



Quintette Caribou Habitat Restoration Program: 2019 Implementation Report

DRAFT REPORT

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Forest Enhancement
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Executive Summary

The Quintette Caribou Habitat Restoration Implementation Plan (the Plan) was developed by Golder Associates Ltd. (Golder) in 2018 to guide a multi-year, range scale, restoration program, with field implementation beginning in 2019 (Golder 2018). The Plan was designed to guide the implementation of habitat restoration treatments in the treatment areas identified during a desktop classification exercise of linear disturbances within the Quintette Priority Area. Operational activities under the Plan were initiated in June 2019 by the Ministry of Forest, Lands, and Natural Resource Operations and Rural Development (FLNRORD). The Society for Ecosystem Restoration in Northern BC (SERNbc) was contracted to implement and manage all restoration activities described within the Plan. Funding for these activities was provided by the Forest Enhancement Society of BC (FESBC) and the Fraser Basin Council (FBC).

The activities described in the Plan were implemented by SERNbc and selected contractors between June 10 and 23, 2019. During implementation the planned treatment of a number of candidate disturbance areas was changed primarily to account for access restrictions and local site conditions. During this period, 28.58 km of legacy linear disturbances, scattered over 115 line segments, were treated within the priority area of the Quintette Herd Range.

This report provides a summary of the 2019 restoration activities with descriptions of the various implementation components including: authorization, site selection and verification, treatment implementation, Indigenous and local community involvement, and key learnings from this implementation program.

Acknowledgments

SERNbc would like to express our gratitude to the Northeast Caribou Recovery Team, who provided the opportunity to undertake this habitat restoration work in Treaty 8 Traditional Territory.

A special thank you also goes out to McLeod Lake Indian Band, general contractor Duz Cho Construction LP and their staff who contributed valuable local knowledge and support for the project. We would also like to thank the management and staff of Twin Sisters Native Plant Nursery, Spectrum Resources Ltd. and Tree Time Services Inc. for their hard work and contributions towards the successful and safe completion of this project.

We are grateful for the support of the Forest Enhancement Society of BC and the Fraser Basin Council.

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1.0 Introduction

The Quintette Caribou Habitat Restoration Implementation Plan (the Plan) was developed by Golder Associates Ltd. (Golder) in 2018 to guide a multi-year, range scale, restoration program, with field implementation beginning in 2019 (Golder 2018). The Plan was designed to guide the implementation of habitat restoration treatments in the treatment areas identified during a desktop classification exercise of linear disturbances within the priority area in the Quintette Herd Range. Operational activities under the Plan were initiated in June 2019 by the Ministry of Forest, Lands, and Natural Resource Operations and Rural Development (FLNRORD). The Society for Ecosystem Restoration in Northern BC (SERNbc) was contracted to implement and manage all activities associated with restoration efforts described within the Plan. Funding for these activities was provided by the Forest Enhancement Society of BC (FESBC) and the Fraser Basin Council (FBC).

An analysis conducted as part of the 2017 joint federal-provincial study of the Central Mountain herds showed 57.6% of the non-high elevation portion of the Quintette range as disturbed (ECCC and MoE 2017). Habitat restoration is one management lever that may reduce predator prey interactions facilitated by the use of linear corridors from low to high elevation habitat. Restoration activities will increase vegetation growth on these corridors that will, in the long-term, decrease the fragmentation of caribou habitat. Development of the Quintette Caribou Restoration Plan is in support of the Quintette Strategic Action Plan (FLNRORD 2017) (QSAP). The QSAP identifies as its goals the recovery of the Quintette caribou herd to a level that supports a sustainable Treaty 8 caribou harvest, and to meet the Government of Canada's recovery targets for woodland caribou.

The 2018 development of a Quintette Caribou Habitat Restoration Plan (Golder 2017) is in support of this QSAP objective (BC FLNRORD 2017). The overall objective of the Restoration Plan is to transition anthropogenically disturbed, low- and mid-elevation low quality woodland caribou habitat into higher quality habitat, with a focus on linear disturbances. Restoration over the entire Quintette range (approximately 607,519 ha) is expected to require 5 to 10 years.

The activities described in the Implementation Plan were implemented by SERNbc and selected contractors between June 10 and 23, 2019. Several modifications were made to the Plan during field implementation to account for access restrictions and local site conditions. During this period, 28.58 km of legacy linear disturbances scattered over 115 line segments were treated within the priority area of the Quintette Herd Range.

This report provides a summary of the 2019 restoration activities with descriptions of the various implementation components including: authorization, site selection and verification, treatment implementation, Indigenous and local community involvement, and key learnings from this implementation program.

2.0 Authorizations

The Project activities were authorized by a Section 52 of the *Forest and Range Practices Act* under the direct supervision of FLNRORD staff. Project supervision and contract management responsibilities were delegated to SERNbc. During the Project, all field alterations to the Plan, such as additions or removal of treatment areas, and deviations or changes to the treatment prescriptions required communication with and approval from FLNRORD staff.

In addition to the Section 52 authorization, the following approvals were secured during stakeholder engagement sessions prior to field implementation:

- Watercourse crossings: FrontCounter BC was notified of watercourses that may be crossed during the Project, including recommended method of crossing. No classified watercourses were crossed by vehicles or machinery during the Project.
- Pipeline Crossing Agreements: A pipeline was crossed during the project, using a designated crossing location. Sunkunka Resources was contacted prior to project initiation by the general contractor Duz Cho Construction LP.
- Road Use Agreements: Golder and FLNRORD met with Canfor on December 19, 2017 to discuss proposed cutblock and active logging roads. Canfor provided a map of the main forestry roads as well as their anticipated access needs relative to treatment candidates.
- Archeological Overview Assessment: An AOA completed and submitted to the following groups: Archaeology Branch FLNRORD, Blueberry River First Nation, Doig River First Nation, Halfway River First Nation, McLeod Lake Indian Band, Saulteau First Nation, and West Moberly First Nation in February 2018. Areas of high archaeological resource potential were mapped and used to determine restoration treatment option to mitigate potential impacts on archeological resources.
- Trappers: Traplines (TR0721T006, TR0721T007, and TR0722T001) were identified in the Priority Area and these tenure holders were contacted about the planned activities.

3.0 Site Selection

Golder completed an initial desktop inventory of linear disturbances in the Quintette range in Phase 1 (Golder 2017). Existing linear disturbance information for the Quintette Range was obtained from government sources, with documented metadata. These included:

- Confirmed 2D seismic survey corridors, sourced from the BC Oil and Gas Commission (1996 to 2015) (BC OGC).

- Confirmed 2D seismic survey corridors from CANVEC datasets (2013), sourced from Natural Resources Canada.
- Possible or probable 2D corridors from CANVEC (2013) datasets and the Digital Road Atlas (2016), sourced from GeoBC.
- Unclassified linear disturbance corridors obtained from the BC OGC (2016) and Digital Road Atlas (2016) (GeoBC).

Aerial imagery for the Quintette Range was used to digitize additional linear disturbances absent from the available government data sources. Roads, pipeline, and well access roads, other than those defined as unclassified, were excluded from the linear disturbance dataset as potential treatment candidate lines. Roads and pipelines are considered active dispositions and therefore are not currently candidate areas for restoration treatments in the Plan. Access management is also a component of the QSAP.

In the fall of 2017, the sources of the linear disturbance layers were checked for updates and refined to eliminate overlaps in the linear disturbance dataset prior to a field reconnaissance program. Sources included the BC Oil and Gas Commission, GeoBC (for the Digital Road Atlas), and Natural Resources Canada (for CANVEC data).

Current and approved mine footprints (e.g., Walter Energy, now Conuma Coal Resources Ltd.) were excluded as candidate areas for restoration treatment in the Priority Area because they have project-specific reclamation plans to address the mine footprint.

Phase 1 of the Plan identified 645 km of linear disturbances in the Priority Area portion of the Quintette herd range, of which 292 km were considered potential treatment candidates (Golder 2017). However, additional data updates and digitization of potential lines on imagery identified 745 km of linear disturbances in the Priority Area, of which 297 km were considered potential treatment candidate to be ground-truthed during field reconnaissance activities.

4.0 Field Reconnaissance

A field reconnaissance program was conducted by low-level fly-over via helicopter between September 30 and October 2, 2017 to ground-truth the Treatment candidate sites mapped during desktop linear disturbance mapping. The main objective of the field reconnaissance was to assign one of three restoration options (No Treatment, Leave for Natural Regeneration, and Treatment Candidate) to each disturbance line and segment. A decision support flowchart was used to determine treatment candidacy (Golder 2017). The field crew consisted of two Golder biologists, one Environmental Monitor from McLeod Lake Indian Band (MLIB), and a pilot from Highland Helicopters. During the field reconnaissance, potential treatments for each Treatment candidate were evaluated including: screefing/scalping, ripping, inversion, topsoil spreading, tree felling, hand felling, slash rollback, seedling planting and live staking. Access routes, stream crossings, and potential disposition holders were also noted to help inform the Implementation Plan.

The field reconnaissance survey identified an additional 5 km of Treatment candidates, totaling 750 km of linear disturbances within the Priority Area; 297 km of lines were considered potential Treatment candidates and were flown for ground-truthing. Following the field reconnaissance, and after stakeholder consultation conducted by FLNRORD, 496.5 km of linear disturbances (66%) were assigned No Treatment, 218.5 km of linear disturbances (29%) were assigned Leave for Natural based on existing natural vegetation recovery, and 27.9 km of linear disturbances (4%) were identified as Treatment candidates. In addition, stakeholder engagement determined that 8.7 km (1%), originally identified as treatment candidates, were classified as 'No Treatment – Stakeholder Conflict' due to overlapping use or future need by stakeholders.

5.0 Treatment Candidates

Linear disturbances within the low- and mid- elevation habitat were considered as a Treatment candidate when the line segment had:

- All cover classes under 0.5 m existing vegetation height;
- Less than 30% vegetation cover and over 0.5 m existing vegetation height; and
- Greater than 30% vegetation cover and 0.5 m to 3 m existing vegetation height.

Golder conducted additional review of linear disturbances within the BEC units of the Priority Area following the field reconnaissance and refined the number of lines that qualify as Treatment candidates after removing those that were in high elevation BEC units (ESSFmvp, BAFAun). In addition, the stakeholder engagement process removed 8.7 km of initially identified treatment candidates due to stakeholder conflicts.

Restoration techniques were refined for each linear segment but generally include screefing (i.e., a site preparation technique used to expose mineral soil for seedling planting), hand or tree felling, slash rollback, and the planting of seedlings. The AOA was superimposed onto treatment candidate line segments by desktop post-field. Restoration techniques involving ground disturbance were modified to hand felling and/or slash rollback to mitigate, where possible, potential impact in areas of high archaeological potential.

Any linear disturbance segments that were less than 150 m in length were removed for treatment based on logistical field implementation and associated costs to mobilize equipment or hand fellers to small segments (e.g., helicopter access only). These segments totaled less than 1 km in length and were dispersed throughout the Project area, occurring between segments of natural revegetation recovery, or as spur segments to linear disturbances that were No Treatment or met the Leave for Natural Regeneration disturbance criteria.

6.0 Candidate Verification

The treatment Candidates were verified on the ground by SERNbc and Duz Cho Construction LP staff between June 8 and 15 immediately prior to the mobilization of machinery and work crews to the prospective treatment Candidates. The candidate sites were assessed as to their suitability for the prescribed treatment and to confirm access routes to the sites for travel by machinery and ground crews.



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A number of access constraints were found involving wet ground, steep and/or remote terrain, unpassable temporary winter roads, and non-existent roads/trails or deteriorating road/trail conditions that in some cases prevented access for even 4-wheel off-road utility vehicles to the Candidate site. Alternative routes were explored for those candidate sites with constrained access, but some prospective sites were eventually removed as treatment Candidates. These changes were recorded in the field and are detailed in the comment section of Appendix B.

The treatment prescriptions for a number of Candidate sites were also subject to changes during this verification process. Field verification activities, on the ground, was essential to ensure the intended treatment was appropriate for local site conditions. Treatment prescriptions were confirmed and/or altered where necessary to account for site conditions. For example, tree felling activities were not possible where appropriate timber resources were not found and where the Candidate sites were too wide (≥ 20) or too narrow (< 8 m) to facilitate effective line blocking. As another example, tree planting was not possible on candidate sites that contained adequate natural regeneration and/or were previously planted by forestry licensees within the priority area. Similarly, a number of Candidate sites contained a dense layer of advanced vegetation and/or compressed woody debris making them unsuitable for planting activities. Access and prescription modifications are detailed in the below sections and Appendix B.

7.0 Treatment Implementation

Restoration treatments occurred from June 10 to 23, 2019. A total of 28.58 linear km and 115 Candidate line-segments were treated using functional and habitat restoration techniques including tree felling, debris rollback, machine screefing, and tree and shrub planting.

Implementation of the treatments began with an initial pre-work on June 10, 2019 at a staging area located at 7km on the Bullmoose Road. The Project kick-off meeting included members of FLNRORD, Duz Cho Construction LP (Duz Cho), Spectrum Resources, and SERNbc. A subsequent pre-work with the planting contractor, Tree Time Services Ltd, took place on June 17, 2020. Both pre-work meetings covered the implementation strategy, work standards, and safety planning.

On June 10, 2019 a John Deere 120 excavator was mobilized to the staging area (7km Bullmoose Rd.). The Project was implemented over the next 13 days using a total of 7 machine and operator man days, 41 tree faller man days, and 63 tree planting man days to complete the project. The Project's treatment implementation phase ended on June 23, 2020, when all of the 29, 674 tree and shrub seedlings were planted in the Quintette Priority Area.

The machine operator was a local employee of Duz Cho Construction LP, the contractor retained to complete the machine site preparation and functional treatments prescribed for the Candidate line segments. The tree fallers were employees of Spectrum Resource Group Inc. subcontracted to Duz Cho and the tree planters were with Tree Time Services Ltd from Edmonton, AB.

Consistent with the Implementation Plan, the three main treatment types included tree-felling, machine-screefing and debris rollback, and tree felling or a combination of these three treatments. Refer to the Treatment spreadsheet located in Appendix A and the below Tables 1-7 for additional details.

Some modifications from the Implementation Plan were made during the field implementation based on the following field conditions:

- Previously identified access routes based on Provincial spatial data were impassable or inaccessible;
- The treatment sites had greater heights and densities of vegetation than what was estimated during the desktop exercise;
- The treatment sites had an abundance of slash and woody debris from winter logging or previous reclamation activities than what was estimated during desktop analysis;
- The width of seismic lines (≤ 5 m) and adequate regeneration prevented prescribed tree felling and/or planting activities;
- The width of treatment candidates (≥ 20 m) prevented effective tree felling activities and some candidates did not have adequate timber resources adjacent to the feature for effective tree felling;
- Some treatment candidates had excessively compact soil conditions which prevented tree planting effectiveness without site preparation activities; and
- Overflow areas for the planting of the remaining tree and shrub seedlings were required due to the loss of plantable ground.

Table 1: Habitat Restoration Treatment Summary by Treatment Type

	<i>Measurement unit</i>	<i>Tree-felling</i>	<i>Machine screefing and debris rollback</i>	<i>Seedling planting</i>
Prescribed	# of Line Segments	132	29	67
	Length (km)	35.46	5.41	18.40
	Area (ha)	27.82	4.16	17.55
Actual	# of Line Segments	101	24	86
	Length (km)	25.81	4.14	21.42
	Area (ha)	19.36	2.80	21.74
Difference	# of Line Segments	31	5	19
	Length (km)	9.65	1.27	3.02
	Area (ha)	8.46	1.36	4.19

Where modifications were required to the candidate sites, the FLNRORD project lead was contacted to discuss prospective treatment changes. Once these changes were discussed and approval was granted, direction was given to ground crews by the SERNbc project lead. In total, 25.58 ha (115 Candidates) were treated with one of five treatment combinations; and 7.4 ha (44 Candidates) identified for treatment during desktop analysis were not treated.

Over the course of the Project, 28.58 km of historical linear disturbances were treated using three main treatment types. The treatments are summarized below and in Appendix B.

7.1 Tree-Felling

A total of 25.81 km (19.36 ha) were treated with tree-felling activities with the functional objectives of restricting/eliminating access and reducing line-of-sight.

One hundred and one Candidate line segments were treated using hand-felling techniques. The sites were accessed by 4-wheel drive pickups and the use of side-by-side and Argo off-road utility vehicles. As per the Plan, line segments intended for tree-felling activities had trees knocked over in clumps (3-6 trees on average) at regular intervals where trees of sufficient height and diameter appropriate for this treatment were located adjacent to the Candidate line segment. At the beginning and end of each line segments and where there were concerns about access control for the Candidate site, clumps of trees were felled on average at 20m intervals or where it was necessary to break-up the line-of-sight. As the tree fallers moved away from the beginning and end of a particular line segment, the felled clumps were spaced on average 50m apart or where it was necessary to break-up the line-of-sight.

In the lowland areas, trees were only felled where there were sufficient trees of an adequate size available. The distance between treatment sites was determined by the availability of sufficient trees to form adequate access control barriers and/or reduce the line-of-sight. Under these circumstances, distance between treatments was site specific and determined at the time of treatment by the tree fallers. In upland areas, where trees of sufficient size were more abundant, trees were felled at regular intervals to create access barriers and break-up the line-of-sight. A summary of all Candidate sites treated with tree-felling activities is below:

Table 2: Tree Felling Treatment Summary

<i>Treatment</i>	<i># Line segments</i>	<i>Line segment #'s</i>
Tree Felling	101	1, 2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 16, 18, 19, 22, 25, 26, 27, 28, 31, 32, 33, 39, 40, 41, 43, 48, 49, 50, 51, 55, 56, 57, 58, 59, 60, 61, 62, 63, 66, 67, 69, 72, 73, 75, 76, 77, 78, 80, 83, 87, 88, 89, 91, 97, 98, 108, 109, 110, 111, 112, 115, 116, 127, 132, 133, 139, 140, 141, 142, 143, 144, 145, 146, 149, 150, 151, 152, 153, 156, 157, 158, and 159.

7.2 Machine Screefing and Debris Rollback

A total of 4.14 km (2.80 ha) was treated by machine screefing and debris rollback activities.

Machine screefing and debris rollback treatments were prescribed for 24 candidate line segments. Five

Candidate line segments were not treated with the intended machine activities as access was not possible due to a combination of deactivated roads and/or steep unsafe terrain for the machine. Two additional Candidate line segments (#101 and 102) that were prescribed with road ripping treatments were machine screefed to reduce compaction and create suitable plantable spots. This change was made to reduce the potential of additional costs associated with mobilizing a more expensive machine to a remote location.

Table 3: Machine Screefing and Slash Rollback Treatment Summary

<i>Treatment</i>	<i># Line segments</i>	<i>Line segment #'s</i>
Machine screefing and slash rollback	24	3, 4, 5, 6, 8, 10, 11, 12, 13, 16, 18, 19, 25, 26, 27, 28, 31, 32, 33, 57, 66, 74, 101, and 102.

A number of Candidate line segments, but not all, had road construction 'spoil piles' located adjacent to the Candidate feature containing a mix of large and small woody debris, organic materials, and top-soil. Where these materials were available, they were rolled-back and spread on the surface of the Candidate feature being treated. This site preparation treatment was used in combination with tree-felling for access control and/or seedling planting to revegetate the Candidate line segment with ecologically suitable plant species.

7.3 Seedling and Shrub Planting

A total of 21.42 km (21.74 ha) was treated with tree and shrub seedling planting.

Eighty-six Candidate line segments were revegetated with ecologically appropriate tree and shrub seedlings using a target density of 2000 sph. Nine thousand five hundred and four (9,504) hybrid white spruce (*Picea engelmannii* x *glauca*), six thousand six hundred and six (6606) subalpine fir (*Abies lasiocarpa*), two thousand two hundred and two (2204) lodgepole pine (*Pinus contorta*), and three thousand one hundred and sixty eight (3,168) black spruce (*Picea mariana*) seedlings were grown at Industrial Forest Service's (IFS) Ness Lake nursery before being bundled, wrapped, and then frozen and put into cold storage in November 2018. On June 14, 2019, the frozen seedlings were transported via a temperature-controlled storage truck to the Twin Sisters nursery in Chetwynd, BC and placed into a protected cache to thaw. It was determined that the 3,168 black spruce seedlings were ecological unsuitable for the Quintette priority area and they were removed from the planting program and sold to Fort Nelson First Nation by Twin Sisters Native Plant Nursery.

Eleven thousand three hundred and sixty (11,360) Sitka alder seedlings (*Alnus viridis* ssp. *Sinuata*) were grown from seed by Twin Sisters Nursery and hot-lifted, bundled, and packaged on June 15 and 16, 2019. On June 17, 2019 a total of 29,674 hybrid spruce, subalpine fir, lodgepole pine and Sitka alder seedlings were transported from the Twin Sisters Nursery to a central staging area in the Quintette priority area and cached in a cool shady location. Protection from the elements was provided for the seedlings by constructing a tent-like structure using

reflective silvacool tarps.

The seedlings were planted using mixed-bag planting techniques on the candidate line segments according to the Implementation Plan. On upland sites (ESSFmv2) a mix of hybrid spruce, subalpine fir, and Sitka alder seedlings was planted. On lowland sites (BWBSwk1) a mix of hybrid spruce, lodgepole pine, and Sitka alder seedlings was preferred. A summary of candidate line segments revegetated by plantings treatments is included below.

Table 4: Tree and Shrub Seedling Planting Treatment Summary

<i>Treatment</i>	<i># Line segments</i>	<i>Line segment #'s</i>	<i>Ecological classification</i>	<i>Planting species mix</i>
Tree and shrub seedling planting	68	3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 23, 24, 25, 26, 27, 28, 31, 32, 33, 36, 37, 57, 58, 59, 60, 61, 62, 63, 66, 67, 69, 72, 73, 78, 80, 83, 87, 88, 89, 91 101, 102, 109, 110, 111, 112, 114, 117, 118, 121, 123, 124, 126, 128, 129, 130, 131, 134, 135, 136, 138, 147, and 148.	ESSFmv2	Sx, Bl, Alnus (minor Pl)
	18	74, 82, 84, 85, 86, 90, 92, 93, 94, 95, 96, 99, 100, 103, 104, 105, 106, and 107.	BWBSwk1	Sx, Pl, Alnus (minor Bl)

Planting prescriptions were changed for 19 Candidate line segments for account for a variety of site conditions. For example, line segments #43, 49, and 51 were comprised of a heavily revegetated seismic line with mature timber on both sides and #129, 135, and 137 were inaccessible by ground crews and all terrain equipment. To adjust for the loss of plantable ground, line segments #15 and #23 were added near the end of planting activities as overflow sites to ensure there was adequate ground to exhaust the seedling supply stored at the central cache. Line segment #15 was partially planted and #23 was fully planted with a mixture of hybrid white spruce, subalpine fire, and sitka alder.

7.4 Treatment Combinations

A total of 31.23 km (28.58 ha) of linear disturbance was treated using the three main treatment types, tree-felling, machine screefing/debris rollback, and seedling planting in five different treatment combinations. These treatment combinations are summarized below in Table 5.

Table 5: Treatment Summary by Treatment Combination

<i>Treatment Combination</i>	<i># line segments</i>	<i>Length (km)</i>	<i>Area (ha)</i>	<i>Percent of total</i>	<i>Percent of total</i>
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				<i>treated by Length (%)</i>	<i>treated by Area (%)</i>
Tree Felling	44	9.87	6.86	32	24
Seedling Planting	12	5.01	8.82	16	31
Machine Screefing / Debris Rollback / Seedling Planting	2	0.42	0.41	1	1
Machine Screefing / Debris Rollback / Seedling Planting / Tree Felling	22	3.72	2.38	12	8
Seedling Planting / Tree Felling	35	12.21	10.11	39	35
Totals	115	31.23	28.58	100	100

8.0 Monitoring

According to the Implementation Plan, vegetation response to the restoration treatments is recommended for monitoring activities following the procedures for sampling design, data collection, data analysis, data management and adaptive management, outlined in Section 4.0 of the Boreal Caribou Habitat Restoration Monitoring Framework (Golder 2015). Monitoring for compliance, effectiveness, and validation were incorporated into the Plan, with monitoring events to occur after the first, fifth, tenth, and fifteenth growing seasons after treatment.

Vegetation monitoring plots should be established to confirm that vegetation on disturbances (both natural ingress of species plus any planting treatments) is growing and moving on a trajectory towards being considered functional habitat for caribou in the long term. Reference plots will be established during treatment periods on untreated gaps of linear features (reference plots- disturbed) and on linear features that are already on a successional vegetation trajectory (reference plots- natural revegetation). These reference plots will be compared to the treatment plots to evaluate the effectiveness of the treatments at achieving the overall objectives of the program, which is to reduce predator and primary prey access and establish a vegetation trajectory that will increase boreal caribou habitat.

Monitoring activities have not been implemented in the Quintette priority area and are recommended for implementation early in the 2020 field season.

9.0 Indigenous and Community Participation

Engagement on the Program Plan and Implementation Plan began in December 2015 and is subject to ongoing discussions between the Province and Treaty 8 First Nations.

In addition to engaging Indigenous Communities about the Plan; the majority of the services required to implement the Plan were awarded to First Nations owned companies such as Duz Cho Construction LP and Twin Sisters Native Plant Nursery. Other efforts were made to engage and support the local community and local businesses on Chetwynd and Tumbler Ridge, BC as much as possible by purchasing or using local services. A summary of this local economic participation is offered below:

- Site preparation and functional restoration activities were managed by Duz Cho Construction LP;
- Equipment and equipment operators were provided by Duz Cho;
- Tree and shrub seedlings were sourced from the Twin Sisters Native Plant Nursery;
- Rental of off-road utility vehicles and trailers were sourced from Peace Rentals;
- Accommodation for field crew was provided by motels in Chetwynd and Tumbler Ridge; and
- Supporting local gas stations, restaurants and grocery stores;

10.0 Recommendations

A number of key achievements and lessons learned were had during the implementation activities in June 2019. The following recommendations are offered for inclusion in future Implementation Plans for the Quintette Priority Area.

The key achievements of this ecosystem restoration project include:

- Twenty-eight point five eight ha and 31.23 km of historical linear disturbance was physically treated using five treatment combinations to meet the short-term objectives of blocking human/predator access, reducing predator-prey interactions while accelerating the rate of vegetation recovery and the long-term object of restoring key wildlife habitat;
- An adaptive management approach was used to respond efficiently to field modifications to the Implementation Plan.
- Local personnel and machine operators were trained in the restoration treatment techniques in an effort to build local capacity in the communities of Moberly Lake, Chetwynd, and Tumbler Ridge. It's recommended that future restoration efforts build on this capacity and these new relationships and consider the necessity of direct award work to local Indigenous and community contractors;
- Local businesses were used for all aspects of the Project, to the extent possible, to ensure funding benefited local communities.
- There were no reported injuries during the field program.

Some key lessons learned during the implementation of operational activities include:

- A number of modifications to the Implementation Plan were necessary given the lack of on-the-ground verification of the Treatment Candidates detailed in the Plan. It's recommended that future treatments candidates are verified, not only via desktop and aerial methods, but through on-the-ground reconnaissance and surveys prior to the completion of the Implementation Plan. This will ensure more precise planning and more accurate cost and material estimates for future treatment work;
- Adequate time and budget were included in the implementation of the Plan and is crucial, not only to an adaptive management approach, but necessary to train local operators and build local capacity for ecosystem restoration treatments;
- A transparent procurement process for provision of services by local Indigenous communities is recommended for future implementation phases to ensure equal opportunities are available;
- For those local community members who have concerns about caribou-related programming, it is recommended that community outreach occurs ahead of future restoration efforts in the Quintette priority area to explain the objectives of the work being completed, the management approaches being applied by the Province, and potential benefits and impacts to local interests;
- It's recommended that discussions with recreational users in the priority area be reopened with a focus on identifying critical recreation trails for motorized and on-motorized traffic that is compatible with caribou conservation and ecosystem restoration programming;
- It's recommended that discussions with Oil and Gas Commission be reopened with a focus on identifying abandoned, suspended, and inactive wellsites and related infrastructure that is incompatible with caribou conservation and ecosystem restoration programming in the priority area;
- The scattered nature of the Candidate line segments involved in the 2019 implementation activities created logistical planning challenges and inflated the operational costs of the treatment activities. Future implementation phases are recommended to be centered around key habitat areas (mountain ranges), or zones, to increase treatment and cost efficiencies. If this approach is used some access may need to be opened to approach key remote disturbance features targeted for treatment;
- Its recommended that for future implementation plans, the line segments be grouped by treatment type and geographic location to reduce the overall number of line segments involved. This will greatly aid in treatment implementation and tracking as well as data management for future project phases.
- A variety of off-road utility vehicles are recommended to adapt to the large variety of access and site conditions in the Quintette priority area. Smaller utility vehicles such as a Honda TRX 500 Foreman quad or the 2 passenger Polaris Ranger were indispensable for site reconnaissance and efficient transport of machine operators. A long-wheel base 4 passenger side-by-side such as the John Deere Gator or Polaris Ranger Crew are excellent transport vehicles on secondary high-grade resource roads but are not preferred in more extreme off-road conditions necessary to access remote or high-elevation sites. Amphibious Argos are recommended for access involving wet ground, washed-out trails, and stream crossings.



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- Cellular service is not available in the Quintette priority area. Free and low-cost remote technologies like Avenza Maps are available for most smart phones and its recommended that all personnel involved in field activities arrive prepared with the application installed and project specific .kmz files loaded on their devices. These navigation essentials are not a replacement for satellite phones and Garmin inReach personal safety devices.

11.0 Conclusion

We trust that the Quintette Caribou Habitat Restoration Program: 2019 Implementation Report meets the requirements of the Northeast Caribou Recovery Team as a summary of the Phase 2 operational implementation of the 2018 Quintette Caribou Habitat Restoration Plan.

Please contact Marc Steynen with the Society For Ecosystem Restoration in Northern British Columbia (SERNbc) at Marc.Steynen@sernbc.ca or (250) 643-3433 with any questions or comments.

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Appendix A: Overview and As-Built Treatment Maps

Table 1: Overview Map – Quintette Priority Area

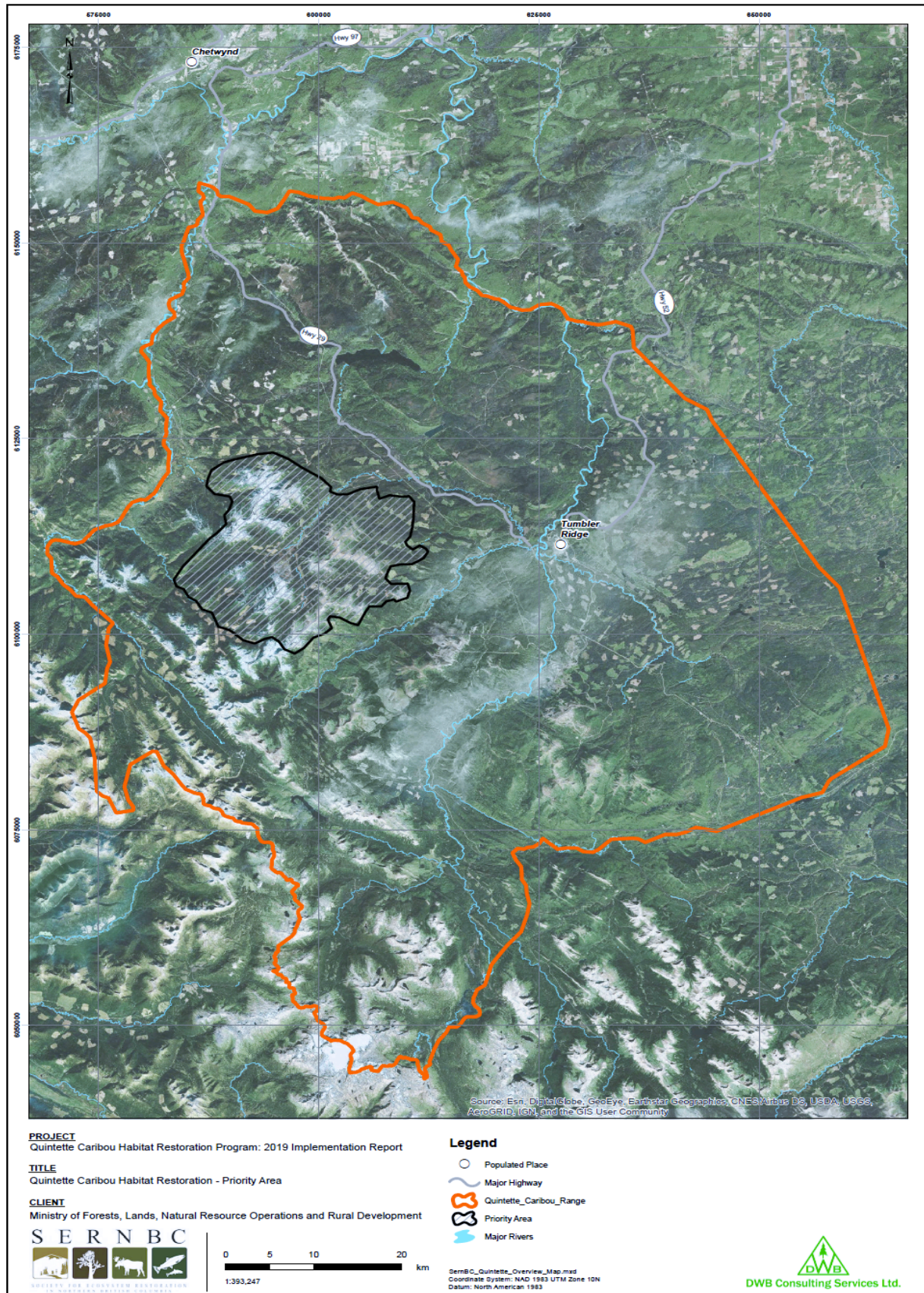
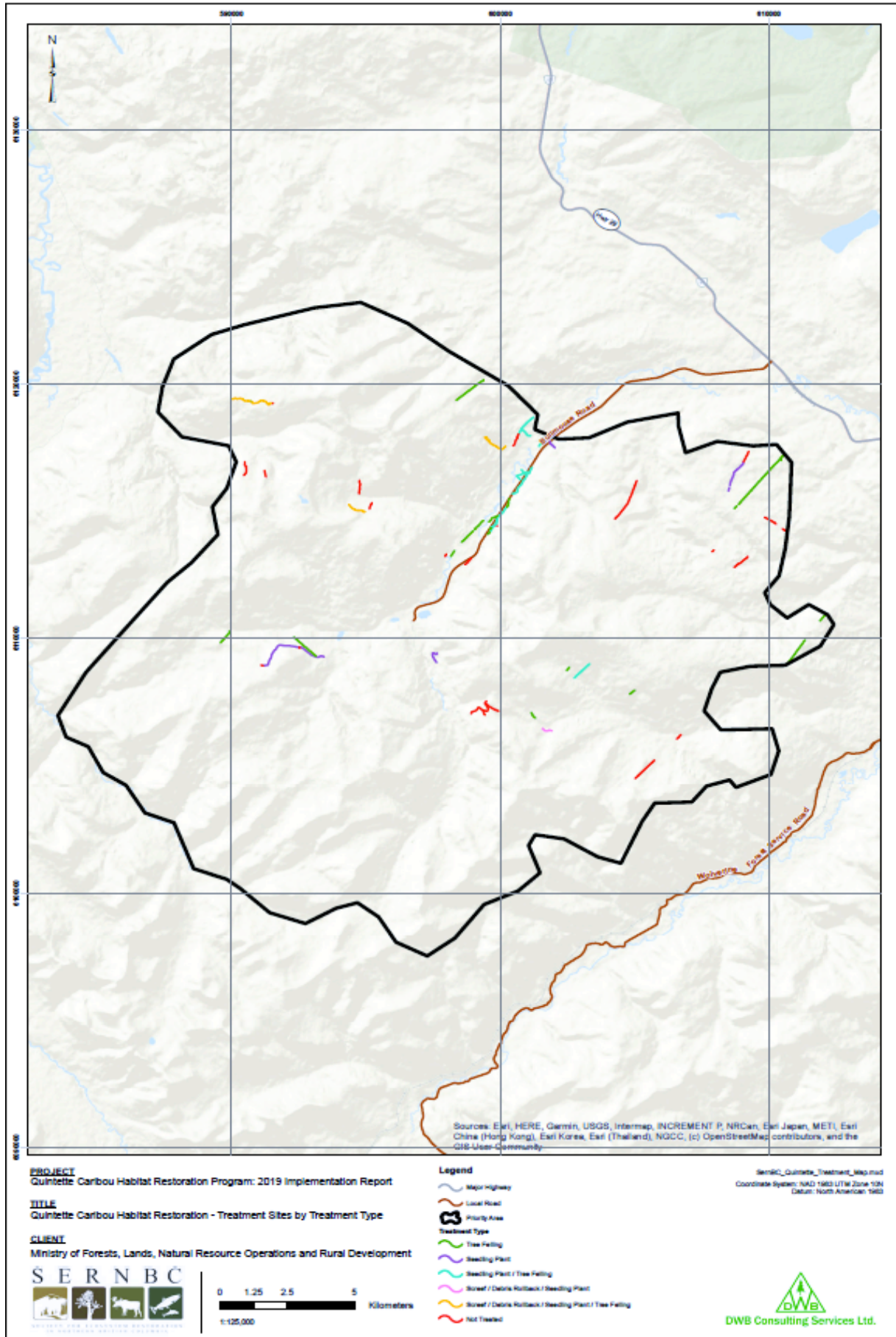


Table 2: Treatment Map – Quintette Priority Area



Appendix B: Treatment Summary by Treated and Untreated Line Segments

Table 1: Treatment Summary by Treated Line Segments

Site ID	Treatment	Line Width (m)	Line Length (m)	Line Area (m ²)	MSP	Tree Felling	Tree Planting	Comments
1	Tree Felling	5	146	730	n/a	Yes	n/a	Tree felling complete.
2	Tree Felling	5	475	2,373	n/a	Yes	n/a	Tree felling complete.
3	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	101	505	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
4	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	233	1,166	Yes	Yes	Yes	Screefed, tree felling, and planting complete.
5	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	86	432	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
6	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	230	1,151	Yes	Yes	Yes	Screefed, tree felling, and planting complete.
8	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	77	384	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
9	Tree Felling	5	26	130	n/a	Yes	n/a	Screefing complete. Tree felling complete.
10	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	69	347	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
11	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	35	177	Yes	Yes	Yes	Screefed, tree felling, and planting complete.
12	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	276	1381	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
13	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	140	701	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
15	Seedling Plant	20	1867	37,335	n/a	No	Yes	Very steep corridor on back of mtn. Some (minor) planting where ground not too steep or rocky
16	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	81	407	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
18	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	57	284	Yes	Yes	Yes	Tree felling complete.
19	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	284	1418	Yes	No	Yes	Screefing complete. No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
22	Tree Felling	5	1,112	5,558	n/a	Yes	n/a	No game trail but recommend tree felling to close access.
23	Seedling Plant	20	945	18,899	n/a	No	Yes	20m wide ROW not good for tree felling but was full planted as overflow.
24	Seedling Plant	20	112	2,240	n/a	No	Yes	20m wide ROW not good for tree felling but was full planted as overflow.
25	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	307	1537	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
26	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	128	639	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
27	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	25	127	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
28	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	164	818	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
31	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	42	208	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
32	Screef / Debris Rollback / Seedling Plant / Tree Felling	5	54	269	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
33	Screef / Debris Rollback / Seedling Plant / Tree Felling	10	19	195	Yes	Yes	Yes	Screefing complete, Tree felling complete, plant BI, Sx, Alnus
36	Seedling Plant	10	265	2650	n/a	No	Yes	No timber to fell, old deactivated curve on road, will plant PI, Sx, BI
37	Seedling Plant	20	362	7240	n/a	No	Yes	No timber to fell, old deactivated road, will plant PI, Sx, BI
39	Tree Felling	5	272	1,359	n/a	Yes	n/a	Tree felling complete.
40	Tree Felling	6	110	659	n/a	Yes	n/a	Tree felling complete.
41	Tree Felling	6	494	2,965	n/a	Yes	n/a	No defined corridor for falling,
43	Tree Felling	8	598	4,787	n/a	Yes	No	Tree felling complete. Narrow segment, mature timber, thick Alnus, not suitable for planting

48	Tree Felling	10	491	4,914	n/a	No	n/a	No define corridor for falling, Walk in access only
49	Tree Felling	8	288	2,304	n/a	Yes	No	Tree felling complete. Narrow segment, mature timber, thick Alnus, not suitable for planting
50	Tree Felling	8	36	291	n/a	Yes	No	Tree felling complete. Narrow segment, mature timber, thick Alnus, not suitable for planting
51	Tree Felling	8	382	3,054	n/a	Yes	No	Tree felling complete. Narrow segment, mature timber, thick Alnus, not suitable for planting
55	Tree Felling	5	104	520	n/a	Yes	n/a	Tree felling complete.
56	Tree Felling	5	99	495	n/a	Yes	Yes	Tree felling complete.
57	Screef / Debris Rollback / Seedling Plant / Tree Felling	10	589	5886	Yes	Yes	Yes	Screefing complete, plant to Sx, Bl, Pl, no Alnus
58	Seedling Plant / Tree Felling	5	111	555	n/a	Yes	Yes	Tree felling complete.
59	Seedling Plant / Tree Felling	5	266	1,330	n/a	Yes	Yes	Tree felling complete.
60	Seedling Plant / Tree Felling	5	266	1,330	n/a	Yes	Yes	Tree felling complete.
61	Seedling Plant / Tree Felling	5	106	530	n/a	Yes	Yes	Tree felling complete.
62	Seedling Plant / Tree Felling	5	178	890	n/a	Yes	Yes	Tree felling complete.
63	Seedling Plant / Tree Felling	5	183	915	n/a	Yes	Yes	Tree felling complete.
65	Tree Felling	15	348	5,213	n/a	Yes	n/a	Tree felling complete.
66	Screef / Debris Rollback / Seedling Plant / Tree Felling	8	308	2462	Yes	Yes	Yes	Screefing complete, plant to Sx, Bl, Pl, no Alnus
67	Seedling Plant / Tree Felling	10	62	620	n/a	Yes	Yes	Tree felling complete.
69	Seedling Plant / Tree Felling	10	127	1,270	n/a	Yes	Yes	Tree felling complete.
70	Tree Felling	15	84	1,257	n/a	Yes	n/a	Tree felling complete.
72	Seedling Plant / Tree Felling	10	70	700	n/a	Yes	Yes	Tree felling complete.
73	Seedling Plant / Tree Felling	10	397	3970	n/a	Yes	Yes	Tree felling complete.
74	Screef / Debris Rollback / Seedling Plant / Tree Felling	8	420	3361	Yes	Yes	Yes	Screefing complete, plant to Sx, Bl, Pl, no Alnus
75	Tree Felling	10	102	1,020	n/a	Yes	n/a	Tree felling complete.
76	Tree Felling	10	82	820	n/a	Yes	n/a	Tree felling complete.
77	Tree Felling	10	168	1,680	n/a	Yes	n/a	Tree felling complete.
78	Seedling Plant / Tree Felling	10	109	1,090	n/a	Yes	Yes	Tree felling complete.
80	Seedling Plant / Tree Felling	10	844	8,440	n/a	Yes	Yes	Tree felling complete.
82	Seedling Plant / Tree Felling	12	327	3,920	n/a	No	n/a	Site previously deactivated with heavy slash rollback. No felling or planting
83	Seedling Plant / Tree Felling	8	5525	44,200	n/a	Yes	Yes	Tree felling complete.
84	Seedling Plant / Tree Felling	10	307	3,068	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
85	Seedling Plant / Tree Felling	10	36	363	n/a	Yes	n/a	Tree felling complete. Plant to Sx, Pl, Alnus.
86	Seedling Plant / Tree Felling	10	156	1,562	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
87	Seedling Plant / Tree Felling	8	162	1,296	n/a	Yes	Yes	Tree felling complete.
88	Seedling Plant / Tree Felling	8	96	768	n/a	Yes	Yes	Tree felling complete.
89	Seedling Plant / Tree Felling	8	76	608	n/a	Yes	Yes	Tree felling complete.
90	Seedling Plant / Tree Felling	10	36	356	n/a	Yes	Yes	Tree felling complete.
91	Seedling Plant / Tree Felling	10	126	1260	n/a	Yes	Yes	Tree felling complete.

92	Seedling Plant / Tree Felling	10	10	100	n/a	Yes	Yes	Tree felling complete.
93	Seedling Plant / Tree Felling	10	211	2,114	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
94	Seedling Plant / Tree Felling	10	139	1,394	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
95	Seedling Plant / Tree Felling	8	280	2,240	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
96	Seedling Plant / Tree Felling	10	104	1,041	n/a	Yes	Yes	Tree felling complete. Plant to Sx, Pl, Alnus.
97	Tree Felling	10	143	1,435	n/a	Yes	n/a	Tree felling complete.
98	Tree Felling	10	121	1,208	n/a	Yes	n/a	Perry Creek Rd
99	Seedling Plant / Tree Felling	10	102	1,022	n/a	Yes	n/a	Bullmoose, old rd with deciduous, tree felling complete, Plant to Pl, Sx, Alnus.
100	Seedling Plant / Tree Felling	10	447	4,473	n/a	Yes	n/a	Bullmoose, old rd with deciduous, tree felling complete, Plant to Pl, Sx, Alnus.
101	Screef / Debris Rollback / Seedling Plant	10	13	127	Yes	Yes	Yes	Was machine screefed not 'ripped' with excavator and will be planted with Alnus, Pl, Bl
102	Screef / Debris Rollback / Seedling Plant	10	402	4,022	Yes	Yes	Yes	Was machine screefed not 'ripped' with excavator and will be planted with Alnus, Pl, Bl
103	Seedling Plant / Tree Felling	5	452	2,262	n/a	Yes	Yes	Bullmoose, old rd with deciduous, tree felling complete, Plant to Pl, Sx, Alnus.
104	Seedling Plant	20	108	2,167	n/a	Yes	Yes	Complete
105	Seedling Plant / Tree Felling	10	106	1,060	n/a	Yes	n/a	Bullmoose, old rd with deciduous, tree felling complete, Plant to Pl, Sx, Alnus.
106	Seedling Plant	20	77	1,541	n/a	No	Yes	Plant to Pl, Sx, Alnus
107	Seedling Plant	20	137	2,749	n/a	No	Yes	Plant to Pl, Sx, Alnus
108	Tree Felling	5	172	862	n/a	Yes	n/a	Tree felling complete.
109	Seedling Plant / Tree Felling	8	207	1,659	n/a	Yes	Yes	Complete
110	Seedling Plant / Tree Felling	8	160	1,282	n/a	Yes	Yes	Complete
111	Seedling Plant / Tree Felling	8	24	190	n/a	Yes	Yes	Complete
112	Seedling Plant / Tree Felling	8	405	3,243	n/a	Yes	Yes	Complete
115	Tree Felling	5	156	781	n/a	Yes	No	Tree felling complete.
116	Tree Felling	5	100	499	n/a	Yes	No	Tree felling complete.
126	Seedling Plant	10	145	1450	No	No	Yes	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
127	Tree Felling	7.5	139	1042	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
128	Seedling Plant	12	686	8230	No	No	Yes	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
130	Seedling Plant	15	25	378	n/a	No	Yes	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
132	Tree Felling	5	106	532	n/a	Yes	n/a	ATV track on southeast side, northwest side has strong re-vegetation growth. Walk in access only
133	Tree Felling	5	632	3162	n/a	Yes	n/a	ATV track on southeast side, northwest side has strong re-vegetation growth.
134	Seedling Plant	10	341	3410	No	No	Yes	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
139	Tree Felling	5	162	811	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
140	Tree Felling	2.5	265	663	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
141	Tree Felling	2.5	149	372	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
142	Tree Felling	2.5	200	501	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
143	Tree Felling	2.5	276	689	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
144	Tree Felling	5	96	482	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.

145	Tree Felling	5	90	448	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
146	Tree Felling	5	274	1369	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
149	Tree Felling	5	119	595	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
150	Tree Felling	5	149	747	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
151	Tree Felling	5	76	378	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
152	Tree Felling	5	46	228	n/a	Yes	Yes	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
153	Tree Felling	5	108	540	n/a	Yes	n/a	Narrow old seismic in mature timber. Good access from wellsite. Falling completed to close access.
156	Tree Felling	10	87	868	n/a	Yes	n/a	Remote site. No access for planters. Fallers used Argos.
157	Tree Felling	10	370	3699	n/a	Yes	n/a	Remote site. No access for planters. Fallers used Argos.
158	Tree Felling	10	679	6788	n/a	Yes	n/a	Remote site. No access for planters. Fallers used Argos.
159	Tree Felling	8	358	2863	n/a	Yes	n/a	Remote site. No access for planters. Fallers used Argos.
Totals			31.23	285,800				

Table 2: Treatment Summary by Untreated Line Segments

Site ID	Treatment	Line Width (m)	Line Length (m)	Line Area (m ²)	MSP	Tree Felling	Tree Planting	Comments
7	No Treatment	5	597	2,984	n/a	No	n/a	Access fully overgrown with 6-8m Alnus and BI regen. More mature BL up higher on line segment. No line of sight and segment regenerating naturally.
14	No Treatment	20	74	1480	n/a	No	n/a	Steep side slope. No Access
17	No Treatment	8	262	2,096	n/a	No	n/a	Access fully overgrown with 6-8m Alnus and BI regen. More mature BL up higher on line segment. No line of sight and segment regenerating naturally.
20	No Treatment	10	76	764	n/a	No	n/a	No trees of sufficient size to fell, machine screef and plant. BI, PI, Alnus
21	No Treatment	15	49	735	n/a	No	n/a	Not treated
29	No Treatment	8	358	2,862	n/a	No	n/a	Very steep ground, did not find line segment, no felling
30	No Treatment	10	193	1,926	n/a	No	n/a	Very steep ground, did not find line segment, no felling
38	No Treatment	8	102	818	n/a	Yes	n/a	Tree felling complete.
42	No Treatment	10	100	1,000	n/a	No	n/a	
44	No Treatment	10	139	1,390	n/a	No	n/a	
45	No Treatment	10	109	1,086	n/a	No	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
46	No Treatment	10	102	1,020	n/a	No	n/a	
47	No Treatment	10	525	5,250	n/a	No	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
52	No Treatment	8	182	1,457	n/a	No	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
53	No Treatment	10	404	4,037	n/a	No	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
54	No Treatment	8	202	1,617	n/a	No	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
64	No Treatment	5	431	2,157	n/a	Yes	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.

68	No Treatment	5	89	445	n/a	Yes	n/a	
71	No Treatment	5	113	566	n/a	Yes	n/a	No access, to steep on pipeline ROW to W and no access from E from the Mt Reesor trail head.
113	No Treatment	8	59	475	n/a	No	n/a	Tree felling complete.
114	No Treatment	8	56	450	n/a	No	No	No access.Made it to the winter log opening to the NE. Tried 2 different routes.
117	No Treatment	8	1402	11213	n/a	No	No	No access.Made it to the winter log opening to the NE. Tried 2 different routes.
119	No Treatment	8	216	1728	n/a	No	No	No access.
118	No Treatment	2.5	152	380	n/a	No	No	No access.
120	No Treatment	2.5	94	2,36	n/a	No	n/a	No corridor
121	No Treatment	2.5	685	1713	n/a	No	Yes	Some re-vegetation but needs higher density and game trail to be deactivated.
122	No Treatment	5	94	469	n/a	No	n/a	No corridor
123	No Treatment	5	114	572	No	No	No	No access for machine very steep slopes. Pipeline ROW off of wellsite, cannot fall timber of pipeline and its wide enough to be ineffective
124	No Treatment	5	125	626	No	No	No	No access for machine very steep slopes. Pipeline ROW off of wellsite, cannot fall timber of pipeline and its wide enough to be ineffective
125	No Treatment	5	105	523	n/a	No	n/a	Very remote. Small segment. No access without Argo.
129	No Treatment	10	145	1452	n/a	Yes	n/a	No access. Area has older winter logging with deaactivated roads.
131	No Treatment	10	64	636	n/a	No	No	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
135	No Treatment	10	362	3615	n/a	Yes	n/a	No access. Area has older winter logging with deaactivated roads.
136	No Treatment	10	386	3864	n/a	Yes	n/a	1.5-2km walk-in deact rd. Line segment is a deactivated winter road, heavy compressed slash and fully vegetated.
137	No Treatment	10	101	1013	n/a	No	n/a	No access. Area has older winter logging with deaactivated roads.
138	No Treatment	10	100	999	n/a	Yes	n/a	No access. Area has older winter logging with deaactivated roads.
147	No Treatment	15	413	6196	n/a	No	No	Difficult access, wide winter log ROW, possible access from new Canfor rd. to the east on Hwy 29
148	No Treatment	15	94	1417	n/a	No	No	Difficult access, wide winter log ROW, possible access from new Canfor rd. to the east on Hwy 29
154	No Treatment	15	114	1706	n/a	No	n/a	Difficult access, wide winter log ROW, possible access from new Canfor rd. to the east on Hwy 29
155	No Treatment	15	104	1565	n/a	No	n/a	Difficult access, wide winter log ROW, possible access from new Canfor rd. to the east on Hwy 29
Totals			9092	74302				

Appendix C: Project Photos



Photo 1: Sitka Alder at the Twin Sisters Native Plant Nursery ready to be hot-lifted and packaged for shipment to Quintette area.



Photo 2: Twin Sisters Nursery crew packing Sitka alder seedlings for transport.



Photo 3: Seedlings ready for transport at the Twin Sisters Native Plant Nursery.



Photo 4: Example machinery – John Deere 120 and Polaris Ranger - used for project implementation.



Photo 5: Machine screening and debris placement on Line Segment # 27.



Photo 6: Tree-Felling Treatment on Line Segment #51



Photo 7: Tree felling at the end of Line Segment #43



Photo 8: Machine screening on Line Segment #33.



Photo 9: Machine screening on Line Segment #26.



Photo 10: Line Segment #23 which was used as the overflow for the project seedlings and planted.



Photo 11: Line Segment #15 which was planted as the overflow for the project seedlings.



Photo 12: Typical tree-felling on lowland Line Segment #93 near the Bullmoose Rd.



Photo 13: Machine screefing and debris rollback on Line Segment #74.



Photo 14: Random picture of a planted Sitka Alder seedling.



Photo 15: Tree felling treatment in immature timber type on Line Segment #75.



Photo 16: Disturbance feature near Line Segment #34 looking north towards Bullmoose Mountain.



Photo 17: Disturbance feature, looking east, in subalpine-alpine environment located west of Bullmoose Mountain.



Photo 18: Disturbance feature, looking south, in subalpine-alpine environment located west of Bullmoose Mountain.