Put the mashed fruit in a bucket of water and float off the pulp (viable seeds should sink to the bottom). Then dry the seed by spreading out on paper or tarps. OR 2.) Plan to store these fruits intact in a cool environment; then macerate fruit, float off seed and plant immediately upon cleaning without prior drying.	Most cleaned and dried seeds have a higher viability rate. Seeds of many species of wet-fruited plants such as Baneberry (<i>Actea rubra</i>) and Toyon (<i>Heteromeles arbutifolia</i>) will often go into complex dormancies when cleaned and dried.
Do store cleaned, dried seeds in a paper envelope or a sealed plastic container with desiccant in a refrigerator until needed.	This will help maintain viability for a longer period of time.

Table excerpted from 'An introduction to using native plants in restoration projects' US Environmental Protection Agency



Fig 79 Collecting Seed

Fig 80 Jen kept plants alive at the Nursery



Results of native plant propagation have been rewarding. Working at the native plant nursery is an excellent way to learn the plants of our area, and provides respite from the hot sun of mid-summer. Work at the restoration site is broken up with work at the nursery whenever possible.

Over 4,000 plants were raised at the nursery this year for use at the restoration site. Approximately 2,253 of them were planted out in the fall of 2009. The remaining plants were overwintered at the nursery. Seeded and salvaged plants do much better than the cuttings planted in trays.

It has been difficult to track the number of plants started versus the number of plants that survived the long hot summer. A more efficient tracking method needs to be developed to assist in planning for the following year's work.

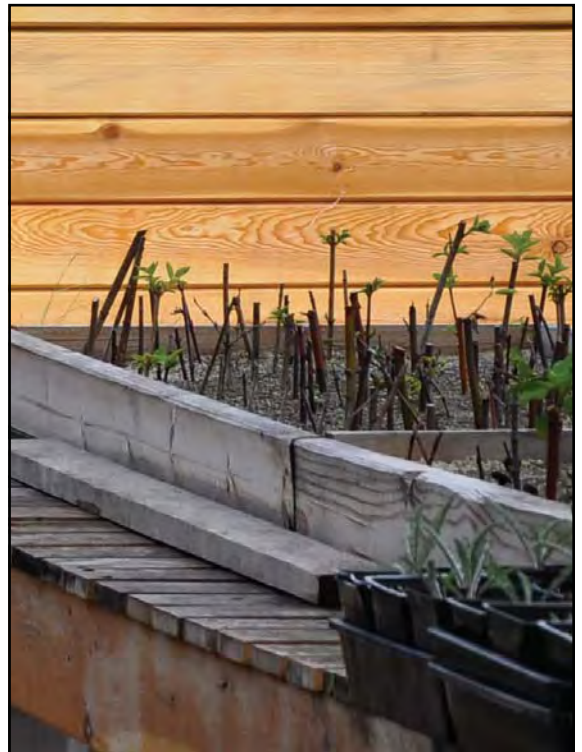
A demonstration garden has now been built at the native plant nursery. The goal is to plant with species that are propagated at the nursery to showcase the beauty and versatility of using native plants in both restoration, ethnobotany and home gardening. The garden will be planted in spring and fall of 2010. Two *Wild About Plants* open houses were held at the nursery this year to promote the project and native plants.



Fig 81 Visitors at the native plant nursery, showing some of the potted up plants in the foreground.

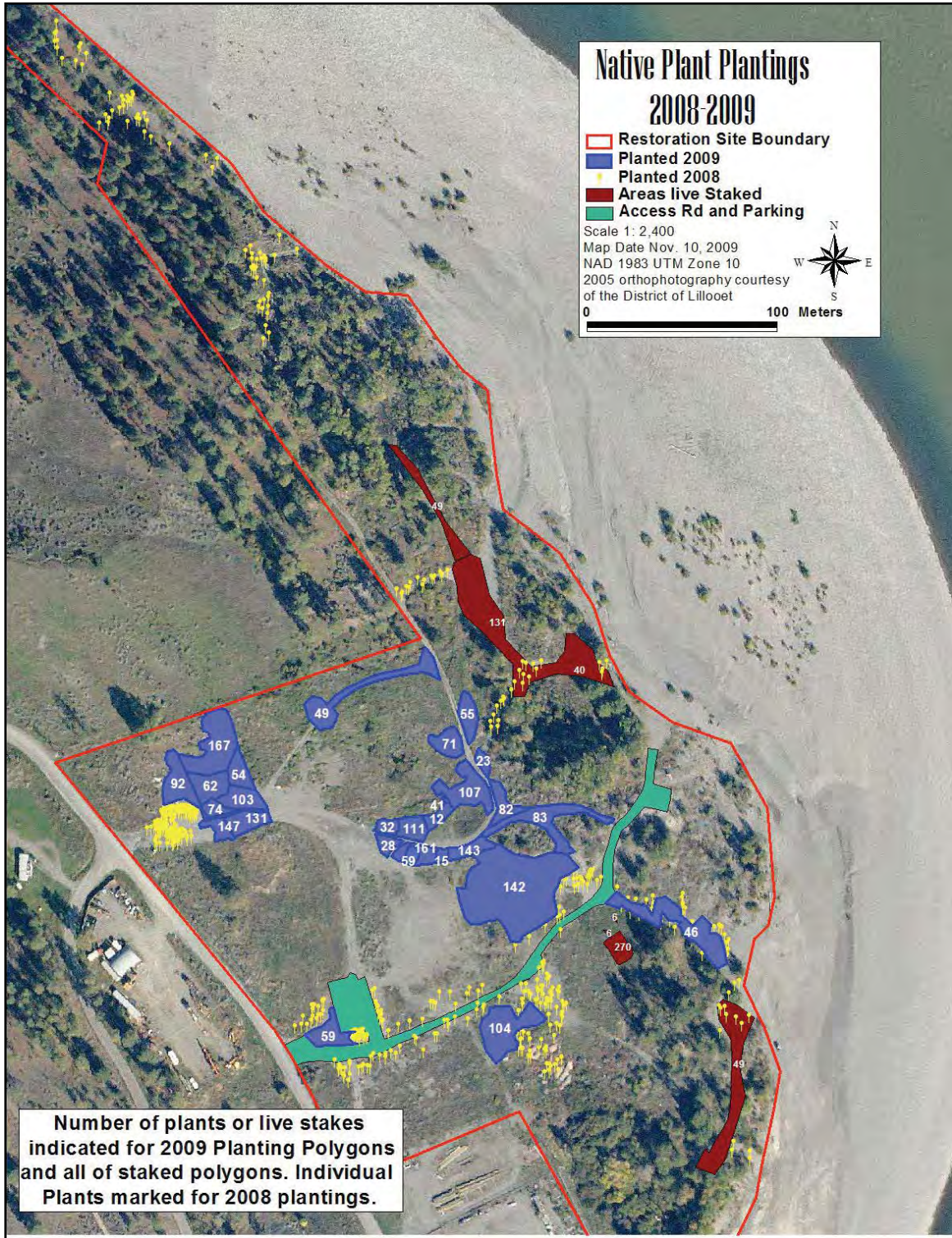
Fig 82 Cuttings of riparian shrubs growing June 18, 2009

Fig 83 Demonstration garden August 18, 2009



5.7 Native Plant Revegetation

Approximately 2,853 native plants and 539 cuttings have been planted into the restoration site over the last three years. Map 13 below shows the areas planted during 2008 and 2009.



Map 13 Native Plant Plantings 2008-2009

During 2008, the focus of planting was the riparian area, along the main access road and around the parking area (see Final Report 2008 for more detail). Two test plots were also established to provide information on how best to proceed on the highly damaged dryland bench. One is located on old roadbed R7 and is now referred to as the Upper Snag Area. This test plot was established to provide information on soil remediation methods that would enhance the survival rate of planted species. The other can be found on old roadbed R9 Polygon 07 and is referred to as the Lower Snag Area. This area was chosen as a site that is at a mid-point between the riparian zone and the upper bench. Cuttings were also established within the riparian zone.

During 2009, the focus of planting was on the upland bench and along the edge of the riparian zone. Again the majority of native plants were planted on old decompacted and recontoured roadbeds. The restoration work is building out from areas of strength found on the site so all existing vegetation is left intact and planted around. Supplemental plantings were also undertaken on old roadbed B16 to fill out that area which was planted in 2008. Cuttings were again planted within the riparian zone.

The species mix planted on the upland bench was based on the percentage coverage found at the reference ecosystem site - 5% trees, 20% shrubs, 75% herbs and grasses. Live staking of various trees and shrubs was also undertaken during 2008 and 2009, with varying success, as described above.

In the fall, approximately 2,253 native trees, shrubs, herb and grass species were planted out into the areas that had been decompacted and recontoured by the excavator. After completion of the machine work on the upland bench, crew used hand tools to rake and micro-contour the soil in preparation of planting. Bluebunch wheatgrass (*Pseudoroegneria spicata*) was the predominant species planted on the upland bench. Other species that were planted in high densities were June grass (*Koeleria macrantha*), Yarrow (*Archillea millefolium*), Brown-eyed Susan (*Gillardia aristata*), Golden Aster (*Heterotheca villosa*), and Holboell's Rockcress (*Arabis holboellii*).

Several hundred of the native species were planted by volunteers, and the balance by the restoration crew. Various groups and community members of all ages, including students from the various local schools, came out on scheduled volunteer planting days to assist the crew and contributed over 300 volunteer hours.

The following procedure took place on each planting day:

- Plan developed for the number and type of species to be planted in a particular area
- Planting tools and personal equipment set up, including first aid supplies
- Refreshment and information booth set up if volunteers are on-site
- Water tank and piss cans filled
- Various potted plants from the nursery were delivered to the site
- Groups of site appropriate native plants were spread across the newly decompacted soils in the places they were to be planted
- Instruction took place in the correct way to plant
- Crew and volunteers dug a bowl shaped hole, at least twice the diameter of the pot, and to a depth where the potted soil surface would be about an inch below the surrounding soil level. This ensured the plant would be in a slight depression;
- The hole was filled with several liters of water before planting
- After the water had seeped into the planting hole, the plant was gently taken from its pot and placed in the hole

- Soil was packed into the hole around the plant, leaving a slight depression to allow for more effective hand watering in the future
- The plant was watered in to ensure no air pockets remained
- A layer of mulch was spread around the plant, ensuring it did not touch the plant stem
- A final watering took place
- A layer of fine mulch was placed around the plant
- The plant was flagged and labelled by volunteers as desired
- If volunteers assisted in planting, crew checked all the work to monitor and correct any undesirable plantings

Plants were watered several more times post-planting over the next few weeks, to help them adjust to their new situation. Plant locations were recorded with a hand-held GPS, giving a general indication of location.

Summers in the Lillooet area are generally very hot, with low precipitation. From our experience last year, the trees and shrubs planted needed a deep watering once a week. The majority of the species planted this year were dryland plants, and so it is assumed they will need less watering over their first year. These plants are also planted closer together than trees and shrubs, and so were grouped into various areas to allow footpaths between plantings, thereby allowing easier access for watering in the coming season.



Fig 84 Tools ready for planting day

Fig 85 & 86 Plants delivered and set out into planting area beside holes dug for them





Fig 87 *Planting lesson*



Fig 88 *Digging holes, watering and planting*



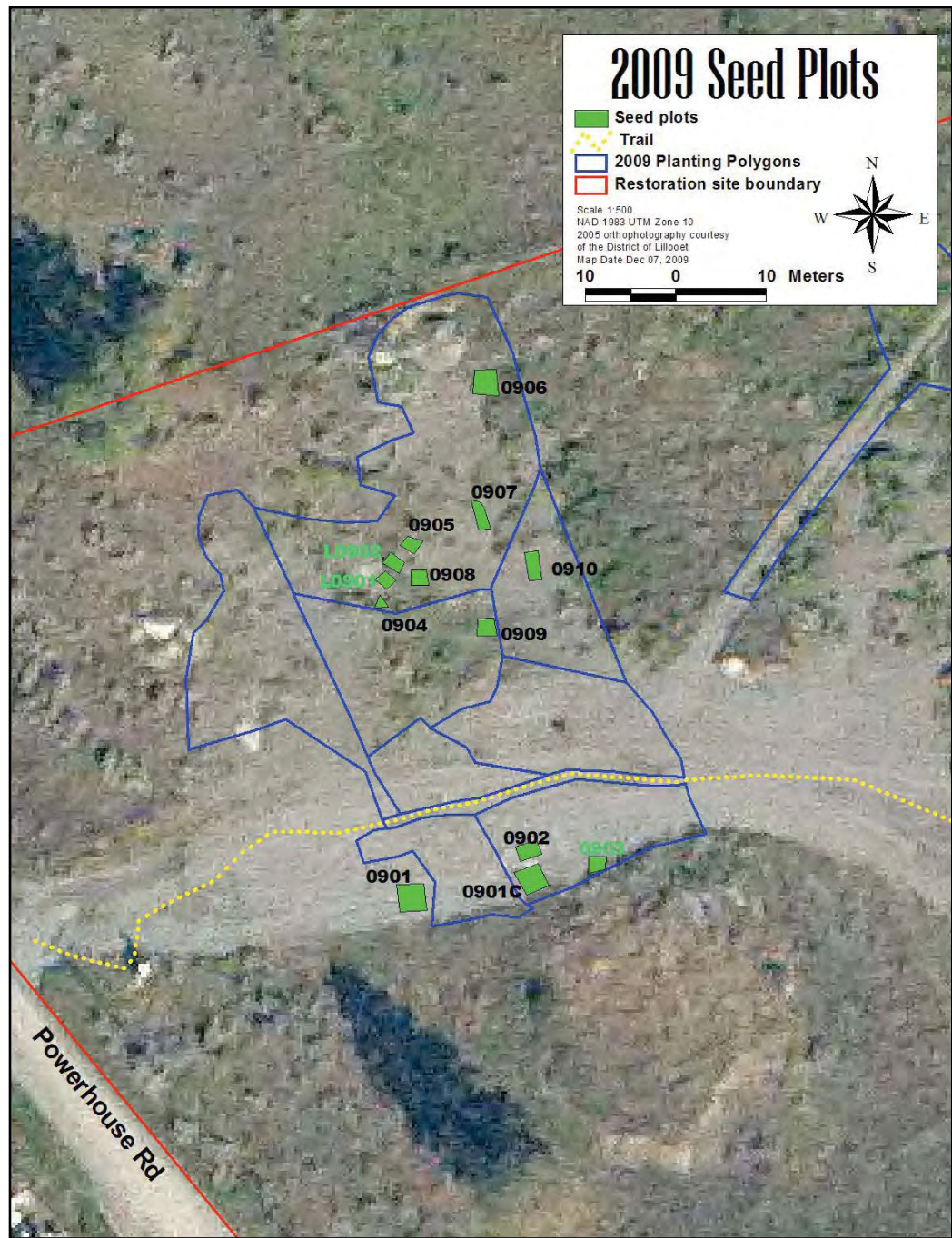
Fig 89 *Planting around areas of strength*

Fig 90 *Almost done - notice depression around plant*



Seeded Plots: In addition to the cuttings and potted plants being stocked onto the site, ten plots of varying sizes were sown with native plant seeds gathered during the 2008 - 2009 year (*Map 14 and Table 06*).

“The areas where the seeds were sown were first weeded if any exotics existed, then the soil was either raked or not, and the seeds cast around. In several plots, indicated in the table, the soil was raked a second time post sowing. One control plot was established to see what is to be expected without adding any native seeds” (Odin Scholz, 2009).



Map 14 2009 Seed and Lichen Plots

Plot ID	Species	Notes
Seed 0901	Lpe, Gwr, BeS, Lfd, Mli, Yar	Raked first, photoes, sown lightly raked corner staked
Seed 0901C	Control Plot	Raked weeded and left unsown stake NWcorner
Seed 0902	Lpe, Yar, BeS	Minimal raking
Seed 0903	Lpe, BeS	Raked
Seed 0904	Lpe, Lfd, BeS, Yar	Raked only before seeding
Seed 0905	Lpe, Lfd, BeS, Yar	No soil treatment
Seed 0906	Lpe, Lfd, Gwr, Cgo	Scattered seeds among planted plants
Seed 0907	BeS, Mli, Nth	
Seed 0908	Lep, Mli, Yar	Raked before sown
Seed 0909	Lep, Spe	Raked before sown
Seed 0910	Gwr, Lpe	Raked before and after sown
Lichen 0901	Crust Lichens	Crumpled into powder across 1m area Plot marked with four stakes
Lichen 0902	Crust Lichens	Pieces 6 -10cm placed shallowly in soil surface
LEGEND		
Lpe	Little Pepperpod (<i>lepidium densiflorum</i>)	
Gwr	Giant Wild Rye (<i>Elymus cinereus</i>)	
BeS	Brown eyed Susan (<i>Gaillardia aristata</i>)	
Lfd	Large-fruited Desert Parsley (<i>Lomatium macrocarpum</i>)	
Mli	Mariposa lily (<i>Calochortus apiculatus</i>)	
Cgo	Canada Goldenrod (<i>Solidago canadensis</i>)	
Nth	Native Thistle (<i>Cirsium undulatum</i>)	

Table 6 Information on Seeded Plots



Fig 91 & 92 Seed control and test plots



In addition to the established plots, seeds of Shrubby Penstemon (*Penstemon fruticosus*) were sown on the south facing slope between 2009 Restoration Polygons 07 and 25. Seeds of Little Pepperpod (*Lepidium densiflorum*) and Large-fruited Desert Parsley (*Lomatium macrocarpum*) were broadcast onto soils of 2009 Restoration Polygons 05, 06 and the northern edge of Polygon 25.

“Little Pepperpod was observed as one of the ‘weedy’ native species quick to colonize disturbed ground. It was hypothesized that we may be able to establish this annual native mustard plant to fill in some of the gaps between other planted native species. It is hoped this plant might hinder the establishment of some of the weedy exotic species” (Odin Scholz, 2009).

Crust Lichens: Two more plots were established on the upland bench to test how easily it is to introduce crust lichens to the site.

“During several seed gathering outings small chunks (2 - 10 cm²) of lichen pieces were gathered from nearby sites with similar conditions to the restoration site. Lichen pieces were harvested during a very dry period in July when the crust was cracked into small pieces that were sitting loose on the soil surface. Caution was exercised to minimize sign of removal at the donor site. Harvested lichens were crumbled into a fine powder and spread across a 1 X 1 m plot. In a second plot, intact larger chunks of lichens were ‘planted’ onto the ground to see if they would establish and spread” (Odin Scholz, 2009).



Fig 93 Lichen Test Plot

All of the seeded plots will be monitored by close photography in the spring, summer and fall of 2010. Based on observations decisions will be made whether to expand these initiatives.

Results of the **2008** plantings in the riparian zone, and the test plots in the Upper Snag Area (Polygon 19) and the Lower Snag Area (Polygon 07) have guided native plant revegetation work during 2009. The live stakes and planted plants were visually monitored while being watered throughout the summer and fall 2009. BCRP also conducted an audit of the project in 2009 and have reported their own results.

The survival rate of planted species was high at approximately 90%. This was an unexpected result considering the difficulty of establishing plants in such a degraded site and the hot, dry summer of 2009. Trees and shrubs planted in the riparian zone were deeply watered approximately once a week to ensure their roots were given a good chance to establish. The plants in the two dryland bench test plots were watered less frequently.

The survival rate of the live stakes was moderate at approximately 60%. The live stakes planted in 2007 had a low survival rate. We have explored the reasons for the 40% loss during 2009, and developed a plan. Odin Scholz reports that:

- ⇒ The intensive live staked area in Polygon 08 where 270 live stakes were planted in 2007, has seen a low survival rate of just 3%. This contrasts to the 40 live stakes planted on the B12 site at a similar date in the fall of 2008, where survival rate is over 95%. The big difference being the 2009 planting holes were drilled with a hydraulic jack-hammer, the cuttings water in and then watered at least a dozen times throughout the summer of 2009. The 2007 plantings were hand planted and never watered.
- ⇒ The live stakes planted in the summer of 2008 in Polygon 19 and on B17 just after high water also show low survival rates. Even though the stakes were planted directly after the high-water event when the ground was still damp, their survival was hampered by the sandy soil drying out too quickly.
- ⇒ Cuttings planted in the spring of 2009 also seemed to be doing well throughout the summer. They were watered along with the riparian plants on a weekly basis. These live stakes were much more dispersed in distribution and mixed among the dead stems from the summer of 2008 staking, so it was difficult to determine how many survived.
- ⇒ Additional research into best practices for live staking confirms that taking cuttings before the sap flows, storing in a dark, cool place for 30 days, and then planting out in early spring will provide better results. It is also recommended that the cuttings be planted in small dense patches (20 cuttings), using the pre-drilling method, and ensuring they are watered in. These dense patches will make it easier to water, maintain and monitor.
- ⇒ Cutting areas to focus on during 2010 will include the south-centre pit area and the old B16 road. Re-staking in Polygon 08 where survival rate is poor is also recommended.



Fig 94 Cutting in Polygon 11 just after high water

July 16, 2009

Fig 95 Group of cuttings in Polygon 19

August 30, 2009



Approximately 2,253 native herbs, shrubs and trees were planted throughout the .97 hectare area during 2009. Much of this area was on the dry upland bench, on the old highly compacted roadbeds.

“It is expected that most of the planted plants will flower and seed into the site providing more competition for the expected exotic weed species. The planted plants will also provide a seed source for harvesting and further propagation at the native plant nursery. Many of the plants planted in the upper snag area and the parking lot island during the fall of 2008 produced much seed in the first year” Odin Scholz, 2009.

Results of the 2009 plantings will not be known until the 2010 restoration year, where they will be monitored visually on a regular basis while maintenance and watering is taking place. As well, the plants, seeded areas and live stakes will be surveyed by crew in the fall to evaluate the survival rate and condition of the planted areas. Comparing 2010 survey results with the original 2006 vegetation survey tables would provide an interesting look at the changes that have resulted over time.

With over 3,300 plants and live stakes planted out into the restoration site over the last three years, it will be challenging to maintain, water and monitor. A large and reliable crew is critical to the success of the 2010 restoration season, as many plants need care and weed numbers are expected to rise with the disturbance of soils on site.



Fig 96 Parking lot island showing the growth over one year of planted stock and naturals.



*Fig 97 Salvaged Sumac planted fall 2008
June 17, 2009*





*Fig 98 Ponderosa pine planted fall 2008
November 01, 2009*



*Fig 99 Prairie Rose planted fall 2008
November 01, 2009*



*Fig 100 - 101 Bluebunch Wheatgrass and
Yarrow started in nursery by seed in spring
2008, planted fall 2008.*

Growth shown by April 21, 2009



6. WILDLIFE STUDIES

The Powerhouse Foreshore Restoration site is at the confluence of the Seton and Fraser Rivers. It is an important low-land ecosystem that could benefit a variety of species. The Ponderosa pine/bluebunch wheatgrass ecology of the site has a “narrow range across British Columbia with continuing threats from varying land use practices, alien species invasion and development ... and fire suppression ... and is rarely found in good to excellent condition (British Columbia Conservation Data Centre, 2003).

The initial goal of the restoration project was to increase functioning habitat for wildlife at the Powerhouse site, with a special emphasis on species-at-risk. By undertaking the restoration work at the site, we aim to enhance and increase critical habitat that will allow species-at-risk to flourish.

During 2007, recommendations and suggestions were made on species that could benefit from such a restoration project. At that time, Jared Hobbs, Ministry of Environment IWMS, provided a list of targeted species that were currently on-site or that could possibly be attracted to the site. He also presented these recommendations at a community visioning session at that time.

Table 07 lists some key species of interest. Many of those listed are either red-listed or blue-listed species. The table also indicates if they are currently found on the site, and outlines some basic habitat enhancement recommendations.

Table 07: Wildlife and Habitat Enhancement Recommendations 2007

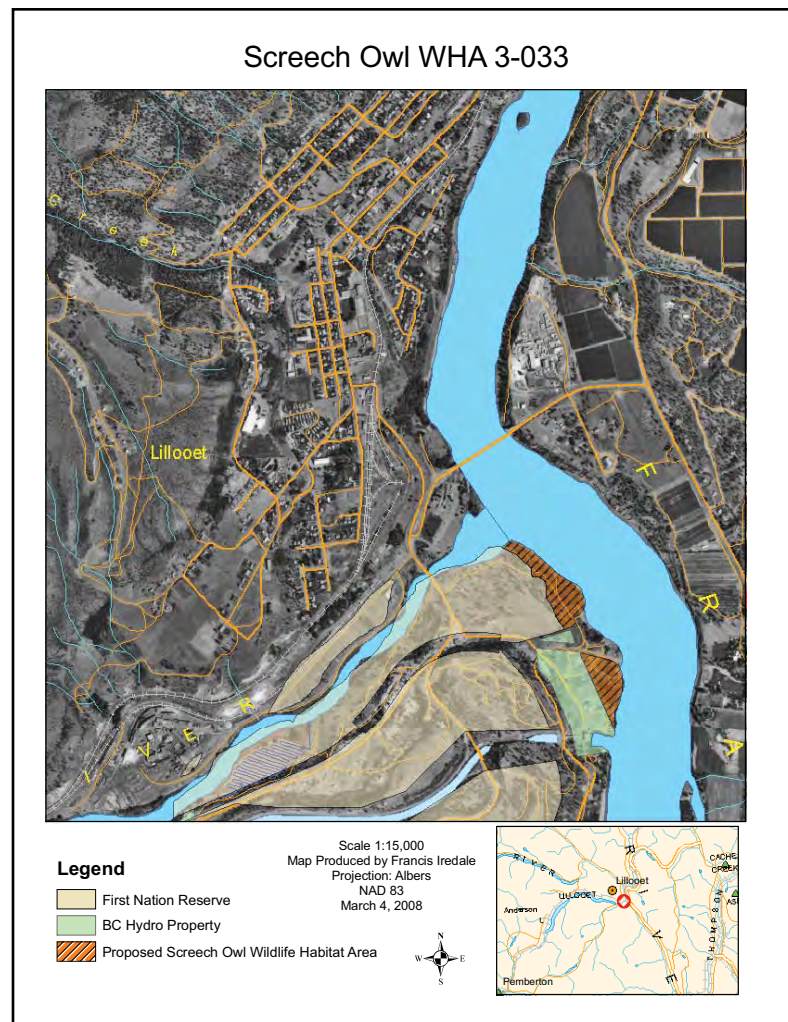
Species	Scientific Name	Species Status Notes	Currently On site?	Habitat enhancement
Birds				
Great Blue Heron	<i>Ardea herodias</i>	Blue listed	Yes	Black cottonwood Ponderosa pine Minimize disturbance around foraging sites Maintain perch trees adjacent to foraging areas
Osprey		MOE Wildlife Habitat Feature	Yes	Maintain nest platform currently used on-site Possibly move 2 nd nest platform a greater distance from 1st
“Interior” Western Screech-Owl	<i>Otus kennicottii macfarlanei</i>	Red listed IWMS COSEWIC Endangered <i>Uses woodpecker cavities</i>	Yes - one recorded occurrence	Wildlife tree retention Black cottonwood Ponderosa pine Do not burn understorey vegetation Do not construct trails within 50m of a known nest site Consider nest-box
Northern Pygmy Owl	<i>Glaucidium gnoma swarthi</i>	Blue listed <i>Uses woodpecker cavities</i>	Yes	Wildlife tree retention Black cottonwood Ponderosa pine
Lewis’ Woodpecker	<i>Melanerpes lewis</i>	Red listed IWMS <i>Cavities created by Lewis’ Woodpecker also assists Western Screech-owl</i>	Unknown – has been seen in vicinity	Wildlife tree retention Black cottonwood Ponderosa pine Maintain shrub density >50% Planting of “snags” in open habitats Prescribed burning
Northern Flicker		<i>Cavities created by Northern Flicker used by owls</i>	Yes	Wildlife tree retention Black cottonwood Ponderosa pine Maintain riparian habitat

Yellow-breasted Chat	<i>Icteria virens</i>	Red listed COSEWIC Threatened to endangered	Unknown – has been seen in vicinity	Black cottonwood Maintain dense understorey of rose, snowberry, willow Maximize retention & connectivity of riparian and grassland habitats
Reptiles				
Great Basin Gopher Snake	<i>Pituophis catenifer deserticola</i>	Blue listed IWMS	Unknown – possible denning site is located just above project site	Conduct Reptile Survey 2008 Link denning and foraging habitat, travel corridors and egg-laying sites Create structural elements such as rock outcrops, friable soils, coarse woody debris, concentrations of boulders Maintain riparian areas
Racer	<i>Coluber constrictor</i>	Blue listed IWMS	Unknown – Possible denning site is located just above project site	Conduct Reptile Survey 2008 Link denning and foraging habitat, travel corridors and egg-laying sites Create structural elements such as rock outcrops, friable soils, coarse woody debris, concentrations of boulders Maintain riparian areas
Amphibians				
Great Basin Spadefoot	<i>Spea intermontana</i>	Blue listed IWMS COSEWIC Threatened	Unknown	Conduct Amphibian Survey 2008 Maximize connectivity between suitable aquatic breeding sites and foraging & overwintering habitats Maintain riparian and small mammal burrows Discourage vehicle use in sensitive areas
Western Toad	<i>Bufo boreas</i>	Yellow listed COSEWIC special concern	Unknown - seen in close proximity to project site	Conduct Amphibian Survey 2008 Maximize connectivity between suitable aquatic breeding sites and foraging & overwintering habitats Maintain riparian and small mammal burrows Discourage vehicle use in sensitive areas
Mammals				
Bats: California Myotis Western Long-eared Myotis Little Brown Myotis Long-legged Myotis, Myotis, Yuma Myotis, Silver-haired Bat, Big Brown Bat, Spotted Bat, Pallid Bat	<i>Myotis californicus</i> <i>Myotis evotis</i> <i>Myotis lucifugus</i> <i>Myotis evotis</i> <i>Myotis yumanensis</i> <i>Lasiurus noctivagans</i> <i>Eptesicus fuscus</i> <i>Euderma maculatum</i> <i>Antrozous pallidus</i>	Blue listed Red listed	Unknown – all species have been seen in close proximity to project site on similar habitat	Conduct Bat Survey 2008 Maintain Wildlife trees Maintain riparian areas Ensure removal of noxious weeds, especially burdock Ensure decent roosting and foraging opportunities Consider roost box
Mule Deer	<i>Odocoileus hemionus (Rafinesque)</i>		Yes	Increase connectivity and maintain travel routes
Coyote	<i>Canis latrans Say - lestes</i>		Yes	Increase connectivity and maintain travel routes
Black Bear	<i>Ursus americanus Pallas - cinnamomum</i>		Yes	Increase connectivity and maintain travel routes

Based on this initial list of species, the Lillooet Naturalist Society has attempted to establish base-line surveys of certain key species that have been known to use the area and to monitor their presence and use of the site in relation to the restoration work being undertaken.

The Interior Western Screech-owl is the primary species to be targeted within the riparian zone. Habitat loss is the primary threat to the Interior Western Screech-owl which occurs in riparian woodlands at low elevations, where approximately half of the suitable habitat has been lost in the last 50 years and most of the remaining habitat is degraded to some extent (Cannings, et al. 1999). Restoration work within the riparian zone has involved the knitting back together of the riparian vegetation to decrease fragmentation. Roads have been closed, Black Cottonwoods, Ponderosa pines and native shrubs planted, wildlife trees retained and erected, and nest boxes installed.

Due to the red-listed status of the Interior Western Screech-owl, a Wildlife Habitat Area has been established to protect the ecosystem within the riparian zone at the Powerhouse site. This designation provides direction for implementing a long-term plan to minimize disturbance and maintain suitable foraging and nesting habitat.



Through the work being undertaken, other bird and wildlife species should be attracted to the site. The Screech-owl nests in tree cavities excavated by woodpeckers such as Northern Flickers and Pileated Woodpeckers, so presence of these indicator species are a good sign. Ian Routley, local coordinator of the Breeding Bird Atlas for our region, has also stated that “when I see the Lewis’ Woodpecker using the Powerhouse site, than I will know that the restoration work has been a success”.

Reptiles, especially **the Racer**, is the indicator species to be monitored on the upland bench. The Racer is a blue-listed species that forages on sandy terraces along riparian margins, hibernates on south-facing rocky slopes and nests in loose soil, beneath flat stones, in decaying wood or on stable talus slopes. Restoration work on the upland bench has focused on providing habitat for reptiles by the placement of large boulders, rock piles, building a south facing 'talus slope' and adding coarse woody debris to the site. This work should also provide habitat for other species.

To monitor the success of our Restoration Plan, we needed to establish base-line data for wildlife using the site. Over the last five years, we have undertaken initial base-line surveying and implemented monitoring protocols for particular species.

6.1 Breeding Bird Survey

The breeding bird survey is being undertaken to monitor for increased use of the site by breeding birds in relation to the restoration work being carried out. An initial base-line survey was completed in 2008 and monitoring continued during 2009.

Two distinct methods were used in monitoring breeding bird activity:

- ⇒ standardized variable radius point counts, and
- ⇒ encounter transect

Three point count stations were established at the restoration site in 2008. They are situated 200 m apart along a north-south axis running parallel to the riparian zone as shown on Map 03. The majority of point counts are conducted in the early morning to take advantage of the increased bird song at that time. A few pre-dusk surveys are also undertaken to target species that tend to be more active in the evening. The process for variable radius point counts involves arriving at the point count station, waiting one minute to allow disturbances to subside, and then recording activity seen or heard over a five minute period. The different types of activity observed provide a window into the likelihood of breeding taking place.

Encounter Transects are conducted during the same timeframe that the point counts are being completed. This method of surveying involves walking along a prescribed 1.7 km route as follows:

- ⇒ From the parking lot
- ⇒ North along the upland bench to the Upper Snag area
- ⇒ East towards point count station 02
- ⇒ North along the riparian trail to point count station 03
- ⇒ East out onto the beach
- ⇒ South along the edge of the riparian zone and sandbar
- ⇒ Enter riparian zone again on main access road
- ⇒ South towards screech-owl box 03
- ⇒ North to point count station 01 and back to parking lot
- ⇒ Back to parking lot

This route can be followed in the opposite direction also.



Fig 102 Crew learning to ID birds

Fig 103 Local birder, Jeff O’Kelly, observing breeding bird activity



Map 16 Bird Monitoring Map - showing point count stations and location of Screech-owl nesting boxes.

Kenneth Wright conducted the initial breeding bird survey in 2008. He then trained volunteers and crew in 2009 so that the work could eventually be carried out by volunteers. The workshop focused on survey methodology; however, bird song identification and resources were also provided. These surveys require the expertise of someone who can identify birds by both song and sight. Jeff O’Kelly, an avid local birder, volunteered to conduct all the surveys during the 2009 season using the protocols put in place by Kenneth Wright. Ken then collated the data and presented a methodological comparison of the last two years monitoring efforts. See full report ‘Breeding Bird and Autumn Migration Monitoring at the Seton Powerhouse Restoration Site’ in Appendix I.

The following breeding bird surveys have been conducted over the last two years:

- 06 - 20 June 2008 Eight surveys by Kenneth Wright
- 09 - 30 June 2009 Seven surveys by Jeff O’Kelly

6.2 Autumn Migration Monitoring

An initial autumn bird migration survey was completed in September 2006 by Kenneth Wright. During 2008 and 2009 migration monitoring was undertaken following the encounter transect method of surveying following the same route as above. Kenneth Wright has collated this information (shown in above report) and will provide a more detailed analysis comparing the surveys done to-date at a later time.

The following autumn migration surveys have been completed:

- 16 August to 17 October 2008 Fourteen surveys by Kenneth Wright
- 26 August to 18 October 2009 Fourteen surveys by Jeff O'Kelly

6.3 Western Screech-owl Survey

The standard call playback protocol is used to monitor for screech-owl activity. Monitoring takes place in the evenings within the Powerhouse site and along the Texas Creek Road adjacent to the site where suitable habitat exists. The survey has also been carried out along the Cayoosh Creek River opposite the Seton Lake campground.

Surveying involves playing recorded Screech-owl calls over a loudspeaker for one minute, and then waiting for three to four minutes while listening for owl responses. This is repeated three times at each location, for a total of fifteen minutes.

No Western Screech-owls were detected in 2009. Francis Iredale, MOE, provides the following information from the May 2009 survey.

Obs: Kim North, Francis Iredale, Ken Wright, Ian Routley
 Date: May 27, 2009.
 Temperature 17C
 Wind: 3
 Cloud Cover: Clear
 Precipitation: none

Station 1- Z10 576129 5614150	Start Time: 21:23	End time: 21:38	No Owl detection
Station 2- Z10 572136 5612860	Start Time: 22:44	End Time: 23:00	No Owl detection
Station 3- Z10 576582 5612265	Start Time: 23:38	End Time: 23:53	No Owl detection
Station 5- Z10 588508 5596385	Start Time: 01:30	End Time: 01:45	No Owl detection

End time Temperature: 14C
 Cloud Cover: Clear
 Precipitation: None

Table 08 Western Screech-Owl May Survey Results

The following Western Screech-owl surveys have been conducted over the last two years:

- 23, 29, 30 September 2008 150 minutes by Kenneth Wright
- 27 May, 2009 59 minutes by Francis Iredale
- 09, 10 September 2009 (Audit) 45 minutes by Shaun Freeman

In addition to this survey method, we have installed four Screech-owl boxes on the site as shown in Map 16. These boxes are visually monitored throughout the season for evidence of both nesting and day roosting use by the Western Screech-owl. Other wildlife using the boxes are recorded.

No Screech-owls were observed using any of the four boxes erected on site. However, a red squirrel (*Tamiasciurus hudsonicus*) had taken up residence in Screech-owl box 02.

Fig 104 Western Screech-owl in Ponderosa



Fig 105 Screech-owl box 04 in Polygon 16



As the Western Screech-owl is a red-listed species and is our indicator species within the riparian zone, the frequency of surveys should be increased to allow for greater possibility of detection.

The best time to survey for the Western Screech-owl is between April and May, when they are more likely to be calling.

Other species that use similar habitat will be observed for, including the Lewis' Woodpecker and Northern Pygmy Owl.

Regular maintenance of the boxes needs to be performed annually.



Some birds of the Powerhouse Restoration site:

- Western Meadowlark
- Osprey
- Lazuli Bunting
- Pileated Woodpecker



6.4 Reptile Monitoring

This is our second year of monitoring reptiles on-site. Elke Wind (amphibian specialist) and Leslie Anthony Lowcock (reptile specialist) visited the restoration site on 16 July, 2008 with the main objective of training survey crews in identification and sampling techniques, but also to assess the suitability of habitat for amphibians and reptiles, to conduct an initial survey of the area and provide recommendations for future monitoring and habitat enhancements.

No amphibians were found on site at that time and Elke Wind reports that “... amphibians may be limited on this site in terms of water availability, temperature, current and hydroperiod”. See *Powerhouse Foreshore Restoration Project Final Report 2008* for more details.

Racers had been observed on one occasion using the site, and there had been reported evidence of use by reptiles, through snake tracks and shed skin. Due to these results, recommendations were made to begin a reptile monitoring program. In August 2008, twenty-four cover objects were placed at 2m intervals along four transects through the upper dry bench ecosystem (Map 17). All locations were GPS and photographed. Boards were made from 1/4 inch plywood (approximately 1m X 1.5m in size) and marked with the transect number and board number. Based on further research into reptile monitoring, the cover objects were modified for 2009 by painting them black to increase their thermal conductivity.

Cover boards are now monitored following the protocol set by Elke Wind. Bob Deadman, Lillooet Naturalist member, has volunteered to monitor the twenty-four cover objects over the last two years. Crew assist when he is unavailable. The boards are checked weekly, by walking the four transects and lifting each board when it is encountered. Visual observations are made and records kept on data sheet. Odin Scholz collects and collates this information.

Over the last two years, the following surveys have taken place:

- September and October 2008 5 surveys by Bob Deadman
- May to October 2009 20 surveys by Bob Deadman/crew

Fig 106 Bob Deadman monitoring boards



Fig 107 Reptile cover board





Map 17 Reptile Monitoring 2008 - 2009

Table 09. Reptile Monitoring Information

ID	OBSERVATION DATE	TYPE	LIFE STAGE	SPECIES	NOTES
1	Aug 21, 2008	Skin	adult	racer	
2	Aug 21, 2008	Skin	adult	racer	
3	Sept 23, 2008	Skin	adult	racer	
4	Sept 23, 2008	body	baby	racer	
5	Sept 23, 2008	body	baby	racer	Lies off Map to the South on Roshard Road
6	Oct 01, 2008	body	baby	racer	
7	Oct 03, 2008	live	baby	racer	Lying under cement retaining blocks
8	Sept 2008	body	baby	racer	
9	July 16, 2008	skin	adult	racer	
10	July 16, 2008	live	adult	racer	Snake observed eating mouse under big sage plant
11	Oct 16, 2008	skin	adult	racer	Among Kochia stand
12	Oct, 2008	live	adult	racer	Basking on slope
13	Oct, 2009	skin	adult	racer	Two skins
14	Sept, 2009	skin	adult	racer	
15	Sept, 2009	skin	adult	racer	Under placed CWD log
16	Oct, 2009	skin	adult	racer	Three skins
17	June, 2009	sign	adult	?	Slither marks in powdery soil

Odin Scholz reports that:

“No reptiles were observed under the cover objects throughout the 2009 season. Early in the year May - July the most common observations were of red and black ants under the cover boards. Mice were observed on several occasions under boards located near the Hydro compound in Polygon 06. Beetles, crickets and spiders were also observed earlier in the season. In the heat of summer little life was observed under the boards” (Odin Scholz, 2009).

As well observing cover objects, casual observations are made throughout the season by the restoration crew who survey the area for direct observation or sign of reptiles and amphibians on the site. Table 09 above details the results of these observations.



Fig 108 Racer

Further research into reptile cover objects and their effectiveness (Engelstoff and Ovaska, 2000) and (Accounts and Measures for Managing Identified Wildlife, (2004) have provided the following recommendations:

- ⇒ Several sampling methods be used in combination
- ⇒ Reptiles show a significant preference for high heat conductivity cover objects (tin, asphalt) over lower heat conductivity plywood. Tin cover objects should be incorporated into the monitoring protocol, without moving any of the existing cover boards. Temperatures under the two different type of cover boards could be compared to the ambient air temperature to see if either of the cover objects have a significant difference in temperature.
- ⇒ Time constraint searches or Quadrant searches should be initiated at the site several times in the spring and fall during annual migrations, and during mating season.
- ⇒ Monitoring of reptiles is best undertaken during warm, cloudy days. Sampling during inclement weather is not productive, but a warm afternoon after rain is worthwhile.
- ⇒ Shed skins can be identified to species using scale counts. This can help determine the particular species using the site, without capture.
- ⇒ Natural cover objects should remain undisturbed for a minimum of at least two weeks between examinations.

6.5 Bat Survey

A preliminary bat survey was undertaken at the Powerhouse restoration site and surrounding areas during 2009. Doug Burles, M.Sc., RP Bio, Emeritus Scientist, Gwaii Haanas National Park Reserve and Haida Heritage Site provided his expertise to the project as an in-kind contribution. He visited Lillooet, with four main goals:

- ⇒ Undertake an initial survey to detect bat presence at the restoration site and surrounding areas
- ⇒ Tour the restoration site and make recommendations for enhancing habitat and developing a monitoring methodology for future years
- ⇒ Conduct a bat biology workshop for naturalist members and the public
- ⇒ Hold an educational bat detection evening for community members

On the evening of 22 May 2009 a walk of the restoration site began at the tailrace and proceeded north through the riparian zone to the main access road. A visual inspection of the generation station was made to check if bats were using the facility for roosting. We then walked through the riparian zone, using the Ana-bat bat detector to monitor for bat activity. The method used was to tune the detector to 20 Khz and listen for five minutes, noting the number of bat passes and feeding buzzes heard during this period. The bat detector was then tuned to 30 and 40 Khz respectively, and the procedure repeated for each frequency. This was just a preliminary assessment to check for bat presence and instruct crew and volunteers in the use of the Ana-bat detector. A quick survey of the canal area around the Texas Creek Road and the lower spawning channels was made to find a suitable place to hold the next day's educational evening.

On 23 May an afternoon workshop was held on bat biology with fifteen people in attendance. This was followed up with a second site visit to the restoration lands to discuss possible work that could be done to enhance bat activity, and to establish a methodology for monitoring bat presence over the long-term.

The evening educational event at the lower spawning channels was highly successful with over twenty adults and children coming out to hear and learn more about bats. Doug used the Ana-bat detector and Sonobat software on a small laptop to show participants the different calls and how that helps identify what type of bat is present. The excitement at detecting bats was clearly shown by both adults and children.

A visual inspection was also made at the Bridge of the 23 Camels to check for bat activity.

Fig 109 Vivian at Bat Workshop providing info



Fig 110 Doug Burles leading bat walk at site



Results of the 22 May initial bat walk at the Powerhouse Restoration site were as follows:

“We first visited the generator station to see if any bats might be roosting in the building. No bats were seen in the area, so we walked upstream along the shore of the Fraser River. Using a bat detector, we heard a number of bats in this area, consisting of two phonic types of echolocation calls. One group had low frequency calls and was tentatively identified as being either silver-haired or big brown bats. Feeding “buzzes” were heard indicating that the bats were actively foraging in the area” ((Doug Burles, M.Sc., RP Bio, Emeritus Scientist, 2009).

Results of the 23 May initial bat surveys are noted below. These were not taken at the Powerhouse restoration site, but at the west end of the Lower Seton Spawning Channels:

“A number of satisfactory calls were recorded, and from these recordings I was able to tentatively identify Little brown, Yuma and Silver-haired bats as being present. Examples of the calls recorded are presented below. Table 00 summarizes some of the parameters measured on these calls to help identify them to species” (Doug Burles, M.Sc., RP Bio, Emeritus Scientist, 2009).

Fig 1. Recorded May 23, 2009 at Lillooet near the salmon spawning channels. Tentatively identified as *Lasionycteris noctivagans*, the Silver-haired bat.

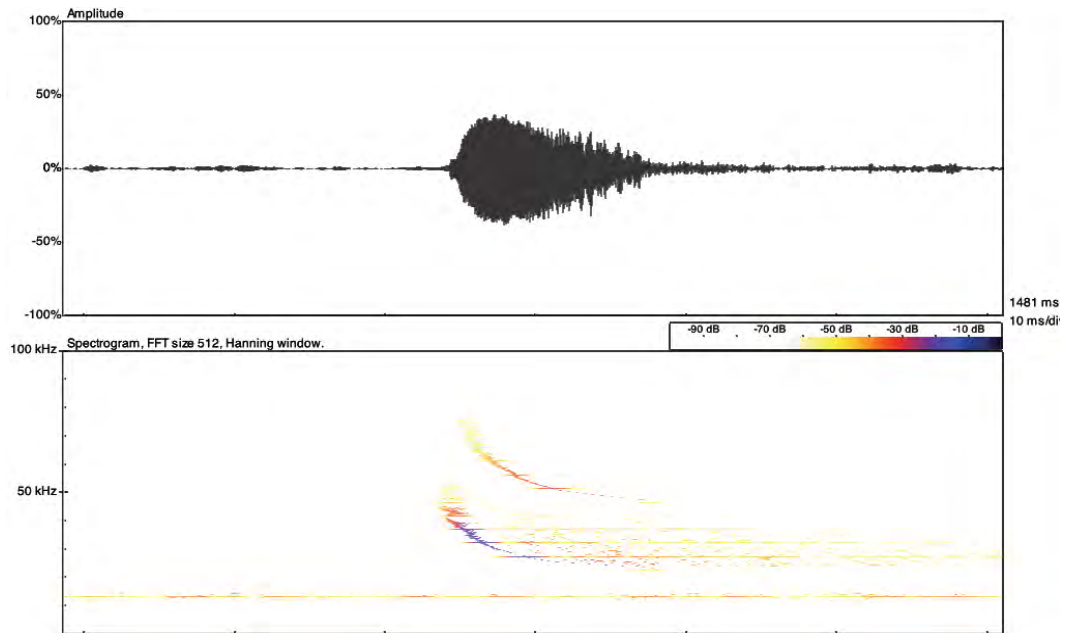


Fig 2. Recorded May 23, 2009 at Lillooet near the salmon spawning channels. Tentatively identified as *Myotis yumanensis*, the Yuma bat and *Lasionycteris noctivagans*, the Silver-haired bat.

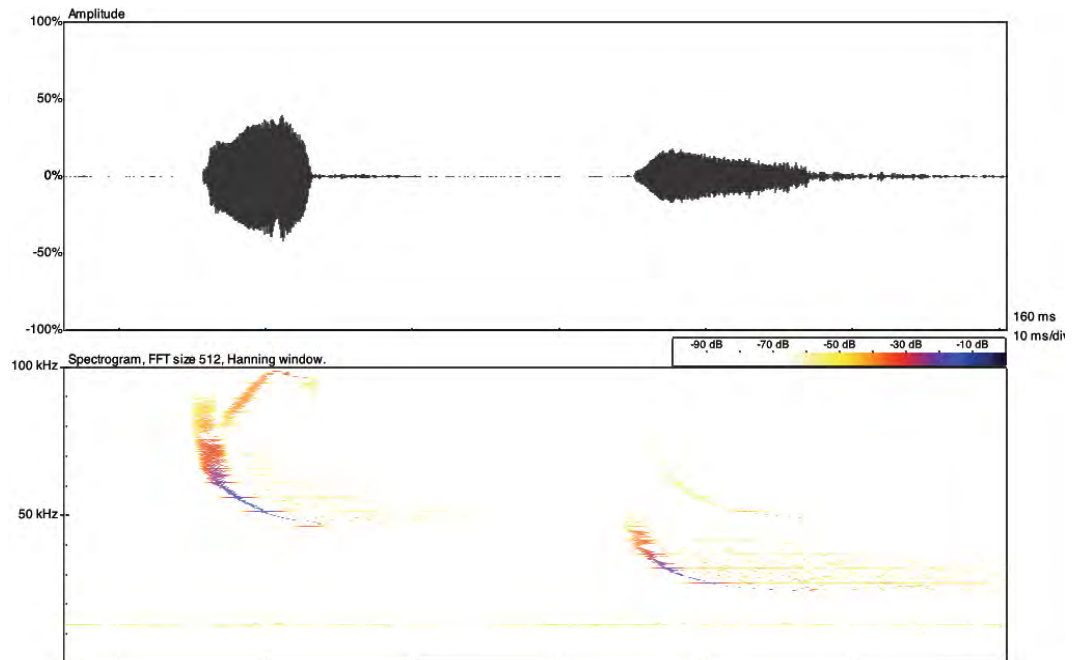


Fig 3. Recorded May 23, 2009 at Lillooet near the salmon spawning channels. Tentatively identified as *Myotis lucifugus*, the Little brown bat.

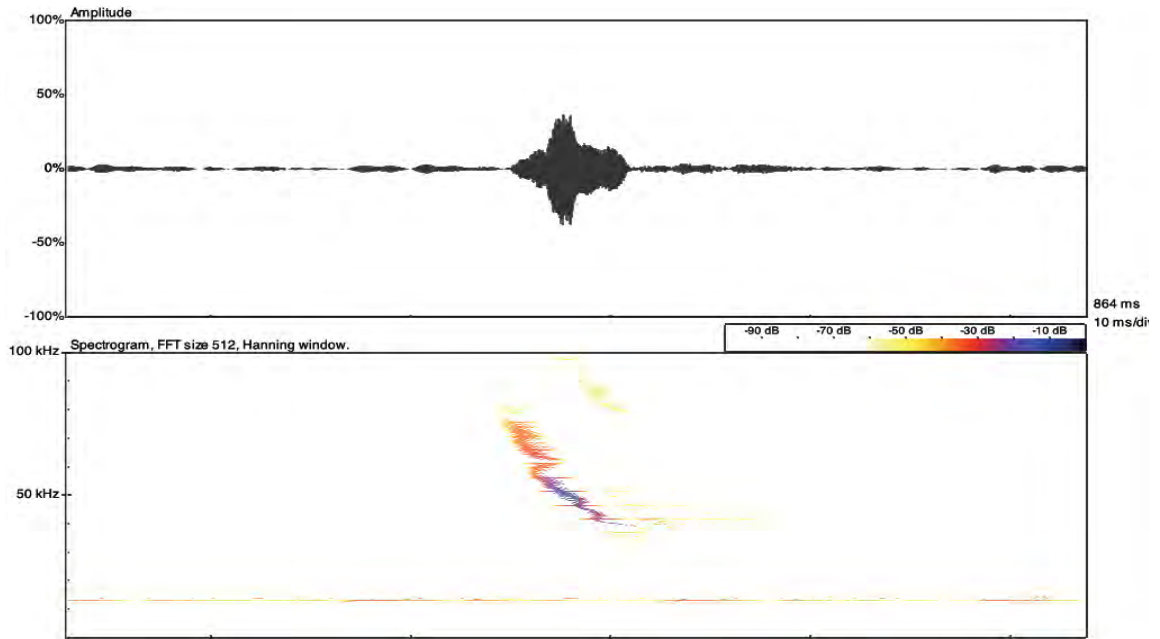


Fig 4. Recorded May 23, 2009 at Lillooet near the salmon spawning channels. Tentatively identified as *Myotis yumanensis*, the Yuma bat.

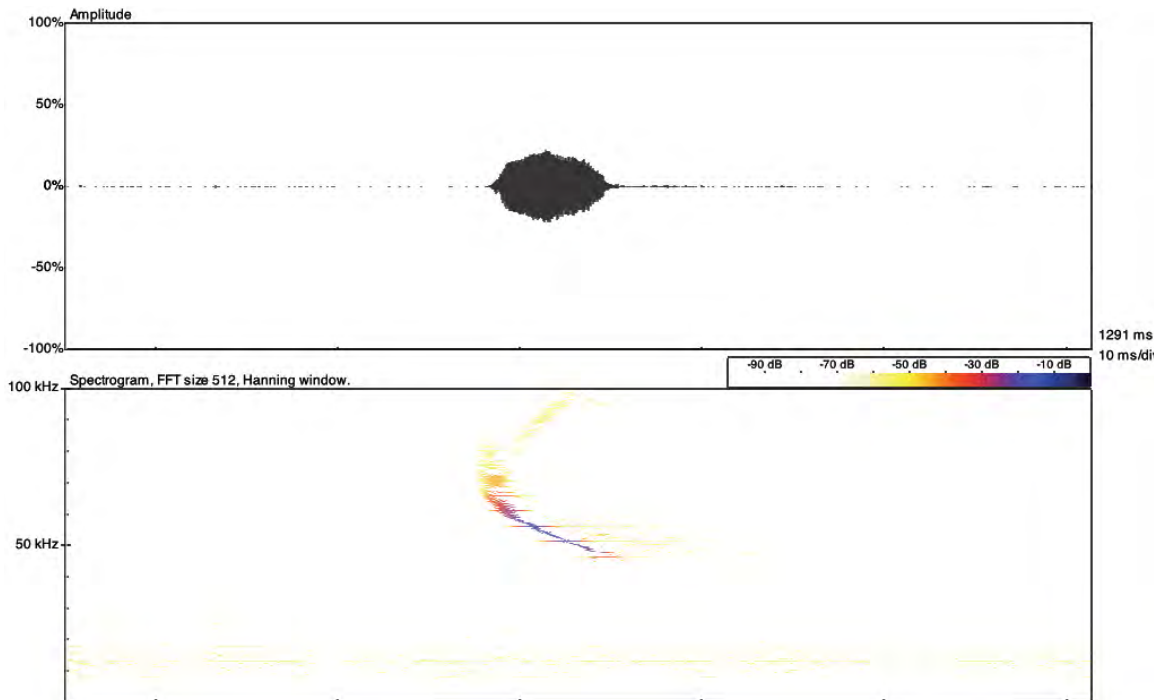


Table 1. Summary of Echolocation call characteristics for bats recorded near Lillooet, B.C. on 23 May 2009 as determined using Sonobat software. Identifications are based on comparison of these measurements with those of known recordings.

Tentative ID	Duration (msec)	Call intrvl (msec)	Hi Freq (kHz)	Low Freq (kHz)	bandwidth (kHz)	Freq @ max amplitud e	character-istic Lo Freq	slope (kHz/msec)	uppr slope (kHz/msec)	lower slope (kHz/msec)
La no	9.021	262	46.771	24.499	22.272	31.466	27.171	2.173	7.873	0.958
My yu	6.293	163	73.497	44.543	28.953	54.095	46.993	4.412	14.5	2.831
My lu	5.699	100	76.837	36.526	40.312	50.431	38.753	7.065	10.491	4.274

Listening frequency (khz)	Bats likely heard	Frequency with Max. energy (khz)	Range of frequencies emitted (khz)	Type of sound heard
10	Spotted bat	14 - 16	6 - 16	Audible without detector; a squeak or metallic click
20	Hoary bat	19 - 26	19 - 39	A tonal "chirp"
20 - 30	Townsend's big-eared bat	26 - 41	19 - 57	low intensity calls, not often heard
30	Big brown bat	29 - 35	26 - 66	A "put" sound
30	Silver-haired bat	27 - 31	25 - 53	A tonal "chirp"
30	Pallid bat	30 - 37	29 - 67	
40	Western red bat	43 - 63	38 - 100	
40	Western long-eared bat	36 - 42	33 - 100	Low intensity calls heard only at close range; A sharp "tick"
40 - 50	Northern long-eared bat	49 - 54	35 - 100	Low intensity calls heard only at close range; A sharp "tick"
40 - 50	Keen's long-eared bat	47 - 52	35 - 100	Low intensity calls heard only at close range; A sharp "tick"
40 - 50	Fringed bat		35 - 110	Low intensity calls heard only at close range; A sharp "tick"
40 - 50	Small-footed bat	43 - 51	41 - 106	A sharp "tick"
50	Yuma bat	47 - 50	44 - 110	A sharp "tick"
50	California bat	48 - 61	46 - 117	A sharp "tick"

Doug Burles also provided the following recommendations to enhance bat activity at the Powerhouse restoration site, as well as information on bat monitoring protocols. These are shown below:

Recommendations to enhance bat activity on the restoration lands

Vegetation restoration activities currently being undertaken in the area of the B.C. Hydro buildings will likely very beneficial affects on a variety of wildlife including bats. Increased vegetation cover will eventually enhance insect activity, which will undoubtedly attract foraging bats. There are a few actions however, that could be undertaken to facilitate bat use of the area, as follows:

1. The artificial snags, as they stand, do not provide much habitat for bats. Placing bat houses on one or two of them will provide roost sites for bats foraging in the area. I suggest that one bat house be placed facing southwest, while a second one is placed facing southeast. This will provide two different microclimates that will vary with

weather conditions and from which the bats can choose. Bat houses should be placed at least 5 m. above the ground and as near to the nearby cottonwoods as possible. Smearing the bat houses with a bit of bat guano may help bats to find the houses more quickly and accept them as roosts.

2. Some of the artificial snags could also be modified with chainsaw cuts to provide additional roost sites for solitary roosting bats. Saw cuts should be on the south facing side, should penetrate 10 - 12 cm. into the wood, and should be angled upwards so that they provide some protection from rain. The cuts should be placed at variable heights above the ground to provide a variety of options for roosting bats.
3. Bat use of the artificial roosts should be periodically monitored to determine their effectiveness.
4. A number of former trails that pass through the restoration lands are slowly growing in. Trails such as these often serve as corridors that bats are use to commute through the forest to the river. Some of these trails should be maintained as narrow hiking trails to facilitate bat use of the restoration lands and adjacent river bank.

Protocol for monitoring bat activity

The expressed desire of the Society is to monitor bat use of the BC Hydro lands over the period of the restoration project. In order to develop a monitoring protocol it is first necessary to have a basic understanding of bat ecology. Bats generally emerge about 1 hr after sunset, although emergence time can be quite variable depending on location, weather conditions and reproductive state. Once they emerge they will often seek a relatively open, calm source of water where they can drink on the wing. They will then forage for the next 1 ½ - 2 hrs before roosting to rest and digest food, or return to the nursery roost to feed young. They will forage again just before dawn, when they return to their day roosts. The best time to monitor for bat activity then, is the 2 hr period shortly after bats emerge, or the 1 hr period before dawn.

Foraging sites vary from night to night, depending on the relative abundance of insects at particular locations. Insects are often most abundant near water or along the edges of habitats, such as along the bank of the river or the edge of a line of trees. Bats often use habitat edges or forest trails to find their way around. As such these are good places to monitor for bat activity.

Following are some recommendations for establishing a protocol for monitoring bat activity that will hopefully provide meaningful results.

1. BC's Resources Inventory Committee guidelines for bat monitoring (Inventory Methods for Bats – Standards for Components of British Columbia's Biodiversity No. 20 – 1998) recommends that a heterodyne (tunable) bat detector be used for monitoring bat activity. The protocol is to tune the detector to 20 Khz and listen for five minutes, recording the number of bat passes and feeding buzzes heard during this period. (A bat pass is defined as a regular sequence of bat calls that is separated from other sequences by at least one second of silence both before and after the calls are heard. A feeding buzz is defined as a rapid series of calls indicating that the bat has detected prey.) The bat detector is then set at 30 and 40 Khz respectively, and the procedure is repeated for each frequency. These three frequencies are monitored because each represents different species groups, as per Appendix 3. Monitoring at each site should take 15 minutes.
2. Given that the protocol takes about 15 minutes per site and most bats are only going to be active for a two hour period, there is only enough time to do about six sites in one night. The sites chosen should be marked and re-used throughout the monitoring period, as well as in subsequent years so that results will be comparable. In order to sample all habitats in the restoration lands, it is recommended that two locations should be identified in the open interior, two along the inner edge of the forest, and two along the bank of the Fraser River. Sampling sites should be at least 50 meters apart.
3. Sampling should occur on a weekly basis from early June to mid August.
4. Use of bat houses and artificial roosts should also be monitored to determine effectiveness. This can be done by observing them periodically at dusk to see if any bats emerge. Chainsaw cuts could also be visually checked to see if any bats are using them.
5. Although not part of the restoration lands, the canal where water enters the penstank should be monitored periodically to determine if bats are roosting in the penstank. If bats are using this site regularly throughout the season, it could be a maternity colony, which would be worthy of special protection.

After receiving the above recommendations from Doug, a local volunteer who had attended the workshop built a few bat houses. These were erected onto a planted wildlife tree in the Lower Snag Area (Polygon 07) as directed by Doug Burles. No evidence of bat use has been observed at this time.

Bat surveying could be used to document species richness and relative abundance at the restoration site. A baseline survey could be done during the 2010 year and again in three - five year increments to see if these numbers have changed in relation to the restoration work.

The possibilities of undertaking a bat survey have been discussed over the last few years by naturalist members. Any movement forward in this direction will be dependent on sufficient funds to carry out a bat survey, and enough willing volunteers to undertake the monitoring as set out in the bat monitoring protocols.



Fig 111 Silver-haired bat roosting in bark on a Ponderosa pine

Fig 112 Bat houses installed at the restoration site



Fig 113 Community members enjoy an evening of batting with Doug Burles.

6.6 Other Wildlife Monitoring

Visual observations were also made by the restoration crew while working at the site, including inspection of tracks and other wildlife signs, and detection of species using the area. Many of these anecdotal sightings were recorded. The general public also reported sightings to the crew, showing a general appreciation for the work being carried out.

Table 10 below details some of these sightings.

“Some of the highlights from on site observations were numerous bird species observed using the restoration snags including Northern Flicker (*Colaptes auratus*), American Kestrel (*Falco sparverius*), common crow (*Corvus brachyrhynchos*), brown-headed cow bird (*Molothrus ater*), Western king-bird (*Tyrannus verticalis*), Downy woodpecker (*Picoides pubescens*), Pileated woodpecker (*Dryocopus pileatus*), and a Merlin (*Falco columbarius*). Deer were observed on the site on several occasions and lots of sign of deer, not as apparent over the previous two years, were very common. A black bear was observed running through the site and bear prints and scat appeared around the site in later summer. Red squirrel (*Tamiasciurus hudsonicus*) were common throughout the Cottonwood riparian zone and the Ponderosa pine zone. A red squirrel was also observed taking up residence in Screech-owl box 2. Small animal trails were observed in the freshly de-compacted soils post restoration work” (Odin Scholz, 2009).



Fig 114 - 117 Mule deer skull found on sandbar, small mammal tracks in freshly decompacted soils, bear prints on old roadbed R5, and sign of animal use on cwd in Polygon 17



Date	Species	Location	Observed Activity
Jun-09	Mule deer	Main access rd near water	Wandering through at 7:30am
Jun-25	Yellow Rumped Warbler	Atop largest diameter snag Lower snag area	Singing
Jun-30	Black bear	Very fresh scat NW corner of main parking lot/Also @ trail head to B17	Not directly observed
Jul-02	Mourning Dove	Riparian zone B17	Alighted in a cottonwood
	Osprey	Above site	3 birds observed circling above
	Mountain pine beetle	Riparian zone B17	Landed on my arm
Jul-03	Racer	Lower rd area across from B17 trail head	Not direct observation, found shed snake skin
Jul-10	Western kingbird	Upper snag area	Perched atop
		Lower snag area	3 Western Kingbirds perched on installed branches on restoration snag with bat houses
Aug-11	American kestrel	Lower snag area	Perched atop snag
Aug-17	Crow	Upper snag area	Perched on top of snag
Aug - 18	Downy Woodpecker	On first snag by road in the Lower Snag Area	Pecking away on pole for about 5 minutes until car scared away
Aug-19	Clarks Nutcracker	Pines along IR fenceline near pit area	Harvesting seeds from cones
	Black bear (juvenile)	Pit area	Running towards Cayoose crk.
Aug-20	Black bear , Mule deer	On old road above pit area	No direct observation, fresh bear and deer tracks along same path.
Aug-24	Common Yellowthroat	In northern riparian zone	Sitting on watering wand in northern riparian zone for about 3 minutes
28-Aug	Merlin	Lower Snag Area	Sitting atop large snag
Aug-31	Crow	Flying out of northern riparian zone (from 2nd snag down from creek)	With a snake in its beak. Dropped on the beach so I went to look - racer
1-Sep	Flicker	On the biggest snag at the lower snag area this afternoon.	Perched atop
Sep-29	Crow	Lower Snag Area	Cawing on top of snag
Oct-10	Downy Woodpecker	Upper snag area	Coming out of hole in snag and pecking
	Northern Flicker	Snag west edge of parking lot	Sitting on branch, flew to large ponderosa by the grave site

Table 10 Wildlife Observations by crew 2009

Snag Monitoring was undertaken on the twenty-two snags that were installed in 2008. Snags were installed to provide immediate structure to the site. Recording their effectiveness as wildlife habitat guides future work. These snags were visually inspected using binoculars in the fall of 2009 and evidence recorded.

“Any sign of use was recorded including an estimate of the height and aspect of modification. Of the twenty-two snags, ten showed direct evidence of woodpecker use, three additional snags showed possible woodpecker sign and three more showed some evidence of bird use by the presence of either feathers or droppings” (Odin Scholz, 2009).

Snag	Sp	Dbh	Height	2008 Notes	2009 Notes	Sign of Picidae use
1	Fd	53.2	5	snag very punky wood possible woodpecker sign	7 small cavities 5cm dia. Under 8' on stem	Y
2	Py	44.3	5	Punky wood near top slender cavity excavation	1 10cm dia cavity in chunk rot 12' up stem	Y
3	X	40.1	7.1		Cavity excavation in blocky rot top NW side of snag 20' up	Y
4	Py	39.8	6.2		1 site of excavation along fissure, slight NE lean.	Y
5	X	73.2	8.75	Riddled with 3mm dia insect bore holes (pre-erection)	4 <2cm dia 3 cm deep cavities 6' up SE side, scaling 8-14' up on NE side. Major fissures possible bat roosts.	Y
6	Py	61.1	3.6		No obvious sign of use, flicker has been observed on this snag	N
7	X	39.8	2.8		No obvious sign of use	N
8	Cw	45.2	4.75	3 Cw branches installed Oct 008	2 installed branches broken off no sign, bird droppings and feathers around base.	N
9	Cw	28	5.5		Leaning slightly NW, bird droppings on top of snag	N
10	X	33.4	5	1 Fd branch installed Oct 008	No obvious sign	N
11	X	51	8.75	5 Cw branches installed Oct 008	2 bat houses installed, 5 installed branches, no obvious sign of use	N
12	X	42.4	6	3 Fd branches installed Oct 008	Possible sign in top blocky rot cavity N side of tree 4 installed branches	p
13	X	43.9	6.5	2 Fd branches installed Oct 008	Possible gleaning on East side leaning NW 2 small cavities 1.6m up snag E side. 1 10cm cavity E side adjacent to installed branch. Small holes in linear row just below installed branch.	Y
14	X	64.6	7.75	6 Fd branches installed Oct 008 2m on south side 4 cm diameter cavity. Fig 7	excavation 7' up South side of tree 4.5 cm dia. Linear cavity 15' up on N side. 2cm cavity in blocky rot N side near top (6 branches)	Y
15	Py	40.1	3.5	Shattered down one side black lichen	3 round cavities near top 1 S, 1 E, 1 NE, 1 shallow bowl cavity 5' up N side.	Y
16	PY	50.3	3		Possible sign in top, low S facing cavity from bucket old cavity W 6' up	p
*17	PY	48.4	2.8		No obvious sign of use	
18	X	28.7	5		no obvious sign of use	
19	X	51.6	6.5		Possible cavities 8' up on E side and 20' up on W side. Bird droppings base E side snag	p
20	Py	40.8	5.5		Nice cavity 18' up S facing. Splinters of wood on ground around snag	Y
21	Py	54.1	3		One small cavity top NE side	Y
22	X	38.2	9.75		No obvious sign of use	N

Py(Ponderosa pine), Fd (Douglas-fir), Cw (Western red cedar), X(unconfirmed-likely Pine or Fir)

Table 11 Snag Observations 2008 - 2009

Just as the site complexing and native plantings are benefiting wildlife, wildlife also provide an important resource for introducing seed back into the site. The planting of snags and addition of other structural elements onto the site also provides a more visually appealing area.



Fig 118 - 119

Evidence of snag use at Powerhouse site



Fig 120 - 121 Snags were also planted in the demonstration garden at the native plant nursery. This snag is very popular - two birds 'fighting' over snag.



7. RESTORATION MONITORING

7.1 Reference Ecosystem

Reference ecosystem sites were identified to carry out comparative surveys for monitoring purposes. Odin Scholz reports:

“Visual assessments were made of sites in the area of the Powerhouse Road site that seemed similar enough in general characteristics to be reference ecosystems. The unique situation of the site - a large flat bench just above the confluence of two rivers at the meeting place of two valleys, made it difficult to replicate at any large scale” (Odin Scholz, 2007).

Very few sites in the valley bottoms with similar topography, aspect and soils, with little disturbance exists today in the Lillooet area. Small areas, with somewhat similar characteristics to the Powerhouse site were visually surveyed and/or soil pits dug. Photographic records were made.

“One of the best sites for comparison was the bench that sits up above the Powerhouse site accessed by going up Roshard Road to the yellow gate on the west side of the road. The site is ponderosa pine woodland with patches of shrub, herb, grass vegetative communities. The surveyed area was selected for its apparent lack of disturbance. The surveyed area is woodland and would be best compared directly with polygon 17 of the Powerhouse site ... This survey was conducted in August (2008) and a repeat of the survey in spring to capture the ephemeral species should be carried out” (Odin Scholz, 2008).

No survey work was carried out on the reference ecosystem site during 2009. The late start to the work season due to funding delays, the fire evacuation of Lillooet in the middle of the summer, and the resulting loss of summer student staff, meant that all our energies were focused at the restoration site and the native plant nursery.

It is important to continue survey of the established reference ecosystem to provide comparison data for the dryland bench restoration.

A survey could also be implemented in a riparian reference ecosystem to assist in monitoring changes over time at the restoration site.



Fig 122 Reference Ecosystem showing Ponderosa pine/bluebunch wheatgrass habitat

7.2 Permanent Photo Monitoring

Five permanent photo monitoring points were established during the 2008 restoration season at the Powerhouse site by Odin Scholz. Photo points were chosen to inform change in each major ecosystem type at the site: the Ponderosa pine dominated ecosystem, the riparian ecosystem and the upper dry bench. Photographs were taken before and after restoration throughout 2008 and 2009.

“Photo point placement was subjectively chosen by the site ecological restorationist with the intention of capturing restoration effects within each broad vegetative community type. At each chosen site a 60cm piece of 1/4 inch rebar was hammered into the ground leaving a 4 inch protrusion to permanently mark the photo location. Additional pins were installed to mark the exact placement of the meter board totaling five pins at four of the photo points and two at the fifth. The central pins were located using a hand-held GPS, and nearby reference points were chosen and distance and azimuth information was taken to locate photo point pin locations.

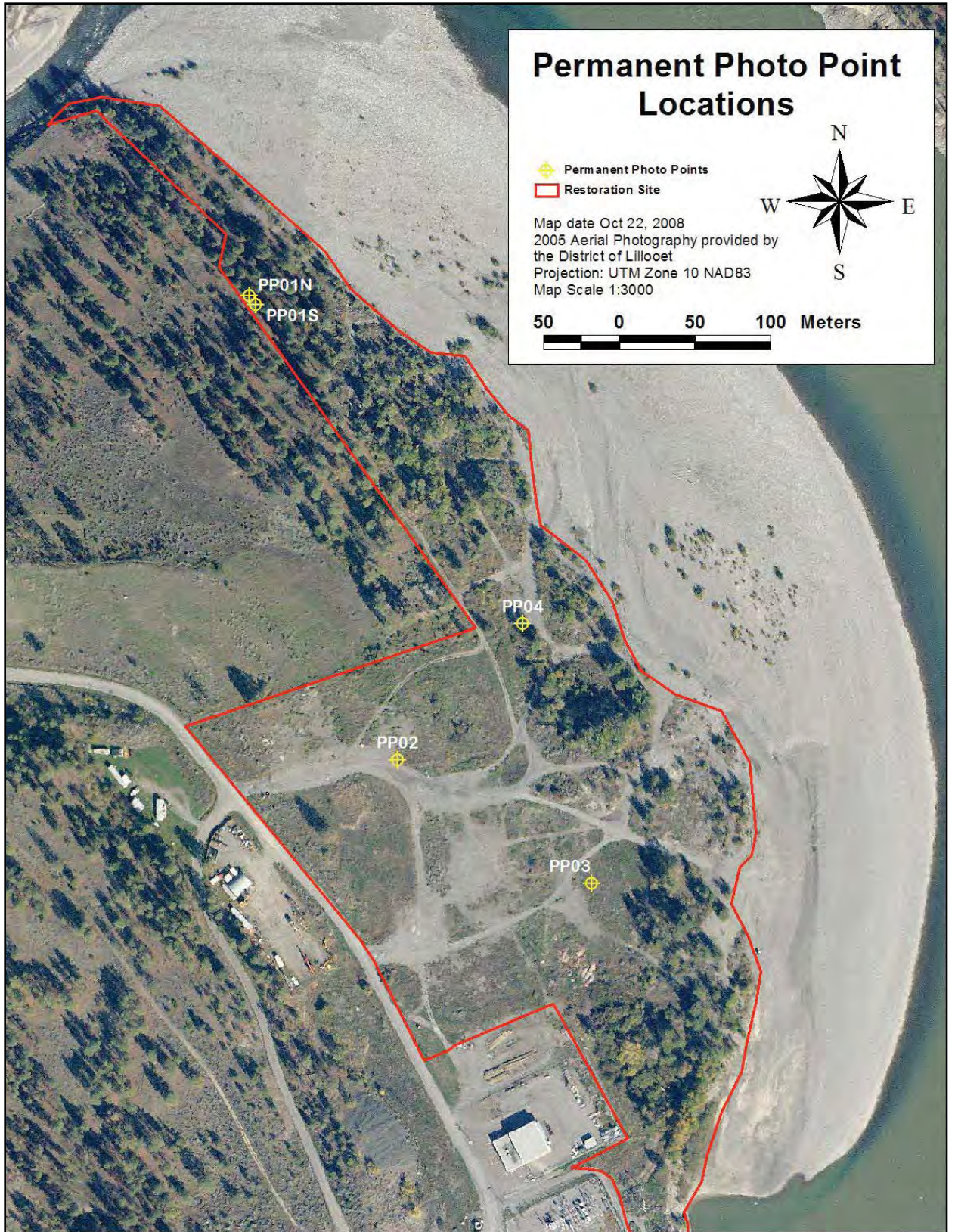
At each location a tripod was situated so that the camera was directly over the central pin. The lens height was recorded as a measurement from the ground to the center of the camera lens. A meter board was designed and constructed for the project to provide a standard reference tool in each photograph. The meter board is 1m X .10m wide. In each photo the meter board is placed 10m from the camera lens. In each photo the frame is centered upon the top of the meter board with the camera set on its widest angle. As the project progressed additional photos were taken from the camera narrowest focus to provide a closer look at the herbaceous layer.

At each photopoint, excepting PP01, the meter board was set 10m from the photopoint center pin at azimuths in the cardinal directions North, East, South and West. In polygon 17 the photo point layout was different because of the polygon being narrow and bounded by a barbed wire fence. The site chosen for the photo in polygon 17 was the site that showed the least amount of disturbance and high vegetation species diversity. For PP01 two pins were set in the ground 10m apart on a 320o azimuth, and photos taken back on each pin” (Odin Scholz, 2008).

Photographs using the photo points will continue to be taken each year to monitor the success of the restoration efforts at the site.



Fig 123 Example of a photopoint



Map 18 Permanent Photo Points

Results of permanent photo point monitoring are shown below by Odin Scholz, 2009:

- **PP01** in Polygon 17, South, (north end of riparian zone) shows that the treatment for alfalfa has been largely successful. As noted above in the weed section this area is now open to the native grasses and wildflowers which have started to seed into the area.



Fig 124 PP01 South BEFORE weed treatments May 28, 2008

Fig 125 PP01 South AFTER weed treatments October 27, 2009



- **PP02** in Polygon 04, West, (looking towards Upper Snag Area) shows some of the transformation from flat barren land to contoured land with structural features in the background. The foreground is part of the areas to be worked during 2010.



Fig 126 PP02 West BEFORE any work commenced June 13, 2008

Fig 127 PP02 West AFTER complexing & planting in sections of upland bench October 27, 2009



- **PP03** in Polygon 08, North, (Lower Snag Area) captures the changes taking place on a badly degraded sloping section of the site. Old roads and motorcycle tracks have been erased from the slope and the area planted with snags, boulders, cwd and native plants. A south-facing 'talus' slope has also been created on the bank.



Fig 128 PP03 North BEFORE complexing

June 04, 2008

Fig 129 PP03 North AFTER complexing

October 27, 2009



- **PP03** in Polygon 08, West, (Lower Snag Area) shows the roads coming off the main access road closed with structural features. Newly planted trees, shrubs and grasses have been planted and mulched with woodchips.



Fig 130 PP03 West BEFORE road closures (weeds removed)

June 04, 2008

Fig 131 PP03 West AFTER road closures & stocking with native plants

October 27, 2009



- **PP04** in Polygon 13, Pit Area, North, shows the gradual encroachment of native species as vehicle disturbance is removed from the area. In particular coyote willow are quickly establishing in the area.



Fig 134 PP04 North BEFORE road closures July 02, 2008

Fig 135 PP04 North AFTER road closures
September 04, 2008



Fig 136 PP04 North No vehicles have entered this area
that was traditionally a '4X4 bogging' site
June 25, 2009

Fig 137 PP04 North showing revegetation
October 27, 2009



The following photos were taken from the air during a helicopter flight over the site during both 2008 and 2009. these photos show a view of the site being transformed.

“The roads through the site are very apparent in the 2008 image. In the 2009 photo the roads are disappearing and being replaced with productive native soils ...Structural features and mulched planted areas can also be seen in Fig 139” (Odin Scholz, 2009).



Fig 138 Restoration site - upland bench from the air

July 11, 2008

Fig 139 Restoration site - upland bench from the air

October 30, 2009



8. COMMUNITY OUTREACH

The Lillooet Naturalist Society and Cayoose Creek St'at'imc regard this restoration project as an excellent opportunity to educate the public on the importance of protecting and enhancing wildlife habitat. Numerous activities have taken place over the last four years to garner the community's vision for the site, to inform the community about the changes taking place on the Powerhouse site and to involve the community in stewardship activities.

8.1 Restoration Outreach

The following outreach activities were undertaken by the restoration crew and volunteers during 2009:

- ⇒ Continuation of the Restoration Advisory Committee
- ⇒ Site walks with various groups and individuals. Walks through the site provided information on the restoration project, plant species, geology and wildlife
- ⇒ Regular discussions with community members using the site
- ⇒ Numerous volunteer events - seed collection, nursery work, fall planting events and outreach assistance
- ⇒ Four elementary and high school educational and stewardship days
- ⇒ Educational and stewardship day with the Uwiclimux youth
- ⇒ Wild About Plants Open House at the native plant nursery
- ⇒ Salmon in the Canyon Festival to highlight the restoration project and provide education on watershed stewardship
- ⇒ River Day Shoreline Cleanup
- ⇒ Participation in various community events organized by other groups, including Seedy Saturday, Roots Festival, Garden Tour, Canada Day, Earth Day and the Apricot Festival.
- ⇒ Bridge River Lillooet News articles and advertising
- ⇒ St'at'imc Runner articles and advertising
- ⇒ Radio Lillooet broadcast information on project, promotion of outreach events and interviews at some of those events
- ⇒ Updates at Lillooet Naturalist Society AGM and a Cayoose Chief & Council meeting
- ⇒ Presentation and restoration tour at the 6th Annual BC Interior Stewardship Workshops
- ⇒ Presentations at District of Lillooet and Squamish-Lillooet Regional District Council meetings planned for April 2010



8.2 Trail Development and Signage

Trails at the restoration site are slowly being developed to provide routes for the public to use while at the same time protecting critical habitat.

Volunteers and crew met at the site in May 2009 before any planned machine work began, to discuss foot trail placement. Discussions focused on using existing roadbeds where they could be downgraded to a trail, and ensuring areas that have high wildlife value are protected. Signage, showing trails marked on a map of the site, was also deemed important. The signage should also discuss the history, fauna and flora of the site, to increase an appreciation of the ecosystem and its importance to wildlife.

Over the last two years we have seen a recreational increase in public use of the site, and this increase is expected to continue. Therefore, it is important to provide a functioning trail that the public will use, and discourage traffic in key areas by deactivating and planting out old roadbeds that are currently being used. Based on these trail discussions, we have developed an initial trail plan. The first stages of this plan have been undertaken by:

- ⇒ restructuring the old roadway (R3U - R2) that follows the fence line in the riparian zone heading north towards Seton River (*Figs 141 - 142*).
- ⇒ deactivating the old roadway (R7) that begins at the first entrance to the site and continues east towards the Fraser River along the top bench and joins with the access road (*Figs 143 - 144*).
- ⇒ signage design has been discussed with initial mock layouts being developed. Signage structures were designed in collaboration with visioning session participants to ensure they did not detract from the natural assets of the site, and would be consistent with any work to be done in the future. The signage structures reflect the rich cultural history of the site by taking the traditional pit house and fish rack ideas and incorporating them into a welcoming shaded entrance to the site.

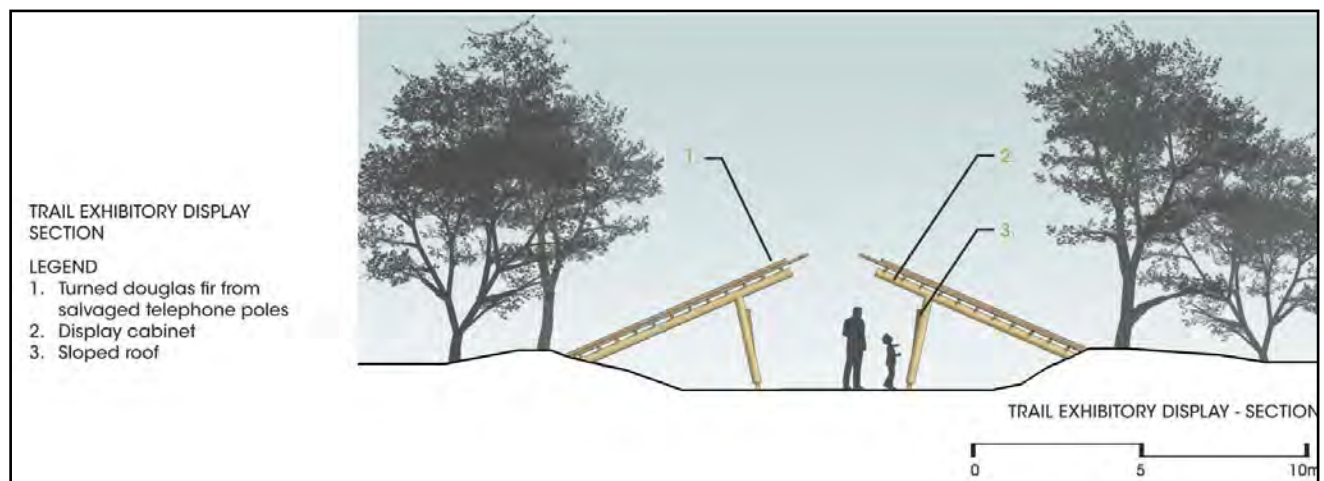


Fig 140 Sign structure developed by architect and based on visioning session participants' input.



Fig 141- 142 Trail through riparian road replacing an old rutted



Fig 0143 - 144 New trail developed on the upland bench and leading to the river. The soils have been contoured and planted with native grassland plants.



8.3 Extension Activities

During the last three years, while working on the restoration project, suggestions and discussions have centered on creating an increased stewardship ethic within our community. A large part of this project is to involve the public by generating an appreciation for the natural world.

Due to the success of the restoration project, we were able to leverage funding from other sources, in particular, the Fraser Salmon and Watersheds Program, to implement two specific activities during 2009:

⇒ *Three Rivers Join One Watershed Discovery Project:*

Seventeen riverside events were held to promote an understanding and appreciation for our local environment, and to enhance stewardship efforts. The most compelling outcome of this project was the creation of an environmental education program, focusing on our local watersheds and our connection to them. It is the only environmental education program in Lillooet that can be delivered riverside, at community events or in the schools. It not only reflects our rich First Nations culture but the wealth of knowledge in our local community by involving the elders, aboriginal leaders, scientists, naturalists and artists. It is a program that is designed to incorporate many methods of sharing information: artistic, scientific, cultural, and hands-on stewardship. Over 750 participants enjoyed the events and took home a bit more knowledge of our rivers and their importance to wildlife and themselves. Stewardship activities, including work at the restoration site, were included in all events. More information on this project can be found in the final report to the Fraser Salmon and Watersheds Program.



Fig 145 Travelling watershed trailer (BCRP logo on back) painted by artists and students. The trailer houses outreach supplies and opens up with display space and 'discovery' bins (shown opposite).



Fig 146 Children learning more about native plants during an event at Cayoose Creek Band Office

Fig 147 A collage of pictures from one riverside event. This event was held on the Bridge & Fraser Rivers, just north of the restoration site, and focused on salmon and healthy rivers.



Stewardship Activities - Planting of a native plant demo garden at the Bridge River Fishing Rocks on an eroded bank.

Art and Salmon

Finished native 'garden'.

First Nation cutting and drying of salmon and importance to community. Ethnobotany was also included.



Learning more about the Bridge and Fraser Rivers on a walk along the shores.

Scientific examination of salmon, focusing on gills and clean water.



⇒ *Visioning Sessions and Feasibility Study:* The idea of having a nature centre on the Powerhouse site or Lower Spawning Channels have been discussed over the last three years while work has been progressing on the restoration project. This feasibility study was undertaken to explore the feasibility of an interpretive centre and a wildlife corridor/trail system along the Seton River, joining the Lower Spawning Channels with the Powerhouse Foreshore Restoration site. Four visioning sessions, surveying and public information sessions were held. Two sessions were held in collaboration with an architect. He has developed pre-design plans for a nature centre and related trail system, based on the input of local people at the visioning sessions.

The feasibility study and pre-design plans could guide direction in establishment of a nature centre for Lillooet in the future at any appropriate site. Moving forward on a project of this scope requires a strong commitment from volunteers, and all the necessary legal permissions and requirements met. More information on this project can be found in the final report to the Fraser Salmon and Watersheds Program.



Figs 148 - 150 Tour of one of the proposed centre sites, display at a visioning session, and a pre-design plan.

A full report will be presented to BCRP for their information when the governing body feels it is ready to move forward with investigating the possibilities.



LILLOOET NATURE CENTRE - EXTERIOR PERSPECTIVE

Fig 151 - 153 Maps showing some pre-design plans for a possible wildlife corridor and trail system linking to important sites on the Seton and Fraser Rivers.



LEGEND

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Foreshore Reclamation Project Information Panels. 2. Western Screech Owl Habitat. 3. Watershed restoration at the intersection of Cayoose Creek and the Fraser River. | <ul style="list-style-type: none"> 4. Point of interest highlighting community history. 5. Migratory bird observation. 6. Seton Spawning Channel Pavilion site. |
|--|--|



9. DISCUSSION

The Powerhouse Foreshore Restoration Project was carried out by the Lillooet Naturalist Society, in partnership with Cayoose Creek St'at'imc, to implement Phase Two of the Restoration Plan.

This project has four main focus areas:

1. Increase wildlife habitat in an important and rare habitat of low-lying land within the mid-Fraser Canyon. The site is approximately 15 hectares - broken down into three distinct ecotypes: a large river sandbar at the confluence of the Seton and Fraser Rivers, a riparian zone and a dry upland bench. The site has recently been designated a Wildlife Habitat Area (WHA) for the Interior Western Screech-owl. We are working on providing habitat for a number of other threatened species including the Lewis' Woodpecker, Racer and Great Basin Gopher Snake.
2. Wildlife base-line surveying and on going monitoring to ensure our restoration prescriptions are meeting our goal of increasing wildlife habitat.
3. Build capacity within our community (both aboriginal and non-aboriginal) in the field of eco-based resource management and restoration so future maintenance of this site can be achieved, and future work can be carried out effectively.
4. Provide an educational resource to our community, where people can learn more about the natural world, including the importance of healthy watersheds. The aim is to instill a stewardship ethic within our community.

Currently, the restoration site has seen a high level of fragmentation, soil damage, and invasive weed dispersal, and the public perception of the area was for high-impact recreational use, partying and dumping. The Lillooet Naturalist Society, in partnership with Cayoose Creek St'at'imc, carried out research, community consultations and planning during 2006 and 2007. Restoration work began on the site during 2008, in cooperation with our community, and with funding assistance from Bridge Coastal Fish & Wildlife Restoration Program.

The restoration site has significant ecological value.

“This is a unique diverse place where two rivers and the moisture loving cottonwood forests meet with the arid ponderosa pine and big-sage-bluebunch wheatgrass ecosystems” (Odin Scholz, 2006).

The **riparian zone** provides critical habitat for the red-listed Western Screech-owl (*Otus kennicottii macfarlanei*) and Lewis Woodpecker (*Melanerpes lewis*). The Screech-owl has been observed and site protected as a WHA. The twenty-two 4X4/ATV roads that fragmented this zone have now been closed and replanted with native trees and shrubs to speed habitat recovery.

Based on research and survey of reference ecosystems, we have concluded that the highly disturbed **upland bench** was once a Ponderosa-pine/bluebunch wheatgrass ecosystem (blue-listed). However, the bench has seen historical impacts from railway, hydro and Transport Department activities, with recent vehicular recreational damage. All these impacts have created “dead-zones” and fragmentation, harbouring many invasive species. We are working on increasing habitat in this threatened ecosystem by decompacting and contouring old roadbeds, soil amendment where

necessary, increasing structural integrity, protecting areas of strength already evident on site, and removing invasive species before replanting with indigenous species. Work being carried out will target the Racer (*Coluber constrictor*) and the Great Basin Gopher Snake (*Pituophis catenifer deserticola*), both blue-listed species.

When the Lillooet Naturalist Society and Cayoose Creek St'at'imc undertook this project back in 2006, we were unaware of the large scope of the project. We have educated ourselves and called upon the expertise of many agencies and individuals to assist us in the restoration work and monitoring protocols. The Ministry of Environment, Fisheries and Oceans, BC Nature, Rivershed Society of BC, Wildeye Restoration, and many local professionals and contractors have provided their time and support to the project.

Vegetation and wildlife monitoring protocols have been established to ensure we are meeting our goal of increasing wildlife habitat. These will continue over the course of the project, and be built upon over the coming years.

As Lillooet is a resource-based community with logging the primary industry, we had few trained people in ecological management or experience in restoration work. This project has increased our awareness of the many facets of land management in relation to restoration and has developed the capacity of our community to continue work in this area by providing training and work experience opportunities. As well, many people have volunteered on the project and this knowledge has been transferred.

The single largest component for the success of this restoration project was to ensure strong public support. As the Powerhouse site is on the outskirts of Lillooet and is used by a variety of people throughout the year for various activities it was imperative that the community “buy-in”. Many people enjoy the foreshore of the Fraser River in a low-impact way. However, as stated in the *Preliminary Restoration Study of the Powerhouse Site 2006*:

“... changing public perception of the site is going to be crucial to stopping many of the ecologically damaging activities that currently occur on the site. The Powerhouse road land needs restoration and a facelift. Public perception needs to shift from the view of a wasteland where it is acceptable to dump garbage and waste, to the view of an ecologically diverse place with significant cultural and historical value” (Odin Scholz, 2006).

We have been successful in educating the public about the work being undertaken on site through various outreach activities. We have provided the community the opportunity to visit the site and view it through the eyes of various biologists, geologists and others with a passion for sharing the natural world. This type of outreach has been most successful to-date in strengthening the image of the site as a natural area with many exciting attributes. Many people have expressed surprise and pleasure when learning more information about the natural ecosystem on site. No further household, garden or building waste dumping has taken place since the roads have been deactivated; however, a small amount of picnic and party garbage is being removed on a fairly regular basis still.

The one-road access designation to the Fraser River, and all road deactivations undertaken in 2008, have been well received by the community. People continue to access the river and sandbar on the one access road maintained, and have, overall, respected the closures within the riparian zone and upland bench. However, on three occasions the boundaries were breached in six different locations,

with no damage evident. Reinforcement of these breached areas has now been completed and increased education efforts continued. The parking area on the upland bench has been developed with the aim of decreasing use of the sandbar by vehicular traffic. During 2009, we did observe an increase of people parking up on the upland bench and using the initial established trails to walk throughout the site. This is a small percentage of the users, but is an indication that public perception is indeed changing. One of the most dramatic changes observed through the road closures within the riparian zone, is the speed with which native plant species are recolonizing those areas independent of any intervention by the restoration crew.

There are a few challenges to creating barricades in the riparian zone, including extreme high water levels of the Fraser River. During 2008, the logs were secured to boulders to ensure they were not swept away by the annual high water events. During spring 2009, the Fraser River high water event was average and visual inspections of the logs placed during 2008 revealed no significant changes. One log had come unsecured from a boulder at one end and moved slightly off angle, causing no damage. A visual check of the logs and boulders will be made annually before spring runoff to ensure structures remain in place and do not cause any detrimental effects.

Site complexing, soil remediation and installation of structural features have again created a lot of interest and comment from the public. Most people using the site, and those that have taken part in outreach activities, now understand the significance of the standing snags, cwd and rock piles. Stumps, woodpiles, rock mounds and the installed wildlife trees have created mini-habitats that have attracted insects, birds and small mammals already. With continued wildlife monitoring of the site we will watch the evolution of wildlife use in relation to the restoration work being undertaken. These structural features also created micro-sites, providing shade and protection, where native trees, shrubs, herbs and grasses have now been planted. Over the last three years, approximately 2,853 plants and 539 cuttings have been planted out into the newly decompacted and weeded soils. The structural changes, and plantings, have already quickly changed the aesthetic of the place, creating the look and feel of a regenerating site. In some areas the old road access points and roadbeds are hard to find.

The northern end of the riparian zone has a significant Ponderosa pine stand and we have undertaken preventative measures over the last two year to protect them, due to the fact that they create important habitat for the Western Screech-owl, and other wildlife. No mountain pine-beetle attack has been observed to-date.

With our focus on the upland bench during 2009, removal of exotic weed species was a significant proportion of the restoration work carried out this year. Exotic plant species are a dominant component of the dry bench shrub/herb zone and are a part of the legacy of disturbance on the site. An exotic plant species inventory has been completed and mapped within the site, and a weed management plan is in place to guide a systematic approach to eradication. The Advisory Committee has decided that no chemical treatment of weeds will take place at this time. The restoration crew worked hard through the long hot summer mechanically removing weeds. Techniques used to remove invasive species during 2009 included labour intensive methods - hand pulling, digging and mulching. Fire control management again took place in two areas and biological controls are already evident on site for knapweed and toadflax. An experiment with a pickling vinegar mixture was undertaken this year on bindweed in an effort to weaken the plant over the long-term. Photopoint monitoring has been established and ongoing surveying will continue. Eradication of exotic plant species is a long-term commitment. Work will need to continue in this area until native species have a strong enough foothold to provide competition to the weed species.

As noted above, when exotics are taken out of the ecosystem it is important to replace them with native species as soon as possible, to fill the gap being left behind. This ensures that weedy species have some competition, making it more difficult for them to establish, and, importantly, it provides habitat for wildlife as quickly as possible after the weedy species have been removed. A large number of native plants are going to be required to restore the Powerhouse site to ensure productive habitat is achieved.

To ensure genetic adaptability of the planted species to the restoration site, a native plant nursery was established in 2008. Over 4,000 plants were successfully raised at the nursery throughout 2009. Various methods were used - salvage, cuttings, live staking, seeding - all generated from local stock. The native plant nursery provides an opportunity for community capacity building in the identification and propagation of native plants for ongoing restoration projects within the territory. The demonstration garden developed at the nursery will also provide an excellent educational resource for our community in dryland gardening that benefits wildlife.

In the fall of 2009, approximately 52% of the plants raised at the nursery were planted into the restoration site. The majority of the planting was done on the deactivated roadbeds on the upland bench. Based on the 2008 test plots established on the upland bench, a similar species mix was planted during 2009 - 5% trees, 20% shrubs, 75% herbs and grasses. The predominate species were blue-bunch wheatgrass and other dryland herbaceous species as noted above. Site contouring and mounding provided favourable micro-sites that optimized the potential for water recruitment and conservation. Providing depressions and shade forming features increases the likelihood of achieving good planting spots and should assist in the survival rate of new seedlings. This has proved true based on the monitoring of the 2008 planted species where there was an approximate 90% survival rate - a much higher rate of success than we had hoped for, especially considering the long hot dry summer of 2009. Plants were watered deeply on a weekly basis during 2009. This is a time-consuming task, and considering we now have approximately 3,300 plants and cuttings on-site, increased monitoring of the upland plants will guide the amount of moisture required to see them through their first year. It is hoped that the riparian plants established in 2008 will require little maintenance this coming restoration season, and that the dryland plants, being more adapted to the harsh conditions, will require less watering in.

We have had some challenges with live staking into the restoration site, with a 60% success rate. Ongoing research and method changes were implemented in 2009, and monitoring during 2010 will see if these measures have been successful. We also implemented direct-seeded plots for the first time this year in an effort to hasten the revegetation at the site. Monitoring of these test plots will be done and guide future work in this direction.

Wildlife studies have taken place over the last two years to provide on-going monitoring of species using the site. Monitoring protocols have been established to provide information on the success of the restoration project in attracting greater wildlife use of the site. The wildlife studies undertaken this year include a breeding bird survey, autumn migration survey, Western Screech-owl survey, reptile monitoring and a preliminary bat survey. A small mammal survey was not completed due to funding and timeline constraints.

We have received recommendations from all the biologists who have undertaken work on the site, as well as the initial recommendations of Jared Hobbs, MOE. We have begun to implement all of these recommendations with the goal of increasing and enhancing the habitat at the Powerhouse site. The work carried out in 2010 will continue to build on these changes. Through our on-site observations it

is clear that the features we have installed on the site are meeting the target of providing wildlife 'spots' that can be used by a variety of species, including the targeted species-at-risk. The ongoing wildlife monitoring efforts will be interesting to follow over the years to see if the restoration work does eventually provide productive habitat across the entire site.

A vegetation and wildlife monitoring audit of the restoration work was also completed by BCRP during the 2009 season. The audit was carried out by Rescan to report on the effectiveness of the work that the Lillooet Naturalist Society had undertaken during 2008. The information provided in that report was interesting and, overall, confirmed the work being carried out is proceeding successfully. Recommendations to assist us in fine-tuning our reporting and monitoring protocols were provided. Based on successful funding, volunteer expertise and commitments, we will attempt to incorporate these recommendations into our plans for 2010.

Community surveying and visioning sessions during 2007 - 2008 revealed that the community was interested in looking at additional extension activities that could develop from this restoration project. The Lillooet Naturalist Society and Cayoose Creek St'at'imc see the restoration project as a great learning tool and community capacity building exercise. Based on the desire expressed during the visioning sessions, the partners implemented two extension activities, both focusing on providing educational programs to increase the sense of wonder and appreciation for the natural environment, with the intent to instill a stewardship ethic within our community. We were able to leverage funding for these two projects from the Fraser Salmon and Watershed Program.

The *Three Rivers Join One One Discovery Project* attracted a wide range of people to riverside events where watershed information, stewardship activities, cultural information and fun, hands-on activities were implemented. Over 750 people attended the seventeen events held during 2009 and early 2010. This program will be continued during 2010 focusing on visiting the various schools, aboriginal communities and different organizations in the community, thereby extending our educational reach. Increased stewardship activities will also be held at the restoration site, building on the programs we already have in place on-site.

The *Visioning Sessions* focused on the idea of having a permanent place to hold educational and stewardship activities, and in having a staffed facility where restoration maintenance, monitoring and research could be based out of. Four visioning sessions were held and a Feasibility and Pre-Design Plan were completed. These preliminary reports will guide any future work towards reaching this goal.

Another extension activity was the idea of creating a wildlife corridor between the Powerhouse Restoration site and the Lower Seton Spawning Channels. The Visioning Sessions incorporated this idea into the Pre-Design Plan. A grant submission was made to BCRP for the 2010 year to undertake a Feasibility Study to map and survey the area and research possibilities of restoration work within the Seton River corridor that could benefit both fish and wildlife. It is thought that extending a functioning link between the two sites will assist fauna in their movements within the Seton River system.

Community outreach has been a large component of the restoration work carried out to date.

"Any successful restoration project, especially when close to a population center, needs to have a strong public support for it to succeed" (Odin Scholz, 2006).

The Lillooet Naturalist Society and Cayoose Creek St'at'imc are encouraged by the goodwill shown towards this project and the lack of vandalism that has taken place on site over the last two years. We believe this is due to our efforts over the last four years to involve the community in the visioning for the site and allowing all user groups to provide input.

Regular updates in local media sources have also provided ongoing commentary on the work being carried out, and interviews on Radio Lillooet presented. All events were posted on our website at www.lillooetnaturalistsociety.org. The contributions of the BCRP and our other funders have been acknowledged both in the media and at all events and presentations.

Numerous outreach activities, as indicated earlier in this report, have taken place over the 2009 restoration season and over 830 hours have been volunteered to the project by community members during *Volunteer Opportunity Days*, and through offers to assist in various aspects of the project. These volunteer days included a clean-up of the site, seed collection, salvage operations, nursery work, construction of the greenhouse and nursery upkeep, and the popular fall native planting days.

The combination of the unique ecology of the site, the easy access to the Fraser River and the active restoration project provides a powerful forum for ecological education. We have provided educational field walks and activities where a wide variety of the public (from seniors to young children) have been involved. A highlight of the year were the visits of two elementary school classes, and two groups of students from the high school, on different occasions. The restoration crew lead educational activities to teach students about the ecology of the site and the wildlife that use the area, including the Interior Western Screech-owl. The students then participated in stewardship activities such as planting native shrubs and mulching plants. Many of the comments expressed by the elementary students was the view that "this was the best field trip they had ever been on". One of the elementary classes have put together a short video of their experience at the restoration site. A link can be found on our website. As well as our regular naturalist volunteers coming out to plant in the fall, members of BC Nature, the Uxwalmixw Society youth and other new community members joined us and we greatly appreciate their assistance.

A lot of people in the community are interested in native plants and we have been involved in various outreach activities speaking about native specie identification, ethnobotany and the growing of plants. We attended the first Lillooet Seedy Saturday event and participants received seed to plant at home in exchange for propagating some for the restoration project. The nursery and restoration site were also requested to be on the annual Lillooet Garden Tour and we had the opportunity to speak with avid gardeners, some who had not visited the site before. We held an open house and barbecue at the nursery, and built three small demonstration gardens, with the assistance of volunteers, over the season - one at the native plant nursery, one at the Xwistan Bridge River Fishing Rocks during a riverside event, and one in the T'it'q'et Community Gardens during the annual Roots Festival.

The 3rd Annual Salmon in the Canyon Festival was hosted by the restoration crew, in conjunction with the Rivershed Society's SLLP program. The event focuses on our watersheds and how to live sustainably within them. The event provides an avenue for other BCRP projects and various organizations to present their findings and work to the community. Over 300 people were in attendance and enjoyed the information, salmon feast and entertainment.

Community capacity building in stewardship work has again taken place, with another five local youth trained as crew technicians through the Summer Works Program, and four Cayoose Creek Band members hired to assist at various times throughout the restoration season.

We are also proud of the fact that we were invited to give a presentation and tour of the restoration project at the 6th Annual Interior Stewardship Workshops held in Lillooet this year. We have also received a request from BCIT to speak to their students on our work, and to assist the Upper St'at'imc Language Culture & Education Society and Boston Bar Band in developing a ethnobotany native plant garden for their communities. We have also presented an idea with the District of Lillooet REC Centre staff to work on a more 'natural' entrance to the REC Centre using the tools and knowledge we have gained.

The Lillooet Naturalist Society and Cayoose Creek St'at'imc were able to leverage additional funds and support for this project during 2009 from Fraser Salmon and Watersheds Program, District of Lillooet, BC Nature, Public Conservation Assistance Fund, TD Friends of the Environment, Lillooet Community Foundation and Service Canada. Many local organizations and businesses provided in-kind support and donations/discounts on materials.

The greatest success of the 2009 restoration year was that we were actually able to complete all the restoration work we had set out to accomplish in our Year Two Plan. We were presented with some very real challenges: a late start to the project due to funding conditions; the hot dry summer, the constant noise of helicopters overhead, the resulting 11-day fire evacuation of Lillooet; and the loss of summer student staff after the evacuation. Through the major efforts of our three core staff, the assistance of volunteers in watering plants throughout the season, Cayoose Creek Band in finding three additional fall crew members, volunteers during the fire evacuation and fall planting season, and the commitment of Tommy Hancock, machine operator, we were able to successfully undertake the work required. The only component not completed was a small mammal survey. The Lillooet Naturalist Society and Cayoose Creek St'at'imc have reviewed the challenges we faced during 2009 and have developed a management plan that will provide greater staffing stability. We hope for more rain in 2010!

We are looking forward to embarking on Phase Three of the Restoration Plan during 2010. Our goal is to continue the work we have started on the upland bench - increasing habitat in this threatened ecosystem by decompacting and contouring old roadbeds, soil amendment where necessary, increasing structural integrity, protecting areas of strength already evident on site, and removing invasive species before replanting with indigenous species. Ongoing monitoring of both vegetation and wildlife will continue and be improved upon.





Figs 154 to 158 Outreach Events

Salmon in the Canyon 'Big Fish', Nature Day at Cayoosh Elementary School, Cleanups, Planting Volunteers, Learning about Screech-owls



Figs 159 - 162 Restoration Project focuses on wildlife, habitat and community - Down by the River, Salmon carcass, Ponderosa pine and blue-bunch wheatgrass.



10. RECOMMENDATIONS

The Lillooet Naturalist Society will follow a detailed restoration plan for 2010. The plan provides a step-by-step sequential process to assist in the enhancement of the site. This plan has information on all the exotic and native plant species and their occurrences with the site, as well as prescriptions on how to eradicate and replant with natives. The plan also has information on targeted wildlife currently accessing the site and those that are to be encouraged to use the area, as well as recommendations on how to promote greater diversity for wildlife use.

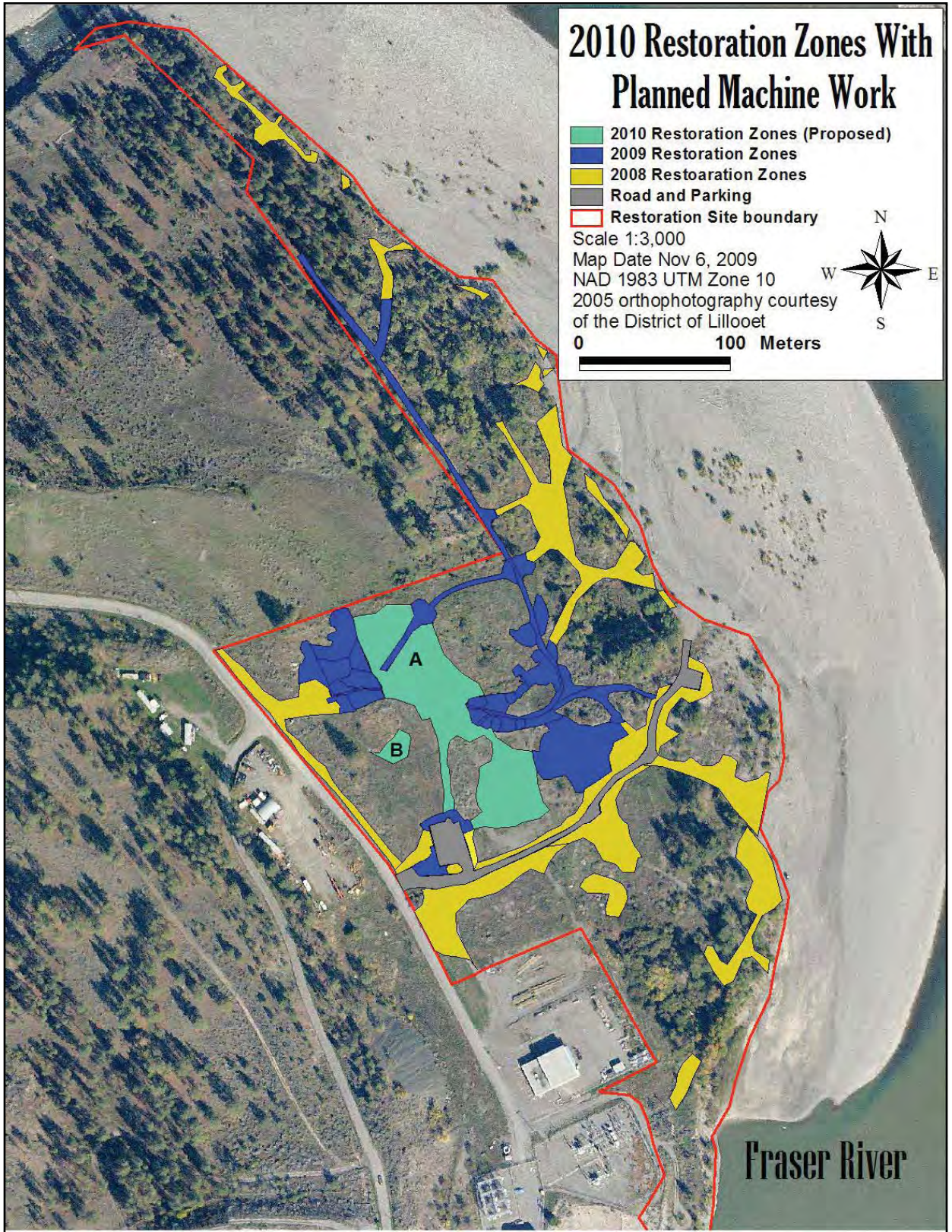
Recommendations provided in the BCRP 2009 Lillooet Biological Audit Survey, and the successes/challenges of the past two years work, will be incorporated into the restoration project based on funding and volunteer commitments.

The following is a summary of the tasks to be undertaken during 2010 - Phase Three of the project. Estimated timelines have been indicated. *See Map 19 below.*

Task	Completion Date
Hire of staff and set up of human resources/accounting functions/office space	15 April 2010
Produce a monitoring objectives and methods document	
Start up Advisory Committee with partner representatives	15 April 2010
Sign all legal documents and secure liability insurance	15 April 2010
Provide training to new crew members – initial training and continuing on-site training	30 April and ongoing
Native Nursery and Greenhouse start-up	01 May 2010
Protect designated Ponderosa Pines with pheromone treatments	15 June & 15 August 2010
Survey and monitor Reference Ecosystem	30 September 2010
Increase structural complexity on last section of top bench – deactivate roads, decompaction, soil remediation, contouring, and log/boulder/stump placement, removal of introduced gravels/asphalt	30 September 2010
Propagation of native plant species from local stock (seed, cuttings, salvage) – ongoing from spring to fall	30 October 2010
Removal of invasive plants in selected areas, working out from areas of strength – ongoing	30 October 2010
Remove seed sources of invasive weeds in sites in close proximity to the site	30 October 2010
Replanting of native plants in selected areas, immediately upon removal of invasive species – ongoing watering and maintenance of 2009 plantings during spring, summer, fall	30 October 2010
Monitor planted vegetation	30 October 2010
Increase wildlife habitat – using professionals' recommendations	30 October 2010
Continue wildlife monitoring on-site (birds, reptiles, bats) and implement new survey (small mammals). Implement monitoring on a control site (based on additional funding and volunteer commitment)	30 October 2010
Continue Trail Development based on input received in 2009	30 October 2010
Install additional trail-side signage	30 October 2010
Archaeological Monitoring – ongoing throughout project timeframe – and graveside work	30 October 2010
Community outreach – slide shows, field walks, newspaper & radio articles, educational and volunteer opportunities - Community capacity building in resource management and stewardship	15 December 2010
Monitoring and reporting – ongoing throughout project timeframe	15 March 2011

Table 12 2010 Restoration Plans

Application has been made for Phase Three work to the Bridge Coastal Fish & Wildlife Restoration Program. Additional funding to assist in restoration work and outreach activities has been requested from the Fraser Salmon & Watersheds Program and Habitat Conservation Trust Foundation. Staffing requirements have been requested through the Youth Eco Internship Program YWCA, Ministry of Social Development JCP and Service Canada.



Map 19 2010 Restoration Work Planned

11. ACKNOWLEDGEMENTS

Phase Two 2009 of the restoration project and report were completed with the financial support of BC Hydro Bridge Coastal Fish and Wildlife Restoration Program. We would like to especially thank Breanne Patterson for her support and encouragement over the last year.

We would like to thank our partners: Cayoose Creek St'at'imc, Michelle Edwards, Wayne Redan, Charmaine John and Trudy Redan for their assistance throughout this project; Sean Bennett, Department of Fisheries and Oceans, for his support of the project and in-kind commitments; Francis Iredale, Ministry of Environment for sharing his expertise with us on species-at-risk and establishing the Wildlife Habitat Area for the Western Screech-owl; Pat St-Dennis, Councillor District of Lillooet, Margaret Lampman Past-Councillor, Jeff O'Kelly, Birder, and Gillian Smith, Wildcrafter, for providing their time and advice while sitting on the Advisory Committee; Darren Oike, District of Lillooet, for all his help in mapping and legal title information; BC Nature for helping us with accessing funding, providing educational materials, and volunteering on-site; Fin Donnelly and members of the Rivershed Society of BC for providing advice and touring the site; the Lillooet Friendship Centre and Cayoose Creek Band Council for in-kind use of their facilities during outreach programs; District of Lillooet and SLRD for their in-kind contributions, and to the Bridge River-Lillooet News, St'at'imc Runner and Radio Lillooet broadcasters for their coverage of the project;

Thanks also to Ed Senger & Simon Warhurst for their time in discussing and making recommendations on how to protect trees on the site from Mountain Pine Beetle attack; Kenneth Wright and Jeff O'Kelly for birding surveys; Doug Burles for preliminary bat survey; Bob Deadman for volunteering to weekly undertake the reptile monitoring program and all his assistance at the native plant nursery and on-site; and to the local businesses and organizations who provided in-kind support and/or donations/discounts on materials, in particular CN Rail, Bob Johnson, Lillooet Feed & Garden, Lillooet Contracting, Rev-It-Up, Lillooet Tim-ba Mart, Buy-Low Foods and Pharmasave.

Members of the Lillooet Naturalist Society provided countless volunteer hours towards this project over the last four years. Thanks to the directors who have provided input into project administration - Vivian Birch-Jones, Ian Routley, Kenneth Wright, Scott Bodaly and Anne Heath. Thank you also to Ian Routley for his wonderful photographs used throughout the project, his quick response to any request for information, and his technical expertise at our open houses; and to all the volunteers who provided valuable time in assisting work at the site, in the nursery and at outreach events: Cathy Arthur-Stathers, Ursela Stephanie, Tim Malone, Judy & Scott Bodaly, Steve Hall, Candice Jack, Jan Wilson, Peter McAlister, Kim & Chris Davy and family, Nancy Humber and family, Terri & Chris Hurst, Maggie Lord, Doug Grossler, Ina Weber, Leigh McGinity, Keith, Mike Carson, Rose Adrian, Rita & Ken Dillon, Kelly DeStrake, Jacquie Moffat, Anne Heath, Marline John, Ruby Berry, Sue Senger, Janna Pike, Bob Chute, Bailey Phillips, Tim & Pam Paradis, Nancy & Lionel Leston, Sandy Horner & family, Jeff Sneep and family, Verne Rasmussen, Chris Galliazzo, Ken and MJ Oakes, Angela, Cedar and Sage Scholz, and Bill Spencer. To the Wild Onions, Willard Charlie, Faith Peters, USLCES, Uxwalmixw Society youth; and also to Ken Oakes, Jody Lane, Mindy Casselman and Lorrinda Casper for engaging their students in stewardship work.

Thanks to the crew technicians – Jennifer Calliou, Christopher Saul, Evan Narcisse, Tanner Dan, Brett Dillon, Karen Edwards, John Frank and Fred James. They were responsible for pulling weeds, digging, sifting through soil, salvaging plants, collecting and propagating seeds and assisting in outreach activities. To Tommy Hancock for his patience and good humour will undertaking all the machine work. To Alex North for his assistance in many varied ways on the project. Finally, we would like to thank Odin Scholz, who has worked with us on this project for the last four years and who is responsible for all mapping and supervision of field work. The *Final Report Phase Two of the Powerhouse Restoration Project, 2009* indicated the work carried out on the site this year and provided recommendations for 2010. Many of the details and recommendations found within this report are based on his meticulous field work.

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- Various websites were also accessed to obtain information on removal techniques for exotic plant species and planting of native species, as well as information on wildlife, their preferred habitats and monitoring techniques. This information is compiled in the *Powerhouse Foreshore Restoration Plan*.

Appendix I

Breeding Bird and Autumn Migration Monitoring at the Seton Powerhouse Restoration Site 2009

Attached.

Appendix II Financial Statement

Project # 09.W.SON.01

Financial Statement Form

	BUDGET		ACTUAL	
	BCRP	Other	BCRP	Other
INCOME				
<i>Total Income by Source</i>	171,880.00	247,960.00	171,796.45	
Grand Total Income (BCRP + other)				
EXPENSES				
Project Personnel				
Wages	85,717.25	19,000.00	90,780.91	16,570.00
Consultant Fees <i>(List others as required)</i>	15,000.00	11,200.00	9,936.25	46,592.35
Volunteer Labor	0	7,600.00	0	8,960.00
Materials & Equipment				
Equipment Rental	1,400.00	3,220.00	1,400.00	1,400.00
Materials Purchased	14,500.00	8,900.00	17,223.87	14,793.77
Travel Expenses	0		0	0
Permits <i>(List others as required)</i>	0		0	0
Materials - Log/Boulder/stumps/grav	2,000.00	8,000.00	659.40	6,000.00
Machine Work	36,100.00	0	34,762.58	3,732.00
Truck Rental	5,400.00	900.00	5,400.00	5,360.00
MPB Protection	1,950.00	0	1,926.40	0
Outreach/Signage	2,000.00	2,000.00	2,257.23	23,680.24
Administration				
Office Supplies	400.00	6560.00	867.90	6560.00
Photocopies & printing	80.00	0	266.22	100.00
Postage <i>(List others as required)</i>	0	0	0	0
Advertising/Promo	800.00	800.00	802.06	900.00
Outreach Supplies	1000.00	1600.00	1114.88	1,500.00
Advisory/ Training	2,350.00	900.00	1,561.21	470.00
Insurance/Payroll Processing/Space	2,000.00	5400.00	2,865.00	5,400.00
Total Expenses	171,880.00	76,080.00	171,823.91	133,954.36
Grand Total Expenses (BCRP + other)		247,960.00		305,778.27
BALANCE				
(Grand Total Income – Grand Total Expenses)	<i>The budget balance should equal \$0</i>		<i>The actual balance might not equal \$0*</i>	
	0		56.09	

* Any unspent BCRP financial contribution to be returned to: BC Hydro, BCRP
6911 Southpoint Drive (E14)
Burnaby, B.C. V3N 4X8
ATTENTION: JANICE DOANE

Appendix III Performance Measures

Project # 09.W.SON.01

Performance Measures

Using the performance measures applicable to your project, please indicate the amount of habitat actually restored/enhanced for each of the specified areas (e.g. riparian, tributary, mainstream).

Performance Measures – Target Outcomes			Habitat (m ²)									
Project Type	Primary Habitat Benefit Targeted of Project (m ²)	Primary Target Species	Estuarine	In-Stream Habitat – Mainstream	In-stream Habitat – Tributary	Riparian	Reservoir Shoreline Complexes	Riverine	Lowland Deciduous	Lowland Coniferous	Upland	Wetland
			Impact Mitigation									
Fish passage technologies	Area of habitat made available to target species											
Drawdown zone revegetation/stabilization	Area turned into productive habitat											
Wildlife migration improvement	Area of habitat made available to target species				X			X	X	X		
Prevention of drowning of nests, nestlings	Area of wetland habitat created outside expected flood level (1:10 year)											
Habitat Conservation												
Habitat conserved – general	Functional habitat conserved/replaced through acquisition and mgmt				X							
	Functional habitat conserved by other measures (e.g. riprapping)				X			X	X	X		
Designated rare/special habitat	Rare/special habitat protected											
Maintain or Restore Habitat forming process												
Artificial gravel recruitment	Area of stream habitat improved by gravel plmt.											
Artificial wood debris recruitment	Area of stream habitat improved by LWD plmt											
Small-scale complexing in existing habitats	Area increase in functional habitat through complexing				X			X	X	X		
Prescribed burns or other upland habitat enhancement for wildlife	Functional area of habitat improved										X	
Habitat Development												
New Habitat created	Functional area created										X	

Appendix IV Confirmation of BCRP Recognition

**Bridge River-Lillooet News articles
&
2 Examples of Nature Nook Articles submitted monthly to the BRLN**

St'at'imc Runner news articles

Posters for Community Outreach Activities

Logo Placement on Outreach Trailer

OTHER ACKNOWLEDGMENTS

Radio Lillooet Announcements

Public Acknowledgements at the Salmon in the Canyon Festival

**Slide show and Powerpoint Presentation at community events
and
at the 6th Annual Interior Stewardship Workshop**

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Restoration program visitors

The B.C. Hydro Bridge Coastal Restoration Program (BCRP) group was in Lillooet last Wednesday and Thursday. The group met at the REC Centre to update the Bridge River and Seton Lake watershed plans. There was very good local participation from the St'at'imc and the local naturalist group among others, including the Department of Fisheries and Oceans and Ministry of Environment. Following the meetings, a few of the BCRP group enjoyed a tour of the powerhouse restoration site. BCRP funding for this year has been approved for various local projects including continued restoration work at the powerhouse site. (Photo courtesy of Kim North; caption courtesy of Vivian Birch-Jones)

Xaxli'p Community Meeting

Rescheduled to
DATE: April 18, 2009
TIME: 10:00 am - 2:00 pm
PLACE: Nuk'way'lh
Lunch will be provided
DEADLINE FOR AGENDA ITEMS
APRIL 15, 2009 at 12:00 NOON

For more information contact Susan Saul at 250-256-4800



Funding aims to create jobs

(Continued from page 6)

The Towns for Tomorrow and LocalMotion projects are part of an overall \$14-billion capital infrastructure program supported by the province that will create up to 88,000 jobs and help build vital public infrastructure in every region of B.C.


Beyond this funding announcement, the government of Canada is taking important steps to support economic growth.

Canada's Economic Action Plan, announced in budget 2009, is a balanced stimulus plan that includes massive investments in infrastructure, tax relief and transfers.

This plan will provide close to \$12 billion in new infrastructure stimulus funding over two years that will address needs in communities across Canada, as well as contributing to long-term economic growth through investments in public infrastructure, such as roads, water treatment, green energy and transit.

5 million adult Canadians have serious problems with reading, writing and math.

1-800-303-1004 www.abc-canada.org




THE BR-LILLOOET NEWS TURNS 75!

Everyone has a story about Lillooet! The news office would like our readers to share your memories, stories & photos of Lillooet over the last 75 years. We would like to share them with all the newcomers and oldtimers alike. Contact the News Office for more information 250-256-4219 or news@lillooetnews.net



Grand Illusions Magic Show
 Featuring
David Attwood

Experience the Magic & Wonder



The Must See Event of the Year

April 23, 2009
 Lillooet Secondary School
 7-9pm
 • \$10 Adult • \$3 Child (13&Under)
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Lillooet Peace & Ecology Group presents

EARTH DAY EVENTS

See brochures & posters for More details! Or call 256-4700

<p>Wednesday, April 22nd ** EARTH DAY **</p> <p>7 pm at Lillooet Friendship Centre</p> <p>FILM NIGHT</p> <p>RACHEL CARSON'S Silent Spring</p> <p>The Classic that Launched the Environmental Movement: In her 1962 book <i>Silent Spring</i>, Carson asserted the right of citizens to be secure against the intrusion of poisons applied by others. Her legacy remains important to this day.</p> <p><i>Prior to the film:</i> Jacquie Rasmussen will present BC Wildlife Federation's "Wetland Creation Project" planned for Cayoosh Elementary School.</p> <p>Admission by donation to the Lillooet Food Bank or Doctors without Borders</p>	<p>Saturday, April 25th</p> <p>24th Annual Walk for Peace, the Earth and Social Justice</p> <p>12 noon at the REC Centre Lawn- Gather at 11:30 with your family and friends, bring signs/banners/drums if you choose, and share in the walk to support peace, the environment and social justice (including real democracy) which are increasingly at risk locally and globally. Bring a picnic lunch, and add your thoughts to the sharing circle after the walk.</p> <p>Powerhouse Restoration Site Visit At 2:30 pm, Lillooet Naturalist Society members will lead a walk through the Powerhouse restoration site to discuss the project, the cultural aspects, the plants and the wildlife. Meet at 2 pm on the REC Center lawn.</p> <p>Planet Peace Café 5:30 pm to midnight at the Lillooet Friendship Centre, featuring:</p> <p>ORGANIC DINNER Lasagna (meat or veggie), salad and bread. Adults: \$12; Kids 12 and under: \$8 Potluck Dessert Table: Baked offerings welcome.</p> <p>OPEN STAGE with local entertainment (musicians, poets & other fine folk)</p> <p>~ A family-friendly event ~ ALL ARE WELCOME!</p>
--	---

Police Blotter

(Continued from page 8)

Police are still investigating the theft and the cause of the fire. No suspects have yet been identified.

MAN STOPPED WITHOUT LICENCE

A local man was stopped by police on April 16 and found not to have a current driver's licence.

In British Columbia, if you drive repeatedly without a proper driver's licence, then any vehicle (including those belonging to work, friends or parents) you are driving can be towed and impounded.

In this case, the driver's vehicle was towed and has been impounded for 30 days.

POLICE WANT PUBLIC HELP

Do you know anything about any of these crimes? Please help your neighbours and call the police or Crime Stoppers if you have any information that will help.

A male was put into a chokehold after his fishing partner demanded he share the wealth of his employment insurance cheque. The victim, fearful for his life, began to strike his attacker in the head with a rock.

The victim's wife, who was also nearby, assisted by striking the assailant with a small log in the back of the head. Charges of assault are pending.

Stumbling man lands in cells
 During the afternoon, a member observed an intoxicated male having trouble keeping his balance in the blowing winds of Lytton.

The male was approached and immediately became belligerent with the police. He was arrested for causing a disturbance as he showed explicit signs of intoxication.

He was booked into cells for his own safety. Upon his release, he was issued a violation ticket for being intoxicated in a public place under the Liquor Control and Licensing Act.

APRIL 15

Garbage collection
 A complaint was made when a male was seen collecting discarded refuse inside the perimeter of the Thompson-Nicola Regional District landfill transfer station on Highway 12 while it was closed.

Police are still gathering further information and the perpetrator may be charged under the Trespass Act.

APRIL 16

Woman bothers neighbours
 Shortly before noon, the police took a complaint of an intoxicated female walking from door to door at Two Mile reserve in Lytton, banging on neighbours' doors.

Police made patrols in the area and the suspect female was located walking barefoot in a heavily intoxicated state.

The woman was arrested for causing a disturbance and subsequently brought back to cells to be held until

sober. While in cells, the intoxicated female became hysterical and informed members that she simply had beer for breakfast and there was no reason to be held.

Upon her release, she was issued a violation ticket for being intoxicated in a public place under the Liquor Control and Licensing Act.

APRIL 17

Man changes mind on sleep
 A male who was looking for a place to sleep approached police on Main Street.

The male informed Lytton members that he was really intoxicated and would like to go to cells to sober up. The man, who was grossly intoxicated, was arrested for causing a disturbance.

Immediately after his arrest, he changed his mind and threw his one best punch in an effort to resist arrest.

The male, outnumbered by police, was quickly subdued and brought back to cells.

Prior to his release, he was fined under the Liquor Control and Licensing Act for being intoxicated in a public place.

APRIL 18

Family reunion
 In the evening, police encountered an intoxicated male walking down Main Street.

While talking to the male, his intoxicated mother approached the police and began to criticize them for "roughing" her son up. Both parties were arrested for causing a disturbance and brought back to cells.

Later on, the grandmother of the male was found wandering the streets of Lytton, looking for her daughter and grandson.

She, who was also intoxicated, was arrested for causing a disturbance as well. The family, which spans three generations, thanked the police for arrested them as they were able to spend quality time together in cells.

Lytton Detachment

APRIL 13

Illegal logging at Six Mile
 A complaint was made to Lytton RCMP that trees were being illegally harvested on private property located at Six Mile on Botanic Creek Road. The property owner declared several trees had been harvested without his permission.

This matter is still under investigation and police are requesting that anyone with information related to this theft contact the Lytton detachment.

APRIL 14

From fishing to fighting
 A peaceful day of fishing turned to bloodshed for three parties fishing on the Thompson River.

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 (contact Belinda at the news office for more information)



PLACE YOUR CLASSIFIED AD

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1010 Announcements

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Lillooet District Hospital Foundations 2009-2010 Memberships Are now due. Cost \$5.00 Available at Created By Design Flower Shop or through Foundation Members



In Memoriam

Have you wanted to pay tribute to a departed loved one? We have compiled a booklet to assist you with some appropriate verses.

Now available by email

1215 General Employment

EMPLOYMENT OPPORTUNITY

Rugged Edge Holdings Ltd. is currently seeking individuals with mining exploration camp and core cutting experience for a summer program to be held in the Lillooet area. Level I First Aid and general maintenance knowledge are requirements. This is a temporary full-time position for a 2-3 month duration. References are required.
Please apply with resume to julienr@telus.net

1215 General Employment

1135 Personal Messages

ARE YOU losing a loved one to substance abuse? Our program has the highest success rate. Help is only one phone call away! 1-877-782-7409; www.nar-conon.ca

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1215 General Employment

1215 General Employment

SUMMER EMPLOYMENT

POWERHOUSE FORESHORE RESTORATION PROJECT

A joint project with Cayoos Creek St'at'imc & Lillooet Naturalist Society

FIVE POSITIONS CREW TECHNICIANS

- Duties:**
- Native plant propagation
 - Planting trees, shrubs, cuttings and seeds
 - Invasive weed removal
 - Building
 - Mountain Pine Beetle mitigation work
 - Restoration test plotting, mapping and monitoring
 - GPS work
 - Assistance in wildlife surveys and monitoring
 - Event planning and implementation
 - Public education field walks and presentations
- Qualifications:**
- Students aged 18 to 30
 - Good physical condition
 - Willing to work outdoors in all weather conditions
 - Good communication skills
 - Knowledge of St'at'imc culture an asset, but not essential
 - Students must currently be enrolled, and planning to return, to a post-secondary program in natural resource sciences, environmental studies, horticulture or similar programs.
 - Aboriginal students, women and people of visible minorities are encouraged to apply.

Date of Employment:
15 weeks: 19 May to 27 August 2009
35 hours per week
Salary: \$12.00 per hour
Positions subject to funding from Service Canada. On the job training and experience.

Deadline for Applications: 11 May 2009 NOON

To: Charmaine John
Project Coordinator
Cayoos Creek Band
Box 484
Lillooet BC V0K 1V0
OR Email to: kinnorth@gmail.com
Kim North Lillooet Naturalist Society



SCHOOL DISTRICT 74 - (GOLD TRAIL) REQUIRES AN EXECUTIVE ASSISTANT (EDUCATION DEPT) DISTRICT ADMINISTRATION OFFICE, ASHCROFT

Reporting to the Superintendent of Schools, the Executive Assistant provides administrative and secretarial support to the Superintendent of Schools, the Director of Instruction, and the Board of Education.

- The successful candidate will possess:
- Excellent communication (verbal and written), organization, human relations skills.
 - Flexibility, initiative, and ability to work under pressure with minimum supervision.
 - A service-oriented approach, including ability to maintain a positive relationship with employees and employee groups, senior administration, the Board of Education and members of the public.
 - Extensive experience with Microsoft Office Suite including Word, Power Point, Access, Excel and FrontPage.
 - Qualities of a self-directed team player.
 - Thorough understanding of the BC Public Education system.
 - An ability to maintain information of a highly confidential nature.
- For full details of this position, please refer to the school district website at www.sd74.bc.ca.
The successful candidate will commence employment effective 01st June 2009.

A detailed résumé, including references, must be received not later than 4:00 p.m., 15th May 2009, and directed to the attention of:



Lynda Minnabarriet, Secretary-Treasurer
P.O. Bag 250, Ashcroft, B.C. V0K 1A0
Fax: 250-453-2425
Email: sd74jobs@gw.sd74.bc.ca



The Bridge River Lillooet News



Established by 'Ma' Murray in 1934 • Volume 79, Issue 27 • Wednesday, July 8, 2009

Life after gang life



Armando Lucio shares experience with Lillooet youth Pages 3

Water Meeting



Ratepayers host the Council of Canadians Page 8

4 Day Forecast provided by ENVIRONMENT CANADA

Wednesday Chance Rain High: 24 Low: 16

Thursday Part Cloudy High: 26 Low: 14

Friday Sunny High: 29 Low: 14

Saturday Sunny High: 32 Low: 15

The Bridge River Lillooet News is a division of Glacier Media Group

\$1 including GST



Three Rivers Join One debuts Saturday Free workshops on watersheds

ROBIN POON

Anyone who wants to learn about the local rivers and protecting them can take part in a series of free workshops starting Saturday and running through winter.

The Three Rivers Join One project will focus on the Bridge, Seton, and Fraser rivers and Cayoosh Creek.

Jacque Rasmussen and Bonnie Michell will work as stewardship facilitators for the project until February 2010. In total, Three Rivers Join One expects to host 16 river-related events and activities between now and then.

"The first goal is education about the watersheds," said Rasmussen.

But the project is also about how humans can help or hinder watersheds.

"The other goal is stewardship and sustainability," she added.

"You want to live in a way where you're not impacting the world's resources."

For the most part, the workshops will run on the riverbanks. Three Rivers Join One is also renting a trailer filled with educational materials that will be present at each site.

The first event will be held this Saturday from 10 a.m. to 1 p.m. at the Bridge River fishing rocks.

The themes for the day are the Bridge River watershed, salmon, and First Nations culture.



Canada Day Celebration in the park

Lillooet held its first Canada Day celebration in recent memory last Wednesday. Among the activities in the park were a live performance by Len Fardella, games, facepainting, and a tour of the newly renovated museum and visitor centre. Above Mayor Dennis Bontron cuts the birthday cake while Chamber of Commerce president Bruce Jaffary and the volunteer servers admire his handiwork.

Photo courtesy of Sue Bell

However, the workshops will go well beyond classroom instruction.

"We just want to make it hands-on and enjoyable," said Rasmussen.

Asked what activities attendees should expect, she said, "It will be things that will require good footwear."

They suggested some possible activities are wildlife viewing, scavenger hunting, and hiking. And, Rasmussen said, as the seasons change, activities will change, too, like tracking in winter.

Michell will give a First Nations perspective to life along the rivers.

"With Bonnie at the helm, we're going to incorporate culture, life...history, ways of living, plant and animal use," said Rasmussen.

The project will also tie into other environmental initiatives in the area like the shoreline cleanup at the powerhouse restoration site. Rasmussen said, "This project is very tied to the restoration site down by the river."

Continued on page 2

Federal funding supports new opportunities in Lillooet USCLES receives investment for Cultural Heritage and Learning Centre

Recently the Honourable Chuck Strahl, Minister of Indian Affairs and Northern Development, and Member of Parliament for Chilibuote - Fraser Canyon, on behalf of the Honourable Lynne Yelich, Minister of State for Western Economic Diversification, announced Government of Canada support for the Upper St'at'imc Language, Culture and Education Society to develop a strategic tourism plan.

"Our Government is taking action to support our mountain pine beetle-affected communities," said Minister Strahl. "Investing in the Cultural Heritage and Learning Centre is an important step in creating new opportunities in Lillooet and strengthening our region."

Funding of \$90,000 is provided through Western Economic Diversification Canada under the Community Economic Diversification Initiative (CEDI), a component of the federal Mountain Pine Beetle Program.

"This contribution to the work of the Society will move us closer to the realization of our dream to build the St'at'imc Heritage and Learning Centre in Lillooet. The Centre will serve as a Cultural Tourism hub that will also support and promote the revitalization of endangered St'at'imc language, culture and arts," said Chief Larry Casper.

The Upper St'at'imc Language, Culture and Education Society will implement activities promoting the St'at'imc culture. The Society will strengthen tourism within Lillooet through key activities including: a strategic plan and study dealing with the feasibility, construction and operation of a new St'at'imc Heritage and Learning Centre; a new initiative termed "St'at'imc Cultural Experiences" to collect and evaluate community assets to promote tourism; as well as the development and pilot testing of tourist-marketing materials.

Managed by Western Economic Diversification Canada, CEDI will invest more than \$33 million over two years towards projects in western communities most at risk from the Mountain Pine Beetle infestation. The program supports a wide range of projects that further economic growth, employment and future community sustainability.

Continued on page 2

Community Events Guide

Listings are free for not for profit events and service groups. AGM Notices are not accepted and will be asked to participate in a paid advertising. Send your listings to: sales@lillooetnews.net prior to Friday at 12 noon. Space is limited please have information submitted at least two weeks prior to event date.



Upcoming Events & Volunteer Opportunities

Lillooet Native Christian Fellowship Sunday Service at the Lillooet Friendship Centre 1 PM for more info 250-256-7709

Buddhist Meditation Group Mondays at 7:30 PM near Lytton. For more information contact Victor Stepan at 250-455-2232

LA to Legion Regular Meetings 7 PM 3rd Thursdays of the month - September to May, except December

Lillooet Food Matters 3rd Mondays of the Month 5:30 PM at varying venues. Please contact Sarah or Roger Barrett at 250-256-7553 for meeting details.

2nd Annual Apricot Tsaqwen Festival Join us for a weekend of fun. July 24-26. Farmer's Market, Street Dance, Live performances, Sturgeon fishing and a whole lot more. Stay tuned or you can go to www.lillooetbc.ca for more information.

Lillooet Gospel Chapel Service Hours: Sunday School 9 AM - Service 11 AM. 1147 Main st. www.gochapel.ca

Lillooet Shambhala Meditation Group Sundays at 9 AM - South Central Health Unit. Call Ina 250-256-0667

Lillooet Legion Branch 66 Hall 737 Main St. Meat Draw: Every Friday 5:30pm

Lillooet Lions Meeting Meet 1st & 3rd Tuesdays of the month, 7 PM in the Legion Hall Basement, 737 Main St.

Three Rivers Join One Project Free community events to increase awareness of the Seton, Cayoosh, Bridge and Fraser Rivers. Snacks, games, activities and fun! First event will be July 11, 2009 from 10am to 1pm. Bridge River Fishing Rocks - confluence of Bridge and Fraser Rivers Contact: Jacquie Rasmussen 256-4292 or Bonnie Michell 256-2361

Water Meeting with Guests from the Council of Canadians who will be speaking to several other towns which are having issues similar to ours: unwanted residential metering initiatives, local governments avoiding public approval processes, and grant-driven development projects overriding local community vision.

July 17th at 7pm at the Seniors Centre, hosted by the Lillooet Ratepayers Association.

Lillooet Farmer's Market Fridays until October Main St. Across from Post Office

Order of the Royal Purple Meet second & fourth Mondays of the month, 7:30 PM at the Elks Hall, 640 Moha Rd. New Members Welcome. Contact Maureen Frantzen for more info 250-256-4523

BPO Elks #467 Meet first & third Mondays of the month. 7:30 PM at the Elks Hall, 640 Moha Rd. New members welcome. Contact George Frantzen for more info 250-256-4523

Seeds of Hope Soup Kitchen at the United Church, LUNCH IS SERVED ON MONDAY'S AT NOON. For more info or to volunteer contact Ailsa Wolfe at 250-256-4744.

Lillooet Quilters Guild Meet last Wednesday of the Month 7pm at the Friendship Centre September thru June

Rivershed Discovery and Open House at the Lower Spawning Channels Saturday 25 July Come see the Native Plant Nursery, learn more about dry-landscaping to attract wildlife, ethnobotany, wild plant uses, worm composting, natural weed control and much more. We will be providing a BBQ. Come help us raise the new greenhouse and take part in fun games and activities.

Nature Centre Visioning Session Wednesday July 15 Drop in anytime between 1:00-7:00 pm Lillooet Friendship Centre Provide your input into whether we want/can run a Fraser River Nature Centre in Lillooet, what you would like to see in such a centre and green design ideas. Colleen Jacob and Toby Mueller are facilitating this event

Experience Aikido with a Master Aikido is a non-violent art of self-defence. **Friday July 24, 11:30 am to 12:30 pm at the Ucwalmicw Centre Ki Development Class** by instructor Joseph Crotty Sensei from Los Angeles: Chief instructor, Aikido Institute of America **Everyone welcome; Admission by donation** For more information on Seidokan Aikido Retreat from July 23-26 or Ongoing classes with Lillooet Seidokan Aikido, please call Mariko at 250-256- 0686

Watershed, salmon, and First Nations culture

Continued from page 1

She pointed out that habitat conservation and restoration are strongly related to the concepts of stewardship and sustainability.

Perhaps most interestingly, Three Rivers Join One is pushing the first phase of a community-mapping project, in which artists are invited to go beyond standard cartography.

Instead, they are being invited to draw maps of places and include elements of personal significance, like favourite fishing holes, and flourishes that reflect the land portrayed.

But, Rasmussen said, "We need more artists to be part of the project."

If the community mapping is successful, that project may be expanded into more phases.

The Three Rivers Join One project is funded with grants from the Fraser Salmon and Watersheds Program and Bridge River Coastal Restoration Program (itself funded by B.C.



Elaine James gives a demonstration of salmon drying out at Bridge River last summer.

Hydro).

The Lillooet Naturalist Society and Cayoose St'at'imc secured the grants on the project's behalf.

Although some of the activities will be aimed primarily at students, the facilitators stressed that everyone is welcome to the free workshops.

"We want to attract as many different people," said Rasmussen.

Michell agreed. "The more people know about us, the better."

For more information on the Three Rivers Join One program, call Rasmussen at 250-256-4292 or Michell at 250-256-2361.

USCLES funding

Continued from page 1

The CEDI program is part of the Government of Canada's \$200 million comprehensive response to mitigate the short and long-term effects of the Mountain

Pine Beetle infestation on B.C.'s forestry sector. This federal Mountain Pine Beetle Program is led by Natural Resources Canada, in collaboration

with Western Economic Diversification (WD) and Transport Canada.

Western Economic Diversification Canada works with the provinces, industry associations and communities to promote the development and diversification of the western economy, coordinates federal economic activities in the West and represents the interests of western Canadians in national decision-making.

For more information on the federal Mountain Pine Beetle Program, please visit: <http://mpb.cfs.nrcan.gc.ca>



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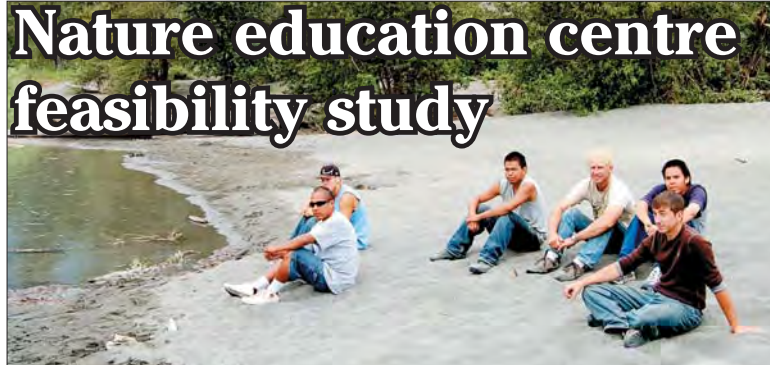


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community

JULY 8, 2009 Lillooet News Page 13



Support the dream

TOBY MUELLER

Special to the Lillooet News

The Powerhouse Foreshore Restoration Project is a community project led by the Lillooet Naturalist Society and the Cayoose Creek St'at'imc. The project has undertaken an ecological restoration where Cayoose Creek and the Fraser River meet. People have been planting trees, pulling weeds and doing other work to bring this place back to the way it used to be. This project engages many important cultural and ecological values and has received widespread support. While doing this work this idea of building a Nature Education Centre on this site took seed. The Foreshore Restoration Project received funding from the Fraser Salmon and Watersheds Program and B.C. Hydro Fish and Wildlife in order to complete a feasibility study to see if the community of Lillooet wants to support this dream of a Nature education centre. Colleen Jacob and Toby Mueller have been hired to ask people what they think, study the way other centres have been built and operated and produce a plan which can help the idea move forward.

Nature education centres offer a wide range of educational experiences. Being in nature awakens our curiosity and makes learning fun, giving people the chance to learn from direct experience and hands on activities. A Nature Centre helps us understand the interconnectedness of all living things. It gives visitors a chance to learn about the connections between the ecology, history and culture of a place. The Cayoose/ Fraser confluence is a unique habitat, a very beautiful place that will be changing dramatically over the years, as the plantings take root and grow. The restoration is an exciting and hopeful project; a Centre increases the possibility of

sharing this process with a wide public. This centre would provide a home to offer a diverse selection of locally developed cultural and environmental programs. The building itself will showcase alternative technologies and green design. The Nature Centre and its programs will encourage people to enjoy and care for this particular place and take personal action toward conservation. It could eventually be part of a chain of small centres along the length of the Fraser River that showcase the unique aspects of each area, and teach people about the importance of the salmon and the need to live sustainably in all parts of the watershed.

The purpose of a feasibility study is to see if it is actually possible,

which means asking lots of questions and listening carefully to the answers. We are interested in your ideas about education, environmental stewardship, cultural sharing, green design and ecotourism. We want to hear your ideas about the challenges and benefits this project presents. Look for our display at events around town this summer, and come fill out a survey. Or better yet drop by the Friendship Centre on Wed. July 15 between 1pm and 7pm for our Open House. We will provide information about what this could look like and ask visitors some questions. There will be refreshments and door prizes. We hope you will join us, this is an exciting possibility and it needs input and ideas from many different people.

Summer 2009 @ the

DVDs	Lillooet Public Library Tues, Wed & Thu 11-7; Fri & Sat 11-2
CDs	<ul style="list-style-type: none"> • Summer Reading Club, Wednesdays 10am-12pm • Basic computer training, Fridays 11am-2pm • New online management of your account (for all libraries)
Videos	Gold Bridge Library Mon 1-5; Thu 1-5; Sat 11-1
Audio-Books	<ul style="list-style-type: none"> • Extended hours • Accepting book donations for ongoing book sale • New & improved internet service
Internet: Highspeed & Wireless	Bridge River Library Wed 2-6; Thu 10-2
	<ul style="list-style-type: none"> • New & improved internet service
	Book Bus New summer schedule posted in libraries
	<ul style="list-style-type: none"> • Games, crafts & storytime for children

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Website: lillooet.bclibrary.ca
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Lillooet News

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July 24-26 2009

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- Farmer's Market - Friday & Saturday
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• Friendship Centre
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Tsaqwem
Tasting Fair**

Saturday

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Prizes drawn
all day...

**Hike on the
Fraser River at
the Powerhouse
Restoration Site**

Saturday 10 am-11:30 am

- Carpooling - Meet at
• Farmer's Market,
across from the
Post Office

**Face
Painting**

Friday
1:30-4:30pm

- Lillooet News
979 Main St

**Lillooet
Quilter's Guild
Annual
Quilt Show & Tea**

Friday 10am-7pm
Saturday 10am-4pm

• St Andrew's
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Main St

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Saturday 4 pm-7pm

• Lower Spawning Channels
Meet at Cayoose Creek
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Salmon in the Canyon returns



Fin Donnelly, executive director of the Rivershed Society of B.C. and leader of the society's Sustainable Leadership Living Program, and Kaley Shields, a local program participant, pose with Lakota James, in fish costume. Participants stopped at the Salmon in the Canyon festival as part of their 1,400-kilometre journey down the Fraser River before making their way to Lytton and beyond.

Attendance improves as salmon count drops

ROBIN POON

The Lillooet Naturalist Society and Cayoose band held the second annual Salmon in the Canyon Festival Aug. 22 at the Cayoosh Creek Campground.

Cooler temperatures compared to last year's festival and this summer in general as well as a later start time seemed to draw higher attendance this year.

According to Kim North of the Naturalists, about 300 people attended the festival this year.

A dinner featuring barbecued salmon and vegetarian lasagna was prepared by Faith Peters of the Lillooet Friendship Centre and offered on a pay-by-donation basis.

"Our fish was limited this year. I didn't get too much," said Peters, explaining the addition of pasta to the menu.

Her comments dovetailed with Cayoose Chief Perry Redan's remarks at the festival.

Redan noted that although the Department of Fisheries and Oceans pre-

dicted nine million sockeye salmon would head upstream this year, only about 700,000 had been counted so far.

He reminded the audience of its responsibility to look after the river's well-being.

"We are merely borrowing it from our children's children."

Fin Donnelly of the Rivershed Society of B.C. arrived after 5 p.m. with a group of about a dozen travelling down the Fraser River from Mount Robson to Vancouver.

They are taking the river journey as part of the Rivershed Society's Sustainable Living Leadership Program.

The festival was timed to coincide with their arrival as the program, like the festival, emphasizes the importance of salmon to the local ecosystem.

Lillooet local Kaley

Shields is taking part in the program this year, as is Glenda Newsted, a former resident who is now a facilitator on the trip.

"I've never had so many great days in a row," Shields said of her time on the river so far. In total, she and the group travelled about 1,400 kilometres.

Of her fellow travellers, she said, "These are a lot of really great people, probably friends for life."

Shields almost missed the journey because of the Mount McLean wildfire.

The evacuation order for Lillooet was issued while she was away in the Lower Mainland. Unfortunately, she had yet to pack for the program.

She rushed back, only to find that access to town was blocked.

However, an out-of-town RCMP officer helping out during the fire took pity on Shields and escorted her to

her home. "I couldn't stop saying thank you," she recalled at the festival.

"That happened the night before it was time to go."

She then surprised her fellow group members, who had not expected her to make it.

"I was really happy how warm and welcoming they were even though we never met each other."

Donnelly, responding to Redan's comments, said that the extremely low salmon count could indeed be a sign we are "witnessing the collapse of the salmon fishery."

Compared to previous years on the river, he said, "The biggest difference would be the sockeye salmon return or lack thereof."

"We're still hopeful those salmon return but...if we don't, that's serious."

(Continued on page 8)



An anatomically incorrect inflatable tent rendering of a sockeye salmon provided by the Department of Fisheries and Oceans for the festival. Though it indeed entertained, it did not inform. (Photo courtesy of Kim North)

Xena and I would like to thank the people who donated to our cause. It's been two years since Xena's accident and we could never forget you all.

Thank You!

Xena is doing very well, she is healthy and back to her normal self, barking like crazy! So again, thank you all from the bottom of our hearts.

Love Xena and Kelly

Happy 40th Agapi

Love Yorgos

Girl Guide Registration

Sparks, Brownies, Guides, and Pathfinder Registration

Wed. Sept. 2nd 6-7pm

At United Church.

Guides Canada

Good bye and Good Luck Jenn!

Wishing you all the best in school. We will miss you very much (you & your Magic Wand!)

From all your buddies at work: Mike, Bea, Blaine, Billy, Alicia, Tina, Bernadette, Taylor and Wayne

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Lillooet Landfill Holiday Closures

Due to statutory holiday the Lillooet Landfill will be closed on **Monday September 7th, 2009.**

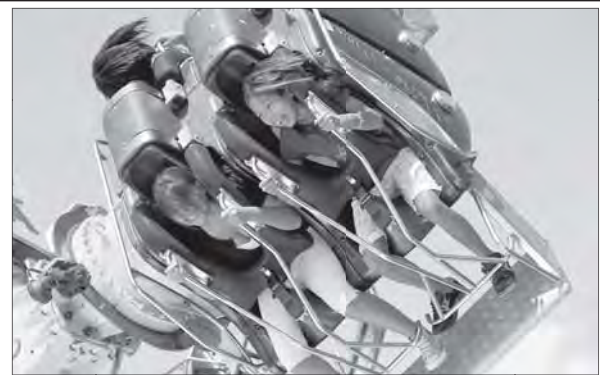
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Enjoying the PNE

Vera Edmonds (left) and Ashiel Edmonds of Pemberton enjoy a ride on the Twin Flip at the 2009 fair at the PNE. The annual summer fair, an end of summer tradition for generations of British Columbians, features over 700 shows, exhibits and attractions that are free with admission. The fair runs daily through Labour Day, Sept. 7.

Early Deadline Notice

The Bridge River - Lillooet News will be closed
Monday September 7th, 2009
in honor of the statutory holiday
We will open the office doors 8:30 am
Tuesday September 8th 2009
Please note the
Deadline for September 9th is
Wed. September 2nd, 2009 at 5 pm

Send your advertisements one of three ways:
Phone 250-256-4219 & ask for Nicole your local sales associate.
Fax your ad details & contact information to 250-256-4210
Or email your information to sales@lillooetnews.net

Dickey supplies most water

(Continued from page 1)

Water from the wells, which has been shown in the past to contain arsenic beyond the level allowed by health regulations, was formerly blended with water from the creeks to stay under the limit.

After the evacuation order was lifted, the Red Cross handed out free bottled water to any residents in need. It later placed a large self-serve tank of water, filled from Cache Creek, in the parking lot of the REC Centre.

Although it closed its wildfire recovery centre in the REC Centre arena, the Red Cross kept the tank in the parking lot. However, it signed a contract only to provide the tank until the end of August.

District chief administrative officer Grant Loyer

said in an interview Monday, "Interior Health doesn't think there's an issue with the water" from Town Creek in the short run.

"They think as long as you boil the water, it's fine." At an Aug. 17 council meeting, Loyer said only turbidity was an issue for Town Creek water, not arsenic.

However, he admitted the creek would likely be unusable in the future.

The district also announced on Aug. 17 that the pump for the REC Centre wells had stopped working.

Since then, Loyer said, Dickey Creek has been the main source of water for the district.

As for the wells, he said, "Right at the moment, we're not drawing anything from the REC Centre wells." The Conwayville well is still in use, but the district is draw-

ing less water from it than usual, he added.

"We're just getting by,"

Loyer said the district hopes to complete the Victoria Street booster station sometime in September so water from Dickey Creek and Conwayville can be used in the Heights.

He also noted, "By and large, I think most of the public has been very co-operative about conserving water.

"Lots of people's lawns are dying.

"It's made our jobs easier."

The district council was scheduled to hold an in-camera meeting Sept. 1 as of press time to consider possible solutions.

The next regular council meeting is scheduled for Sept. 8 at 7 p.m. at the municipal hall.

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Drop by & talk with Shirley, Kathy, Jack, Greg, Penny & John.

Sponsored by the Lillooet Friendship Centre Society Funded by Interior Salish Employment & Training Society

Funded in whole or part through the Canada-British Columbia Labour Market Development Agreement.

Salmon at risk in many ways
Protection begins on a personal level, says Donnelly

(Continued from page 3)

He added that hot weather, lightning strikes and risk of fire, the effect of pine beetles on erosion, and higher water temperatures could all work together to make the Fraser inhospitable to salmon.

"Everything has an impact. Whether it's small or large, I wouldn't be able to say."

However, he said, the warm welcome he received in Lillooet and other communities was a sign that people were willing to work together to increase awareness of the role regular people must play in protecting the river.

"What I try to reinforce is we have to

start small, we have to start with our own actions."

But he admitted that what happens on just one part of the Fraser can have a mushroom effect on other areas of the watershed and beyond.

"Pretty soon you get into the big global community discussion."

Donnelly said that while some residents in other towns had greeted the program participants, there was "nothing like a community event, like (Salmon in the Canyon)."

"This is unique and great."

He added, "We definitely want to thank Kim (North) and Cayoose Creek band for putting on this event and continuing building this relationship."

Following the meal, The Wild Onions took the stage. The local group also played at last year's festival.

Lillooet News

PROFILES

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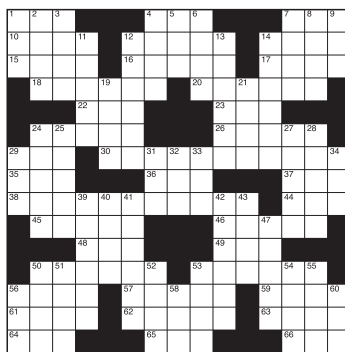
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Old Bridge bat show

Thirty adults and 20 children attended the Three Rivers Join One event on bats last Thursday at the Old Bridge. They enjoyed learning about the Fraser River watershed, smudging for spiritual purposes and all about bats. The kids had fun trying to locate bats with the echolocators and made moth sugar. The Old Bridge is a great place to visit in the evening to watch the sun set and the bats come out. (Photo and caption courtesy of Kim North)

This Week's Crossword

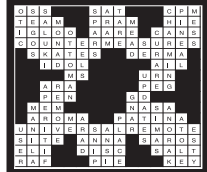


CLUES ACROSS

1. Married woman
4. Converged
7. Point one point S of due E
10. Table condiment
12. Trade
14. Indian frock
15. Bombast
16. Blighia tree (var.)
17. Pre-college school
18. Give clear expression to
20. _____ Tomei, actress
22. Tall hardwood tree
23. Actress Ryan
24. Not true
26. Organic compounds
29. Hill (Celtic)
30. Apprehension
35. They ____
36. 1st state abbr. (var.)
37. Chicken ____ King
38. "Me & Bobby McGee" singer

5. Large northern deer
6. Spill over
7. Auricles
8. La ____ Tar Pits in L.A.
9. A way to take in liquids
11. Mercaptan
12. One who fires
13. Sewed together
14. Water tap
19. Vogue publisher Conde
21. ____: of the kidneys
24. Nummulite
25. Space for public entertainments
27. Chinese dynasty 502-557
28. Genus of the Soleidae
29. ____ Mahal
31. Tokyo
32. High spirits
33. Not in good health
34. Seize suddenly
39. Bearded plants
40. Beget
41. Shouted derisively
42. No man is one
43. A hammered fastener
47. N.W. state
50. Old Italian money
51. Aroma
52. Detergent
53. Demeanor
54. Sports paraphernalia
55. ____ Romeo, car
56. No (Scottish)
58. ____ Lanka
60. Fall back time

Crossword Solution - 08/26



CLUES DOWN

1. Mutual savings bank
2. Abnormal breathing
3. E. European people
4. Nutmeg covering spice

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Community Events Guide

Listings are free for not for profit events and service groups. AGM Notices are not accepted and will be asked to participate in a paid advertising. Send your listings to: news@lillooetnews.net prior to Friday at 12 noon. Space is limited please have information submitted at least two weeks prior to event date.



Upcoming Events & Volunteer Opportunities

Lillooet Native Christian Fellowship Sunday Service at the Lillooet Friendship Centre 1 PM for more info 250-256-7709

Buddhist Meditation Group Mondays at 7:30 PM near Lytton. For more information contact Victor Stepan at 250-455-2232

LA to Legion Regular Meetings 7 PM 3rd Thursdays of the month - September to May, except December

Lillooet Food Matters 3rd Mondays of the Month 5:30 PM at varying venues. Please contact Sarah or Roger Barrett at 250-256-7553 for meeting details.

Lillooet Shambhala Meditation Group Mondays at 7pm - South Central Health Unit. Call Ina 250-256-0667

Lillooet Legion Branch 66 Hall 737 Main St. Meat Draw: Every Friday 5:30pm

13th Annual Harvest Dinner Saturday, October 24th at the Lillooet Memorial Curling Club. Cocktails: 6:00 pm • Dinner: 7:00 pm Tickets: \$20 Available at: Created by Design Lillooet District Hospital, BRLN or Foundation Members

Alzheimer's Disease: The Connection Between Brain and Behaviour Caring for someone with Alzheimer's disease? This free telephone workshop from the Alzheimer Society of B.C. allows family caregivers to learn from home! Learn the connection between what is happening in the brain and how this leads to specific behaviours of dementia.

This session will be held Oct. 29 from 7 to 8 pm. To register visit the Care-ring Voice website www.caringvoice.com/tele-learning.php or call 1-866-396-2433. After you register, a representative will call a few days before the workshop with details about participating by phone. Please register at least 5 days in advance. Participation is limited to residents of B.C. and the Yukon.

Order of the Royal Purple Meet second & fourth Mondays of the month, 7:30 PM at the Elks Hall, 640 Moha Rd. New Members Welcome. Contact Maureen Frantzen for more info 250-256-4523

BPO Elks #467 Meet first & third Mondays of the month. 7:30 PM at the Elks Hall, 640 Moha Rd. New members welcome. Contact George Frantzen for more info 250-256-4523

Lillooet Quilters Guild Meet last Wednesday of the Month 7pm at the Friendship Centre September thru June

Lillooet Gospel Chapel Service Hours: Sunday School 9 AM - Service 11 AM. 1147 Main st. www.gochapel.ca

Karaoke Night... come down & show off your talents & listen to the talents of others 1st & 3rd Fridays at the Legion 8:30 pm.

Lillooet Lions Meeting Meet 1st & 3rd Tuesdays of the month, 7 PM in the Legion Hall Basement, 737 Main St.

Lillooet & District Chamber of Commerce Monthly meetings • Meetings are held the second Thursday of each month at NOON in council chambers at the District of Lillooet Municipal Hall.

Games Night at the Legion Starts October 7th Wednesdays 7 PM to 9 PM. Contact Cindy Wirtz for more information. 19+

Lillooet Farmer's Market Fridays until October Main St. Across from Post Office
The Annual Fountainview Academy International Supper is October 4th at 5pm at Fountainview Academy

Cadets Barbecue Oct 10th: 12pm-5pm Benefit/Fundraiser BBQ for the Lillooet Cadets Come down and enjoy great food while helping out the local group. It will take place at Buy-Low Foods

Catholic Church Dinner, October 2nd 5:30 pm German Style Dinner. Eat in or take-out, everyone welcome. St. John's Catholic Church 1116 Main St.

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off the front

Council



Briefs

Date set for 9-1-1 calling

ROBIN POON

The Squamish-Lillooet Regional District has again set a date to begin 9-1-1

service in Lillooet, Mayor Dennis Bontron said in the Sept. 21 regular council meeting. "They have chosen a specific date in November in which to convert the emergency numbers to 9-1-1," said Bontron.

He expressed cautious optimism. The regional district has already pushed back plans to bring the emergency number to Lillooet several times in the past. "I would like to say 'yay' but a year ago they said July and then a year ago they said September and a year ago

they said May, so I'll wait until they say they're done before I get too excited."

According to Lillooet Fire Department Chief Pat Sullivan, "Nov. 24 is the date they're telling me." He also said the department plans to start testing new call-reception equipment in late October.

Sullivan reported on the fire department to council.

He noted that firefighting in East Lillooet is greatly hampered by the lack of water service in the area.

(Continued on page 6)

Thompson River cleanup

Rapids follow trash gathering, lunch

(Continued from page 1)

"Definitely the outhouse is a special find this year," said Meghan Fandrich.

Haller agreed. She said of her students, "They really wanted to stay and pick up the port-a-potty." Kumsheen's own staff volun-

teers collected the prize find.

After the meal, the rafters were soaked and soaked again in the rapids between Nicomen House and Lytton, passing such colourfully named sites as the Devil's Kitchen and the Fluffy Bunny.

All told, the volunteers collected a trailer and truck bed of garbage. Chang said, "We'd definitely love to have the same response if not bigger" from the public next year.

Lillooet's shoreline cleanup



Ursula Stephane got to take some worms home after learning about worm composting from Jan Wilson. (Photo courtesy of Kim North)

Thirty-one participants, from four years old to seniors, worked hard to clean up some of our shorelines last weekend and then have lunch, games and activities at Seton Lake.

The Pathfinders cleaned up the Lions trail along the Fraser River on Saturday. The rest of the participants spent Sunday morning cleaning up Seton Lake beach, the spawning channels, the canal walkway, the Fraser River south of Cayoosh Creek and the stream flowing down Station Hill.

They collected seven large garbage bags full of mostly picnic items in all, including drink containers and food wrappers.

The most frequently found item was cigarette butts, followed by plastic forks. The most unusual item found was a full marijuana joint up Station Hill - someone was ditching it quick!

Two dead snakes were found on the road squashed by vehicles - you may see snakes warming themselves on the roads this time of year and heading back towards their dens for the winter; some area snakes are endangered species.

After cleaning up, everyone enjoyed the afternoon at the lake, learning about worm composting thanks to Jan Wilson, playing recycling games and eating.



Gloria Joseph receives victim assistance award in Arizona

ROBIN POON

Longtime victim assistance worker Gloria Joseph was recognized for her work last month in Arizona thanks to fans at home.

Joseph started volunteering at the Lillooet Friendship Centre in 1986 and was hired there in 1992. In particular, she works with female and young victims of physical and sexual abuse.

On Aug. 25, she received the Margery Fry Victim Service Practitioner Award from the National Organization for Victim Assistance (NOVA) at the North American Victim Assistance Conference in Scottsdale, Ariz.

Christine Jack, a volunteer with the local victim assistance program, nominated Joseph for the award after Joseph invited her to come to the conference.

While Jack was filling out the registration form, she noticed a section asking participants if there was anyone they would like to nominate for an award.

"It didn't give very much detail so I just went to their website," said Jack, adding, "I was quite shocked that nobody ever nominated Gloria for any of these awards."

Seeing what she felt was an oversight, "I took it upon myself to nominate her, with four days notice."

Jack wrote a letter detailing Joseph's achievements and struggles with help from Babe Smith and other community members to compile Joseph's history.

About two weeks later, NOVA's executive director, Will Marling, called Jack to tell her that Joseph would receive the award.

She recalled, "I was pleased. I wasn't really surprised, because when you look at Gloria's history, it really speaks for itself."

According to a letter from Marling, "The award is given to an individual who adheres to the highest standards in providing quality victim services on an everyday basis. It has typically been awarded to an innovator who has been in the field for ten years or more and has contributed time and resources above and beyond what would be expected in a paid staff position or as a volunteer."

The letter also delves into the history of the award's namesake.

"Margery Fry founded the shelter movement for battered women in the United Kingdom and then went on to be



Gloria Joseph works at the friendship centre.

the inspiration for victim compensation in both the United Kingdom and New Zealand."

Joseph, too, has clearly inspired others.

Jack attended a series of weekly workshops for women that Joseph hosted at the friendship centre.

Over time, she worked through her own issues stemming from abuse and now volunteers with the victim assistance program herself.

The workshops not only help restore a sense of self-esteem and support (the sessions end with a spa and make-over day and dinner), they also serve as a forum for victims to share their experiences.

Joseph suffered sexual and physical abuse herself when she was growing up.

She recalled how hard it was to find a sympathetic ear. "No one wanted to listen," she said, especially if she brought up her sexual abuse.

She was consumed with shame and turned to drugs and alcohol for relief. At one point, she even contemplated suicide "just to numb the pain."

"You begin to hate your whole body and you don't even love yourself."

Joseph's emotional scars stunted her relationships with others, even her own children.

"I felt so dirty that I didn't want to touch them."

When she started volunteering with victims, "I think I was going there to save a bunch of these girls."

Over time, though, her naiveté faded as she realized how many victims there were.

She also realized she needed more training to deal with the complex issues a victim faces. In 1989, she completed the sex abuse worker training program at the Nicola Valley Institute of Technology.

At the program, Joseph said, "We had to talk about our own issues."

"If you haven't dealt with your own issues, you can't go to a courthouse and listen...to your victim's story."

Over time, she learned that she could not simply push victims into pursuing criminal charges against their aggressors. "I give them a choice now."

She admitted the legal system's setup and the burden of evidence makes it difficult to make charges stick, especially when victims are trying to forget the details of painful experiences.

"I don't remember what I wore and I wasn't going to run to the clock to see what time it was," she said.

At the workshops, Joseph and other facilitators encourage attendees to disclose details of their abuse by sharing about themselves. She said keeping things secret does not help someone forget. However, knowing that others have been in the same situation creates a sense of support.

Her favourite part of the job is seeing people change as they go through the workshops.

Joseph fondly recalled one attendee who, over time, asserted her independence by earning a driver's licence and standing up to her husband. "She was so timid before."

By finding support at the workshops, "They can respect and love themselves again." Some participants, like Jack, eventually become facilitators themselves.

"I couldn't have done it without them," Joseph said of the volunteers.

And even though Joseph has spent many years doing this work, she seems far from burnt out. "I could've retired a couple of years ago, but I love my job so much."

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The Ucwalmicw Centre & Lillooet Food Matters present 3 days of sustainable
 community workshops and demonstrations.
 For a schedule, see posters around town or email ucwalmicw@yahoo.ca



Powerhouse plants going to seed



Left to right: Fred James, Jen Calliou, and John Frank of Cayoose plant native seedlings at the powerhouse foreshore restoration site.

Helping nature heal itself

ROBIN POON

Field work at the powerhouse restoration site is almost over for the year. To those who remember the site before the restoration project began, the changes are remarkable.

"This was the main driveway," said Karen Edwards, pointing to an area now pockmarked by craters filled in with native plant seedlings and mulch.

"Everybody just drove down there."

Edwards is one of four Cayoose members working on the final planting at the restoration site.

"It's neat that it's coming full circle," said Odin Scholz, the restorationist in charge of the powerhouse project.

He explained that last year, summer students gathered the seeds of native spe-

cies at the site. The seeds were raised to seedlings in a nursery near the Cayoosh Creek spawning channels. Those plants are now entering the soil from which their seeds came.

The restoration effort is being led by the Lillooet Naturalist Society with funding from the Bridge Coastal Restoration Program. B.C. Hydro created the program to remedy the negative impact of hydroelectricity generation in provincial watersheds.

The land is part of the Cayoosh Creek St'at'imc band's traditional territory.

After years of industrial and transportation use, the ground at the site was firmly compacted and unfriendly to plant life other than invasive weeds.

Scholz said the goal of the restoration is "helping nature heal, basically."

To that end, the fall planters from Cayoose spent three days weeding before doing any actual planting in late September. They will

be finished sometime next week.

Heavy machinery loosened up the soil and moved dirt and gravel.

When the ground was ready, workers began planting seedlings from the native plant nursery.

"We just planted about a thousand plants here," said Kim North of the site Sept. 30. North is co-ordinating the restoration project on behalf of the Lillooet Naturalists.

Edwards said almost all of the seedlings from the nursery will be in the ground by the time planting is finished. "That's over 4,000 plants."

In some patches of the powerhouse site, native plants are even thriving and multiplying on their own. "They're naturally seeding in," said Scholz.

The plants will provide even more seeds for the native plant nursery as they mature. As they grow in areas that formerly made up trails and roads, they

and a series of carefully placed logs are meant to deter cars and ATVs from driving through.

"We're trying to stitch the site together," said Scholz. "It's been really fragmented by roads."

Nevertheless, the site is clearly on the grow again.

North said that many visitors to the nursery had asked to buy seeds for native plants.

While they need their supply now for the restoration site, North said they hope to have enough seeds to sell to the public in later years.

In addition to the Bridge Coastal Restoration Program, the powerhouse restoration is funded by TD Friends of the Environment, the Lillooet Community Fund, and the Public Conservation Assistance Fund.

Money from Fraser Salmon and Watersheds is being used to offer public education events about the rivers in the area as well.

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Public Notice
Healthy Foods and Beverage Sales Draft Policy

The patrons of the District of Lillooet REC Centre and the general public are invited to review and comment on our Healthy Foods and Beverage Sales draft policy. This will take place on **October 17, 2009 from 5pm to 7 pm** in the REC Centre Room 201. Visitors are invited to review the draft policy, provide feedback and ask any questions they may have regarding the policy.

This policy will affect both foods and beverages sold through vending machines, concession stand, or offered from our local catering suppliers. During this period we will have samples of some of the healthy snacks that we plan to have for sale in the facility vending machines.

If you cannot attend, but would like to review the draft policy, please email wayrobinson@yahoo.ca for a copy before Oct 19, 2009.

BOOK BUS

The Book Bus is "off its wheels"!

The book bus offered a unique opportunity for people throughout Lillooet and area to access reading materials and other programs. We'd like to hear your feedback on the Book Bus service and suggestions for what the "new wheels" could look like.

Date: Wednesday, October 28, 2009
Time: 11:30 am to 1:30 pm.
Lunch will be served.
Place: Ucwalmicw Hall, T'it'q'et

The format of this meeting will be very interactive, using small groups. So, if you are afraid of speaking in big groups... no worries. The important thing is to participate!

Please RSVP to **Debbie Demare, Literacy Outreach Coordinator at 250/238-2248 or s.demare@telus.net.**

THE BRIDGE RIVER - LILLOOET NEWS TURNS 75!
 Everyone has a story about Lillooet! The news office would like our readers to share your memories, stories & photos of Lillooet over the last 75 years. We would like to share them with all the newcomers and oldtimers alike.
 Contact the News Office for more information 250-256-4219 or news@lillooetnews.net



The Bridge River Lillooet News



Established by 'Ma' Murray in 1934 • Volume 79, Issue 42 • Wednesday, October 21, 2009

Xaxli'p Health

Band hosts first mental health and wellness fair
Page 3

Chillaxin Anniversary

Celebrating six (or seven?) years in robin's-egg blue
Page 20

4 Day Forecast
provided by ENVIRONMENT CANADA

Wednesday
Rain
High: 12
Low: 8

Thursday
Part Cloudy
High: 11
Low: 8

Friday
Rain
High: 12
Low: 8

Saturday
Cloudy
High: 10
Low: 6

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Learning at the fishing rocks

Three Rivers Join One hosts day

KIM NORTH
Lillooet Naturalist Society

A very interesting Three Rivers Join One event was held at the Bridge River fishing rocks Saturday.

The fall colours were beautiful and the light rain welcome.

To start the event, children were engaged in creating a watershed nature map with plasticine under the watchful eye of Brittany Spankie.

Laura John then entranced the audience when she told the story of Qwalimak: the Long-Nosed Monster.

Jacquie Rasmussen then showed everyone how to make more watershed-friendly cleaning products and talked about the importance of not using toxic cleaning products that go down our drains and into our sewage treatment system where they can kill beneficial bacteria that break down waste.

The most fascinating



Children build a watershed nature map using plasticine at the Bridge River fishing rocks. Other activities included storytelling and tips on keeping watersheds pollution-free. (Photo: Kim North)

part of the day was when Jeff Sneeep showed three aquatic invertebrate monitoring baskets that had been sitting in the Bridge and Seton Rivers over the prior two weeks.

The baskets were filled

with rocks and placed in buckets of water for the event. Kids were shown how to clean off the rocks so the bugs clinging to the rocks would drop into the water.

With magnifying glasses and an electronic micro-

scope, we all got a close-up look at these bugs and learned more about their importance to many species of fish and other wildlife, and their role in showing which creeks are healthy and which are not.

A little rainbow trout was caught in the baskets also, but after a short climb down to the Bridge River, the fish was released.

Everyone stayed warm and well fed with a big pot of tswan soup and bannock.

District council bans private recording at meetings

Question period gets ugly

ROBIN POON

Conflict returned to council chambers Monday evening in the first regular meeting since the death of former councillor Greg Kamenka.

During question period, Ernie Anderson said Mayor Dennis Bontron had made misleading statements about the provincial government's water conservation goals.

According to Anderson, Bontron had said the province aims to reduce water use by 50 per cent by 2020. However, Anderson said, the goal was in fact a 30 per cent reduction and the 50 per cent reduction only applied to new water infrastructure.

Bontron agreed that the 50 per cent reduction target applied to new

infrastructure only but maintained that he had stated as such whenever he quoted the figure.

Soon after, Anderson asked if the mayor was aware of a draft report for the district prepared by True Consulting. Bontron said that he had not and then told Anderson curtly, "Sit down."

Anderson took offence at Bontron's tone and said that although his questions had been answered, the mayor could have asked him to sit respectfully.

"You could say it in a polite way, Your Worship."

Bontron replied, "Whatever," prompting Anderson to call him an obscene name.

"If you can't abstain from profanity, you should leave," said Bontron. Anderson chose instead to stay, remaining silent until he left near the end of question period.

Council unanimously adopted a policy to stop the use of recording devices by private citizens at meetings.

Under the policy, the district would only allow the use of its own audio recorder during council meetings. Recordings would be destroyed after the minutes for the recorded meetings were adopted.

(Bontron said recordings by the Lillooet News and Radio Lillooet, currently considering broadcasting council meetings, would not be subject to the restrictions since they would not be for private use.)

In a report, chief administrative officer Grant Loyer said the policy was meant to avoid liability for privacy issues if members of the public were recorded without giving permission. It was further meant to avoid council's spoken comments being taken out of context.

Kate Kempfle, vice-chair of the Lillooet Ratepayers, said forbidding private recordings would not reduce the possibility of misinterpreted words and disagreement. "It's just the nature of people."

Coun. Kevin Anderson supported the motion but felt it would be difficult to enforce given the current size of recording devices.

Kevin Anderson brought forward Kamenka's motion to reconsider the installation of water meters in Lillooet. Coun. Carmen Pallot seconded the motion.

Kamenka had given notice that he would make the motion at the planned Oct. 5 meeting, but succumbed to a heart attack that day.

Mayor and council restated their support for metering and unanimously opposed the motion.

Look for more meeting highlights and a fuller account next week.

Nature's Nook

Brought to you monthly by the Lillooet Naturalist Society & Cayoose Creek St'at'imc



What's a watershed?

No matter where you live you are a part of a watershed. A watershed is more than just rivers! It's really an area of land that drains downslope to the lowest point. High in the mountains snow or rain falls, it then moves underground or through rivers and streams to bigger rivers or lakes and eventually to the ocean.

What watershed do we live in?

We live in one of the greatest watersheds in the world. The Fraser River begins as a snowdrop in Mount Robson, runs as a blue turbulent stream in its northern reaches, becomes calmer and browner as it travels through Prince George to William Lake. The river narrows on its way



to Lillooet and rushes over the Bridge River rapids on its way to Lytton and through the lower canyon to Hope. The river then enters a broad flood plain extending all the way to the coast in Vancouver. It has traveled 1,368 kms across British Columbia and encompasses diverse ecological zones, from alpine tundra and pine forests, to grasslands and desert-like canyons, to old growth rainforest, to a fertile river delta.

We also live within the Bridge and Seton River watersheds. These rivers are part of the 40 tributaries that make up the Fraser River Basin which covers 25% of BC - an area almost as large as California.

Who depends on the Fraser River Watershed?

Aboriginal people have depended on the river for thousands of years and have established a fundamental link to the river as a source of water, food and spirituality. The river promoted the Gold Rush, was changed forever by the railway and now supports over 2.6 million people.

Many plants and animals depend on this great river and watershed - and salmon is king! Salmon provide sustenance to many species of wildlife including bears and eagles and provides vital nutrients for the plants growing in the riparian zones.

Why are healthy watersheds important?

1. Watersheds let water drain and soak into the ground and helps prevent flooding and erosion.
2. Watersheds provide safe homes for our fish, birds and wildlife.
3. Watersheds supply fresh drinking water to both people and animals.
4. Watersheds are places where people of all ages can go to enjoy recreational activities.

Fill in the blanks to see what you can do to keep our watersheds healthy!

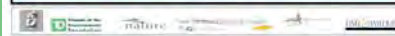
1. What we put down our sinks and toilets goes into our watershed. I always clean using a cloth and non-..... cleaning projects.
2. I save water by turning off the tap when I my teeth.
3. When I go for a picnic I always up my litter and put it in the can.
4. I always put out my camp before leaving so the forest does not
5. The Town Creek Watershed has been affected by the



COME CELEBRATE THE GREATEST SALMON RIVER ON EARTH
THE FRASER RIVER
RIGHT IN YOUR BACKYARD

SATURDAY
22 AUGUST
5:00pm to 9:30pm
Cayoos Creek Campground

FAMILY EVENT
with Games and Art, Fish, Wildlife, Plant and Rivershed Information
Great Music with the Wild Onions and Reggae-Mexi Band
AND A SALMON FEAST (bring your own plate and cutlery)



Animal of the Month:

August 2009:

The Salmon

How many species of Salmon use the Fraser River Watershed?

Five salmon species use the river. - Chinook, Coho, Chum, Pink, and Sockeye

Which is the largest Pacific salmon?

The Chinook. The world record is 57.27 kg. They return to spawn in the spring.

Which is the most numerous?

The Pink Salmon. They are also known as humpies due to their extremely humped back. They are also the smallest of the salmon..

What salmon is most sought after?

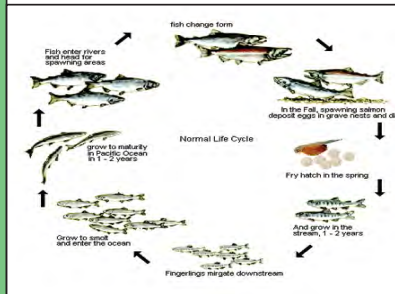
The Sockeye due to its superior flesh, colour and quality. They are the latest to swim the river to spawn.

How do adult salmon find their spawning grounds?

Adult salmon live in the ocean and return to the same river or stream they were born in. How do they do this? By smell..

How do young salmon survive?

Many don't! To be a survivor, young salmon (alevins, fry and smolt) look for safe places like side streams, overhanging banks, under logs, behind large boulders and in the shade of riparian plants..



Naturalist Updates

We have received funding for restoration work and outreach activities again this year. We would like to thank Bridge Coastal Fish & Wildlife Program, Fraser Salmon & Watersheds Program, Public Conservation Assistance Fund, TD Friends of the Environment Foundation, BC Nature and Service Canada for all their support in allowing us to work effectively within our community.

Restoration Work - The goal of this work is to increase wildlife habitat, while encouraging enjoyment and stewardship of the natural world. The summer crew continue to work hard at the Powerhouse Foreshore Restoration site. The major jobs include pulling invasive weeds, monitoring and watering the 600 native trees, shrubs and herbs planted last fall, and studying the birds and reptiles on site. The native plant nursery is flourishing and many of the species will be planted out in the fall. Machine work on the upper bench to increase habitat structure begins this week. Visit the site and talk to our restoration crew - Odin Scholz, Jennifer Calliou, Chris Saul, Evan Narcisse and Brett Dillon.

Nature Centre Feasibility Study - An initial Open House was held on July 15th. We would like to thank the people who participated as your thoughtful responses generated some very interesting ideas and issues. Overall, most people were enthusiastic about the general idea of a Centre as it would provide a public place to learn about our local ecology. Some of the key issues that must be examined are ensuring preservation of spiritual, cultural and ecological values at any proposed site, land use issues, long-term funding and governance of a centre and possible programming. There are still a lot of questions about how best to proceed, if at all. Please look for the upcoming visioning sessions in September and October and watch for surveying in your community. We need your input. For info contact Colleen Jacob or Toby Mueller.

Three Rivers Join One Discovery Project - The first event of this watershed outreach program has taken place at the Bridge River Fishing Rocks. Kids and adults alike enjoyed learning more about salmon and the Bridge River. Thanks to Xitsan for hosting us. More events will take place throughout the year so come out and have fun, get creative and dirty, while learning more! The next Discover Day takes place during the Salmon in the Canyon Festival and will explore watersheds, pemmican, and birds. To keep up-to-date on future events watch for posters around town. For info contact Bonnie Michell or Jacque Rasumussen.

Bluebird Trail - Volunteers have checked all the bluebird boxes again this year, cleaning and repairing as needed. Monitoring of bluebird use continues under the guidance of Chris Galliazo.

Churn Creek Trip - Greg Smith led a great trip to the Churn Creek Protected Area in late June. A presentation on that trip and on grasslands will take place in the Fall.

Breeding Bird Atlas - Ian Routley and other locals have been busy identifying birds breeding in our area. The information is being submitted to BC Breeding Bird Atlas whose goal is to provide up-to-date assessment of the distribution, relative abundance and status of birds that breed in BC. This helps professionals in the field of research and conservation.

Sustainable Living Leadership Program - Seton Lake Band, LNS and the Rivershed Society of BC have sponsored Kaley Sheilds to take part in this trip. Travelling and camping along the entire length of the Fraser River, students study the fauna & flora, watersheds, ecosystems, resource management and what a truly sustainable fishery would look like, while learning how to become a leader in their own community. Meet them at the Salmon in the Canyon Festival on their stopover in Lillooet.

BC Nature Camp - will be held in September and many people from across BC will be coming to enjoy the Lillooet area's natural beauty.

Nature's Nook

Brought to you monthly by the Powerhouse Restoration Advisory and crew



Animal of the Month: MULE DEER



Mule deer are graceful with quick feet and acceleration. They can run up to 35 miles per hour leap four-foot fences and are good swimmers. Males are called bucks and females does.

So what do they look like?

Mule deer are relatively large animals - 90 to 95 cm high at the shoulder. Bucks can weigh around 113 kg and does up to 75 kg. They have a reddish brown coat that changes from tawny brown in summer to dark or grizzled brown in winter. They have a dark brown forehead, a whitish face with a black muzzle, and a white throat patch. Mule deer have very large ears (about two-thirds the length of their head). The most distinguishing feature is a large white rump patch with a narrow black tipped tail. They have antlers with two main beams, each of which forks again into two beams.

What is their lifecycle?

Bucks are capable of breeding as yearlings, but it is the older, dominant bucks that do most of the mating during rutting season in November and December. Does breed as yearlings and drop their first fawn on about their second birthday. After a gestation period of six/seven months does drive away their offspring of the previous year and seek a secluded place to give birth - usually in late May through June. The doe leaves the fawn hidden while they forage, returning occasionally to nurse them. The white-spotted fawn relies on its colouration, lack of scent, silence and stillness for protection. Twin fawns are the rule. Does produce offspring throughout their life and more than 90 percent of them give birth every year. However, normally 45 to 70 percent of the fawns die, and few deer live more than eight to ten years. Predation, starvation, and hunting are the main causes of death.

Where can you see them?

As mule deer have difficulty moving through snow deeper than 30cm, and do not paw through snow for food, their traditional winter ranges consist of shrublands in the dry forest zone and on steep south-and-west facing sites. Here they feed on shrubs like big sagebrush, pasture sage, rabbitbrush, Saskatoon, rose, the foliage of Douglas-fir trees and a variety of grasses and herbs. In summer many head for higher elevations to take advantage of nutritious new growth, but many remain at low elevations all year long. Most people have seen deer along highways, on the dry benchlands of the Fraser and in parks.

Why are they so important?

Mule Deer are vital to their ecosystems and provide food for several predators, including cougars and wolves. Bears, bobcats, coyotes, wolverines, ravens and magpies also supplement their diet by scavenging on carcasses.

Aboriginal peoples relied on Mule Deer for food and other products, as they still do today.

How are they doing?

Mule Deer are doing fairly well in the face of expanding populations. However, deer habitat is being lost to residential development, surface mining, overgrazing, development of agricultural land (e.g. to vineyards) and fragmentation of ecosystems by roads and other developments. Hunting is declining, but several thousand deer die each year on BC's roads and highways.

Info from *Mule & Black-tailed Deer MOE, Lands & Parks*.
For more information on restoration and outreach events check out www.lillooetnaturalistsociety.org

Thank You!

Cayoosh Creek Band & Lillooet Naturalists would like to thank the following for their support during 2009 of the Powerhouse Foreshore Restoration Project

For providing in-kind contributions & advice:
Pat Stone for storing our work trailer all season
Ainsworth, CN Rail & Bob Johnston for rocks & logs
Tommy Hancock for site machine work
DnL Contracting for nursery machine work
Lillooet Feed & Garden Store
Seton Lake Band - Bare Root Nursery
Bridge River Xwisten

- | | |
|----------------------------|--------------------|
| REC Centre | Dist of Lillooet |
| HUB International Barton | SLRD |
| Lillooet Contracting | Little Big Mill |
| Mile O Taxi & Charter | DN Autobody |
| Lillooet Tim-BR-Mart | Lillooet IDA |
| Landscape Consulting | Revitup |
| Lillooet Finest Waters | Cayoosh Campground |
| Kelly DeStrake | Jones Ranch |
| Faith Peters & crew | Marie Barney |
| Lillooet Food Matters | ELKS |
| Lillooet Library Book Bus | DFO & MOE |
| Buy Low Foods | Garden Patch |
| Joan DeLuca | Bonnie Tedford |
| Airport Gardens | Wild Onions |
| Trailerman Trailers | Luther Brigham |
| Steve Hall | Simon Warhaust |
| Jason Whittaker | Bob Chute |
| Chris Galluzzo | Mike Carson |
| Doug Burles | Kenneth Wright |
| David Threatful | Linda Williams |
| Jan Wilson | Tim Jones |
| Lillooet Friendship Centre | Radio Lillooet |
| Bridge River Lillooet News | St'at'inc Runner |
| Radio Lillooet | Rivershed Society |
| Breanne Patterson BCRP | BC Nature |

For volunteering their time to the project:

- Bob Deadman · Ursela Stephanie · Cathy Stathers · Judy, Scott & Krystal Bodaly · Terry & Chris Hurst · Anne Heath · Vivian Birch-Jones · Ian Routley · Nancy Humber & family · Kim Davy & family · Candice Jack · Peter McAlister · Alex North · Sarah & Roger Barrett · Maggie Kingston · Ina Weber · Leigh McGINity · Keith · Rose Adrian · Chief Perry Redan · Mayor Bontron · Ruby Berry · Rita & Ken Dillon · Florence · Bailey Phillips · Trudy Redan · Trish Andrews · Jacquie Moffatt · Lindsay Hillocks · Marlene John · Sue Senger · Toby Mueller · Tim Malone · Janna Pike · Lakota James · Tim & Pam Paradis · Nancy & Lionel Leston · Sandy Horner & Family · Jeff Snee & family
Cayoosh Elementary - Mr Oakes & Mr Lane's classes
LSS - Ms Casselman's Science 10 class,
LSS - Ms Casper's group & the foods class,
Uwalicumx Centre Youth · BC Nature Camp group

Thanks also to the Advisory Committee who provided ongoing guidance:

- Wayne Redan · Michelle Edwards · Charmaine John
Jeff O'Kelly · Marg Lampman · Gillian Smith
Pat St Dennis · Sean Bennett · Francis Iredale
The Crew Technicians for pulling weeds, hauling garbage, collecting & propagating seeds, digging holes, planting & all the other work necessary for restoration:
Odin Scholz and Jennifer Calliou · Chris Saul · Evan Narcisse · Tanner Dan · Brett Dillion · Karen Edwards · Fred James · John Frank

Outreach Crew:

- Colleen Jacob & Toby Mueller - Visioning Sessions
Jacquie Rasmussen & Bonnie Michell - Three Rivers

All restoration activities and outreach funded by:

PUBLIC CONSERVATION ASSISTANCE FUND

Plant of the Month: LICHEN



Lichens are among the most bizarre of all life forms. That's because every lichen species is actually composed of two, sometimes even three, distinct species of organisms. Most lichens are a successful partnership between a fungus and an alga - only certain algae and certain fungi can get together to form the lichen. The algae and fungi cannot live alone - they need each other.

So are they rare?

No! Lichens are just easy to miss. They can be microscopically small, they don't move, and they often blend into the background. You may not even recognize one if you were staring right at it; however, chances are you have come face-to-face with plenty of them. Lichens live on rocks, branches, houses, and even metal street signs - from deserts to rainforests, Antarctica to Africa. They have even survived trips to outer space.

Why do they need each other?

The alga harvests the sun's energy to make food for the fungus, and the fungus provides a safe place for the alga to live. The fungus gives the lichen shape and provides the reproductive structures. Both organisms benefit to become one.

Lichens reproduce when the fungus part produces spores that land and germinate, creating hypha that find the right species of alga. The hypha grows through the algal cells and a new lichen starts developing, or they can reproduce by fragmentation when a piece of a lichen breaks off and then grows into a new lichen. There are about 20,000 different types of lichens and they come in many different forms - paint-like crusts, (Crustose) scalloped, wrinkled sheets, lacy patterns (Foliose), bushy tufts, strands of black or green "hair" (Fruticose).

Why are they important?

Lichens are homes for spiders, mites, lice and other insects. Birds use lichens to make nests; deer, caribou, mountain goats and other animals eat them; humans have used them to make dyes, clothing and medicines. Lichens are also widely used as environmental indicators for air quality. As they absorb most of their nutrients and water from the atmosphere they are highly susceptible to air pollution. If an area has polluted air there may be no lichens growing, or only the crusty types. If the air is clean there will be an abundance of shrubby, hairy and leafy lichens.

Info from "Fun with Lichens" Oregon State University
Learn more at the next Three Rivers event on December 19th at Cayoosh BC Hydro Campground at 1:00.

LICHENS: WHAT'S NOT TO LIKE?

T M E T S Y S O C E N E R G Y
T A N T A R C T I C A P K L P
I S V R O T S E C N A G I F P
A A I R Q U A L I T Y D L I M
M O R G A N I S M L X I H A O
P H O T O S Y N T H E S I S N
Y O N L V L L Y O B N C P N I
T S M I T H O L B O B O C I T
S P E C I M E N I B G V H S O
U E N H E L E T E I U E D U R
R C T E O H A V G H E R M O H
C I A N J L F N O U C Y H C Q
V E M U E S U M D L E I F S W
T S E R O F N I A R V U L X B
L E A F Y D E S E R T E M O P

- AIR QUALITY
- ALGAE
- ANCESTOR
- ANTARCTICA
- COUSINS
- CRUSTY
- DESERT
- DISCOVERY
- DNA
- ECOSYSTEM
- ENERGY
- ENVIRONMENT
- EVOLVE
- FIELD MUSEUM
- FUNGI

- LEAFY
- LICHEN
- LICHENOLOGIST
- MONITOR
- ORANISM
- PHOTO SYNTHESIS
- RAIN FOREST
- RELATIONSHIP
- SHRUBBY
- SPECIES
- SPECIMEN

The Power of Women:

“We’re stepping in.”

A recent murder in the Downtown Eastside has stirred the Power of Women to action. “We are the Power of Women. We don’t want this ‘hush, hush’ anymore. We’re stepping in. We don’t want this happening to our people in our communities.” Stella is one of several women who signed a letter to the Vancouver Police Department insisting on an investigation into the death of Lisa Arlene Francis, a non-native woman who worked on the street.

“It had to be homicide,” say the Women. “I had a sister who died in 1997, and the police just pushed the case onto the back burner and said she probably died of alcohol poisoning. I don’t want that to happen to Lisa, she’s a human being, a mother. She was a volunteer here.” Bea does not believe the case is actively under investigation.

Bea and Stella both volunteer helping women and children and advocating for the very poor. They both have histories which include foster families, residential school, addictions, and abuse. Bea explained, “We are victims of abuse, and we see others going through it and we don’t want them to keep going through it.”

The Women have protested

police harassment of the homeless people who sell things they find on the street. Police have arrested homeless people for this, and started doing it more regularly as Vancouver get closer to the 2010 Olympics. “Power of Women held a black market vending stand right in front of the VPD office, and they didn’t do anything about it. We made \$250 dollars.”

“We petition for the housing for the homeless. The Olympics is really cutting us out. We don’t want the Olympics because it’s spreading poverty. The prices here are skyrocketing and people can’t afford to live here, but people who come here for the Olympics will have a place to stay. I don’t know where they’re going to put all the homeless people.”

The Power of Women is addressing funding cuts to programs that are a “lifeline” to women who work on the street, such as the Mobile Assistance Program.

Each woman has something to offer, Bea is an advocate for women and children who have been separated by Ministry decisions. “Lots of women don’t even know that they can appeal a permanent order for the kids becoming wards

“Mostly we get together and share stories, because it’s a healing process.”

Lillooet Rec Center seeks St’át’imc Instructors

Recreational instructors are in demand at the Lillooet REC Center. Director Duane Laurence is seeking out St’át’imc course instructors in saq’ota (traditional dancing), storytelling, basket making, net making, art, carving and lacrosse. Instructors with other skills are invited to contact Duane and explain their passion. The classes will be available to the general public, at a cost that is typically \$60 for a ten-class session. Course instructors are paid \$18 per hour, and can generally set up a schedule that

suits their availability. Classes can be at any schedule that the activity requires.

Instructors for the Fall and Winter seasons are invited to plan a course at their earliest convenience, by calling the REC Center directly: 250 256 7527.



Stella and Bea are members of the Power of Women, located in the Downtown Eastside Women’s Center, in Vancouver. Their members protest on the street, they support women and children, write letters and petitions, and keep the VPD’s feet to the fire on issues like unsolved murders.

of the government. I got my kids back after four years. I went back to school and got my GED.”

Phillipa Ryan, from the Power, spoke about the Olympics at the Under the Volcano festival in North Vancouver, August 7. “When you think of the Olympics, you don’t see Native people. When I was growing up there were always friendly games, lots of athletes, but you don’t see that anymore. They’ve been trying to starve us into signing treaties to legitimize their thievery.

“We did not want DIA in our lives. That’s why we started our land claims through the courts. The powers that be have polluted the land and made us beggars in our own countries and now they’re trying to do that to the rest of you. It’s extortion. Now they’ve got you in their powers, they’re going to start treating you like Indians.”

The Power of Women meets weekly at Pender and Columbia in Vancouver. “Mostly we get together and share stories, because it’s a healing process. Everybody’s welcome.”



SALMON IN THE CANYON

FEAFESTIVAL

Hosted by:
Lillooet
Naturalist
Society &
Cayoosh
Creek
Band

**COME CELEBRATE THE
GREATEST SALMON RIVER
ON EARTH
... THE FRASER RIVER ...**

**SATURDAY
22 AUGUST
5:30pm to 9:00pm
Cayoosh Creek Campground**

FAMILY EVENT
with
Games and Art, Fish, Wildlife, Plant and Rivershed Information
Great Music with the Wild Onions and Reggae Band
AND A
SALMON FEAST (bring your own plate and cutlery)



Restoration.

Vital places have been fragmented by industrial development. At the confluence of Cayoosh Creek and the Fraser River, we are putting the pieces back together.



In an ecosystem where plants have been separated from themselves by roads, people are now doing healing work. Known as the Cayoosh Foreshore Restoration effort, many have come together to repair an important place on the Fraser.

Over the last hundred years, a saw mill, a rail yard and bridge, construction of the Hydro power canal, agriculture and cattle grazing all uprooted natural events. The recovery phase that is now being overseen primarily by restoration biologist Odin Scholz is coming about fast and thick.

Since community sessions late in 2006 established common ground on focusing road access off to the side of the foreshore, access roads to the river beach have largely been cut

off. Now, where roads were, logs are cabled to boulders and the coyote willow, cottonwood and rose bushes are stepping into the safe space. Within a year the roads have become plant, animal and fish habitat once again.

Once the rush of new growth filling in the gaps has "defragmented" the situation, traditional forms of management will be looked to.

The plant values in this area are huge. Balsam root, the Indian hemp and coyote willow which are used for fibre, the black Hawthorn and chokecherry, the clematis whose fluffy seed was collected, all these are staples of the Ucwalmicw culture. As people choose to return to the culture, they often run into the problem of actually not being able to access the basic building blocks of it.

Many species have been grazed out by cattle, and others simply paved over. Some introduced species are naturalizing, like the asparagus that mingles with the rose bushes and the apricot whose stone ends up in the bear scat just the same as the choke cherry seeds.

When the river rises in spring, the willows and other shrubs growing back will buffer the strength of the flow and provide protection for juvenile fish that may otherwise be swept downriver too soon.

Long term goals are to restore the mariposa lilies and balsam root, and other plants that have been gone too long. A nursery has been built on the Cayoosh to cultivate them.

What this project shows is that nature can recover, if only it has a little help and if only we stop sustaining the impacts we do. There is still road access to the beach, because just as the plants have to be able to interact with each other, so do the human users of the area. The Lillooet Naturalist Society and the Cayoosh Indian Band, who co-manage this restoration, have engaged all users of the area, formerly known as "the Pits" - or - "Party Central." With the support of everyone to restore the area that it can be shared by the deer, bears, birds and reptiles alike, real change can happen.

Kerry Coast



Top: coyote willow moves in to "Party Central": once a road and party pit.

Mid left: asparagus naturalized among roses.

Mid right: deer tracks show their presence here.

Left: Biologist Odin and his dog Aquila. Trees in the background were put up for bird use.

Salmon In The Canyon

Salmon in the Canyon is in its second year of celebrating one of the world's most important, longest and most productive salmon bearing rivers - n'Sát'atqu. the best salmon river in North America. A hundred people came to celebrate the initiative formed by the Lillooet Naturalists Society and Sek'wél'was.

Salmon dinner was served, special guests received, and music played. The event is to celebrate Chief Perry Redan of Sek'wél'was spoke to the people about the connection between the Ucwalmicw and the salmon. Mayor of Lillooet Dennis Bontron offered a few words as to the need to protect the salmon, including the idea that, if protecting the Fraser sockeye meant shutting down coastal fish farms, then "so be it."

Ruby Berry, member of the Georgia Strait Alliance and the Coastal Alliance for Aquacultural Reform, presented on the threat to wild salmon caused by those coastal fish farms. Open-pen fish farms, there are 80 in the salmon smolts' migration pattern to get to the northern Pacific Ocean, can hold up to a million salmon. Berry wondered, what does a million salmon look like? A biologist friend afforded, "that's forty elephants." Berry did not know what 40 elephants looked like. The friend explained further, "that's like a town of 30-40,000 people. In a net."

The Salmon festival provided local restoration groups a place to show off their projects and gather support for wildlife preservation initiatives.

Gilbert Redan demonstrates the capacity of grizzly jaws on biologist Ken Wright. Below, Chief Perry Redan and Lillooet Naturalist Society member Kim North at the Festival.





Fire Season - Suppression and St'át'imc Interests

The 2009 fire season brought people together. Not only at the community level, but at many levels of St'át'imc and BC government and administration.

A meeting was called to review the season. Matt Manuel at Lillooet Tribal Council's Land and Resource Department brought representatives from the Fire Centers, Village of Lillooet and Squamish-Lillooet Regional District to discuss each agency's tactics and their success and failure last summer. Part of the meeting was to look at those strategies and policies that affect St'át'imc interests on the land.

Culture and Heritage resources, like trails and village sites, can be deeply impacted by fire suppression methods such as bulldozed fire-breaks. As Darryl Orosz, Manager of the Cariboo Fire Center, aptly described the problem: "Our legal advisors have clarified, as in the case of the lightning-caused wildfire in Tsilhqot'in, it is the mandate of Ministry of Forests to go put out that fire, and we don't have to consult one on one with First Nations about where to put fire guards. We can't have our hands tied."

On the other hand, the provincial Wildfire Act is one of those pieces of legislation that is jurisdictionally paralyzed on Aboriginal title lands, as stated by Justice Vickers in

"We don't have to consult one on one with First Nations about where to put fire guards. We can't have our hands tied."

the 2007 *Williams* decision. St'át'imc territory is Aboriginal title lands.

The province's legal advisors, and certainly the Managers on the ground, do not recognize this.

One of the outcomes of the meeting is going to be the establishment of a working group to improve strategies in emergency situations. The question of how this process will work is what needs to be answered.

Ministry of Forests representatives say that the provincial vote to allocate an annual budget to fire suppression does not authorize contracting "to the company you folks use to go looking for heritage sites."

Manuel brought a draft set of outcomes to the meeting, including the need for St'át'imc crews on the ground to advise on where to build fire guards. The recommendations, originally sent last August, were rejected out of hand by Orosz. The working group will attempt to bring the two points of view closer.

Stewardship Conference hears St'át'imc projects

The 6th Annual BC Stewardship Workshop was held in Lillooet last month, at the REC Centre, February 24th and 25th. Several presentations were given by local and visiting stewardship groups.

People throughout BC are taking it into their own hands to restore damage to riparian zones and salmon populations by forming committees and finding funding sources to carry out small projects. While the projects have to be approved by DFO and often include DFO partnership, a lot of impetus to get these restorative measures underway are coming from regular citizens, and of course Band fisheries programs.

Maxine Bruce, Lil'wat, Gerald Michel, Xwisten, and Michelle Edwards, Sek'wél'was all presented on projects they spearhead.

The Powerhouse Foreshore Restoration project, a partnership between Sek'wél'was and the Lillooet Naturalist Society, is in its third year. Said Edwards, "When we restore this area along Seton River, where there is an old village site, the land is going to be telling the story to us. We are a forestry-based community, and restoration is going to create the economic basis for the future; for when we get around to harvesting again."

Xwisten Fisheries is involved in a number of restoration projects, under the leadership of Gerald Michel. Since the Teryzhagi Dam cut off the Bridge River in 1962, the Chinook run that used to spawn in Carpenter Lake and all



Michelle Edwards, Sek'wél'was, reported on the Powerhouse Foreshore Restoration project, a partnership between Sek'wél'was and the Lillooet Naturalist Society. "When we restore this area along Seton River, where there is an old village site, the land is going to be telling the story to us."

throughout the valley was cut off. Where there had been a Chinook run in the tens of thousands each year, 2009 saw only twelve adults return.

Even while problems plague the impacted river, Michel is in year two of developing spawning grounds at Apple Springs, about ten kilometers up the river. There is a large gravel bar that is being dug for channels and pools, and a water system to keep a regular flow through the channel. The hope is that improved spawning areas will help the population survive.

In Lil'wat, Birkenhead Chinook and sockeye populations have been steadily declining. Bruce pointed to various impacts along the river, such as erosion from the banks of Highway 99, which follows the river in several places.

Lil'wat has had project funding from DFO since 2002 for stock assessment, counting Chinook, sockeye and Coho on the Birkenhead. They are now in the second year of a Chinook residency study, identifying redds (nests) and the presence of juvenile Chinook. Another aspect of their stewardship activity is attending public schools and educating the students about the interconnectedness of St'át'imc culture with the salmon - the songs are about the Bear, Grizzly, Eagle and Salmon.

Birkenhead sockeye returned at 53,000 last year, while in 2003 the count was over 300,000. 625 Chinook were counted in 2009, while there have recently been returns only a quarter that size, and, in 2007, three times that number. There should be thousands of Chinook going to Birkenhead headwaters.

The architect's vision for a nature interpretation and education centre near Seton/Fraser confluence.



Warriors in Training Welcome Lillooet home after the fires



Xaxl'ip summer culture camp adapted fast to the forest fire situation. Co-ordinator Tony Curtis Adolph turned Sunday August 16 into a celebration for the whole area.

"We couldn't go camping because of the conditions, and we were on Evacuation Alert."

The planned camping trips had to be canceled since the youth and their families would not want to be separated when an Evacuation Order could come through at any time.

"We had planned a culture camp, but we rearranged the whole one-week program into a one day celebration."

People came to dance and sing, tell stories, learn basket weaving.

"The reason we really wanted to do it was to get St'át'imc culture out into Lillooet and raise the pride of our youth and see there are other people taking an interest in our culture.

"The response was great, I couldn't get over it."

Activities on the REC Center

lawn included art stations for children, led by Jack Ned; cultural workshops in dancing with Gerald Gabriel; basket weaving with Doreen Copeland; storytelling by Ceda Scotchman, and live music.

George Leach, local guitar legend, was brought all the way from Toronto to play for the people. The Wild Onions played old favourites as well.

Lightfoot Gas made a cake the size of a desk. Many volunteers came out to prepare a feast for many hundreds of people. Buy Low Foods donated food for the feast, which was attended as well by a large number of honorary guests - the fire fighters still stationed at Lillooet.

Thanks go out to Thor Davidson from the Lillooet Elks, Stephanie Witt and Orra Storkin for co-ordinating food, and a large set-up and clean up crew. And special thanks to Xaxl'ip for supporting Tony Adolph in creating a great event. "It was a day to remind us how strong our community is and what we can do when we put our minds to it."

The Warriors in Training program had purchased a new tipi, above, for their camp. At the Welcome Home Lillooet celebration, the tipi was used for story telling and basket making. At left, organizer Tony Adolph received a special painted rock from artist Remy Dillon.



Three Rivers Project brings two cultures together

A new project has started in partnership between the Lillooet Naturalists Society and Sek'wel'was to promote an understanding of the Bridge, Cayoosh and Seton watersheds and their relationship to the health of the Fraser River wildlife and salmon.

The goal is to increase people's commitment to sustainable living and promote stewardship.

On Saturday, July 11, Bonnie Michell of Xwisten, co-organizer of the project, gave demonstrations in cutting sts'wan at the Bridge River fishing rocks. Since there was no sockeye, she had to demonstrate on this Chinook salmon! Dozens of Lillooet residents came out to learn about the traditions of fishing on the Fraser.

There will be more hands-on activities that will feature at events from July 2009 to February 2010.

The project will feature a travelling trailer that will go to different sites on the named rivers to hold events with fun activities, learning opportunities, nature restoration, art projects and almost always opportunities to get dirty!

Activities are intended for families, but guest speakers and artists will have expertise and experience suitable for youth and adults as well.

The project was made possible by sponsorship from the Fraser Salmon and Watersheds Program, Public Conservation Assistance Fund, TD Friends of the Environment

WILD PLANT SALVAGE



Are you building, renovating, making a road or expanding your gardens this spring?

If you think you have some native plants, grasses or small shrubs that may be impacted, the Lillooet Naturalist Society will come and dig them up to use on local restoration projects.

For more information contact Kim at 250-256-0227

Sponsored in part by:



WANT TO LEARN MORE ABOUT THE WILD NATIVE PLANTS and SHRUBS of OUR AREA?



Volunteer during the Powerhouse Foreshore Restoration Project!

Collecting Seed and Cuttings, Salvaging, Propagation, and Planting Activities. A Workshop on Identifying Native Plants and Grasses will be held in July.



Bring some gloves and we will supply everything else you will need. Call Kim 250-256-0227



BATS?

Learn more about them



BAT DISCOVERY DAY

Saturday 23 May

1:00 to 3:00 pm	Presentation REC Centre Rm 201
3:00 pm	Walk to look at potential habitats
Dusk (9:00pm approx)	Meet at Powerhouse site to see/hear the bats



LEARN ABOUT WILD NATIVE PLANTS



Fall Volunteer

PLANTING DAYS



Bring family and friends to one of our fun hands-on plant days.

19 September

03 October

17 October

10:30 am to 1:30 pm (or as long as you want)
Powerhouse Foreshore Restoration Site





**Sunday
September 27**

Family Event

**Help Cleanup Our Local Shorelines
Fraser River to Seton Lake**

**FUN ACTIVITIES AND INFORMATION AROUND GARBAGE,
POLLUTION AND WHAT YOU CAN DO TO HELP**

**Meet at the Powerhouse Restoration Site
10:30 am to 1:30 pm
(or as long as you like)**

**Bring a bag lunch
and
enjoy a fun day with family and friends on the rivers and lake**





Appendix V

Letters of Support Received

(These are attached to the 2009 Application submitted to BCRP)

1. Cayoose Creek St'at'imc
2. Lillooet Tribal Council
3. Upper St'at'imc Language, Culture and Education Society
4. District of Lillooet
5. BC Rail Properties
6. Department of Fisheries and Oceans
7. Ministry of Environment – Kamloops
8. Ministry of Environment – Victoria
9. BC Nature - Federation of BC Naturalists
10. Lillooet & District Chamber of Commerce
11. Uxwalmixw Centre Society
12. Lillooet Food Matters
13. Yalakom Ecological Society
14. Teacher, Cayoosh Elementary School
15. Principal, George M. Murray Elementary School
16. The Bag Ladies, Lillooet
17. Lillooet Employment Centre - Friendship Society
18. Fraser Salmon and Watersheds Program
19. Bridge River Lillooet News
20. St'at'imc Runner
21. Radio Lillooet
22. Lillooet Naturalist Society