FINAL REPORT 2016 -17

Sát`atqwa7 - The River
Powerhouse Foreshore Restoration Project

Maintenance Program Year 3

Project No.: FWCP COA-F17-W-1341

Prepared for: Cayoose Creek Indian Band - Sekw'el'was
Fish and Wildlife Compensation Program

Prepared by: Kim North
Splitrock Environmental Sekw'el'was LP
Box 798
Lillooet BC V0K 1V0

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Financial support also provided by Environmental Canada, Aboriginal Fund for Species at Risk.

EXECUTIVE SUMMARY

During 2016-17, management work continued to ensure that the investment made into the Powerhouse site over the years was protected. Management of invasive plant species and maintenance of past works encourages native species to spread, thereby optimizing wildlife values. Appendix A Page 17-18 of the Watershed Plan places a "high" value on invasive plant management "as it was felt that invasive plant species are affecting many of the high priority habitats".

Invasive weed management took place over the entire 15 ha site, with a focus on the 5 ha upland bench where the majority of invasive plant species are found. Between 12 April 2016 and 21 September 2016 a total of five weed-blitz days were completed for a total of 189 crew-hours. An additional eight days were spent irrigating and weeding the site with smaller crews for a total of 78 crew-hours. Invasive plants removed during 2016 included the usual species that have been treated over the past several years – mustards, salsify, alfalfa, cheat grass, prickly lettuce, bulbous bluegrass, bindweed, knapweed, white clover, Dalmatian toadflax, Russian thistle and Kochia. No observations were made of new invasive plant species encroaching into the site. Minimal invasive weed removal was required within the riparian area or on the large sandbar, where predominately alfalfa and white clover were removed easily from the sandy soils.

Due to the large seed bank in the soils from the historic invasive species found on site before restoration works began, it is imperative that weed management continue yearly with the goal of reducing the seed bank for future years. It is noted that some of the invasive plant species on site have seed banks that can last up to 20 years or more (Seton Corridor Report 2012).

Restoration and Revegetation works were completed during 2016-17 based on results of regular monitoring of the site. A total area of 2,872 sm was planted out with 649 native trees, shrubs, forbs and grasses. As well, four large boulders and cuttings were installed into a gap in the riparian zone where an off-road vehicle was observed encroaching into the restored areas.

The Powerhouse Foreshore Restoration Project has engaged St'at'imc and non-St'at'imc communities in multiple outreach and stewardship activities over the last nine years. This continued in 2016-17, where one field tour and stewardship event took place at the Powerhouse site, and environmental technicians mentored high school and post-secondary students throughout the season on plant identification and weed management strategies.

The Powerhouse site has been incorporated into the Seton River Corridor planning process and has been identified as high-value wildlife habitat and been designated a conservation area by the partners and stakeholders. It has been deemed important to continue monitoring the site and implementing adaptive management strategies identified, including continued weed removal, increasing diversity, public education and installation of signage.

ACKNOWLEDGMENTS

This Project was funded by the **Fish and Wildlife Compensation Program** on behalf of its program partners BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and the public, who work together to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams.

The federal government **Aboriginal Fund for Species-at-Risk (AFSAR)** program provided funds towards Interior western screech-owl and Great Basin gopher snake survey, and enhancement works.

Lillooet Naturalist Society provided assistance towards weed blitz and outreach activities. They are ongoing champions of the project and continue to assist in planting, reptile cover board monitoring and environmental education.

Splitrock Environmental - Kim North - on behalf of Sekw'el'was has compiled the information provided in this report. Information has been gathered from:

- Fred James, Environmental Technician
  Daily maintenance summary reports completed throughout year
- Kim North, Project Manager
  Restoration and Revegetation Works 2016-2017
- Iraleigh Anderson
  Photo Point Monitoring 2016
- Heather Richardson, B.Sc.
  Carbon Sequestration Program oversight (see Seton Corridor 2016-17 final reports) and assistance with mapping

Thompson Rivers University – Professor Lauchlan Fraser, Professor, Department of Natural Resource Sciences/Biological Sciences, worked with Splitrock Environmental and students from Thompson Rivers University to assist in monitoring activities on the site.

- Chantalle Gervan, Colton Stephens, and Dan Denisik
  The effects of various sagebrush removal methods on a disturbed site in Lillooet, BC.

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1.1 Proponent Information

Splitrock Environmental Sekw'el'was is a 100% owned aboriginal business of Sekw'el'wás (Cayoose Creek Indian Band) specializing in environmental services, ecological restoration, and propagation of native plants. Environmental services include habitat, fish and wildlife inventory, mapping and monitoring. Through our restoration work, we create long-term adaptive management plans and implement projects from start to finish.

Splitrock Environmental began as a partnership between the Lillooet Naturalist Society and Sekw'el'wás in 2007, when we partnered to undertake restoration works on the banks of the Fraser River, in part funded by FWCP. Since that time the non-profit work has evolved into the establishment of Splitrock Environmental – a social enterprise business that stays true to it's cultural and ecological values while providing community capacity building and environmental stewardship and outreach. Our goal is to develop a sustainable business that links our community to its past while providing opportunities for the future. Our business has grown to include two biologists and one plant ecologist, as well as a passionate crew of certified environmental and fisheries technicians from the St'at'imc community. Where necessary, we engage professionals in their field to ensure we develop appropriate working protocols that ensures we gather the necessary information needed to protect and enhance our natural world and to share with the wider scientific community.

1.2 Hydroelectric Impacts

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

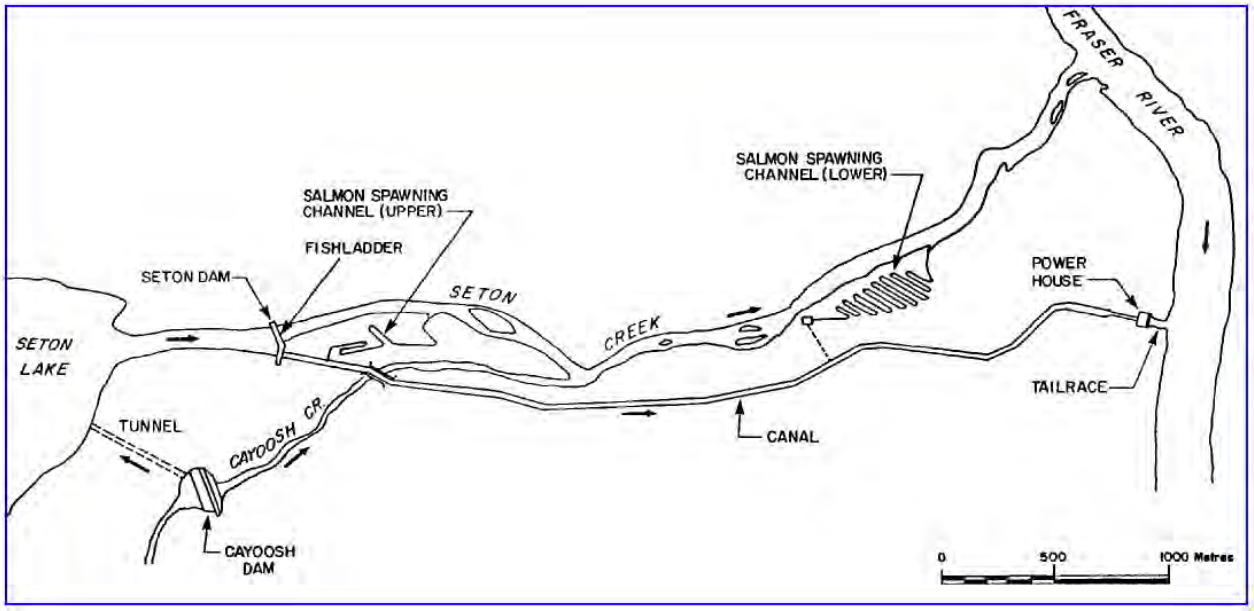
Extensive development of the Powerhouse site occurred during construction of the Seton power system. Excavation of the canal and forebay required the movement of vast amounts of earth, which fragmented habitats at the Powerhouse site and riparian ecosystems along the Fraser River. Construction altered the flow of the Seton River, which disturbed the original habitats and destroyed "an area of low marshy habitat [that] existed near the Fraser confluence" (Bridge-Coastal Restoration Program, 2000). Historic photographs of the area show the extent of

industrial use of the Powerhouse site by BC Hydro, including use for Hydro operations and for leasing to other industrial users. Figure 1 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.

The upland bench, under the ownership of BC Hydro, was also leased out to Department of Transport who had a salt yard and bitumen making operation on site for many years. An area of the site was where large chunks of bitumen where found buried and necessitated the elimination of one large area from machine manipulation of the soils in preparation for planting. This area in particular remains one of the most difficult areas to get native trees and shrubs established and where invasive plant species have still not been effectively controlled.

The site was also an area where garbage, including building materials, car parts and household garbage was dumped, and where recreational activities like off-road vehicle use, mud-bogging and partying occurred. BC Hydro did not manage the property except to erect 'No Dumping' signs that were ignored.

The legacy of these activities was the fragmentation of the riparian area, compaction of the upland bench and increases in invasive weed populations, to the extent that only two small areas on the upland bench had native species (Figures 2-8).



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

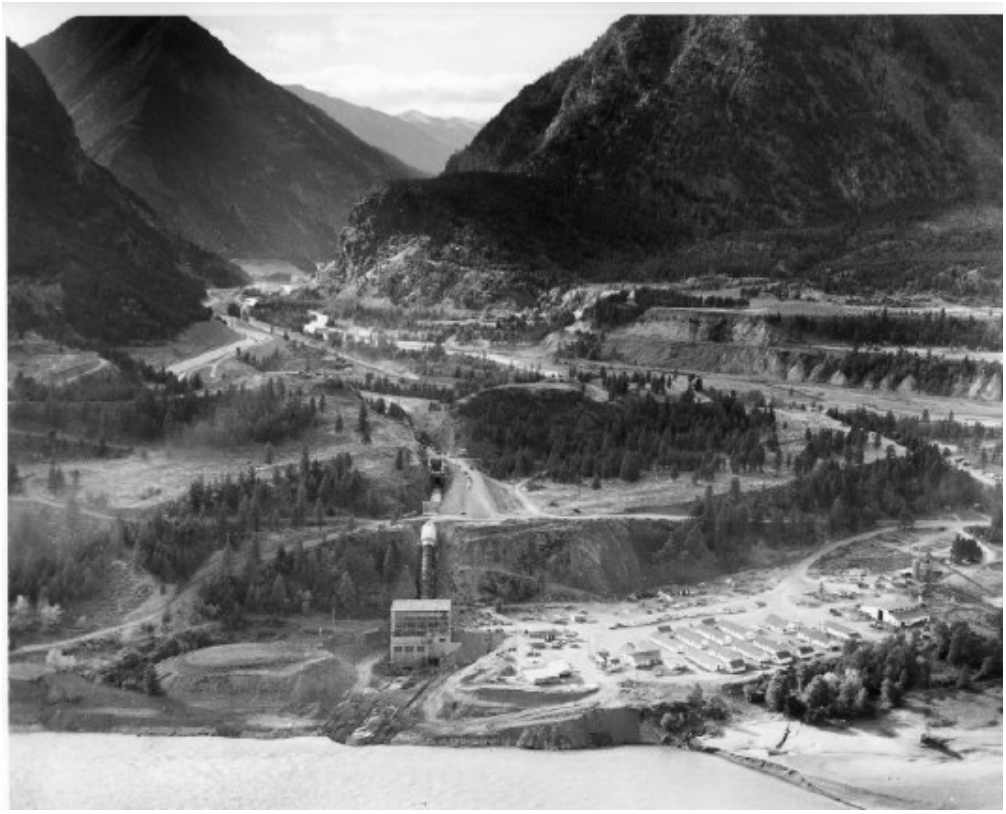


Figure 1 Cayoosh Canal and Forebay Construction 1950s

Figure 2 Section of upland bench – compacted soils, roads and invasive species prevalent on site 11 July 2008

Figure 3 Site of the three initial test plots R7 Before restoration 13 June 2008

Figure 4 Upland bench - roads and weeds. Note the only small native shrub island top right

Figure 5 Asphalt chunk being dug up - evidence of MOT operations - this area continues to be difficult to plant into August 2009

Figure 6 Concrete slabs being removed August 2009

Figure 7 Diffuse Knapweed covered the site before restoration works began August 2009.

Figure 8 Old roadbed showing the extent of alfalfa that is very difficult to remove August 2009

2. Goals and Objectives

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

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

The objectives in 2016-17 were to:

- train weed management crews on native and invasive species identification to ensure they can recognize species before undertaking any weed management strategies.
- remove targeted invasive plant species over entire site based on weekly monitoring of site for invasive weed encroachment. The aim is to gradually, over time, remove the large seed-bank and to ensure native species can establish and compete with invasive species.
- increase the density of primarily trees and shrubs, and native bunchgrasses, in past restoration areas, with the aim of increasing percent cover of native species in fragmented areas.
- maintenance of 2015/2016 trees and shrubs by watering as required, based on weather conditions.

The 2016-17 objectives have been met. In addition, one area to the south of the main access road was closed off were it was observed that an off-road vehicle had entered the riparian from the gravel bar between two large boulders. Additional boulders were used to close the gap and cottonwood cuttings planted throughout the area to deter further encroachment.

Other work that occurred on the Powerhouse site during 2016-17 included revegetation monitoring of the 2009 – 2012 restoration works, a carbon sequestration survey, reptile cover-board and Interior western screech-owl surveys, clean-out of screech-owl boxes, and ongoing observation of use of osprey nest on the site. This work is being reported under 2016-17 Seton River Corridor project COA-F17-F-1329 project as part of the Seton River Corridor project.

3. Study Area

3.1 Site Location

The project site 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 specific site is off Powerhouse Road where the local BC Hydro Office and work yards are located (Map 2).

The Powerhouse site is located along the western shores the Fraser River, between the mouth of Seton River and the Cayoose canal outlet. The site is bordered by Powerhouse Road to the west and Cayoose Creek Reserve Lands to the north-west. The project site is currently zoned 'Industrial', with a Wildlife Habitat Area for the Western Screech-owl established over the riparian ecosystem along the Fraser River. The reference site for the project is Mariposa Flat, a large bench above the Powerhouse Site.

3.2 Biophysical Description

The site (50.67393°N, 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 restoration project, the site has been broken into three specific ecological zones (Figure 9):

The area under BC Hydro ownership was largely a damaged flat bench above the river with many old roads crisscrossing the area. It is a **dry upland bench** that was dominated by many aggressive weeds, as well as a few native grasses and low shrubs, including Big sagebrush *(Artemisia tridentata*), giant wildrye *(Leymus cinereus)* and a few ponderosa pine (*Pinus ponderosa).* This area was targetted as a prime candidate for restoration and creation of new and diverse habitat. All roads, except one, in this area were closed off during Phase One (2008). The majority of the benchland has been the focus of restoration work during Phase Two to Five (2009-2012). During 2012/13 it was observed that invasive weed species were still prevalent on the site. This is to be expected due to the large seed bank that still remains in the soil. No funds were available to maintain the site and protect the investment in 2013-14; however, volunteers and crew from Splitrock were used to undertake two days of an intense sweep across the site to remove weeds before they seeded again into the area. During 2014-15 and 2015-16 funds were

available from FWCP to undertake some weed removal, sage thinning and revegetation works.

The crown land portion of the site is a **riparian band** dominated by taller deciduous shrubs and trees. Plants include saskatoon (*Amelanchier alnifolia*) and prickly rose *(Rosa acicularis*), as well as black cottonwood (*Populus balsamifera* spp. *trichocarpa*) stands. A ponderosa pine forest is located on the border at the northern end of the site. The area had been degraded and was used as a party site, racetrack, mud-bogging pit and dumping ground for garbage. During Phase One (2008) all roads in the riparian zone were deactivated and invasive weed removal and planting/layering begun. This work continued during 2009-2012. Recovery has been successful with many native plant species recolonizing the area and roads disappearing. The area is now designated a WHA for the red-listed Interior Western Screech-owl. One road that was converted into the riparian trial has weeds returning, in particular alfalfa, due to the existing seed bank and will need to be removed again in the future.

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. The minimal weed species that have encroached into the area were targeted for removal during 2010-2015 and this work has proved successful. This is an area that benefits from general clean-ups, focused annual weeding and public education programs.

Map 2 Powerhouse Foreshore Restoration Site

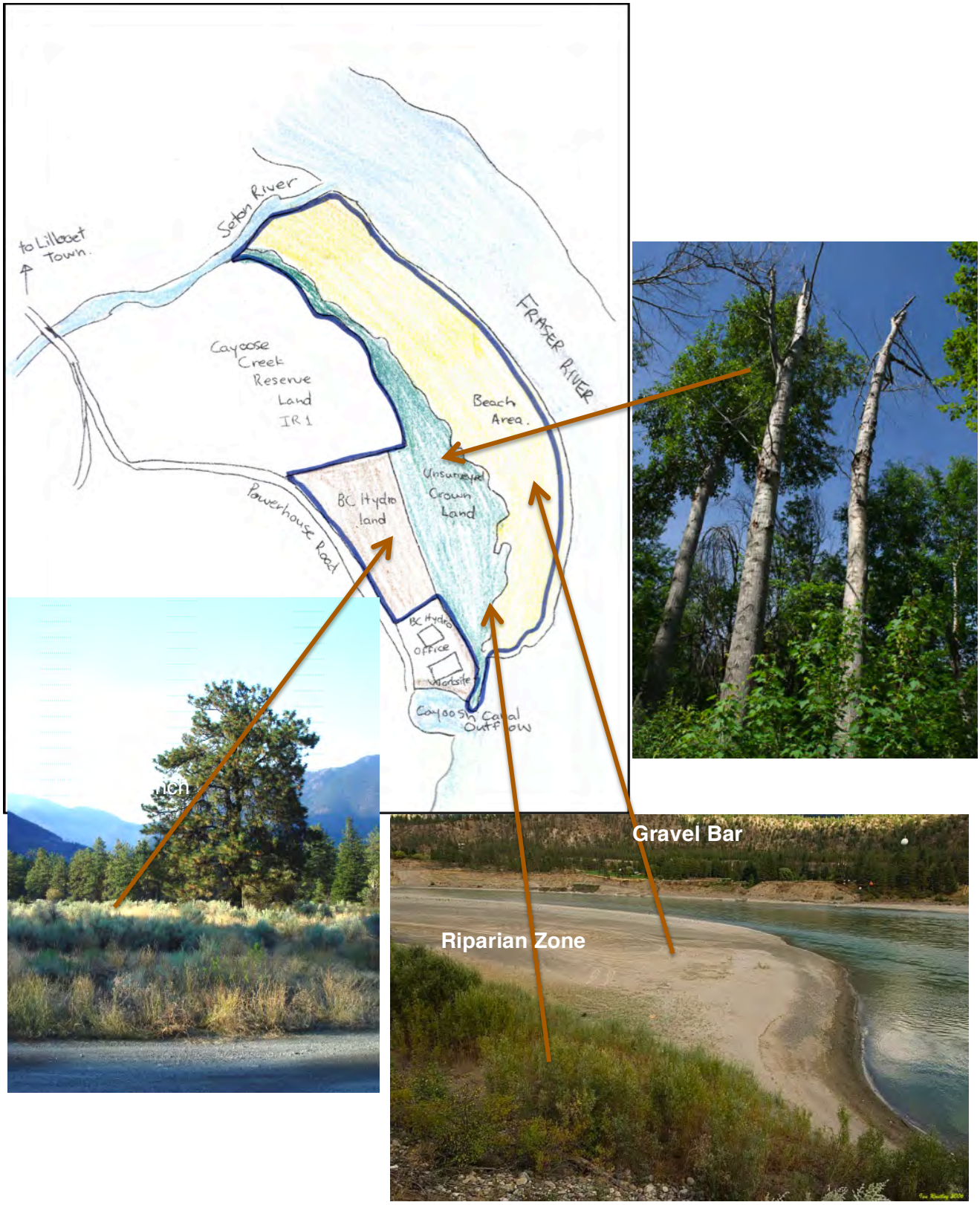


Figure 9 Site Sketch and photos describing locations

4. Background

The Powerhouse Foreshore Restoration Project is a multi-faceted project that was carried out between 2005 – 2012 (Maps 3 – 9). We are now in the maintenance phase of the project.

The goal of the restoration works and ongoing maintenance program at the Powerhouse Foreshore Restoration site was to increase suitable and productive habitat, with a focus on high priority species: Interior western screech-owl, Spotted bat and Mule deer. Other species that were targeted to benefit from the restoration work included the Yellow-bellied Racer, Great Basin gopher snake and Lewis's woodpecker (Bridge Seton Species Action Plan: Species of Interest). This project addresses the concept of ecosystem integrity, resiliency and the functional elements of ecosystems, including efforts to optimize productive capacity (Watershed Plan Pg 10).

Maintenance requires long-term commitment and a practical plan to ensure the work that was carried out continues to meet the project goals. The work carried out to date includes:

- 2005: Initial idea conceived and Bridge-Coastal Restoration Program seed funding application submitted
- 2006: Restoration and Enhancement Feasibility Study completed (06.W.BRG.07)
- 2007: Restoration Plan Developed (07.W.BRG.05)
- 2008: First year of ground work with focus on riparian zone (08.W.BRG.02)
- 2009: Second year of ground work with focus on upland bench (09.W.SON.01)
- 2010: Third year of ground work and increased monitoring (10.W.SON.01)
- 2011: Fourth year of ground work and monitoring (11.W.SON.01)
- 2012: Fifth and final year of planting and monitoring (12.W.SON.01)
- 2013: Volunteers and in-kind donations from Splitrock partially maintained the site.
- 2014: Maintenance Funds to manage weeds, implement sage removal and revegetate (14.W.SON.03).
- 2015: Maintenance funds to manage weeds, protect trees and shrubs by watering through summer season as required, continue sage removal trials and revegetate (16.2.SON.03).

During 2016-17, maintenance funds were used to manage weeds, protect trees and shrubs by watering through summer season as required, and increase native plant density in targeted areas (COA-F17-W-1341).

The Powerhouse Foreshore restoration works were undertaken between 2008 to 2012. The restoration works involved the deactivation of over twenty-three roads that were fragmenting the site, the removal of years of garbage, decompaction of soils degraded from industrial activities and control of invasive weeds in an attempt to decrease any future weed banks from

establishing. The restoration work also involved the installation of CWD, boulders and standing snags and revegetation with native plant species (FWCP Powerhouse Foreshore Project – Final Reports 2008 – 2012).

During 2013-14 no funding was secured and it was obvious that without any committed action the weed bank that existed on the site from decades of seeding was impacting the restoration works completed. Some volunteer invasive weed management did occur by Splitrock Environmental during that year, but not enough time to effectively prevent certain species from seeding again. During the last two years weed management funds provided by FWCP, and additional leveraging of funds from AFSAR, made it possible to initiate weed management strategies, sage thinning trials and revegetation efforts. During 2015-16, work was carried out to manage invasive plant species, continue sage removal trials and plant to increase species diversity on the site (FWCP Powerhouse Foreshore Project – Final Report 2015-16

During 2016-17, maintenance funds were used to manage weeds, protect trees and shrubs by watering through summer season as required, and increase native plant density in targeted areas (COA-F17-W-1341). The management work continued to ensure that the investment made into the Powerhouse site over the years was protected. Management of invasive plant species and maintenance of past works encourages native species to spread, thereby optimizing wildlife values. Appendix A Page 17-18 of the Watershed Plan places a "high" value on invasive plant management "as it was felt that invasive plant species are affecting many of the high priority habitats". This work included weed removal, infilling with native plants, installation of boulders and coarse woody debris.

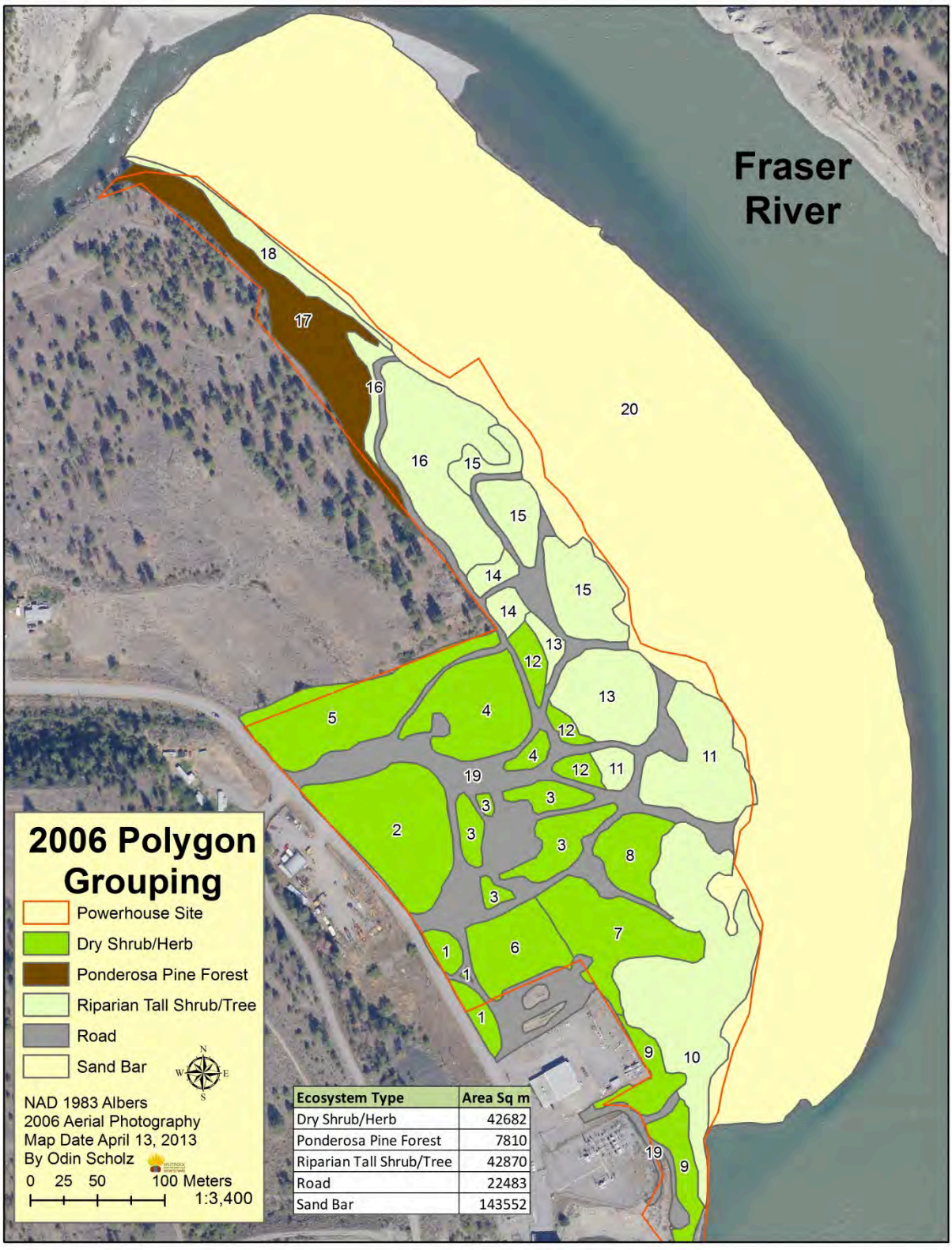
Due to the large seed bank in the soils from the historic invasive species found on site before restoration works began, it is imperative that weed management continue yearly with the goal of reducing the seed bank for future years. It is noted that some of the invasive plant species on site have seed banks that can last up to 20 years or more (Seton Corridor Report 2012).

To gain a greater understanding of the post-restoration conditions on all restored sites within the Seton River Corridor, Splitrock Environmental implemented a revegetation monitoring program in 2016 to assess the successes and challenges found on the sites, and to provide adaptive management strategies as required. This monitoring program included the restoration works completed between 2008 and 2012 at the Powerhouse site. As well, a partnership with Thompson Rivers University enabled a research project to be implemented to look at the effects of various sagebrush removal methods on disturbed grounds at the Powerhouse site and the carbon capture possibilities of restoration activities. The revegetation monitoring and carbon sequestration projects are reported under the Seton River Corridor 2016-17 final report.

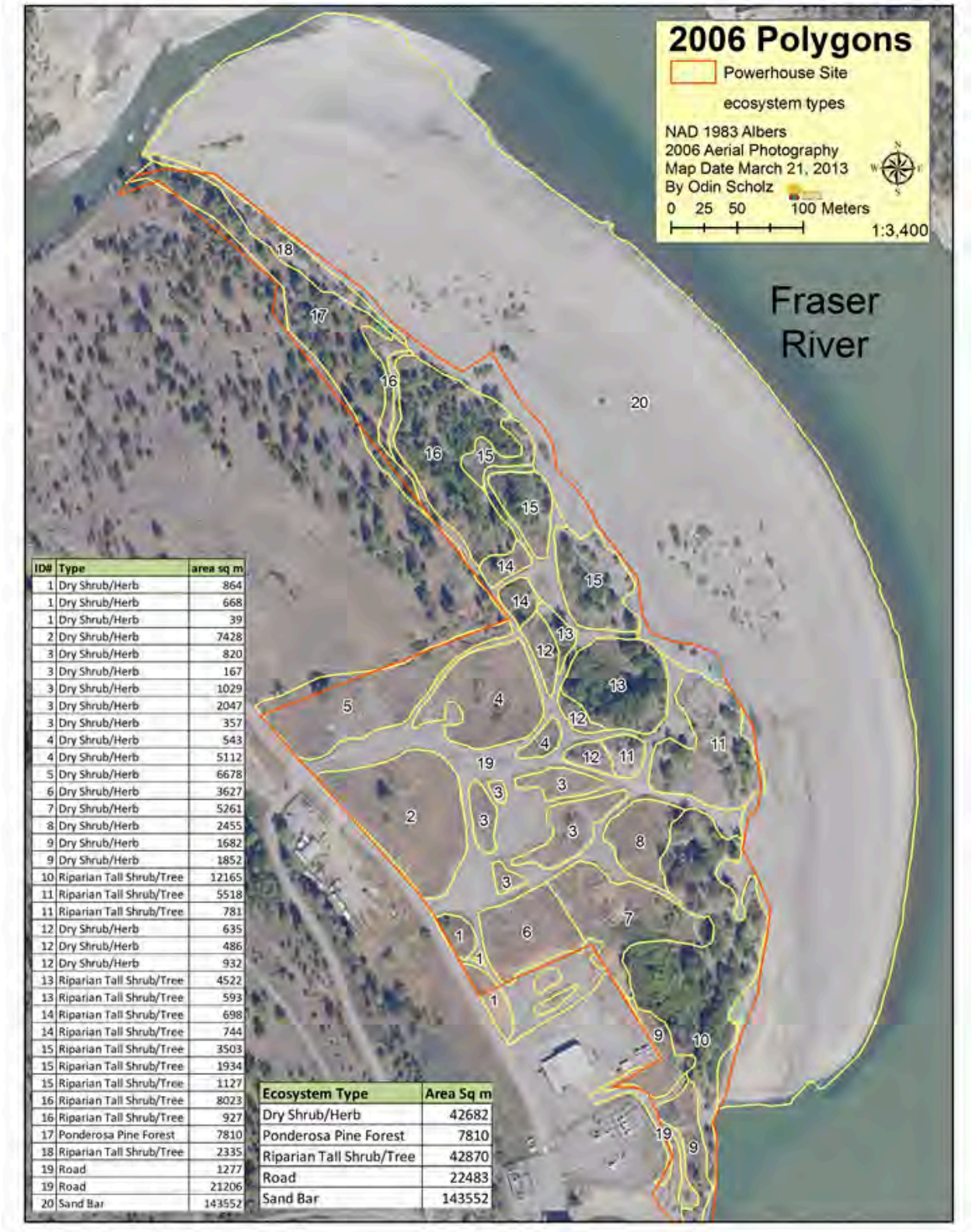
The Powerhouse Foreshore Restoration Project has engaged St'at'imc and non-St'at'imc communities in multiple outreach and stewardship activities over the last nine years. We have

promoted the site, the restoration work, the importance of functioning habitat to fish and wildlife, and have provided tools and opportunities for people of all ages to become involved in habitat protection and/or restoration. This has created a stewardship ethic in the community and has been instrumental in protecting the site from past activities like dumping, partying, ATVing and mud bogging. This work continued in 2016-17.

The Powerhouse Advisory Committee made up of first nations, government reps, NGOs, and local community members guided work on the site for the first seven years. This Advisory has now become part of the Seton River Corridor Stakeholder group that meets to work together with the common goal of conserving and increasing fish and wildlife habitat in the corridor from the Fraser River to Seton Lake. The partners and stakeholders have identified the Powerhouse site as one of four most significant wildlife habitat areas in the Seton Corridor.



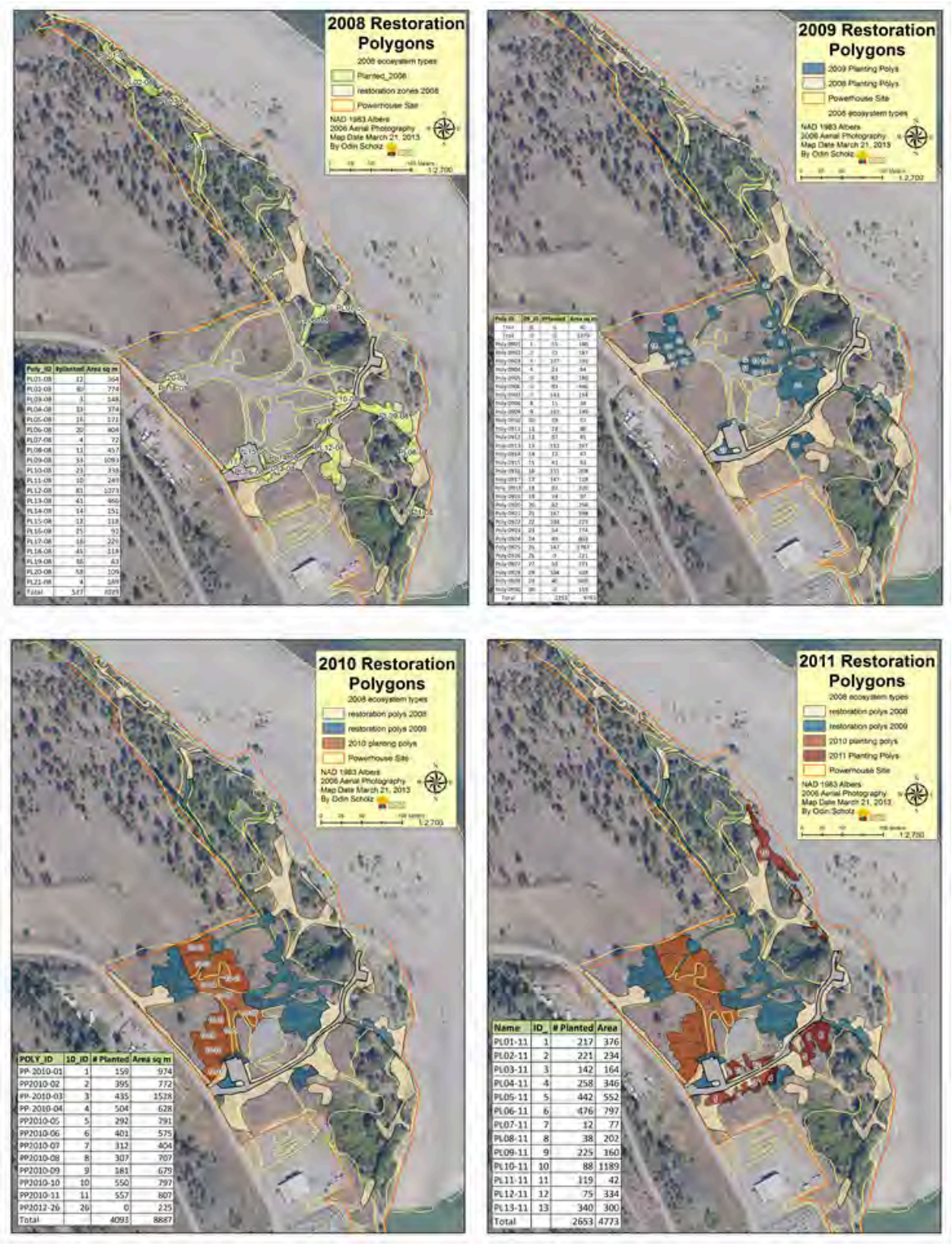
Map 3 Polygon Map showing different ecosystem types 2006



ID#	Type	area sq m
1	Dry Shrub/Herb	864
1	Dry Shrub/Herb	668
1	Dry Shrub/Herb	39
2	Dry Shrub/Herb	7428
3	Dry Shrub/Herb	820
3	Dry Shrub/Herb	167
3	Dry Shrub/Herb	1029
3	Dry Shrub/Herb	2047
3	Dry Shrub/Herb	357
4	Dry Shrub/Herb	543
4	Dry Shrub/Herb	5112
5	Dry Shrub/Herb	6678
6	Dry Shrub/Herb	3627
7	Dry Shrub/Herb	5261
8	Dry Shrub/Herb	2455
9	Dry Shrub/Herb	1682
9	Dry Shrub/Herb	1852
10	Riparian Tall Shrub/Tree	12165
11	Riparian Tall Shrub/Tree	5518
11	Riparian Tall Shrub/Tree	781
12	Dry Shrub/Herb	635
12	Dry Shrub/Herb	486
12	Dry Shrub/Herb	932
13	Riparian Tall Shrub/Tree	4522
13	Riparian Tall Shrub/Tree	593
14	Riparian Tall Shrub/Tree	698
14	Riparian Tall Shrub/Tree	744
15	Riparian Tall Shrub/Tree	3503
15	Riparian Tall Shrub/Tree	1934
15	Riparian Tall Shrub/Tree	1127
16	Riparian Tall Shrub/Tree	8023
16	Riparian Tall Shrub/Tree	927
17	Ponderosa Pine Forest	7810
18	Riparian Tall Shrub/Tree	2335
19	Road	1277
19	Road	21206
20	Sand Bar	143552

Ecosystem Type	Area Sq m
Dry Shrub/Herb	42682
Ponderosa Pine Forest	7810
Riparian Tall Shrub/Tree	42870
Road	22483
Sand Bar	143552

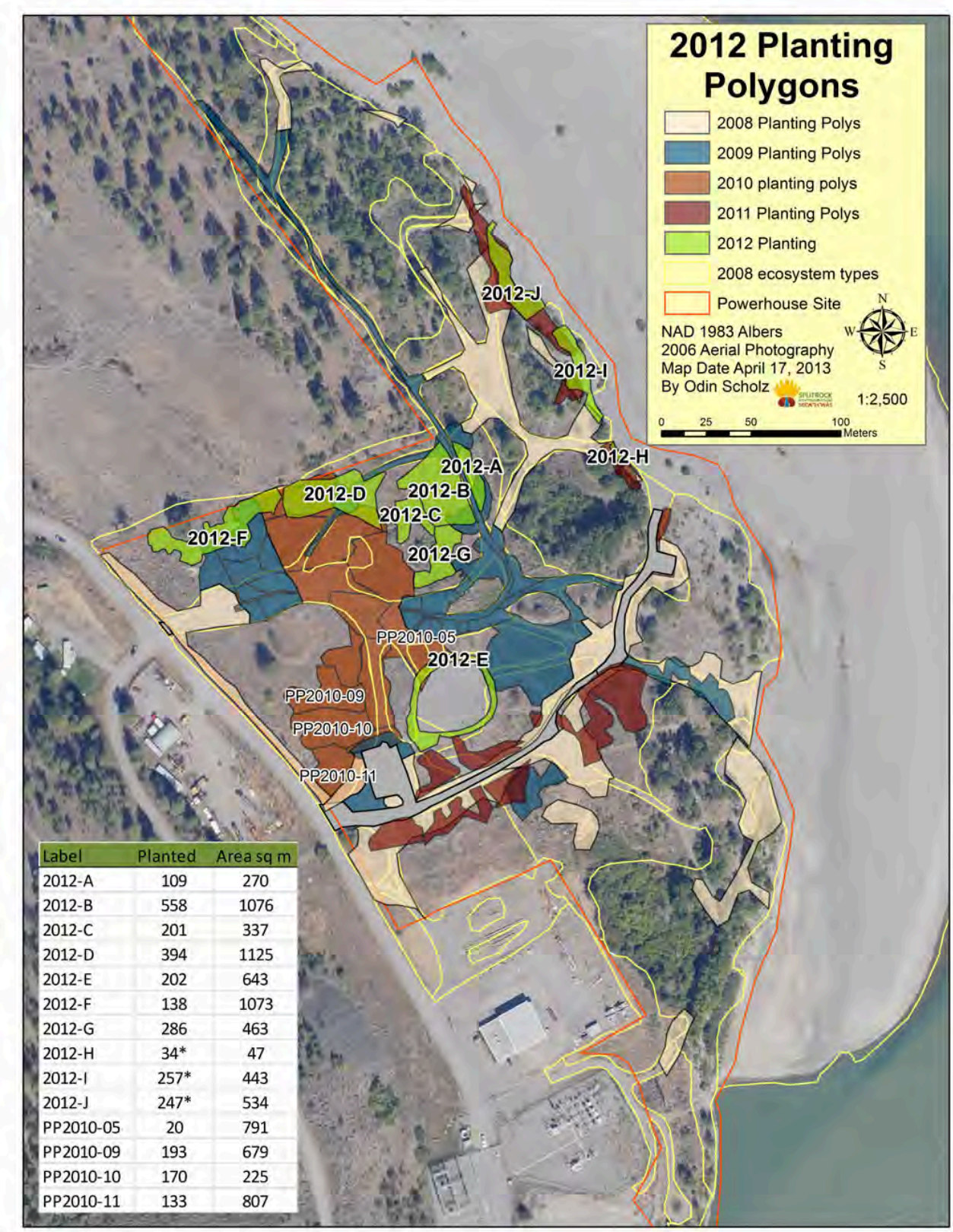
Map 4 Polygon map showing areas of the different Ecosystem Types found in 2006



POLY_ID	10_ID	# Planted	Area sq m
PP-2010-01	1	159	974
PP2010-02	2	395	772
PP-2010-03	3	435	1528
PP-2010-04	4	504	628
PP2010-05	5	292	791
PP2010-06	6	401	575
PP2010-07	7	312	404
PP2010-08	8	307	707
PP2010-09	9	181	679
PP2010-10	10	550	797
PP2010-11	11	557	807
PP2012-26	26	0	225
Total		4093	8887

Name	ID_	# Planted	Area
PL01-11	1	217	376
PL02-11	2	221	234
PL03-11	3	142	164
PL04-11	4	258	346
PL05-11	5	442	552
PL06-11	6	476	797
PL07-11	7	12	77
PL08-11	8	38	202
PL09-11	9	225	160
PL10-11	10	88	1189
PL11-11	11	119	42
PL12-11	12	75	334
PL13-11	13	340	300
Total		2653	4773

Map 5 - 8 Restoration Polygons showing areas treated between 2008 - 2011



Label	Planted	Area sq m
2012-A	109	270
2012-B	558	1076
2012-C	201	337
2012-D	394	1125
2012-E	202	643
2012-F	138	1073
2012-G	286	463
2012-H	34*	47
2012-I	257*	443
2012-J	247*	534
PP2010-05	20	791
PP2010-09	193	679
PP2010-10	170	225
PP2010-11	133	807

Map 9 Restoration Polygons from last year of ground work 2012

5. Methods

5.1 Invasive Weed Management and Site Maintenance

Invasive weed removal is a large part of the restoration work that is required to maintain the restoration investment. Invasive plants such as diffuse knapweed (*Centaurea diffusa*) and alfalfa (*Medicago sativa*) easily invade sites and prevent the establishment of native species, including those that we have planted. During 2016, we again focused on primarily removing weeds from the dry upper bench, with just one sweep along the Fraser River to hand pull weeds growing in the sandy soils of the gravel bar. Again, no work was completed in the riparian zone except one weed trimmer sweep along the edges of the riparian trail.

We accomplished most of the work through weeding blitzes, where the crew size was increased with the goal of removing targeted weeds in a few days. Crews were trained in plant ID before tackling the site and partnered with experience crew technicians. Weeds were removed using digging tools and by hand-pulling were appropriate. The weed blitzes were timed according to the emergence and blooming time of invasive species on the site. We aimed to remove invasive species during early flowering, but always before seeding.

In addition to the weeding blitzes, the site was also weeded as needed by a team of one to three staff members during regularly scheduled maintenance days. Alfalfa (*Medicago sativa*) was mowed and or weed-wacked several times throughout the summer, to prevent flowering and seed spread. Weeds were left on site, composted, or taken to the dump, depending on the plants tendency to reproduce.

Due to the extended hot dry climate of the Lillooet area it has been proven over the past several years that trees and shrubs watered in for up to two years after planting have a better chance of successfully surviving as they can set down a good root system and grow taller, thereby outcompeting invasive plant species. One site where a drip line was installed and a weed cloth and mulch cover laid down has shown the best growth to-date compared to other areas where plants are watered by hand using the irrigation trailer or where no watering takes place at all.

Watering of 2014 and 2015 planted trees and shrubs was initiated again in 2016. Trees and shrubs were flagged in 2014 and 2015 so that watering crews could easily locate the plants that needed to receive additional water during the maintenance sessions. Watering was done using the Splitrock irrigation trailer, which has a 900 litre water tank and 1” pump and hoses attached. When possible, the water tank was hooked up to sprinklers to allow staff to weed while an area was being watered.

5.2 Revegetation

Crew technicians planted potted trees and shrubs by digging holes twice the size of the potted plants, then loosened the soil in the hole, and used a hose and/or watering can to fill the hole with water. Once the water had soaked into the ground, the plant was placed into the hole and covered with soil, packing firmly around the plant as more soil was added. Directions on covering the potting soil were stressed and a slight depression was left where water could pool and be directed to the plants roots. The soil around the potted plants was then mulched with composted wood chips.

Crew technicians planted grassland plugs using a silviculture shovel. The soil was opened up with the shovel, the plug inserted into the hole, and the soil then tamped back in against the plug.

Crew technicians collected cottonwood cuttings from under hydro transmission lines using hand pruners. The cuttings were then soaked for one week, and then staked into the riparian area using a metal pole made especially for planting cuttings. The metal pole was rammed into the earth multiple times to get to a depth of approximately one meter deep. The cuttings were then inserted into the hole and the soil pushed back around the plants.

5.4 Photo Point Monitoring

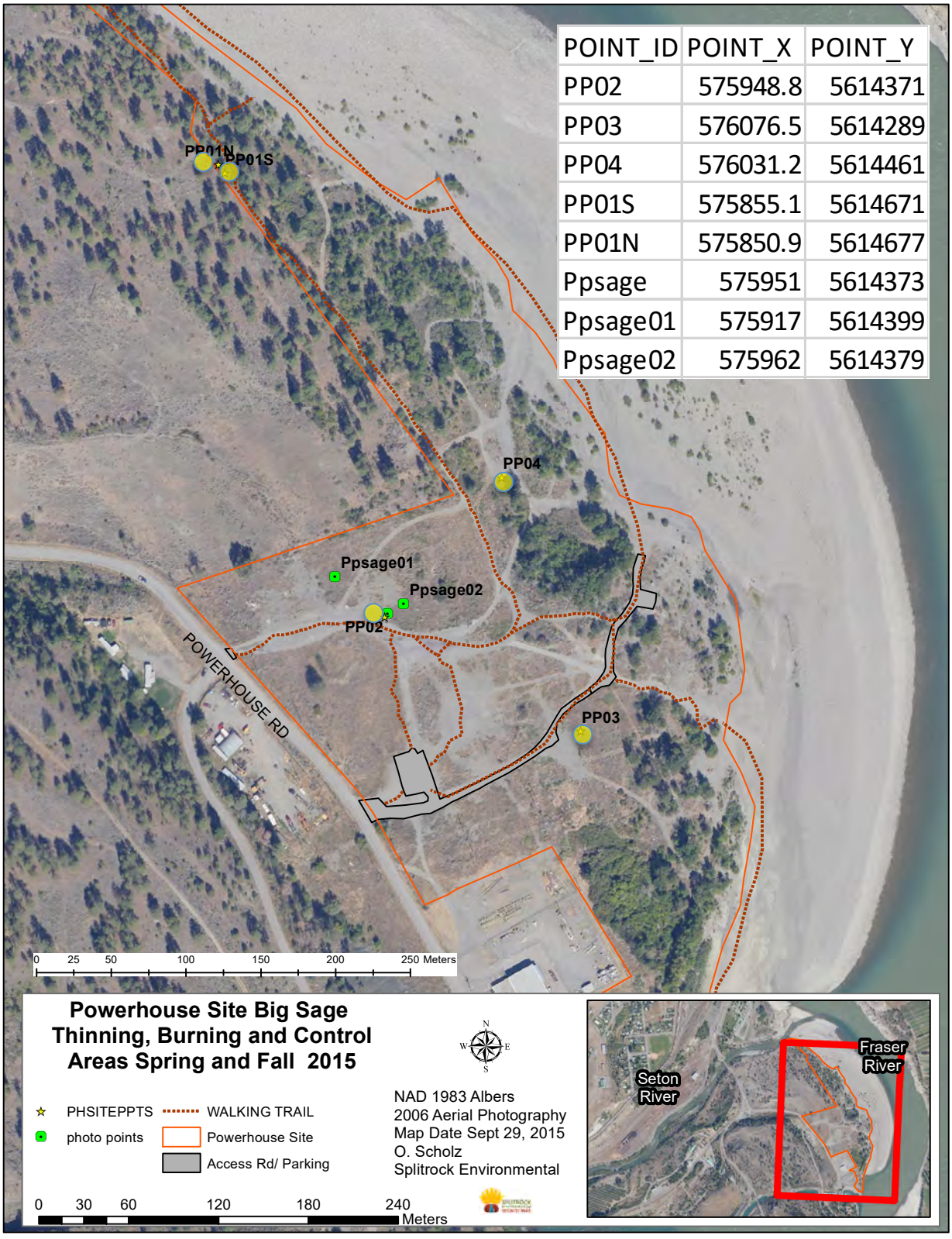
In 2008, five permanent photo monitoring points were established at the Powerhouse site (Map 11). The five photo points include representative sites for each major ecosystem type on site:

- Ponderosa pine dominated ecosystem to the north-west of the site (PP01S and PP01N)
- Upland bench along the “grassland trail” (PP02)
- Intermediate zone between upland and riparian area near Lower Snag Area (PP03)
- Riparian zone within the old “pit” area (PP04).

During 2015, three additional photo point monitoring locations were established at the sage removal trial polygons (ppsage, ppsage01, ppsage02). No monitoring was completed during 2015 at these three locations (Map 10).

2016 was the ninth year of photographing the site using the established photo point stations and the second year using the newly established photo point stations. Installed markers (ground pins) were located, and photographs taken at all sites by setting up a tripod so that the camera was directly over the top of the pin. The camera was then mounted to the tripod and measurements made to set lens height at 1.0 or 1.3 m. The meter board was then set up 10m from pin in direction of subject of interest and the camera focused at the top of the meter board and centred in the photo frame. Photos were taken at all locations in all directions, using three camera zoom settings (wide, midpoint, zoom).

Data was then entered into doForms and included recording new photopoint name, date, locations, GPS UTM's, description of site, weather, time and photo numbers. DoForm data was then entered into an excel database for reference.



POINT_ID	POINT_X	POINT_Y
PP02	575948.8	5614371
PP03	576076.5	5614289
PP04	576031.2	5614461
PP01S	575855.1	5614671
PP01N	575850.9	5614677
Ppsage	575951	5614373
Ppsage01	575917	5614399
Ppsage02	575962	5614379

Map 10 Photo Point Locations (Old and New) 2015

6. Results

6.1 Invasive Weed Management and Site Maintenance

A native plant and weed identification training session was held by experience crew technicians to ensure new members and summer students were aware of the plant species found on site. Specific weeds were recognized as being the priority at the different weed blitz sessions and inexperienced crews focused on those easily identified, while more experienced crews removed the targeted species and other species when encountered. Experienced crews worked alongside casual workers to ensure weeds were pulled and native plants recognized and retained.

A total of five weed blitz days took place and involved a larger crew moving across the 5 ha upland site in a methodical manner, removing targeted weeds as they went. The weed blitzes occurred at different intervals throughout the growing season (Table 1). On one of the weed blitz days technicians spent some of their time out on the gravel bar and targeted alfalfa and white clover that is easily pulled from the sandy soils.

Keeping the seed bank down was the main focus of the weed management program. Different weed species occur at different times throughout the season, and some species that are initially trimmed down again try to set seed (Figures 11-18). Weeds from off-site can also impact on the restoration works (Figures 11-14; 19). Therefore, weed pulling and trimming on a regular basis is imperative to keep plants from going to seed and adding to the already existing seedbank. So in addition to the weed blitzes, regularly maintenance days were scheduled. While irrigating trees and shrubs planted in 2014 - 2015, technicians pulled invasive species as they were observed in the areas they were working, while another technician targeted mostly alfalfa with the trimmer on various occasions. Crews attended the Powerhouse site an additional eight days to weed, trim and irrigate (Table 1). 2016 was a cooler and wetter year than that experienced in 2015; therefore only 13 site visits for weed management and maintenance was required in 2016 compared to 18 days in 2015.

Many of the same invasive plant species observed and removed on the site in 2015 were again encountered during 2016 field season. The focus of 2016 was to continue to remove any mustard, salsify, knapweed, prickly lettuce and kochia found across the entire upland bench. Many of these species have seen a marked decline in effort needed to remove.

Based on observations throughout the season, five sites were targeted for specific weed removal:

- Polygons 6 and 7 (Map 4); Lower Snag Area and bench above: Dalmatian toadflax (listed provincially as noxious) was a concern in these two locations, with more plants observed in 2016 than in the last two years. Dalmatian toadflax is a persistent and aggressive invader that reproduces by both seed and vegetative propagation, and a mature plant can produce up to 500,000 seeds annually which remain viable for up to ten years in the soil; therefore, it

is recommended that physical removal must be repeated annually for at least 10 years to completely deplete the seed bank. (https://www.for.gov.bc.ca/dos/programs/range/docs/dt.pdf). Biological controls are evident on site as noted in the past.

- Polygon 8 (Map 4); PL06-11: Bindweed continues to sprout in this location. Planted willows and cottonwoods have now filled in this area and are creating shade, but the small bindweed patch is persistent and required digging on two occasions. In the past vinegar treatments have been used and seem to have been successful at other drier site locations where they had previously occurred. Bindweed is a climbing and/or rambling perennial that sinks its roots as much as 5 m into the soil. It can reproduce by both seed and vegetative propagation, and even a tiny section of root in the soil is enough to allow bindweed to grow and spread. Seeds can remain viable for up to 50 years in the soil. (https://www.for.gov.bc.ca/hra/plants/plantsInfo.htm#FB). Without using chemicals the best method of eradication is continual cutting back of vegetative growth with the goal of weakening the roots over time. The literature states that bindweed does not like to grow in wet or shaded ground; however this area is inundated with Fraser River waters most years during freshet and the planted willows and cottonwoods are now shaded the entire site.

- Sage Trial Polygon 1 (Map 00): Cheat grass and bulbous bluegrass are evident in this sage cutting removal site. Weeds were removed to open up the area so that the planted native species had the opportunity to grow and seed into the site. Compared to the areas where no sage treatment has occurred in 2016 there was a greater diversity of native plants in Polygon 1 than in either Polygon 2 and 3. Many of the native planted species were observed seeding. No further burning of sage was undertaken on the site, based on research findings that show an increase in cheat grass after burns, and from general observations on the site.

- Polygon 2 (Map 4); PP2010-9 TO PP2010-11 (both sides of car park trial leading north): cheat grass and bulbous bluegrass were removed in areas where sage was thinned. Again native planted species are increasing diversity in these areas and seeding back into the site (Fig 000).

- Polygons 4 and 12 (Map 4); Just before riparian trail: is an area where no machine work was used to prepare soil for planting during the original restoration works, due to the fact that large chunks of asphalt were found buried deep in the soils. The area was overplanted with ponderosa pine trees in 2012 and again in 2014. The trees are still quite small and can easily become overwhelmed by the weedy species found there. Removal of alfalfa predominately, as well as mustard, kochia and cheat grass, occurred in 2016.

Alfalfa was again removed by digging in locations where only a few plants were observed on the upland bench, and in all other areas the plant was trimmed back using a weed trimmer, with only one pass along the riparian trail. As noted in previous reports, alfalfa is much harder to remove during fast-paced weed blitz as it requires a sustained effort of digging out to remove the long taproots and so this species continues to remain a problem on the site, especially on the edges of restored lands and along trail systems where it grows large and outcompetes native species. A few hours were spent removing alfalfa and white clover from the gravel bar.

Table 1 Invasive weed removal and maintenance days 2016

Date	Weed Blitz or Maintenance	Location Targetted	Method	Invasive species targetted	Left/ Removed	# Staff
12 April	Maintenance	Hydro yard area to shrub layer Upland Bench	Trimmer	Alfalfa	Left	1
25 April	Weed blitz	Upland Bench	Hand-pulling, digging, trimmer	Cheatgrass, Bulbous bluegrass, mustards, Dalmatian toadflax	Removed	3
06 May	Weed Blitz	Upland Bench Gathering area Lower Snag	Hand-pulling, digging	Mustards, Salsify, Dalmatian toadflax	Removed	5
24 May	Weed Blitz	Upland Bench	Hand-pulling	Dalmatian toadflax, mustards, salsify, cheatgrass, bulbous bluegrass	Removed	7
21 June	Maintenance	Hydro yard area Poly 2012-B/E	Hand-pulling, trimmer, irrigation	Alfalfa, Mustards, Salsify	Left	2
23 June	Maintenance	Gathering Area Lower Snag PL06-11	Hand-pulling, irrigation	Bulbous bluegrass, Prickly lettuce, Mustards Bindweed, D.toadflax	Removed Left Left Removed	3
30 June	Maintenance	Poly 2012-B/E Sage Trials	Hand-pulling, irrigation	Bulbous bluegrass, cheatgrass	Removed	3
07 July	Weed Blitz	Upland Bench Lower Snag Gravel Bar	Hand-pulling, digging, irrigation	Dalmatian toadflax, Mustards	Removed Left	6
25 July	Maintenance	Poly 2012-B/E Sage Trials	Irrigation	Minimal weed pulls while watering – not recorded		1
15 Aug	Maintenance	Along Lloyd's fence-line	Trimmer	Alfalfa Knapweed	Left Removed	2
16 Aug	Maintenance	Hydro yard area Upland Bench	Trimmer	Alfalfa	Left	2
24 Aug	Weed Blitz	Upland Bench	Hand-pulling	Dalmatian toadflax, Kochia	Removed	6
21 Sept	Maintenance	Upland Bench	Hand-pulling, Trimmer	Alfalfa, Russian thistle	Left	2

Figure 10 View from the hydro yard showing alfalfa, cheat grass, Dalmatian toadflax (looking west running parallel to the hydro yard area) 25 April 2016. Note: a shrub layer has been planted just to the right of this site with the ultimate goal of reducing windblown seed from entering restoration site.

Figure 11 Same hydro yard area after trimming (looking south from restoration site) 25 April 2016

Figure 13 View showing shrub layer (centre) and native plant cover (left) -v- trimmed hydro yard area (right) 30 April 2016

Figure 12 Area beside hydro yard showing mustard and returning alfalfa cover (looking north from hydro yard area towards restoration site) 21 June 2016

Figure 13 Polygon 4 (Map 4) showing area that was not treated by machine due to the large chunks of asphalt found buried in the ground in this area while attempting soil manipulation. Ponderosa pine trees were planted over the invasive weeds in 2012, and infilled in 2014, with the ultimate goal of shading out and mulching the weeds with naturally falling pine needles. The plants are flagged for watering. 23 May 2016

Figure 14 Polygon 4 (Map 4) Small ponderosa pines being watered and weeded. Showing good growth 25 April 2016

Figure 15 Polygon 4 (Map 4) Showing crew person pulling mustard 24 August 2016

Figure 16 Polygon 12 (Map 4) just across from Polygon 4 showing alfalfa again going to flower in fall at same time rabbitbrush is blooming 04 Sept 2016

Figure 17 Location across the Powerhouse Road, used by hydro for transmission line laydown area during 2015/2016. This site is now covered with Kochia as a result of that work. These weeds used to be prevalent on the Powerhouse site but have been mostly controlled. Future monitoring will identify if this site used by hydro will impact on the Powerhouse site. 25 July 2016

Figure 18 Example of an area near established parking lot that had almost 100% weedy species, now showing good growth of native trees, shrubs and forbs going to seed, with only minimal salsify and mustard plants 29 May 2016

6.3 Revegetation

Restoration and Revegetation works were completed during 2016-17 based on results of regular monitoring of the site. A total area of 2,872 sqm was planted out with 649 native trees, shrubs, forbs and grasses (Map 11; Table 2-3). Crew technicians performed this Revegetation work in early spring 2017.

The following locations were targetted for revegetation during 2016-17 (Map 11):

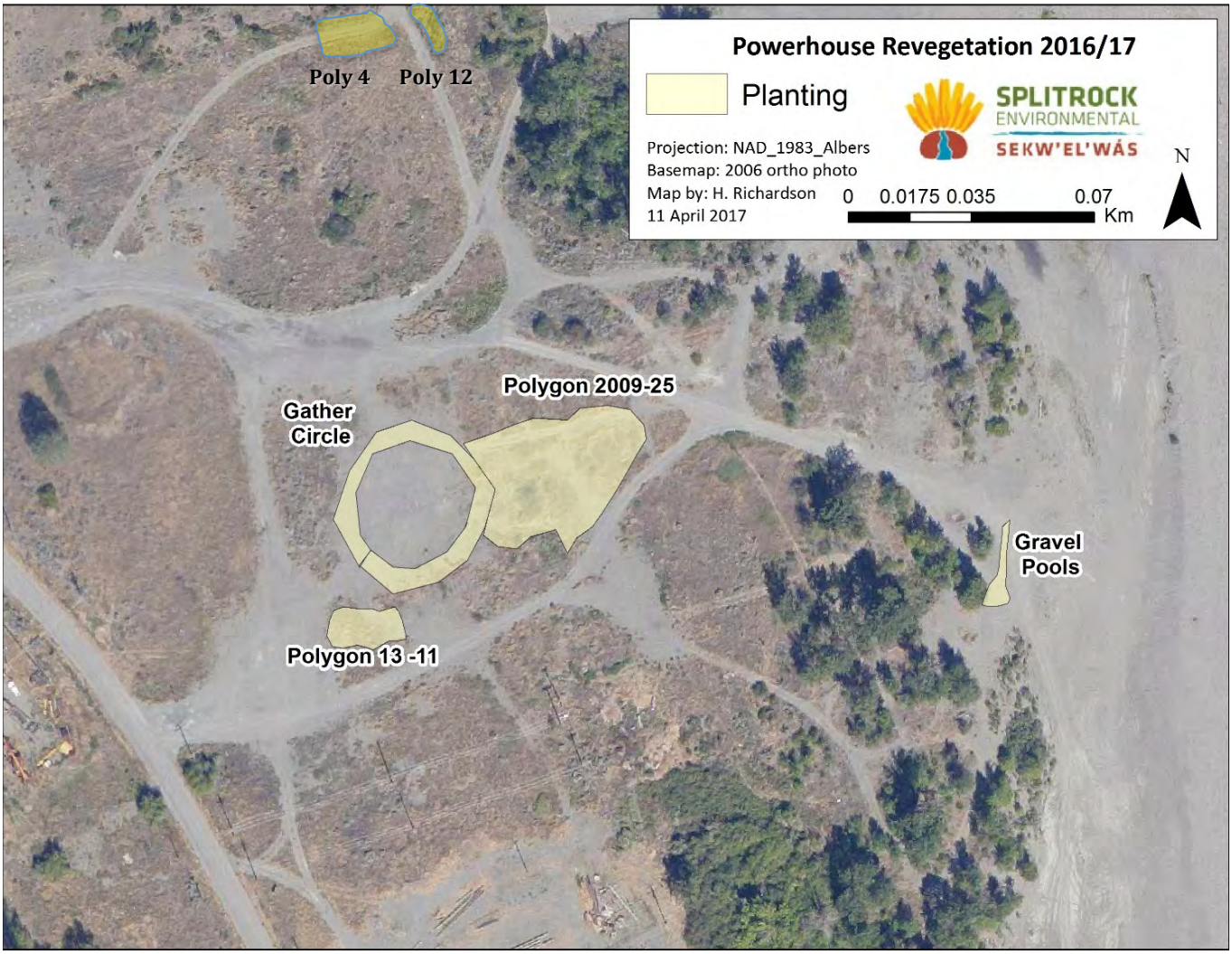
- **Gravel Bar (B18):** As a result of ongoing field visits to the Powerhouse site to ensure adaptive management strategies are incorporated into each year's work, it was observed that vehicles were driving up over a sandbank and entering the riparian area to the south of the main access road. To mitigate further entry, an excavator placed four large boulders into the gap being used by off-road vehicles, and Black cottonwood cuttings were planted across the area to decrease the likelihood of further encroachment by off-road vehicles. A total of 96 cuttings were struck into the edge of the riparian area at the base of the sandbank over a 78 sqm area. The goal was the create additional habitat for species-at-risk, in particular the Western screech-owl and to decrease fragmentation.

- **Gathering Circle (2012-E)** : This area is located on the upland bench where no machine work took place to decompact the site, due to the fact that it was originally targetted as the site for a nature centre. The area is now used as an outreach gathering area. 70 Ponderosa pine plugs were planted into a 645 sqm space around the gathering circle to replace those lost over the years and to increase the number stocked into the site. The long-term goal is to provide shade to a public space and delineate the gathering area.

- **Polygon 2009 – 25:** This area is located on a bench just above the high water mark along the main access road. A total of 20 trees and 110 shrubs were planted into the 1372 sqm. The goal was to increase diversity, decrease fragmentation and infill where shrubs had died.

- **Polygon 13 – 11:** This area has very sandy, oily soils and is close to an historical highways re-fuelling area, and has shown limited success of revegetation. Some plants (mostly bunchgrasses and golden aster) are continuing to persist. A total of 4 trees, 30 shrubs and 231 bunchgrasses were planted into an 271sqm area.

- **Polygon 4 and 12:** This area is a transition between riparian and upland habitats planted out in the past with Ponderosa pine and shrubs. During the restoration process, soils in this area were not decompacted or contoured due to the fact that large slabs of asphalt were found in the soils. On discussions with MOE it was recommended that the asphalt be left in place as they were more detrimental to the environmental being unearthed. A total of 20 trees, 62 shrubs and 6 giant wildrye were planted over a 560 sqm area. The goal was to extended the riparian and Ponderosa pine forest out into an area that is predominately invasive weed species.



Map 11 Revegetation Locations 2016-17

Table 2 Summary of area and plants used in restoration works 2016-17

Location	Area (sqm)	Total Plants
Gravel Bar (B18)	78	96
Gathering Circle 2012-E	645	70
Polygon 2009 - 25	1372	130
Polygon 13 - 11	217	265
Polygon 4 and 12	560	88
TOTAL	**2,872**	**649**

Table 3 Powerhouse Site Planted Species 2016-17

Common Name	Scientific Name	Gravel bar (B18)	Gather Circle (2012-E)	Poly 2009-25	Poly PL13-11	Poly 4 & 12 (2016)	Total
Ponderosa Pine	*Pinus ponderosa*		70	20	4	20	114
Cottonwood Cuttings	*Populus balsamifera*	96					96
Black hawthorn	*Cratageus douglasii*			8			8
Bristly black currant	*Ribes lacustre*			2			2
Choke cherry	*Prunus virginiana*			15		10	25
Indian Hemp	*Apocynum cannabinum*					20	20
Oregon grape	*Berberis nervosa*					2	2
Prairie Rose	*Rosa arkansana*			21		20	41
Saskatoon	*Amelanchier alnifolia*			30	30	10	70
Sumac	*Rhus typhina*			32			32
Red raspberry	*Rubus idaeus*			2			2
Bluebunch wheatgrass	*Pseudoroegneria spicata*				154		154
Giant wildrye	*Leymus cinereus*					6	6
Sand dropseed	*Sporobolus cryptandrus*				77		77
TOTAL PLANTS		**96**	**70**	**130**	**265**	**88**	**649**

Figure 19 Boulder cluster and cottonwood cuttings at B18 29 March 2017

Figure 20 Polygon 13-11 planted with predominately grassland plugs, some saskatoon and ponderosa pine 07 April 2017

Figure 21 Polygon 2009-25 Shrubs and trees overplanted 30 March 2017

Figure 22 Polygon 12 Volunteers planting shrubs

6.4 Photopoint Monitoring

Photopoint 01 in Polygon 17: Ponderosa pine/grassland area at the north end of site

The pin is located in the ponderosa pine woodland at the north end of the riparian zone. Photos capture the removal of predominately alfalfa and salsify from the first year of groundwork in June 2008 that was successful in opening up the forest floor to native grasses and wildflowers. However, since 2013 – 2015 due to lack of resources there has been little effort targeting the return of the alfalfa within this forested area and along the riparian trail system from the old seedbank. A concerted effort still needs to be focused in the riparian area if the goal is to increase the ecological functioning of the forested grassland.

Photopoint 02 in Polygon 04: Upland Bench

The pin is located right on the edge of what was used as the main road access point to the river prior to 2008. The main access road was closed down and a new road that skirts the edge of the site was allowed to become the new access road. The photos are westward looking towards the BC Hydro powerplant and show the progression from impacted road bed in 2008 to restoration works in 2011, to native shrub, forb and grassland restored site in 2012. However, since that time sage has grown thickly into the site and test plots have now been established to monitor the various sage removal and planting tests noted above. This is the area that was most impacted and had a large invasive weed infestation and will require more long-term maintenance to mitigate these damages.

Photopoint 03 in Polygon 08: Lower Snag Area

The pin is located in the Lower Snag Area, which is one of the initial sites to be restored in 2008. The site is located on the south side of the main access road where a number of snags were installed. This site has had intensive weed removal over the years due to the impacted nature of the site where hydro waste was deposited over the bank and a large seedbank existed. In particular the black cottonwood, Prairie rose and Oregon graperoot plants stocked into the site are showing excellent growth, but invasive species remain an issue, including Dalmatian toadflax, Russian thistle and crested wheatgrass.

Photopoint 04 in Polygon 13: Old Pits Area

The pin is located in a willow and cottonwood riparian area that used to be a mud-bogging and party site called “the pits”. This area is within the floodplain of the Fraser River and the bulk of the restoration work involved installing boulders and logs to close down the riparian roads in 2008, and the layering of willow and planting of cuttings. Many of the roads criss-crossing the riparian area were closed off to decrease fragmentation of the riparian area and this has been successful.

Photopoint 01 in Polygon 17 South: Ponderosa pine/grassland area at the north end of site

Figure 23 Photopoint 01 in Polygon 17 South: Series of photos showing change from alfalfa understory to more open forested grassland June 2008 to June 2012

Figure 24 Photopoint 01 in Polygon 17 South 13 November 2014

Figure 25 Photopoint 01 in Polygon 17 South 14 October 2015

Figure 26 Photopoint 01 in Polygon 17 South 01 June 2016

Photopoint 02 in Polygon 04, South: Upland Bench

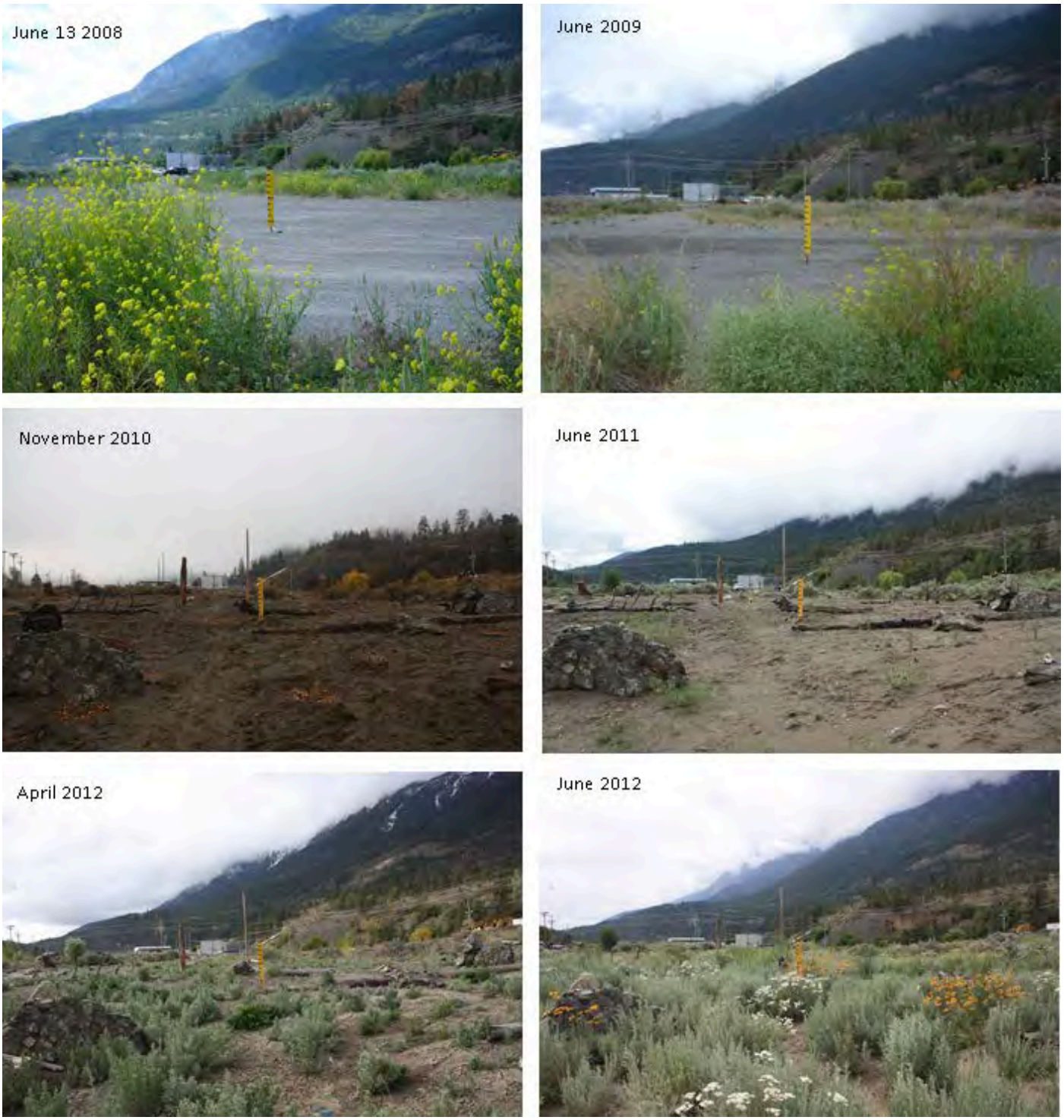


Figure 27 Photopoint 02 in Polygon 04, South: Series of photos showing change from impacted roadbed to open sagebrush grassland with flowering forbs June 2008 - June 2012

Figure 28 Photopoint 02 South showing sage filling the site 13 November 2014

Figure 29 Photopoint 02 North showing revegetation efforts and plant diversity 12 June 2012 and again on 13 November 2014

Figure 30 Photopoint 02 North before sage removal March 2015 and again in June 2016

Near Photopoint 02 in Polygon 04, West: Upland Bench Trail Area (working photos)

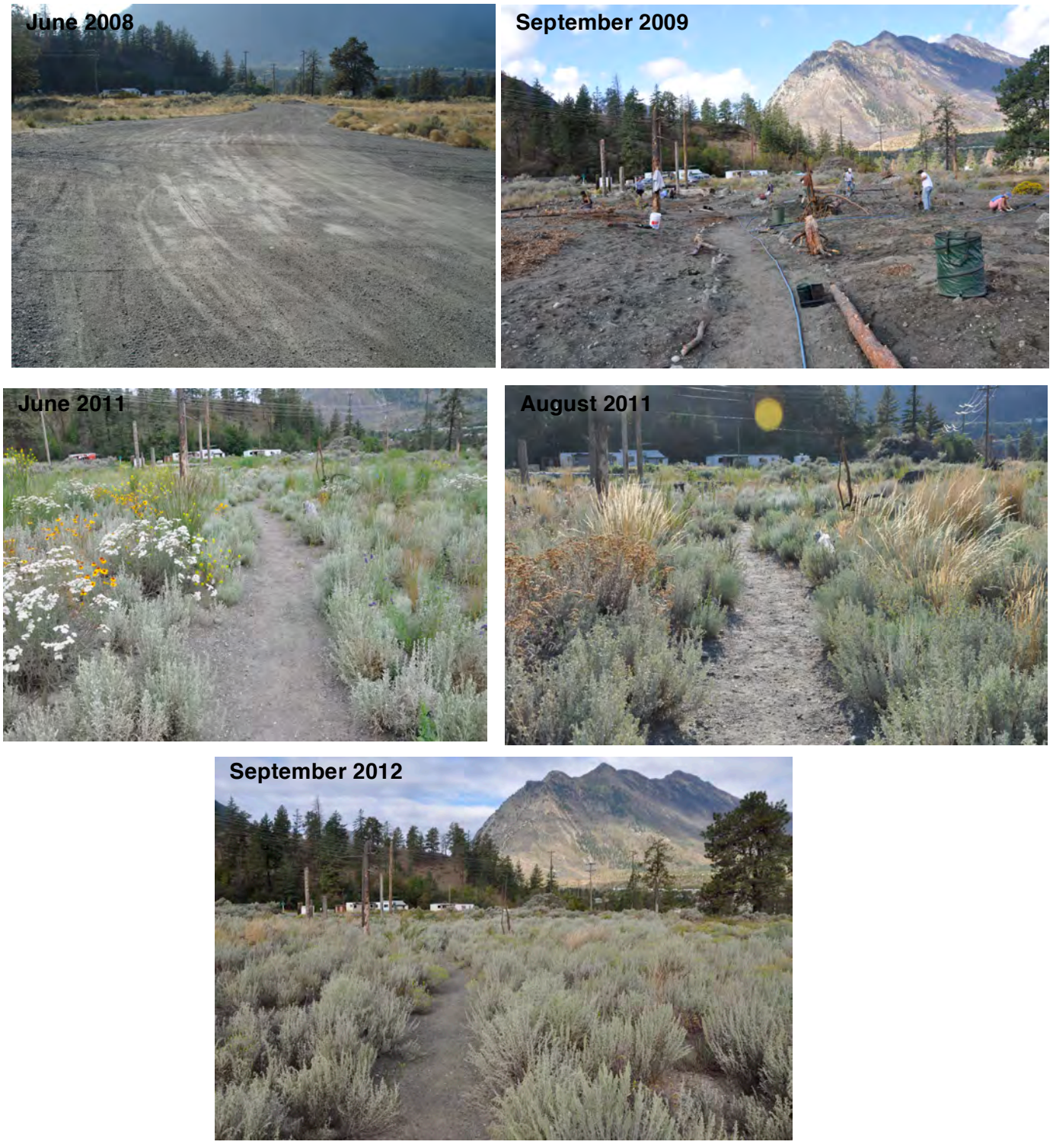


Figure 31 Photopoint 02 West Area: Series of photos showing from compacted roadbed to a diversified big sage grassland June 2008 - September 2012

Figure 32 Polygon 02 area showing predominantly big sage cover with less diversity 21 September 2014

Figure 33 Near photo point 2 showing dominate sage cover 06 June 2016

Photopoint 03 Lower Snag Area

Figure 34 Photopoint 03 Lower Snag Area: Series of photos showing preparation for restoration, installation of snags and CWD and growth of planted stock June 2008 - June 2012

Figure 35 Photopoint 03 Lower Snag Area: 14 November 2014

Figure 36 Photopoint 03 Lower Snag Area: showing good tree and shrub growth, but also encroachment of alfalfa and other invasive weeds 14 October 2015

Figure 37 Photopoint 03 Lower Snag Area 06 June 2016

Photopoint 04 in Polygon 13 North - Pits Area

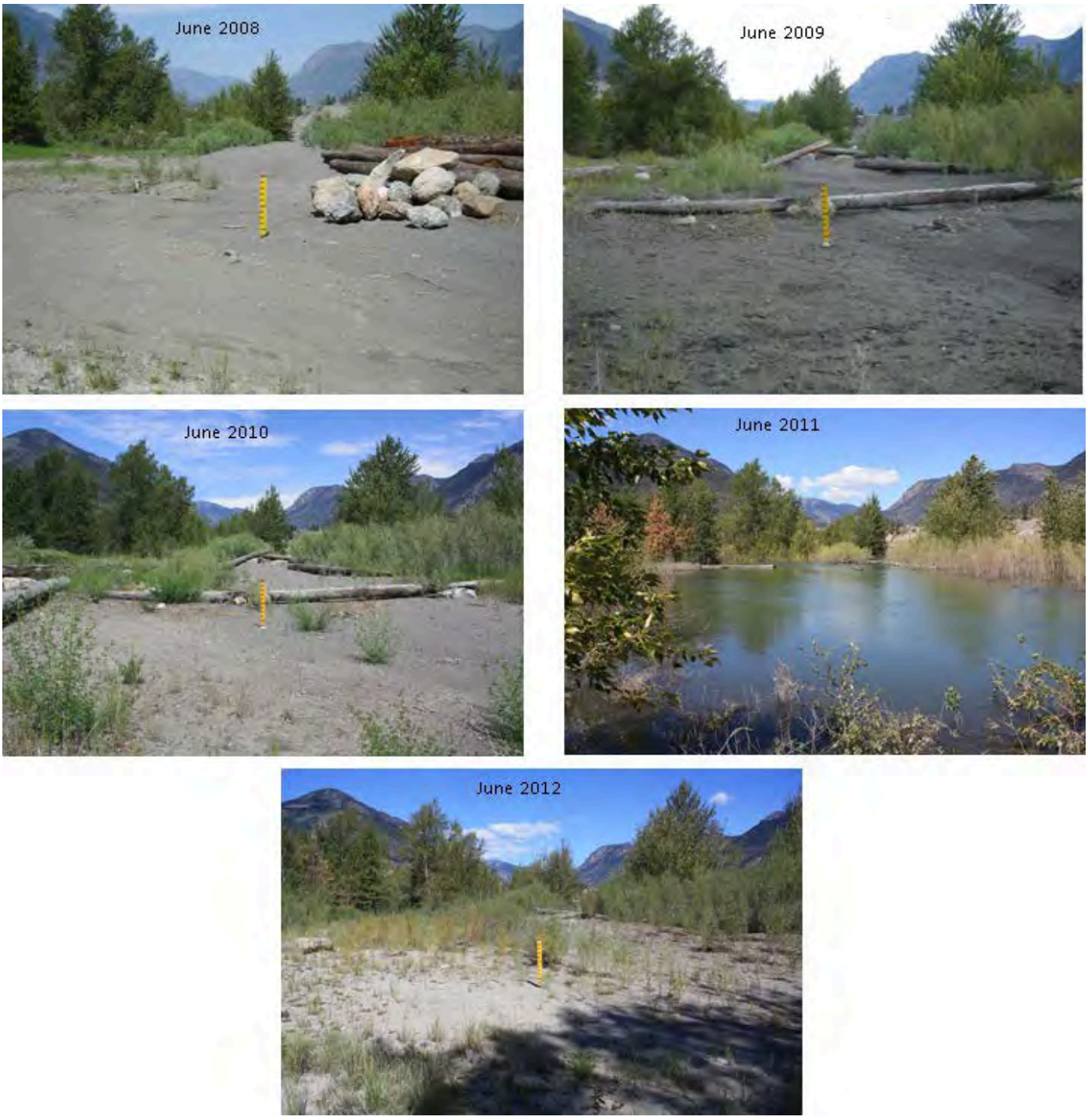


Figure 38 Photopoint 04 in Polygon 13 North: Series of photos showing preparation for closing roads and vegetation growing into impacted areas June 2008 to June 2012

Figure 39 Photopoint 04 in Polygon 13 North: 14 November 2014

Figure 40 Photopoint 04 in Polygon 13 North: 14 October 2015

Other Areas Photographed over Time

Polygon 06-2011 Riparian Area

This area was covered with a thick layer of couch grass and large pockets of bindweed, surrounded by riparian trees and shrubs; however, the surrounding cottonwood, willow and other species were not colonizing this area due to the thick invasive species cover and compacted soils. After monitoring showed lack of natural recruitment, planting took place in 2011 to overplant the area with the aim of shading out the invasive species with native riparian trees, shrubs and grasses. This area is flooded most years during spring freshet and since restoration works were completed success of plantings has been excellent.

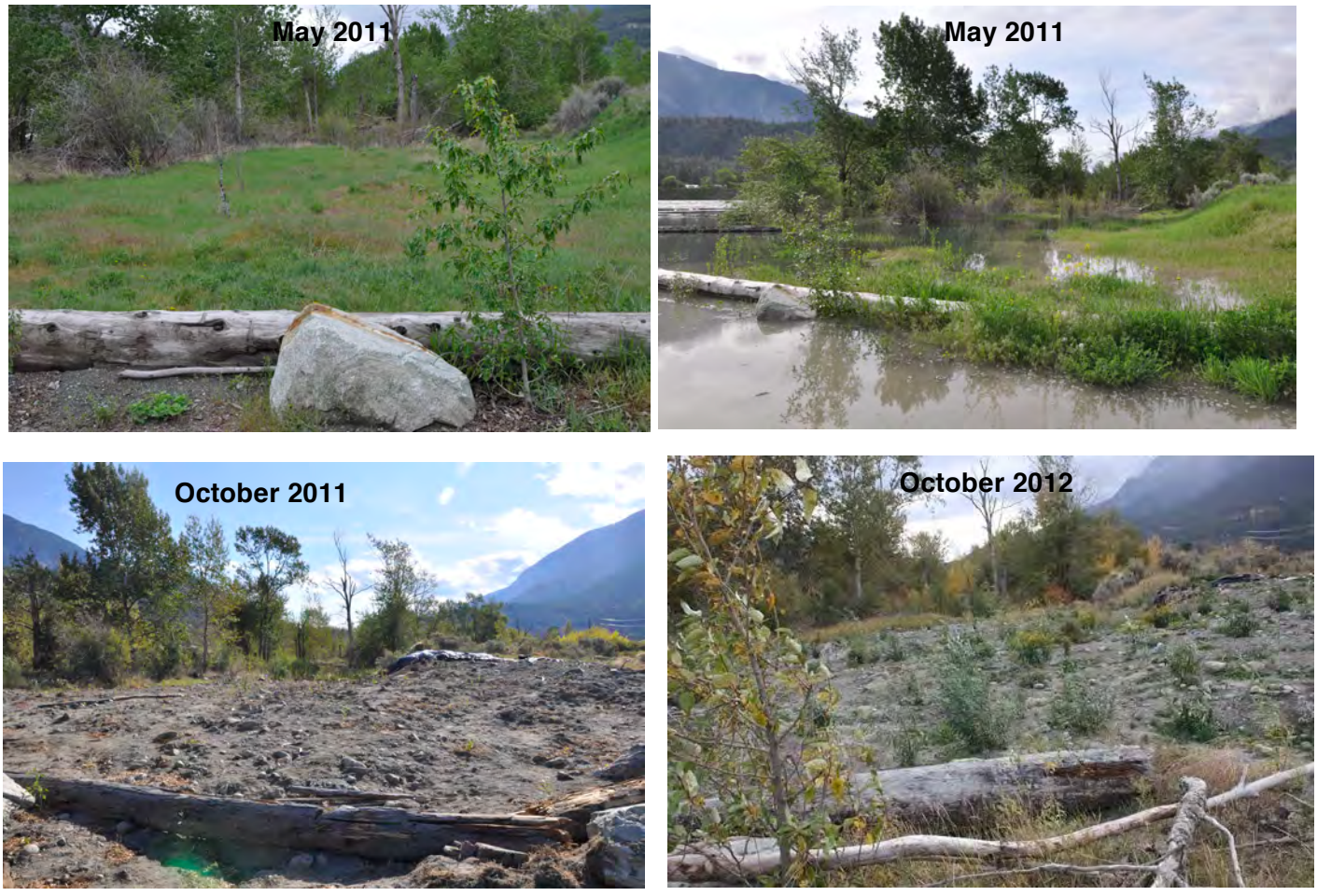


Figure 41 Bindweed Polygon: Series of pictures showing the area pre-restoration to riparian defragmentation May 2011 - June 2013

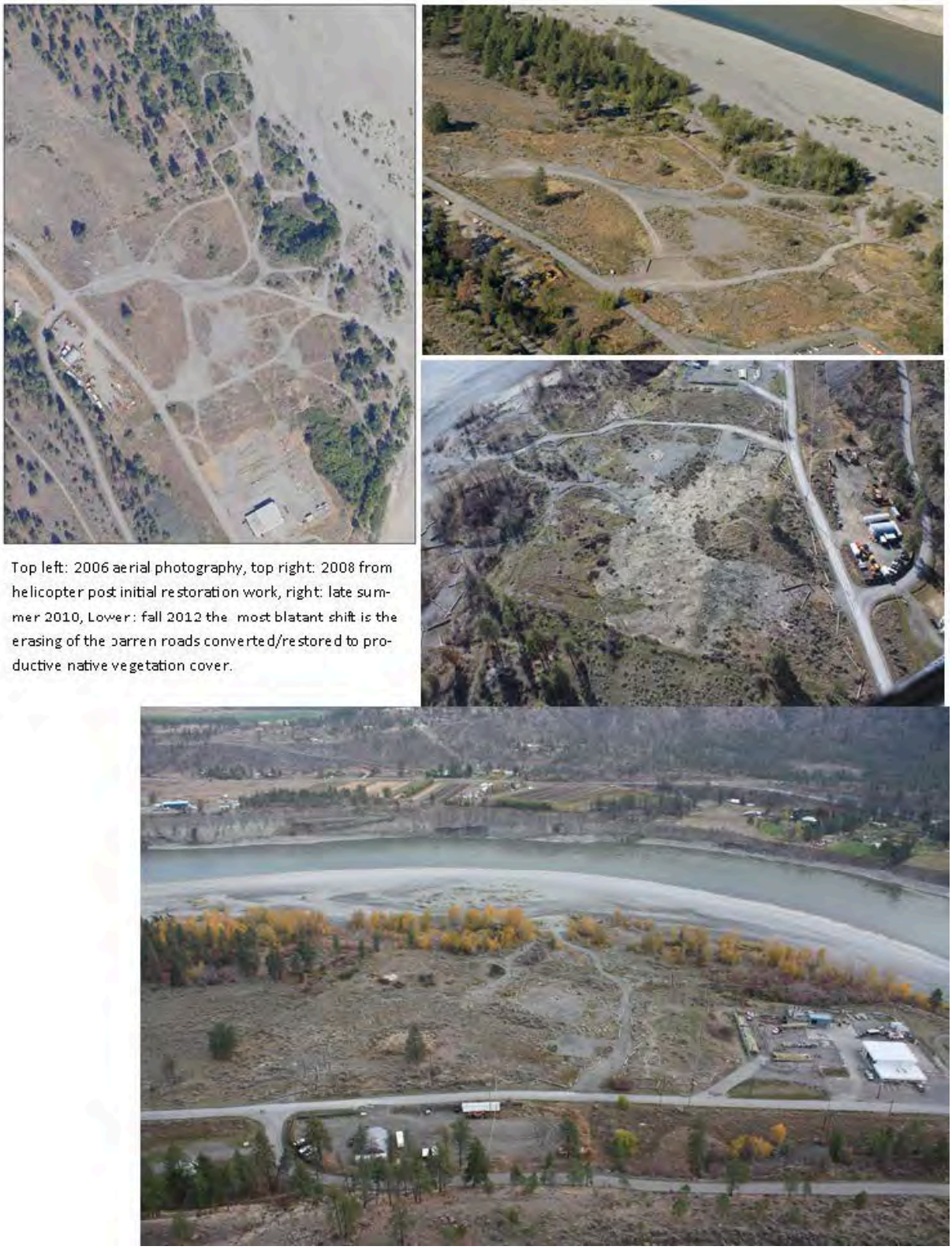
Figure 42 Polygon 06-2011: 12 June 2013

Figure 43 Bindweed Polygon showing fast growth of riparian plants 14 October 2015

Riparian Trail System - Riparian

Figure 44 Riparian Trail: Series of photos showing pre-restoration invasive weed cover to a more diverse ecosystem June 2008 - June 2013 During 2014-15 alfalfa seed in the ground has grown back into the riparian trialside.

Aerial Photomonitoring



Top left: 2006 aerial photography, top right: 2008 from helicopter post initial restoration work, right: late summer 2010, Lower: fall 2012 the most blatant shift is the erasing of the barren roads converted/restored to productive native vegetation cover.

Figure 45 Aerial photograph clearly showing the defragmentation on the upland bench October 2015

Figure 46 Aerial photograph showing the successful defragmentation of the riparian zone where 23 roads used to crisscross through the site October 2015

7. Discussions

The maintenance program of 2016-17 achieved the goal of keeping down targeted invasive species in targeted restoration polygons on the upland bench over approximately 5 ha, either through removal or cutting back. Based on the weed species observed on the site during the project manager's weekly walks of the site and the 2016 weather conditions, maintenance and weeding shifts were scheduled to ensure invasive plant species were removed and/or controlled so that no additional seeds were added to the historical seedbank. The weather conditions were conducive to less maintenance time at the Powerhouse site compared to previous years.

Species diversity on the upland bench appeared to be decreasing in 2014-2015 based on casual observations during weekly monitoring walks. A sage monitoring program was initiated in 2015-2016 and will continue over the coming years as resources allow. As noted above there is less invasive species found on the site in 2016 compared to pre-restoration works in 2009. Each year there is a decrease in effort to remove species such as knapweed, mustard, salsify, kochia, prickly lettuce and tumbleweed; however, Dalmatian toadflax, bindweed, and alfalfa continue to demand attention throughout the field season. Cheatgrass and Bulbous bluegrass are two species that will be very difficult to eradicate in certain areas, but the aim is to keep it from taking over restored areas by annual control so that seeds do not spread, thereby giving native species a chance to colonize the area.

Diversity within the riparian area has increased and the old roadbeds are closing in successfully each year with cottonwoods, willows and other shrubs. The 20 roadbeds that originally crisscrossed through the riparian area fragmenting the area, have now virtually impossible to find. One old roadbed (Map 00, B18) was breached early in 2016 during a party night and garbage left on site, necessitating the installation of a small boulder pile and staking of cottonwood cuttings to mitigate the likelihood of this happening again. All other roads remain free of vehicles and dumping. Volunteers and crews clean picnic type garbage up throughout the year, but this littering is also getting less.

During 2016 a Revegetation monitoring program was also initiated within the Seton River Corridor on all past restoration sites, including the Powerhouse site. The results of this monitoring program are reported in the 2016-17 Seton River Corridor Conservation, Restoration and Sustainable Management final report. The results of both the sage and Revegetation monitoring programs will assist in guiding adaptive management strategies over the next several years.

Reptile cover board monitoring continued with the support of local naturalist citizen scientists. Results of this work have been reported in the 2016-17 Seton River Corridor Conservation, Restoration and Sustainable Management final report.

The Powerhouse site has provided an excellent venue for learning more about grassland restoration, for increasing culturally important plants for the St'at'imc and for engaging our community in stewardship work. We also successfully worked with Thompson Rivers University

during 2016 on a sage carbon sequestration, and will be partnering with University of Arizona on a biocrust restoration project during 2017.

The Powerhouse site has also been included in the Seton River Corridor Conservation, Restoration and Sustainable Management planning process. During the planning process the Powerhouse site has been identified as one of four of the most important wildlife locations within the corridor and has been designated as Category 1: Conservation. The partners and stakeholders believe the site should be protected in the long-term. The riparian area is already covered by a WHA for the Interior Western screech-owl, and the red-listed species was heard calling in April 2017 during the annual owl surveys undertaken by Lillooet Naturalist Society and Splitrock Environmental.

Figure 47 Field Tour of Powerhouse Restoration site speaking on restoration activities successes and challenges

8. Recommendations

The Sekw'el'was community, Lillooet Naturalist Society and the community members of the Lillooet area, as well as tourists, are all using the Powerhouse Restoration site for hiking, bird viewing and other sustainable activities. This current use of the site is a big shift from the dumping, partying, mud-bogging and ATVing that used to happen on the site prior to 2009. At the same time research shows that there is an increased use of the site by reptiles and observations that more birds and large mammals are crossing through and using the site.

The restoration works are finished, but due to the large seedbank in the soils from past industrial uses it is very important to ensure the invasive species are removed annually to allow the native species planted and seeded into the site to grow enough so they can outcompete the invasive weeds. It is also important during the hot dry summer conditions that vulnerable shrubs and trees are irrigated.

The Revegetation monitoring that was completed in 2016, and the ongoing sage trials, will provide adaptive management strategies that could be implemented at the Powerhouse site to ensure the investment in the restoration works will benefit wildlife over the long-term.

As FWCP has informed the community that no further funding is available for maintenance work at the Powerhouse site, we are concerned that the investment in the restoration work by the community, FWCP, AFSAR and other funders, and the hard work completed by the crews, will impact on the progress that has been observed occurring in many site locations. As noted above, there are a suite of invasive species that were historically found on the site, and that continue to be prevalent in varying degrees, based on weather conditions and implementation of weed management and maintenance strategies. Many of these historical weeds were introduced as a direct result of the construction of the hydro canal and powerhouse, and the lease of the land to MOTI, and their seeds will still be found in the soils just waiting for the perfect conditions to propagate and grow. If no crews are available to manage these incursions we will loose the battle. Over the years, attempts have been made to have volunteers come out for weed blitzes with limited success. Most volunteers enjoy planting but not weeding. Lillooet Naturalist Society has provided weed blitz funds in previous years when no other funding was available. Splitrock Environmental has also engaged summer students and environmental crew technicians in the weed management and maintenance activities over the last several years and will continue to do so.

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