Stuart River Provincial Park
2016 Vegetation Monitoring Summary

Prepared for: Society of Ecosystem Restoration in North Central BC
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TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

The Society for Ecological Restoration in Northern BC (SERNbc) has an ongoing restoration program at Stuart River Provincial Park near Fort St James, BC. The site was treated with prescribed burns in 2002, 2009, and 2014 with the intent of increasing and maintaining the amount of grassland area present. Vegetation monitoring was previously conducted 2006 (Sharp 2006), 2009 (Albertson 2009), and 2012 (FLNRO; unpublished data).

Ecofor Consulting Ltd (Ecofor) was retained by SERNbc to conduct vegetation monitoring as per the Prescribed Burn Monitoring Protocol for Omineca Region, British Columbia (Rooke et al 2015). This document summarizes the work conducted at the Stuart River Provincial Park (PP) by Ecofor in 2016.

1.1 PROJECT LOCATION

The vegetation monitoring plots in Stuart River PP are located approximately 34 km south of the town of Fort St James, BC. The approximate centre point of the sampling area is at UTM coordinates (NAD 83) Zone 10U, 442926 E, 6007546 N. The site can be accessed by road by following the Necoslie Forest Service Road (FSR) southeast from Vanderhoof for 33 km, then following the Charlie FSR for approximately 5 km (UTV/ATV maybe required during wet conditions). Access to the plots by foot is possible from this road.

The Project area is comprised mainly of a matrix of grassland, shrubs and regenerating forest varying in composition on a south facing hillside. Mature mixed forest is present in most locations at the top and bottom of the slope.

1.2 OBJECTIVES

The monitoring objectives were to collect data to characterize changes in vegetation composition and stand structure resulting from the prescribed burn.

2 METHODS

The Prescribed Burn Monitoring Protocol for Omineca Region, British Columbia (Rooke et al 2015) was used as the guideline for the survey methods.

2.1 PLOT SELECTION

Ten plot locations were established during the original monitoring visit in 2006 (Sharp 2006). Plots were marked with a 1 m length of steel rebar. All plots were located in areas that were burned (i.e. no control plots).

Relocation of the original plot center rebar markers was not possible in most cases. There were abundant fallen logs and dense shrubs in many locations, which made finding the rust-coloured rebar difficult or prevented it altogether. The original rebar was located at plots 7, 8, 9, and 10. At the other plots, the GPS point from 2009 was used to locate the plot centre.

2.2 PLOT ASSESSMENT

In 2006, 2009, and 2012 the plots were assessed using the Stuart River Prescribed Fire Monitoring Protocol (Simonar and Migabo 2006). In 2009, no data was collected for Plot 7, since the survey crew found that GPS coordinates and site characteristics did not match the 2006 data. Plot 7 appears to have been assessed at the erroneous GPS location in 2012, but was assigned the Plot ID 12-7208 in the 2012 data (12 indicates the year 2012, 72 indicates the site, and 08 should indicate the plot). Other plots also appear to have alternate plot numbers in 2012, so the 2016 plot naming follows 2006 and 2009.

Assessments at each plot in 2016 followed the Prescribed Burn Monitoring Protocol for Omineca Region, British Columbia (Rooke et al 2015) for site characteristics, stand structure, vegetation intercept transects, shrub transects, and ungulate use plots. Soil profiling was not conducted due to time constraints. The simplified coarse woody debris (CWD) scoring method was utilized, as described in the protocol.

Data was collected using the ESRI Survey 123 app on iPad minis to approximate the data required in the data forms recommended by the Protocol: stand structure (FS505G), vegetation (FS505G), shrub transects (FS882(4)), and the supplemental combined data form (canopy coverage, CWD, ungulate use) used by Ecofor in 2015 at Grizzly Valley and Euchiniko Sidehills (Ecofor Consulting 2016).

None of the plots were located in areas that could be truly consider treed, so only one transect was assessed, as per the protocol. Transects were established using a random bearing from a random number table. A 50 cm pigtail stake was place at the centre of each plot, along with a 10 cm nail driven flush with the ground. A second 10 cm nail, driven flush to the ground was placed at the 25 m mark on each transect (27 m from plot centre, since the transect begins 2 m from plot centre).

Where available, the tree nearest the plot centre was spray painted orange at shoulder height and at ground level, and an aluminum tag with Project and Plot information was affixed with an aluminum nail. In plots without a suitable tree present; a pigtail and nail were placed. If the rebar centre stake from previous assessments was located (Table 1), it was spray painted orange to facilitate future plot location.

Photos in the four cardinal directions were taken at the centre of each plot with the iPad's camera. A photo of the ground vegetation at the centre stake was also taken.

All herbaceous vascular species and low woody shrubs listed in the Field Manual for Describing Terrestrial Ecosystems (Ministry of Forests and Range and Ministry of Environment 2010) in were included in the vegetation transects. Shrub and tree species less than 2 m tall were included in the shrub transects. Unidentified plants were collected for identification at the office.

Ungulate use plots were 4.0 m radius circles centred at 10, 20, 30, 40, and 50 m on each transect. Ungulate use plot centres were marked with flagging ribbon.

3 RESULTS & DISCUSSION

Sampling took place from August 30th to September 9th (Table 1). A map of the plot locations is provided in Appendix 1. Data tables are provided in Appendix 2, and as a deliverable MS Excel

spreadsheet. Appendix 3 presents photos from each plot. Data was collected in 2016 using a different protocol than in 2006, 2009, and 2012, so the data are not directly comparable in most cases. In addition, the exact location of the original plot was located only in Plots 7, 8, 9 and 10, which could also confound direct comparisons (See Section 4 for discussion on additional comparison statistics).

Table 1: Plot location and assessment dates for Stuart River PP in 2016

Plot	UTM Zone	Easting	Northing	Rebar Located?	Date Assessed	Transect Azimuth
16-SR01	10	447019	6007803	No	2016-09-08	3
16-SR02	10	446403	6007892	No	2016-08-30	19
16-SR03	10	445473	6007640	No	2016-09-01	83
16-SR04	10	444439	6007583	No	2016-09-01	318
16-SR05	10	443764	6007337	No	2016-09-02	144
16-SR06	10	442932	6007535	No	2016-09-02	159
16-SR07	10	442203	6007822	Yes	2016-09-08	130
16-SR08	10	440791	6008018	Yes	2016-09-06	117
16-SR09	10	439506	6007993	Yes	2016-09-06	111
16-SR10	10	437713	6008680	Yes	2016-09-09	323

3.1 TREE CANOPY

Tree canopy was sparse in all plots. A BAF 4 prism was used to enumerate the trees in each plot (12.5 cm minimum DBH). Plots 4, 7, and 8 had no trees meeting the criteria (Table 2; Appendix 2). Canopy coverage percentages were scored in the 0-5% range in all but 2 plots. Plot 3 and 10 scored in the 5-25% canopy coverage range.

There was no basal area (BA) data available from the 2012 assessments, but the data show a large decrease from 2009. In 2009 the average basal area for all the plots was 25.3 m2/ha compared to 9.2 m^2/ha in 2016. The biggest change is in live stems, which decreased from an overall average of 22.5 m^2/ha in 2009 to 5.2 m^2/ha in 2016. Dead stem basal are increased slightly from 3 m^2/ha to 4 m^2/ha on average. It is likely that mortality over time following the 2009 fire, and additional tree mortality from the 2014 fire account for these changes.

Table 2: Summary of tree species and basal area in BAF 4 prism plots for Stuart River PP vegetation monitoring plots in 2016.

Plot	Species	Total BA (Live and dead) (m^2/ha)	BA live stems (m^2/ha)	BA dead stems (m^2/ha)
16-SR01	At	4	-	4
16-SR02	At	8	-	8
16-SR03	Sxw/W*	28	24	4
16-SR04	n/a	0	-	-
16-SR05	At	8	8	-
16-SR06	At	12	4	8
16-SR07	n/a	0	-	-

16-SR08	n/a	0	-	-
16-SR09	Sxw	8	8	-
16-SR10	At	24	8	16
Avg.		9.2	5.2	4

* 1 live willow in plot

Trembling aspen (*Populus tremuloides*) was the most common tree species, while hybrid white spruce (*Picea engelmannia x glauca*) was also common. One plot had a willow large enough to count as a tree. In general, there were few standing trees present in each plot.

3.2 REGENERATION AND SAPLINGS

The most common forest regeneration (regen) (tree and large shrub species, <2m tall) and sapling species (>2m, < 10 m) was trembling aspen (Table 3). Several other species were found in small numbers. The only plot that did not have an abundance of aspen regen and saplings was Plot 3, which had the most abundant conifer coverage.

Table 3: Species of large shrub and tree sapling and regeneration layers in Stuart River PP vegetation monitoring plots in 2016.

Plot		Trembling aspen	Hybrid White Spruce	Alder sp.	Saskatoon	Pin Cherry	Choke Cherry	Willow sp.	Total
16-SR01	Regen	38	-	-	-	15	-	-	53
	Sapling	39	-	2	-	-	-	-	41
16-SR02	Regen	20	-	-	17	-	-	-	37
	Sapling	73	-	-	8	-	-	-	81
16-SR03	Regen	1	2	-	-	-	-	-	3
	Sapling	2	-	-	-	-	-	-	2
16-SR04	Regen	42	-	-	-	-	-	-	42
	Sapling	63	-	-	-	-	-	-	63
16-SR05	Regen	22	-	-	-	-	2	-	24
	Sapling	9	-	-	-	-	3	-	12
16-SR06	Regen	29	-	-	-	2	2	-	33
	Sapling	23	-	-	-	1	1	-	25
16-SR07	Regen	101	-	-	-	-	-	-	101
	Sapling	20	-	-	-	-	-	-	20
16-SR08	Regen	84	-	-	-	-	2	-	86
	Sapling	14	-	-	-	-	-	-	14
16-SR09	Regen	16	8	-	-	-	-	1	25
	Sapling	17	-	-	-	-	-	1	18
16-SR10	Regen	31	-	-	-	-	-	1	32
	Sapling	11	-	-	-	-	-	2	13

3.3 SHRUBS

Sixteen species were counted as shrubs (woody species <2 m tall) along the shrub transects, though three of these species were actually young tree species (aspen, paper birch and hybrid white spruce) (Table 4, Appendix 2). Three species were found in all 10 plots: Saskatoon (*Amelanchier alnifolia*), prickly rose (*Rosa acicularis*), and tall Oregon-grape (*Mahonia aquifolium*). Common Snowberry (*Symphoricarpos albus*) was found at nine of the plots.

Beaked hazel (*Corylus cornuta*) was found only at Plot 2, and was not detected during previous monitoring visits. It was fairly abundant in the area of the plot, but was only intercepted the plot transect in one location.

Table 4: Average length along shrub transects and number of plots for each shrub species detected within Stuart River PP in 2016.

Shrub Species	# of plots	Avg total length along transect
Beaked Hazelnut	1	0.3
Birch-leaved Spirea	7	0.74
Choke Cherry	6	1.23
Common Snowberry	9	1.92
Highbush-cranberry	2	0.35
Hybrid White Spruce	1	0.8
Paper Birch	1	0.1
Pin Cherry	1	1.55
Prairie Saskatoon	10	3.15
Prickly Rose	10	2.80
Pyramid Spirea	2	2.38
Red Raspberry	4	0.96
Red-osier Dogwood	1	0.22
Tall Oregon-grape	10	1.36
Thimbleberry	2	0.46
Trembling Aspen	9	1.99

3.4 UNDERSTORY

A total of 34 species of understory plants were detected along the understory point intersect transects (Appendix 2). Four species occurred in each of the 10 plots: American vetch (*Vicia americana*), Canada violet (*Viola canadensis*), Hooker's fairybells (*Prosartes hookeri*), and showy aster (*Eurybia conspicua*). Five more species were found in 7 or more plots: blue wild-rye (*Elymus glaucus*), creamy peavine (*Lathyrus ochroleucus*), fireweed (*Chamerion angustifolium*), northern bedstraw (*Galium boreale*) and western meadow-rue (*Thalictrum occidentale*). Showy aster, American vetch, Canada violet and western meadow-rue were also considered common in 2009, and appear to be common in the 2012 data as well. As in previous years, grass species were present in each plot, but not dominant in any plots.

Although reported as the dominant understory species in 2006, 2009 and 2012, clasping twisted-stalk (*Streptopus amplexifolius*) was not detected in 2016. Hooker's fairybells is a similar-looking member of

the lily family which was widespread throughout the Project area in 2016. The assessment crew was aware of the previous species list, and are confident in the identification of this species (the presence of 2 berries at the end of the stalk is diagnostic, and this feature was present on many specimens). Similarly, creamy peavine was identified in 2016, while previous monitoring identified purple peavine (*Lathyrus nevadensis*). These two species are both somewhat variable and quite similar to each other. Due to the late time in the season of the assessments it is possible that they could not be differentiated (the flowers are the diagnostic feature, which were no longer present).

One plant considered a noxious weed in BC, Canada thistle (*Cirsium arvense*), was detected in Plot 1. It easily colonizes disturbed areas, and may expand in abundance in disturbed areas of Stuart River PP. Only one occurrence was detected on the understory transect.

3.5 COARSE WOODY DEBRIS

Coarse woody debris (CWD) was assessed in a manner differing from previous years. It was not directly counted, but estimated from plot centre based criteria laid out in the protocol (Rooke et al 2015). CWD with diameter greater than 7.5 cm was included in the CWD estimate.

Plots had varying degrees of CWD present, except for Plot 7, which lacked CWD altogether (Table 5; Appendix 2). High volumes of CWD were defined in the protocol as several full length pieces of CWD, or piles of debris making walking a transect difficult.

Most CWD was classed as 'decomposing', indicating that the CWD likely resulted from tree mortality caused by one of the prescribed burns. A 'decayed' classification indicated that the CWD had been dead and decaying since before the burns occurred.

CWD complexity was variable at each site. Some sites had CWD spread apart in singles, while others had CWD grouped in piles or overlapping.

Table 5: Coarse woody degree ocular estimates for each plot in Stuart River PP in 2016.

Plot	CWD Volume	CWD Length	CWD Decay Class	CWD complexity
16-SR01	High	Mixed	Decomposing	Complex
16-SR02	Moderate	Mixed	Decomposing	Complex
16-SR03	Moderate	Mixed	Decomposing	Single
16-SR04	High	Mixed	Decomposing	Complex
16-SR05	Moderate	Mixed	Decomposing	Single
16-SR06	Moderate	Mixed	Decayed	Complex
16-SR07	None	NA	NA	NA
16-SR08	Low	Short	Decomposing	Single
16-SR09	Moderate	Mixed	Decomposing	Single
16-SR10	Low	Mixed	Decomposing	Single

3.6 WILDLIFE

Wildlife use was assessed by counting ungulate pellet groups in five, 4-metre radius plots along a 50 m transect from plot centre. This differs from previous years, where wildlife use was recorded based on general observations of bedding sites, browse evidence and pellet groups.

Pellet groups for deer, elk, and/or moose were found at each plot (Table 6). Moose pellets were found to be the most abundant, followed by elk, and then deer. Moose and elk pellets were each found at 9 of the 10 plots, while deer were detected at 6 plots. No correlation between wildlife use and other data was explored, but this could be done in future work.

Table 6: Total pellet groups for ungulate species detected at Stuart River PP in 2016.

Plot	Deer	Elk	Moose	Total
16-SR01	-	3	5	**8**
16-SR02	-	-	13	**13**
16-SR03	-	1	1	**2**
16-SR04	-	3	2	**5**
16-SR05	1	8	1	**10**
16-SR06	2	7	-	**9**
16-SR07	8	10	12	**30**
16-SR08	14	6	15	**35**
16-SR09	1	1	7	**9**
16-SR10	2	9	5	**16**
Total	**28**	**48**	**61**	**137**

A den site was located near Plot 1 at UTM Zone 10, 447015 E, 6007814 N (Figure 1). The species that made the den is not confirmed, but is potentially wolf, coyote or bear. There were several holes close together, but it could not be determined if they were connected. There was no evidence of prey item remains around the dens site or of recent use, although the excavation did not appear to be very old.

Figure 1: Den site located near Plot 1 in Stuart River PP.

3.7 UNIDENTIFIED PLANTS

Some species of plants could not be identified in the field. Plants generally began to wither in early September, making identification of some species more difficult. However, most species remained in a condition suitable for conducting the vegetation assessment.

No specimens of unidentified plants were collected. Species that could not be identified in the field were noted as additional species for the transect, but they all lacked structures required to secure a confident identification.

4 CONTINUING/FUTURE WORK

Future work should include a compilation of the data to provide one large, organized dataset for easier viewing and analysis.

The primary scope of the 2016 work described in this document was to visit the plots and collect data after the most recent prescribed fire at Stuart River PP. Data for the 2006, 2009, and 2012 exists, but is several formats, both in spreadsheets and reports. Compilation of the data into a standard format would be beneficial for storage and organizational purposes, and may be mandatory for conducting additional analysis of the data (At minimum, it would make analysis much simpler and straightforward).

Several issues require attention going forward:

- The 2012 plot numbering does not match the UTM coordinates for previous years. When the data is compiled, an effort should be made to rectify this issue.
- 2012 site 12-7208 (corresponding to Plot 7 in other years) was assessed at the top of the hill in a level treed area. This area was not treated, and does not resemble the initial location of the Plot in 2006 or 2016. It should be removed from the data set.

Beginning in 2016, the data was collected using a different protocol, which presents additional challenges to analysis, since not all the data is directly comparable. Some multivariate statistical approaches have a broad tolerance for noisy inconsistent data. Exploration of the existing data in this manner and could provide excellent insight into some of the broad changes in the plant communities and correlations with environmental conditions and wildlife use.

4.1 DATA ENTRY TRIAL

The intention at the start of the work was to enter data directly to the ERPro database. After contacting the developer of this software it was determined that the mobile version of the software was still in the testing phase.

In looking for an alternative, digital data entry was preferred, so Survey 123 was used. This app was available to Ecofor without charge as part of their ESRI ArcMap subscription. It allowed for customized form-based data entry, recorded GPS location for each survey point, and integrated photo collection as part of each form. Data from the app was uploaded to ArcGIS Online each evening (when the crew returned to wifi/cell service) via an automated process. Once the data was on ArcGIS Online, it could be

exported to MS Excel tables, and from there to whatever other purpose require (MS Access for additional processing, MS Word for reporting etc).

The data in its current form cannot be easily entered into ERPro. It may be possible for it to be manipulated to match ERPro standards for easier import.

5 CLOSURE

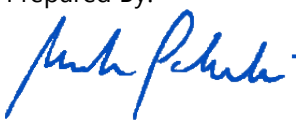
This report summarizes the findings of the field work by Mark Pokorski and Ruth Lloyd of Ecofor Consulting Ltd. regarding the assessment of vegetation and other characteristics of permanent survey plots in Stuart River PP. Findings reflect the conditions in the field at the time of the assessment.

We trust this report satisfies your requirements at this time and thank you for the opportunity to work with you on the project. If you have questions or concerns do not hesitate to contact our office.

Yours truly,

Ecofor Consulting Ltd.

Prepared By:



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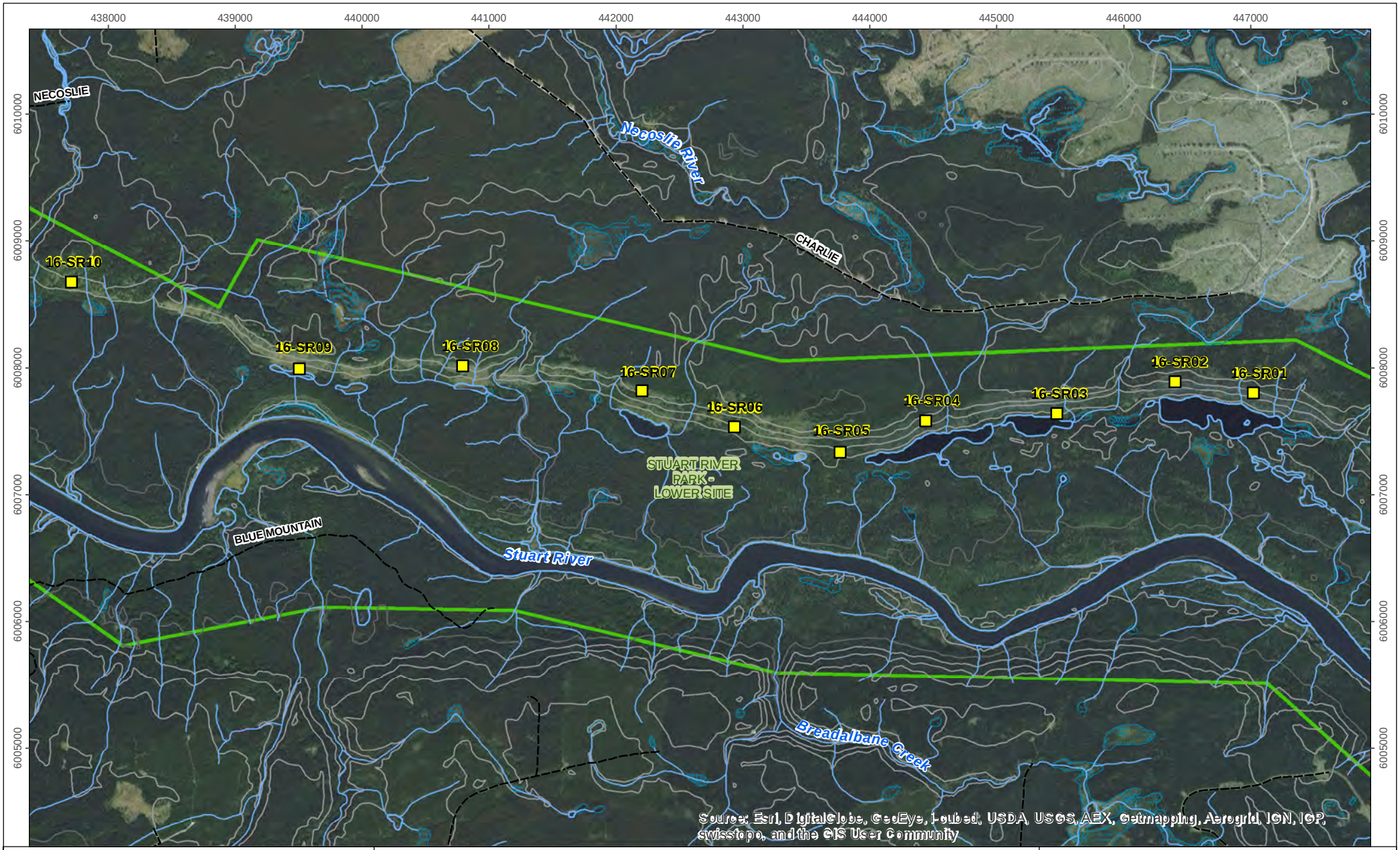
Appendix A Mapping



2016 Stuart River Provincial Park Vegetation Monitoring Plots

N

1:40,000

0 0.5 1Km

NAD 1983 UTM Zone 10N

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Ecofor Consulting Ltd. March-03-17 (MM)

Disclaimer: This product is for informational purposes only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. The base data layers have been obtained from the British Columbia Geographic Warehouse (BCGW) and the National Topographic System (NTS).

- Vegetation Plots
- Road - Other
- Provincial Park Boundary
- Waterbody
- Wetland
- Stream - Definite
- Stream - Indefinite
- Contour (100m)
- Contour (20m)

Appendix B Data Tables

Site Characteristics

Plot Name	UTM Zone	Easting	Northing	Sample Date	Crew	General Location	Plot Representing	BGC Unit	Successional Status	Structural Stage	Elevation (m)	Slope %	Aspect (degrees)	Meso slope	Surface _shape	Microtop Prefix	Microtop _Feature	Notes
16-SR01	10	447019	6007803	2016-09-08	MP RL	Site is located on uphill side of a small bench of steep south-facing slope above small lake just below midslope. Site is about 1.14 km north of the Stuart River within the SR Prove park.	Treated shrubland	SBS dw3	YS	3a	756	60	190	MD	CC	mc	mnd	Site is located within metres of a short bench on hillside where water appears to collect creating mini patch of sedge and grass. Alder at site also indicate moisture from hillside does collect in area.
16-SR02	10	446403	6007892	2016-08-30	MP RL	Burnt aspen parkland area with abundant regen	Treated	SBS dw3	YS	3a	765	18	190	MD	ST	mc	mnd	Burnt aspen area on benched area. Abundant regen
16-SR03	10	445473	6007640	2016-09-01	MP RL	Below south-facing slope next to small lake within patch of remaining spruce forest	Treated	SBS dw3	YS	3	724	10	210	LW	ST	sl	hmk	
16-SR04	10	444439	6007583	2016-09-01	MP RL	Steep southwest-facing slope above lake approx mid slope. Azimuth is 318	Treated	SBS dw3	YS	3a	752	53	170	MD	CC	mc	hmk	
16-SR05	10	443764	6007337	2016-09-02	MP RL	Lower section of open slope to the west of a small lake. Aspen and shrub approximately 800 m from north shore of the Stuart River in SR Provincial park.	Treated	SBS dw3	YS	3a	735	15	180	LW	CC	mc	hmk	Area burned well on lower slope with few live aspen remaining. Further upslope many live aspen and some spruce.
16-SR06	10	442932	6007535	2016-09-02	MP RL	Lower third of south-facing slope of aspen and brush. Approx 1.3 km from north side of Stuart River in SR Provincial Park. Bottom of slope appears to terminate in a ravine with some water in a mixed forest	Treated	SBS dw3	YS	3a	739	35	200	LW	CC	mc	mnd	Irregular slope east-west across a larger south-facing hillside. Large number of ungulate beds and wildlife trailers encountered enroute to site from Site 16-SR05. Hillside aspen forested upslope of site but mainly shrub and dead aspen @ site
16-SR07	10	442203	6007822	2016-09-08	MP RL	Upper slope near crest of hill on south-facing slope above small lake. Shrubbed hillside adjacent to aspen stand at top of slope leading into spruce forest. 1.4 km north of Stuart River in Stuart R Provincial Park	Treated shrubland	SBS dw3	YS	3a	773	35	210	UP	CV	mc	mnd	Generally south-facing slope with small undulations cross-slope forming shallow draws and shallow ridges. Shrubbed hillside with some remnant dead aspen from burn.
16-SR08	10	440791	6008018	2016-09-06	MP RL	Top of south-facing slope, just as the slope begins to drop from bench. Open shrubbed area, approx 30 m south from forested bench, approx 100 m upslope from wetland, mixed spruce forest on south side of wetland. Site approx 1km north of Stuart River	Treated/shrub	SBS dw3	YS	3a	767	21	190	UP	CV	mc	mnd	Shrub and herb dominant with low-laying coarse woody debris an easy traversing. Wildlife trails and heavily used ungulate beds and mineral lick passed on route into site
16-SR09	10	439506	6007993	2016-09-06	MP RL	Near base of a south-facing slope next to small wetland approx 375 m from Stuart River inside the Stuart River Prov Park	Treated, shrubland	SBS dw3	YS	3b	727	35	200	LW	ST	mc	mnd	
16-SR10	10	437713	6008680	2016-09-09	MP RL	Gently sloping mature aspen and shrub area of south-facing hillside with mixed spruce forest at bottom of slope and mixed forest Above on crest. Site located at base of fallen aspen.	Treated/forest and shrub	SBS dw3	YS	3a	756	13	220	MD	CV	mc	mnd	Rolling terrain across slope with very shallow gullies, site is at lower edge of aspen forest, more open hillside below

Supplemental Data

Plot	Canopy Cover	Total trees in plot	Height to Crown	Transect Azimuth	General Site Comments	Ungulate Plot Comments	Sapling and Regen Comments
16-SR01	0-5%	1	-	3	No live trees over sapling size at site, crown is shrub and some deciduous saplings	Small den in hillside at 10 m, possibly fox den. Large bear den next to the smaller den, west across slope, entrance ~45 cm wide. Shrub/herb cover and deadfall variable thru azimuth and difficult to see thru in sections may underestimate ungulate use.	U1 is an alder sp. Alnus tenufolia mountain alder Saskatoon and red osier dogwood also present
16-SR02	0-5%	2	-	19	No crown has developed since burn.		
16-SR03	5-25%	7	-	83	Open plot with some remaining tall spruce so live crown continuous to forest floor essentially	Pellet groups difficult to find due to dense shrub and herb layer, likely an underestimate of use.	Open area at base of slope. Well separated trees with no consistent canopy and live branches to base. Well developed shrub and herb layers.
16-SR04	0-5%	0	-	318	Herb/shrub layer with sapling regen make up groundcover, no live crown at this point	Wildlife trail crosses plot azimuth near 30 m and another fainter wildlife trail at 41.5 m	
16-SR05	0-5%	2	-	144	No real crown cover, two sparse aspen provide minimal crown, no crown layer. Estimate 10 m to crowns of trees in plot but they are the only two trees close to transact.	Browsing apparent on shrubs and a wildlife trail through plots at 10 m, 30 m, 40 m Likely an underestimate as dense shrub and herb layer with leaf litter reduces visibility to ground.	Wildlife trail through site area. Noted both bear and elk scat on walk in as well as elk tree rub.
16-SR06	0-5%	3	-	159	Crowns of the few live aspen at site are approx 25 m up, however majority of site is open scrubland oops	Heavy ungulate use based on wildlife trails and pellet groups in more treed areas. Pellet groups difficult to locate on visit due partly to heavy herb/shrub layer but also made more difficult by rain creating similar surface texture in pellets and litter	Wildlife trails and large number of animal beds on hillside. Ungulates appear to be using aspen as shelter upslope of site
16-SR07	0-5%	0	-	130	No trees in site or along azimuth, low shrub is only cover. But adjacent to forest.	Azimuth was 130	Wildlife trail crosses azimuth at 42 m, perpendicular to azimuth and near 14 m. Significant browsing evident on shrubs, unknown duck species on lake at visit.
16-SR08	0-5%	0	-	117	No live crown, area is shrub and herb cover on open south-facing slope	Wildlife trail crosses azimuth at 23 m and runs nearly parallel for approx 80% of azimuth, evidence of browsing on shrubs	Extensive aspen regen, as well as many plants characteristic of well-drained areas
16-SR09	0-5%	2	15	111	Open shrub next to wetland bog or fen and some spruce.	Good habitat for browsing and wetland use, slope had wildlife trails spotted while making way to site	
16-SR10	5-25%	6	20	323	Aspen stand with live crown on north side of site, open shrub downslope to south	Wildlife trail crosses transect at 30m.	Wildlife trails and beds throughout area. Browsing apparent on shrubs.

Understory Species by Plot

English Name	*Scientific Name*	Veg Type	16-SR01	16-SR02	16-SR03	16-SR04	16-SR05	16-SR06	16-SR07	16-SR08	16-SR09	16-SR10	Total Occurances	# plots
American Vetch	*Vicia americana*	Forb	19	14	5	27	8	12	2	8	5	7	**107**	**10**
Blunt-fruited Sweet-cicely	*Osmorhiza depauperata*	Forb				1							**1**	**1**
Canada Goldenrod	*Solidago canadensis*	Forb						6					**6**	**1**
Canada Thistle	*Cirsium arvense*	Forb	1										**1**	**1**
Canada Violet	*Viola canadensis var. rugulosa*	Forb	1	4	4	2	10	2	4	2	3	1	**33**	**10**
Cow-parsnip	*Heracleum maximum*	Forb					3	7					**10**	**2**
Creamy Peavine	*Lathyrus ochroleucus*	Forb	6	5	5	6	8	1		7		1	**39**	**8**
False Solomon's-seal	*Maianthemum racemosum ssp. amplexicaule*	Forb			2			1	2				**5**	**3**
Fireweed	*Chamerion angustifolium*	Forb	1	2	6	2		4		2	2		**19**	**7**
Great Northern Aster	*Canadanthus modestus*	Forb					4						**4**	**1**
Hooker's Fairybells	*Prosartes hookeri var. oregana*	Forb	7	14	8	13	16	8	6	1	6	11	**90**	**10**
Lindley's Aster	*Symphyotrichum ciliolatum*	Forb	1		1			1	6	3	8		**20**	**6**
Northern Bedstraw	*Galium boreale*	Forb	2		2	8	2	4	9	5	4	2	**38**	**9**
Pink Wintergreen	*Pyrola asarifolia ssp. asarifolia*	Forb			3							1	**4**	**2**
Purple Peavine	*Lathyrus nevadensis var. pilosellus*	Forb						8		1			**9**	**2**
Purple Sweet-cicely	*Osmorhiza purpurea*	Forb			1								**1**	**1**
Queen's Cup	*Clintonia uniflora*	Forb		5	6	11						4	**26**	**4**
Scarlet Paintbrush	*Castilleja miniata var. miniata*	Forb								2	3	3	**8**	**3**
Showy Aster	*Eurybia conspicua*	Forb	12	4	19	16	8	7	7	12	5	14	**104**	**10**
Slender Wheatgrass	*Elymus trachycaulus ssp. trachycaulus*	Forb							1	1			**2**	**2**
Spreading Dogbane	*Apocynum androsaemifolium var. androsaemifolium*	Forb								11			**11**	**1**
Western Meadowrue	*Thalictrum occidentale*	Forb		5		5	3	3	4		1	1	**22**	**7**
Wild Sarsaparilla	*Aralia nudicaulis*	Forb	2	3	6	8					2	2	**23**	**6**
Yarrow	*Achillea millefolium var. borealis*	Forb							1				**1**	**1**
Blue Wildrye	*Elymus glaucus ssp. glaucus*	Grass	3		11	2	4	12	5		1	9	**47**	**8**
Fowl Bluegrass	*Poa palustris*	Grass	1		2				3				**6**	**3**
Fringed Brome	*Bromus ciliatus*	Grass			9		10			1			**20**	**3**
Kentucky Bluegrass	*Poa pratensis ssp. pratensis*	Grass							3				**3**	**1**
Rough-leaved Ricegrass	*Oryzopsis asperifolia*	Grass		2	9	1					8	4	**24**	**5**
Bunchberry	*Cornus canadensis*	Low Shrub			5								**5**	**1**
Dwarf Red Raspberry	*Rubus pubescens*	Low Shrub			1	2				1			**4**	**3**
Twinflower	*Linnaea borealis ssp. borealis*	Low Shrub			1								**1**	**1**
Wild Strawberry	*Fragaria virginiana var. glauca*	Low Shrub			6	1			1		7	1	**16**	**5**

Shrub Species by Plot

English Name	Scientific Name	16-SR01	16-SR02	16-SR03	16-SR04	16-SR05	16-SR06	16-SR07	16-SR08	16-SR09	16-SR10	Total length	# plots
Beaked Hazelnut	*Corylus cornuta var. cornuta*		0.3									**0.3**	**1**
Birch-leaved Spirea	*Spiraea lucida*	1.35	1.5	0.1	0.9		0.3		0.35	0.7		**5.2**	**7**
Choke Cherry	*Prunus virginiana var. demissa*					2.75	3.45	0.2	0.25	0.15	0.6	**7.4**	**6**
Common Snowberry	*Symphoricarpos albus var. albus*	3.3	0.3		0.55	3.8	1.15	3.1	1.8	0.07	3.25	**17.32**	**9**
Highbush-cranberry	*Viburnum edule*			0.35							0.35	**0.7**	**2**
Hybrid White Spruce	*Picea engelmannii X glauca*									0.8		**0.8**	**1**
Paper Birch	*Betula papyrifera var. papyrifera*				0.1							**0.1**	**1**
Pin Cherry	*Prunus pensylvanica*	1.55										**1.55**	**1**
Prairie Saskatoon	*Amelanchier alnifolia var. alnifolia*	1.75	1.7	0.75	1.35	0.4	1.9	11.75	4.15	6.1	1.6	**31.45**	**10**
Prickly Rose	*Rosa acicularis ssp. sayi*	3.65	2.25	1.75	2.9	6.25	5.05	1.71	0.2	1.65	2.6	**28.01**	**10**
Pyramid Spirea	*Spiraea x pyramidata*							2.15			2.6	**4.75**	**2**
Red Raspberry	*Rubus idaeus ssp. strigosus*	0.95		0.05		1.4	1.45					**3.85**	**4**
Red-osier Dogwood	*Cornus stolonifera*	0.22										**0.22**	**1**
Tall Oregon-grape	*Mahonia aquifolium*	1.55	0.35	1.2	0.35	0.45	0.35	0.9	1.87	3.05	3.55	**13.62**	**10**
Thimbleberry	*Rubus parviflorus*	0.9		0.05								**0.95**	**2**
Trembling Aspen	*Populus tremuloides*	4.05	1.6	0.4	1.3		2.2	0.8	1.9	1.75	3.9	**17.9**	**9**

Tree DBH and Wildlife Classes by Plot

Plot	BAF	Crew	DBH_limit	Tree Sp	Age	DBH	Wildlife Code
16-SR01	4	MP RL	12.5	At		21	Hardwood7
16-SR02	4	MP RL	12.5	At		20.9	Hardwood7
16-SR02	4	MP RL	12.5	At		17.2	Hardwood4
16-SR03	4	MP RL	12.5	Sxw	35	38.3	Conifer1
16-SR03	4	MP RL	12.5	Sxw		88.3	Conifer3
16-SR03	4	MP RL	12.5	Sxw	43	40.1	Conifer1
16-SR03	4	MP RL	12.5	Sxw		35.6	Conifer1
16-SR03	4	MP RL	12.5	Sxw		39.6	Conifer1
16-SR03	4	MP RL	12.5	Sxw		39.3	Conifer1
16-SR03	4	MP RL	12.5	W		40	Hardwood2
16-SR05	4	MP RL	12.5	At		29	Hardwood2
16-SR05	4	MP RL	12.5	At		30.4	Hardwood2
16-SR06	4	MP RL	12.5	At		35.5	Hardwood2
16-SR06	4	MP RL	12.5	At		21.7	Hardwood7
16-SR06	4	MP RL	12.5	At		18.8	Hardwood9
16-SR09	4	MP RL	12.5	Sxw	39	48	Conifer1
16-SR09	4	MP RL	12.5	Sxw	34	37.7	Conifer1
16-SR10	4	MP RL	12.5	At		49.7	Hardwood7
16-SR10	4	MP RL	12.5	At		44	Hardwood1
16-SR10	4	MP RL	12.5	At		50.8	Hardwood2
16-SR10	4	MP RL	12.5	At		43.4	Hardwood9
16-SR10	4	MP RL	12.5	At		41.8	Hardwood9
16-SR10	4	MP RL	12.5	At		48.2	Hardwood9

Coarse Woody Debris with Additional Comments

Plot	CWD Volume	CWD Length	CWD Decay Class	CWD complexity	CWD Comments
16-SR01	High	Mixed	Decomposing	Complex	Walking very difficult due to number of pieces of coarse woody debris but most of the debris are smaller diameter, <12 cm dbh, steepness also a factor in movement.
16-SR02	Moderate	Mixed	Decomposing	Complex	Fallen burnt trees with little bark but solid wood.
16-SR03	Moderate	Mixed	Decomposing	Single	
16-SR04	High	Mixed	Decomposing	Complex	Smaller diameter aspen all over plot on ground, some areas they are stacked up but low numbers of branches and highly burnt state means walking not completely impeded, expect most trees still standing to fall within next 5 years
16-SR05	Moderate	Mixed	Decomposing	Single	Walking in some directions difficult due to high numbers of downed and burnt aspen, however no massive pile ups and few beaches make moving around not too difficult except for dense shrubs which make it difficult to see ground terrain.
16-SR06	Moderate	Mixed	Decayed	Complex	Walking a transect not as hampered by large woody debris at this site as previous sites, but short steep drops in places did add to challenge of the area and dense shrub growth
16-SR07	None	NA	NA	NA	Very little coarse woody debris at site. Open and easy walking.
16-SR08	Low	Short	Decomposing	Single	Walking on south side of plot marker is unimpeded for most part, some heavier areas of deadfall north of plot marker towards forested plateau area
16-SR09	Moderate	Mixed	Decomposing	Single	Walking impeded more by slope and heavy shrub than by coarse woody debris
16-SR10	Low	Mixed	Decomposing	Single	Easy walking in mostly open terrain. Some fallen mature aspen to step over, some softer and more decayed prices in spots

Appendix C Photodocumentation

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Date: Sept 8, 2016
Comments:
16-SR01
North

Date: Sept 8, 2016
Comments:
16-SR01
East

Date: Sept 8, 2016
Comments:
16-SR01
South

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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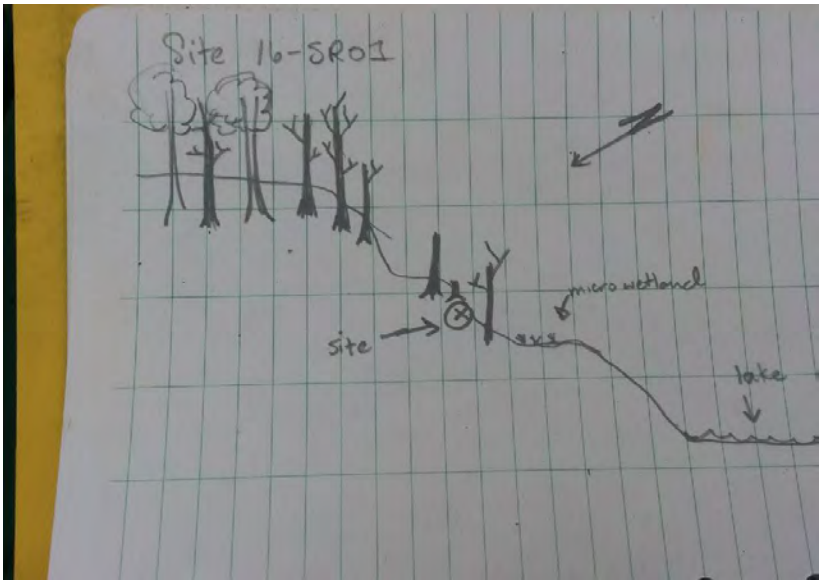
Date: Sept 8, 2016
Comments:
16-SR01
West

Date: Sept 8, 2016
Comments:
16-SR01
Ground



Date: Sept 8, 2016
Comments:
16-SR01
Diagram

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Date: Aug 30, 2016
Comments:
16-SR02
North

Date: Aug 30, 2016
Comments:
16-SR02
East

Date: Aug 30, 2016
Comments:
16-SR02
South

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Stuart River Provincial Park 2016

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Date: Aug 30, 2016
Comments:
16-SR02
West

Date: Aug 30, 2016
Comments:
16-SR02
Ground
This photo was missed during the field day.

Date: Aug 30, 2016
Comments:
16-SR02
Diagram
This photo was missed during the field day.

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Date: Sept 1, 2016
Comments:
16-SR03
North

Date: Sept 1, 2016
Comments:
16-SR03
East

Date: Sept 1, 2016
Comments:
16-SR03
South

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Stuart River Provincial Park 2016

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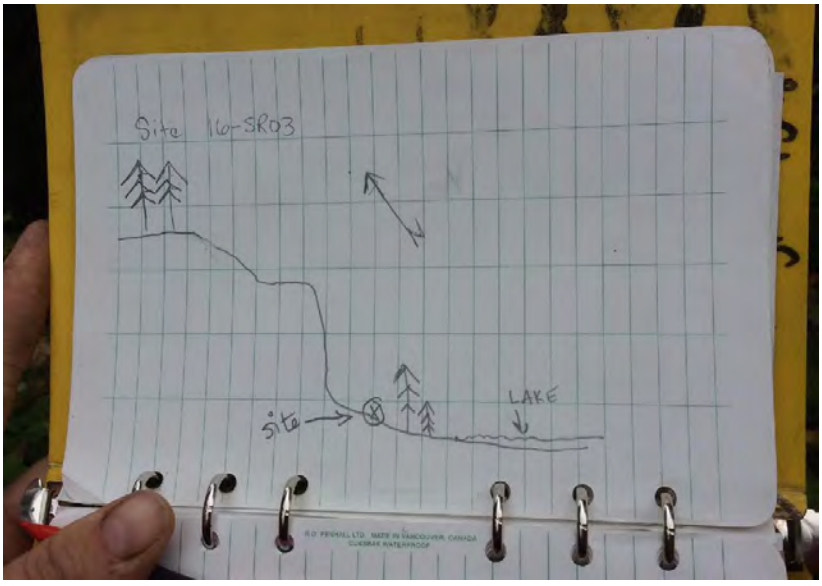
Date: Sept 1, 2016
Comments:
16-SR03
West

Date: Sept 1, 2016
Comments:
16-SR03
Ground



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Stuart River Provincial Park 2016

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Date: Sept 1, 2016
Comments:
16-SR04
North

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Comments:
16-SR04
East

Date: Sept 1, 2016
Comments:
16-SR04
South

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Stuart River Provincial Park 2016

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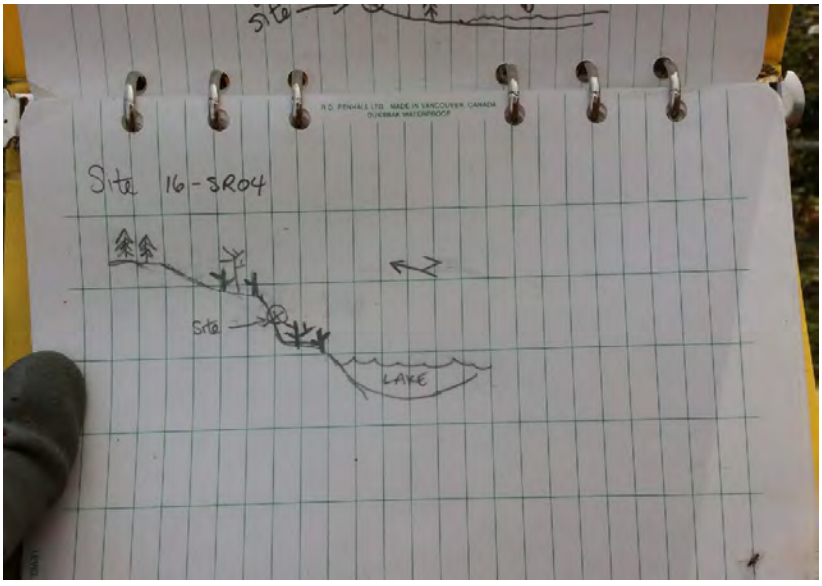
Date: Sept 1, 2016
Comments:
16-SR04
West

Date: Sept 1, 2016
Comments:
16-SR04
Ground



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Comments:
16-SR04
Diagram

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Stuart River Provincial Park 2016

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Date: Sept 2, 2016
Comments:
16-SR05
North

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Comments:
16-SR05
East

Date: Sept 2, 2016
Comments:
16-SR05
South

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Stuart River Provincial Park 2016

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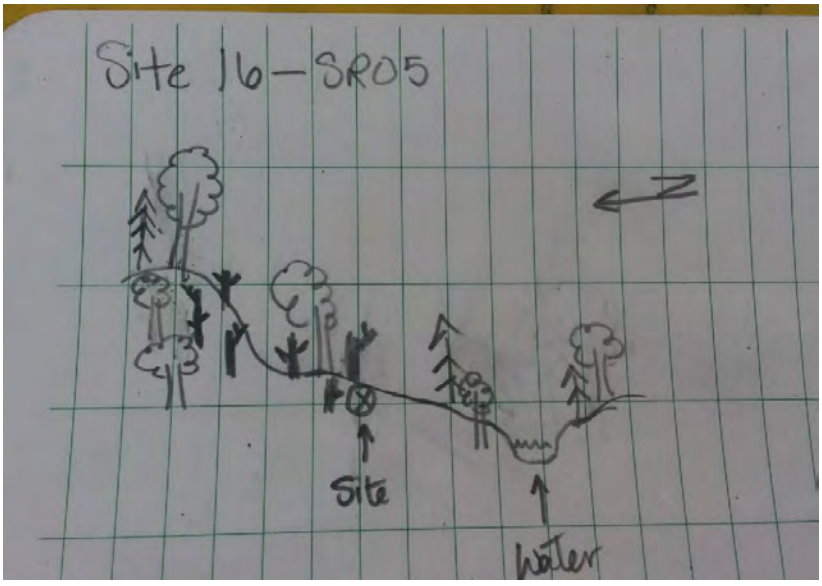
Date: Sept 2, 2016
Comments:
16-SR05
West

Date: Sept 2, 2016
Comments:
16-SR05
Ground



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Date: Sept 2, 2016
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16-SR06
North

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16-SR06
East

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Comments:
16-SR06
South

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Stuart River Provincial Park 2016

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Date: Sept 2, 2016
Comments:
16-SR06
West

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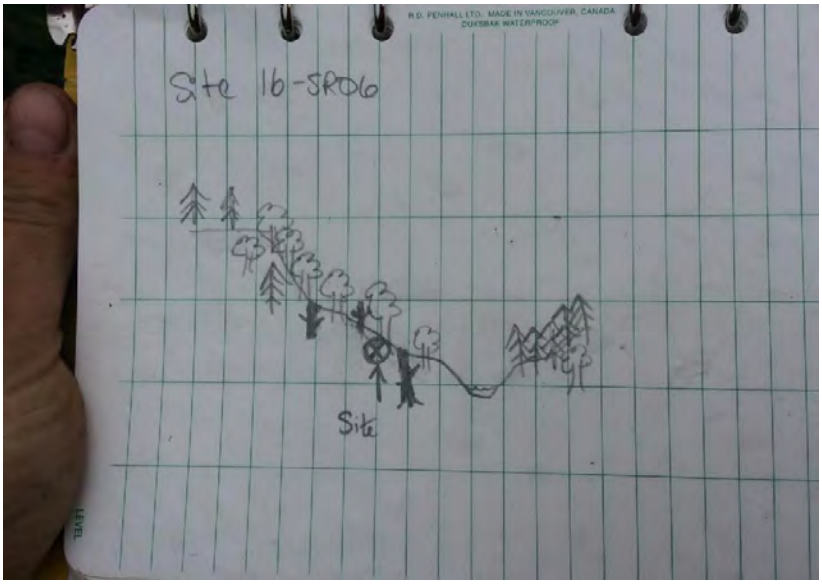
Comments:
16-SR06
Ground



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16-SR06
Diagram

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Comments:
16-SR07
North

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Comments:
16-SR07
East

Date: Sept 8, 2016
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16-SR07
South

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Stuart River Provincial Park 2016

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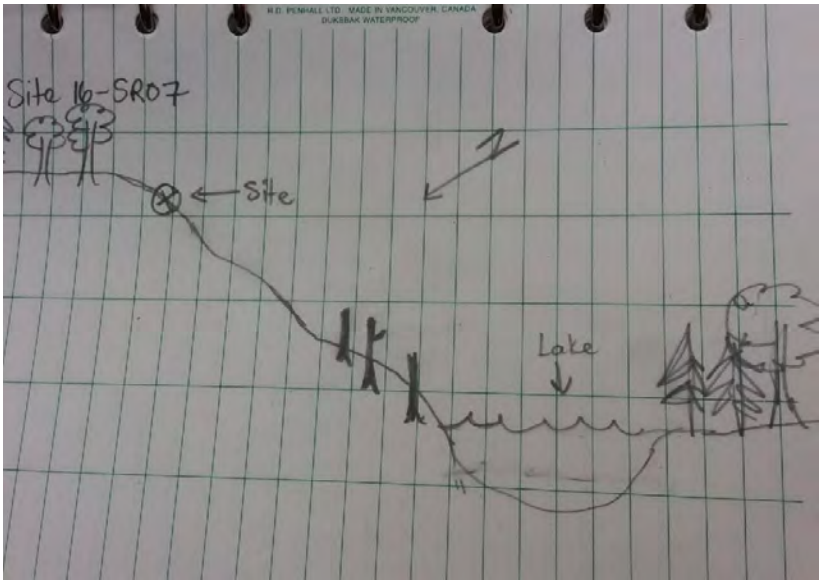
Date: Sept 8, 2016
Comments:
16-SR07
West

Date: Sept 8, 2016
Comments:
16-SR07
Ground



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Comments:
16-SR07
Diagram

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Comments:
16-SR08
North

Date: Sept 6, 2016
Comments:
16-SR08
East

Date: Sept 6, 2016
Comments:
16-SR08
South

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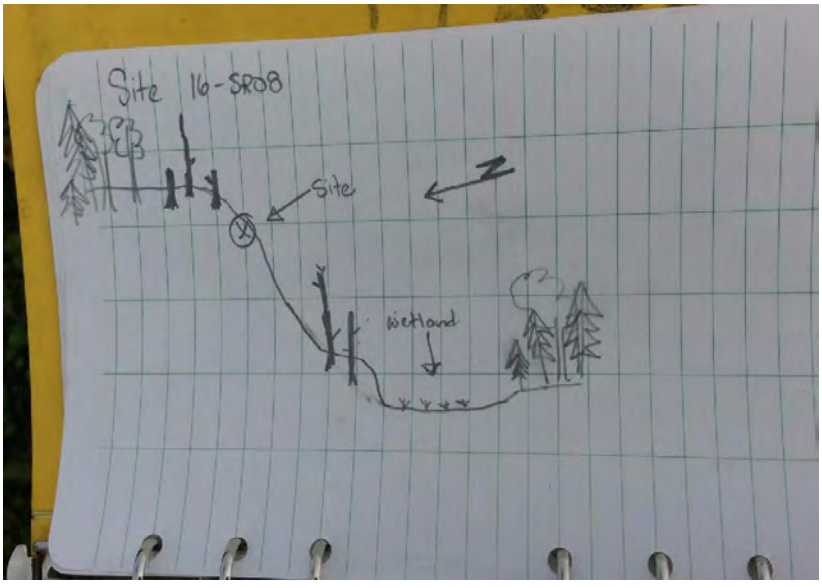
Date: Sept 6, 2016
Comments:
16-SR08
West

Date: Sept 6, 2016
Comments:
16-SR08
Ground



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Comments:
16-SR08
Diagram

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Date: Sept 6, 2016
Comments:
16-SR09
North

Date: Sept 6, 2016
Comments:
16-SR09
East

Date: Sept 6, 2016
Comments:
16-SR09
South

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Stuart River Provincial Park 2016

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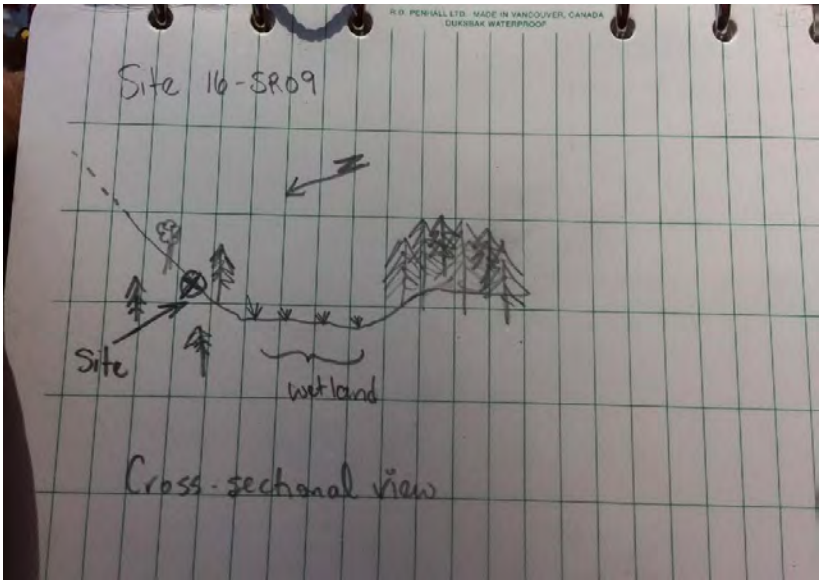
Date: Sept 6, 2016
Comments:
16-SR09
West

Date: Sept 6, 2016
Comments:
16-SR09
Ground



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16-SR09
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SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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Date: Sept 9, 2016
Comments:
16-SR10
North

Date: Sept 9, 2016
Comments:
16-SR10
East

Date: Sept 9, 2016
Comments:
16-SR10
South

SERNbc Vegetation Monitoring Plots
Stuart River Provincial Park 2016

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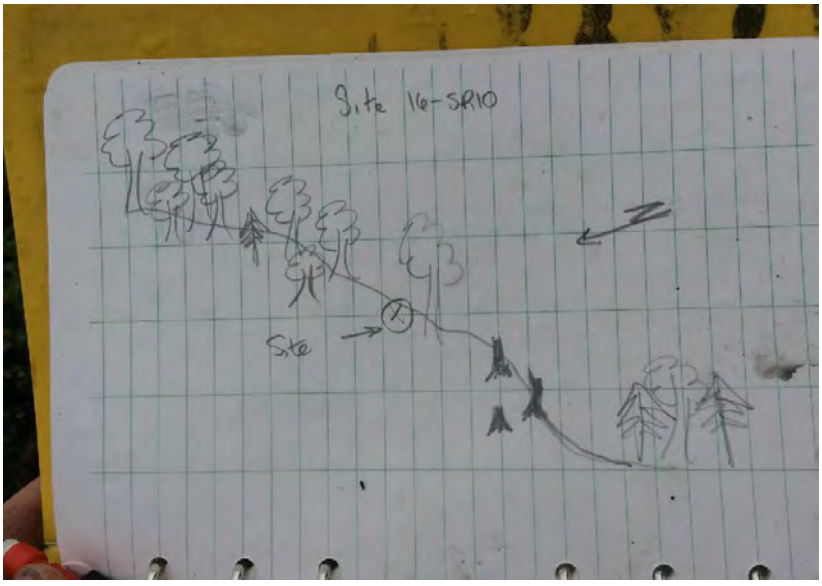
Date: Sept 9, 2016
Comments:
16-SR10
West

Date: Sept 9, 2016
Comments:
16-SR10
Ground



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Diagram