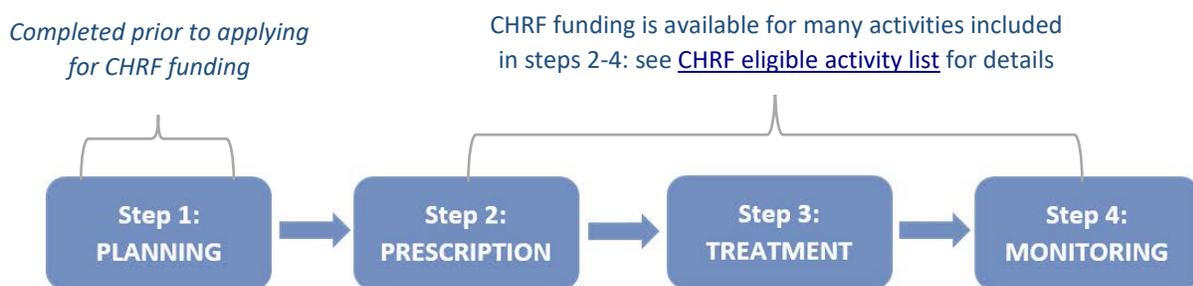


Summary - Operational Framework for Caribou Habitat Restoration

An Operational Framework for Woodland Caribou habitat restoration in British Columbia is currently being developed to provide guidance for the planning, implementation, and monitoring of caribou habitat restoration initiatives in BC. The Framework will provide a comprehensive approach for restoration efforts to support those who may be involved in the implementation and monitoring of habitat restoration. The Framework is intended for the use of individual restoration projects which will operate at the site level once the Province and Proponent has confirmed priority areas for a restoration program at the range level.

This document provides a summary of the Framework and the four main steps involved in successfully coordinating a habitat restoration project in BC. These steps are intended to provide a clear and consistent approach for Proponents in how to prepare, execute and evaluate their restoration projects. Please note that the Framework, and this document, is meant to provide guidelines only. Every restoration program should be adapted to site specific conditions, and be informed by local expertise.



Step 1 The initial **planning** stage includes the selection of priority areas for habitat restoration, an engagement process, and permitting applications.

Step 2 Development of an **operations plan** which outlines in detail the proposed treatment areas and treatment prescriptions.

Step 3 Delivery of restoration **treatment** within a project area.

Step 4 The **effectiveness monitoring** phase of a project assesses vegetation growth and treatment success.

PLEASE NOTE - Caribou Habitat Restoration Funding (CHRF) is available for activities in steps 2 through 4: see the [CHRF eligible activity list](#) for more information.

STEP 1: Planning

Restoration should focus on critical habitat areas utilized by caribou and habitat that is unlikely to regenerate on its own. The Proponent must establish which areas will be treated, excluded from treatment, or left to be regenerated naturally. General definitions and criteria to be utilized for this

determination are outlined in Table 1 below, though specific criteria will vary based on site-specific conditions and project goals.

Table 1. Definitions and Criteria for Treatment Feature Determination.

TREATMENT	NO TREATMENT	LEAVE FOR NATURAL REGENERATION
<ul style="list-style-type: none"> • Disturbed areas not naturally regenerating or unlikely to regenerate within a reasonable timeframe (i.e. under 0.5m height or 30% cover). • Disturbed areas not previously restored/not restored to caribou habitat requirements. • Areas where access by humans/predators may impact caribou. 	<ul style="list-style-type: none"> • Areas not previously treed. • Existing active dispositions (ie. pipelines, mines, cutblocks, roads). • Protective notations such as riparian areas, protected grasslands. • Safety hazards such as steep terrain. • Continued human use (e.g. recreational) of the area. 	<ul style="list-style-type: none"> • Vegetation cover is naturally developing and is on a trajectory to regenerate to 3 m heights within 30 years.

An initial determination of treatment areas is best determined as part of a desktop mapping exercise. The spatial layers described below are largely publicly available through either GeoBC¹ or iMapBC² and overlap summary reports can be generated using Natural Resources Online Services³. The Proponent is encouraged to contact the MFLNRORD to access any additional databases which may not be publicly available.

- Base mapping, Satellite and Light Detection and Ranging (LiDAR) imagery;
- Habitat Suitability Models and maps which outline habitat critical for caribou within their range;
- Locations of provincially designated areas (e.g. WHAs, UWRs, parks);
- Industrial land use tenures (e.g. oil and gas, forestry and mining);
- First Nations Interests, including traditional territories.

Once a list of potential treatment areas has been established, the Proponent must initiate an engagement process with First Nations, local stakeholders and active tenure holders to determine if there are any overlapping conflicts with proposed restoration areas. Based on feedback received during engagement, proposed treatment areas may need to be removed or refined.

A field visit should then be undertaken to ground-truth any potential restoration sites and ensure restoration suitability determined as part of the desktop mapping exercise is correct.

STEP 2: Prescription

Once the initial planning phase is complete, a field reconnaissance survey should be undertaken on the selected restoration sites to determine which restoration treatment prescriptions are most suitable, confirm access routes and check for potential watercourse, pipeline or road crossing locations. This field reconnaissance survey must take place under snow free conditions to allow for an assessment of the current vegetation status.

¹ <https://www2.gov.bc.ca/gov/content/data/about-data-management/geobc>

² <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/web-based-mapping/imapbc>

³ <https://portal.nrs.gov.bc.ca/web/client/explore>

It is recommended that the Proponent develop an Operations Plan prior to initiation of restoration treatment. This Operations Plan will help with coordination of restoration planning, and can be submitted to the Ministry of FLNRORD in support of an application for a Special Use Permit for Habitat Improvement⁴ if required. Please ensure applications and supporting documents are submitted a minimum of three months prior to restoration to ensure adequate time for review and acceptance.

The following elements of an Operations Plan are essential in providing a summary of how a restoration project aims to maximize the probability of achieving desired restoration goals.

- **Define treatment areas** – document what areas will undergo treatment and what areas will be left for natural regeneration including rationale for each. Include detailed maps depicting chosen treatment candidates within the project area.
- **Description of baseline site conditions** – summary of existing site conditions of the proposed treatment areas as assessed during the field reconnaissance survey. This should contain a description of existing plants and plant communities, wildlife features, fisheries resources, and a map showing distributions of environmentally sensitive features known to occur in the area.
- **Outline treatment prescriptions** – Determine what treatment prescriptions are appropriate for each treatment area (eg. mounding, ripping, mulching; seeding and tree/shrub planting, spreading of woody debris, tree felling and bending, installation of fences), including frequency, intensity, and the appropriate timing for implementation of each.
- **Permitting** – Outline regulatory permits and approvals obtained in preparation for proposed restoration activities, and how any permit/approval conditions will be met. A list of approvals as well as copies of each authorization should be included in the Operations Plan.
- **Consultation** – *Include a summary of consultations that were held to obtain planning permission and consent, including approval obtained by third-party lease holders and First Nation groups.*
- **Environmental Management Procedures** – General section describing environmental mitigation measures and procedures to be implemented during operations. This may include: Soil Conservation and Erosion and sediment control, invasive plant management, spill prevention, management of stream crossings and riparian areas.
- **Quality Control and Compliance** – Document quality control requirements including the timing of inspections or audits and the process that will be used for implementation of remedial actions or adjustments to treatment if necessary.
- **Effectiveness Monitoring** – Document performance standards for monitoring project effectiveness, a monitoring protocol and minimum data required to evaluate treatment success.

To support the successful development of an Operation Plan, a checklist of key items to be addressed within a Plan has been developed. (Appendix A)

⁴ The Special Use Permit for Habitat Improvement has been developed to take the place of applying for an Occupant License to Cut in some Forest Districts. Please contact your local [Front Counter BC Office](#) or [Natural Resource District Office](#) for more information.

STEP 3: Treatment

A wide range of treatment options are currently being applied in habitat restoration projects across BC. An example of field specifications for habitat restoration treatment options can be found in the *Boreal Caribou Habitat Restoration Operational Toolkit for BC*.⁵

The scheduling and timing of implementing treatment prescriptions is crucial. The best time to restore defined habitats will depend largely on the type of treatment to be applied. For example, mechanical site preparation methods are typically applied during frozen conditions to limit ground disturbance, while seeding and planting efforts are best applied in early spring to allow for the best chance of survival. Seed and seedling availability will also affect the timing of treatment delivery. The Proponent is encouraged to source these early on in the planning phase of the restoration project to ensure all required materials will be available for the time treatment is scheduled. Once treatment has been applied, planted areas are to be flagged or otherwise marked for identification to assist with long term monitoring.

Quality Control

Quality control requirements that were documented in an Operations Plan to support a Permit application (Step 2) will require inspection or audit by a Qualified Environmental Practitioner (QEP). Audits will involve walking treated areas and establishing treatment and reference monitoring plots to determine if the contractor's activities comply with the restoration contract and applicable permit conditions. Quality control evaluations should be submitted to the Ministry of FLNRORD within six weeks of the survey, or as per relevant permit conditions. An example of sampling design for project level restoration monitoring can be found in Section 3 of the document *Boreal Caribou Habitat Restoration Monitoring Framework*⁶. A template for a Restoration monitoring plot establishment survey Datasheet can be found in Appendix B.

STEP 4: Monitoring

Effectiveness monitoring is essential to determine whether treatments applied as part of a restoration project have resulted in the desired outcomes of increased vegetation growth and/or access control.

A survival survey allows for an initial assessment of seedling survival and early response of vegetation. It is recommended that the first survival survey be conducted after one full growing season to identify any immediate issues, e.g. with seedling mortality, seed germination and/or access control. Within the following four years, surveys will be able to identify issues with vegetation growth. After five growing seasons, monitoring results should be able to indicate whether recommended targets will be met based on a free-growing tree stand.

An example Restoration Monitoring Survey datasheet which may be used for conducting survival surveys is found in Appendix B, and standard protocols for data collection to assist with completion of the data sheet is provided in Appendix C.

⁵ <http://www.bcgri.ca/sites/default/files/bcip-2015-05-restoration-toolkit-28final29-jan-2115.pdf> (Pg 7-19).

⁶ <http://www.bcgri.ca/sites/default/files/bcip-2016-02-restoration-monitoring-framework-final-dec151.pdf>

Results of each survival survey should be evaluated based on the recommended restoration targets found in Table 2. Where expected targets have not been met, remedial actions are to be determined in consultation with the MFLNRORD and implemented at the earliest practicable time.

Table 2. Generalized Restoration Targets for a Survival Survey*.

RESTORATION GOAL	EVALUATION CRITERIA/INDICATORS	TARGETS
Vegetation Establishment	<ul style="list-style-type: none"> • Density (%) of live seedlings (stems/ha), including planted and natural regeneration • Percent cover of live seedlings • Vigour of live seedlings (i.e. presence of chlorosis or other health issues) • Vegetation community composition (conifers, shrubs, grasses etc.) 	<ul style="list-style-type: none"> • Target survival rate, densities and percent cover are specified in regional FSPs. • No evidence of tree health issues.
Access Control	<ul style="list-style-type: none"> • Evidence of access (Y/N) • Type of access (Predators/other ungulates or Motorized vehicles, including ATV, truck, snowmobile) • Level of use (May be low with infrequent and few signs or high with tracks and ground disturbance very visible) 	<ul style="list-style-type: none"> • Evidence of predator or motorized vehicle use following installation of access control is eliminated or reduced.

*Adapted from Golder, 2015b

Appendix A - Operations Plan Checklist

KEY ITEM	REQUIRED DETAIL	COMPLETED
TREATMENT AREAS	<ul style="list-style-type: none"> • General Site Location Map • Treatment Map depicting treatment zones • Description of how areas were classified to be treated, not treated, or left for natural regeneration 	<input type="checkbox"/>
ENVIRONMENTAL SETTING	<ul style="list-style-type: none"> • Summary of existing site conditions based on field survey (e.g. vegetation, streams) • Summary of environmental setting based on online background search (i.e. sensitive plant, wildlife features, fisheries resources, timing windows) • Environmental Features Map 	<input type="checkbox"/>
TREATMENT PRESCRIPTIONS	<ul style="list-style-type: none"> • Outline of restoration techniques to be applied (e.g. mechanical site preparation, planting, access control) • Outline of how prescriptions were chosen based on site conditions and site limiting factors • Summary Treatment Prescriptions Table for individual Treatment Zones • Sign off from Registered Professional Forester for all planting programs. 	<input type="checkbox"/>
ENGAGEMENT	<ul style="list-style-type: none"> • Summary of stakeholder (e.g. government, other tenure holders) and First Nation engagement 	<input type="checkbox"/>
PERMITTING	<ul style="list-style-type: none"> • Written understanding of relevant regulations and statutes • Acquisition of approvals and permits based on project activities and verified environmental features 	<input type="checkbox"/>
ENVIRONMENTAL MANAGEMENT PROCEDURES	<ul style="list-style-type: none"> • Written understanding of applicable mitigation and conservation measures as required by regulation and best management practices • Summary of procedures to be implemented (e.g. stream crossings, erosion and sediment control, invasive plant management, spill prevention) 	<input type="checkbox"/>
OTHER CONSIDERATIONS	<ul style="list-style-type: none"> • Worker Safety • Worker Training 	<input type="checkbox"/>

Appendix B – Field Datasheets

- Habitat Restoration Monitoring Plot Establishment Survey
- Ground-based Habitat Restoration Monitoring Survey

Habitat Restoration Monitoring Plot Establishment

General Plot Information					
Project No.	Plot ID	Date (dd/mmm/yy)	Company	Crew Initials	QAQC initials
Plot Type		Plot Center Coordinates			
<input type="checkbox"/> Treatment <input type="checkbox"/> Reference		Datum		UTM E	UTM N
		<input type="checkbox"/> NAD 27 <input type="checkbox"/> NAD 83			
Plot center staked?	Disturbance boundary staked?	Plot Markers		Plot Photos	
Y / N	Y / N	Flagging tape Y / N	Aluminum tags Y / N		
General Location Description					
General Location Drawing (include plot markers, adjacent habitat features, disturbances, etc)					
BEC Zone/ Subzone/ Site Series		BEC Site Series Name		General Vegetation Classification	
				<input type="checkbox"/> Upland_Pine <input type="checkbox"/> Upland_Decid. <input type="checkbox"/> Upland_Spruce <input type="checkbox"/> Wetland_Sb-Lt <input type="checkbox"/> Other___	
Slope (%)	Aspect (°)	Mesoslope Position			Elevation (m)
		CR -crest UP -upper MD -middle LW -lower TO -toe DP -depression LV -level GU -gully			
Disturbances		Soil Information			
Human		Soil Org. Depth (cm)	Mottles / Gley (depth)	Surface/Effective Texture	Soil Class
Fire / snow			Y / N cm		
Wildlife		Moisture Regime			
Notes		0-very xeric 1-xeric 2-subxeric 3-submesic 4-mesic 5-subhygric 6-hygric 7-subhygric 8-hydric			
		Nutrient Regime			
A - very poor B - poor C - medium D - rich E - very rich F - saline					
Linear Feature Information					
Type of Linear Disturbance				Comments	
<input type="checkbox"/> Seismic line <input type="checkbox"/> Cutline <input type="checkbox"/> Trail <input type="checkbox"/> Pipeline <input type="checkbox"/> Transmission line <input type="checkbox"/> Road <input type="checkbox"/> Other					
Line Width (m)	Line Age Class (years)		Line-of-Site Distance Class (m)		Line Orientation
	<input type="checkbox"/> <5 <input type="checkbox"/> 5-10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-40		<input type="checkbox"/> <50 <input type="checkbox"/> 50 - 200 <input type="checkbox"/> 200 - 500 <input type="checkbox"/> > 500		
Robel	Height (cm)	Bearing	Photo #	Adjacent Site Series /Tree Canopy Attributes	Adjacent (NE) Adjacent (SW)
1				BEC zone/ subzone/ site series	
2				Overstory / Understory canopy	
Evidence of Line Use by Humans			Evidence of Line Use by Wildlife		
<input type="checkbox"/> none <input type="checkbox"/> ATV <input type="checkbox"/> Truck <input type="checkbox"/> Heavy Machinery <input type="checkbox"/> Other_____			<input type="checkbox"/> none <input type="checkbox"/> scat(s) <input type="checkbox"/> track(s) <input type="checkbox"/> game trail(s) <input type="checkbox"/> nest(s) <input type="checkbox"/> other:_____		
Notes re. human evidence of line use, including estimated amount of use:			Notes re. wildlife evidence of line use, including estimated amount of use:		

Vegetation Percent Cover - average within plot					
Tree/Tall Shrub [T] (1.5 - 4.9 m)	Shrub [S] (<1.5 m)	Forb [F]	Graminoid [G]	Bryophyte [B]	Lichen [L]
+ 1 2 3 4 5 6 7 8	+ 1 2 3 4 5 6 7 8	+ 1 2 3 4 5 6 7 8	+ 1 2 3 4 5 6 7 8	+ 1 2 3 4 5 6 7 8	+ 1 2 3 4 5 6 7 8
Percent Cover of Invasive/Non-Native Species		Description of Invasive/Non-Native Species	Description of Soil Litter Layers		
+ 1 2 3 4 5 6 7 8			L F H O		
Vegetation Density - average within plot					
Tree/Tall Shrub [T] (1.5 - 4.9 m)	Shrub [S] (<1.5 m)	Forb [F] - description of distribution	Graminoid [G] - description of distribution	Bryophyte [B] - description of distribution	Lichen [L] - description of distribution
Low Med High Dense	Low Med High Dense				
Planted and Naturally Re-established Seedlings - average within treatment plot					
Mounded	Season Planted	% Survival		Vigour	
Y / N	Winter / Summer	# of live seedlings: _____ # of dead seedlings: _____		0 - dead 1 - poor 2 - fair 3 - good 4 - excellent	
Dominant and Co-dominant Plant Species					
Species	Strata	Cover Class	Species	Strata	Cover Class
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
	T S F G B L	+ 1 2 3 4 5 6 7 8		T S F G B L	+ 1 2 3 4 5 6 7 8
Incidental Wildlife Observations					
Species	Sign			Notes / Comments	
1					
2					
3					
4					
5					
Comments / Notes					
<hr/>					

Cover classes: + [<1%], 1 [1-2%], 2 [>2-5%], 3 [>5-10%], 4 [>10-25%], 5 [>25-50%], 6 [>50-75%], 7 [>75-95%], 8 [>95-100%].

Appendix C – Effectiveness Monitoring Data Collection Standard Protocols

MEASURABLE TARGET	DESCRIPTION OF DATA COLLECTION METHOD	REFERENCE
BEC zone, subzone, site series	Describe the Biogeoclimatic zone, subzone, and site series of the plot using the Ministry of Forests and Range maps and regional field guide to site identification and interpretation for terrestrial zones (available online), and the Wetlands of British Columbia to describe wetland ecosystems.	BC Ministry of FLNRO 2011; MacKenzie and Moran 2004.
Slope	Record percent slope gradient using a clinometer.	Field Manual for Describing Terrestrial Ecosystems ¹ (Sect. 1, pg. 25)
Aspect	Record orientation of slope relative to true north, using a compass.	Field Manual for Describing Terrestrial Ecosystems (Sect. 1, pg. 25)
Mesoslope position	Record the position of plot relative to localized catchment area using codes, where: <ul style="list-style-type: none"> • CR = crest • UP = upper slope • MB = middle slope • LW = lower slope • TO = toe • DP = depression • LV – level • GU = gully 	Field Manual for Describing Terrestrial Ecosystems (Fig 1.3, Sect. 1, pg. 25-26)
Elevation	Determine in the field using an altimeter or GPS at plot center. Record in meters.	Field Manual for Describing Terrestrial Ecosystems (Sect.1, pg. 25)
Soil Organic depth	Record the depth of the upper and lower boundaries of the organic layer (in centimetres) at plot center.	Field Manual for Describing Terrestrial Ecosystems (Sect.2, pg. 28)
Mottles/gley depth	Describe whether there is iron oxidation in the soil and if so, measure the depth at plot center.	Field Manual for Describing Terrestrial Ecosystems (Sect.2, pg. 45)
Soil surface/effective texture	Describe the texture of the soil within the A horizon using soil classification codes in the Canadian System of Soil Classification.	Field Manual for Describing Terrestrial Ecosystems (Sect. 2 & 9.19)
Soil Class	Use the Canadian System of Soil Classification codes for soil order, great groups, and sub groups.	Field Manual for Describing Terrestrial Ecosystems (Sect. 2 pg. 14 & Sections 9.17-9.18)

¹Field manual for describing Terrestrial Ecosystems: https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/conservation-data-centre/field_manual_describing_terrestrial_ecosystems_2nd.pdf

MEASURABLE TARGET	DESCRIPTION OF DATA COLLECTION METHOD	REFERENCE
Drainage Class	<p>Assess the speed and extent of water removal from the soil in growing season conditions using Drainage class codes, where:</p> <ul style="list-style-type: none"> • x = very rapidly drained • r = rapidly drained • w = well drained • m = moderately well drained • i = imperfectly drained • p = poorly drained • v = very poorly drained 	Field Manual for Describing Terrestrial Ecosystems (Table 2.16, Section 2 pg. 22)
Soil moisture regime	<p>Assess the soil moisture based on environmental factors, soil properties and indicator plants. Use code system 0 to 8, where:</p> <ul style="list-style-type: none"> • 0 = very xeric • 1 = xeric • 2 = subxeric • 3 = submesic • 4 = mesic • 5 = subhygric • 6 = hygric • 7 = subhydric • 8 = hydric 	Field Manual for Describing Terrestrial Ecosystems (Table 1.1, Section 1 pg. 13)
Nutrient regime	<p>Assess the nutrient regime based on environmental factors, soil properties, and indicator plants. Use code system A to F, where:</p> <ul style="list-style-type: none"> • A = very poor • B = poor • C = medium • D = rich • E = very rich • F = saline 	Field Manual for Describing Terrestrial Ecosystems (Table 1.2, Section 1 pg. 15)
Type of disturbance	Describe the type of disturbance, ie. Seismic line, cutline, trail, pipeline, transmission line, road, cutblock, wellsite/facility, other.	n/a
Line/trail width	Record the width of each linear disturbance by measuring a straight line from one distinguishable linear edge to another at plot centre. As a general rule, edges can be determined to start at the first mature tree (DBH > 10cm) from the disturbed area. Record measurement of the linear disturbance in meters.	n/a

MEASURABLE TARGET	DESCRIPTION OF DATA COLLECTION METHOD	REFERENCE
Age of line	Approximate age based on vegetation regrowth (refer to age of trees in treatment/reference plot) or know age based on disturbance marker such as a seismic tag; use age categories of <5 years, 5 – 10 years, 10 – 20 years, 20 – 40 years, and >40 years.	Vegetation Resources Inventory – Ground Sampling Procedures (2018) ² (Sect. 4.8, pg. 73-79)
Line orientation	Record the orientation that the linear disturbance runs using a compass (in degrees).	n/a
Line of sight distance	Estimate distance that observer can visually see down the linear disturbance (both directions) with bare eye (in meters). One observer stands at plot center while other field crew member walks down line until observer can no longer see them. Classify distances as <50m, 50 – 200m, 200 – 500m, and >500m.	n/a
Average height and vertical density of standing vegetation	<p>Using robel poles, this measurement method can determine amount of standing vegetation remaining on an area after use, and can be interpreted as the hiding cover for wildlife. This method can be used to monitor height and vertical density of standing vegetation over large areas quickly.</p> <p>Place the robel pole 5m from the plot center in the middle of the line along each orientation of the linear disturbance (eg. 90 degrees and 270 degrees if that is the orientation of the line). Observer crouches so their eye level is at 1m, to visually assess the band on the pole that is at the top of the vegetation, and records the height. Two measurements should be taken (in centimeters) and an average recorded (in meters) for each orientation of the linear disturbance (Robel 1 and Robel 2).</p>	Robel et al. 1970 ³
Evidence of human line use	<p>Assess whether there has been evidence of human use on the linear disturbance. If so, add information about whether it is motorized or foot traffic. Assess access level using the following categories:</p> <ul style="list-style-type: none"> • Absent • Low (tracks/trail evident but difficult to discern or appear to be used infrequently) • High (tracks/trail evident and appear to be well used; vegetation is trampled, and bare ground may be visible) 	

² <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-inventory/ground-sample-inventories/vri-audits/standards>

³ <https://journals.uair.arizona.edu/index.php/jrm/article/download/5830/5440>

MEASURABLE TARGET	DESCRIPTION OF DATA COLLECTION METHOD	REFERENCE
Evidence of game trail	<p>Assess linear disturbance for evidence of wildlife game trails. A game trail is defined as wildlife walking on a trail that is embedded in a path on the ground due to animals walking the same route for many years. Assess access level using the following categories:</p> <ul style="list-style-type: none"> • Absent • Low (tracks/trail evident but difficult to discern or appear to be used infrequently) • High (tracks/trail evident and appear to be well used; vegetation is trampled, and bare ground may be visible) 	Field Manual for Describing Terrestrial Ecosystems (Section 5 Table 5.11)
Wildlife sign	Search the area and record any sign of scat, tracks, trails, tunnels, nests/beds/burrows/dens, signs on compacted or foraged vegetation, and wildlife remains.	Field Manual for Describing Terrestrial Ecosystems (Section 5 Table 5.11)
Percent cover of non-living and organic matter	Record the proportion of ground surface covered by each substrate class of non-living and organic matter (water, mineral soil, cobbles and stones, bedrock, decaying wood, and organic matter); need to add up to 100% within plot.	Field Manual for Describing Terrestrial Ecosystems (Figure 3.2 – visual estimation of foliage coverage)
Height of trees in treatment/ reference plots	Measure and record total height of individual trees in centimetres, by measuring the length of the tree along the stem from high side ground. Record by tree species type.	Vegetation Resources Inventory – Ground Sampling Procedures (2018) (pg. 49)
Root collar diameter (rcd) of trees in treatment/reference plots	Measure diameter of the stem 1 cm below cotyledon nodes and below any obvious swelling. An average of two measurements should be taken for each tree located within the treatment/reference plot.	
Age of trees in treatment/ reference plots	Count the number of whorls present on coniferous trees present within the plot. Record age by species type.	Vegetation Resources Inventory – Ground Sampling Procedures (2018) (pg. 78, Figure 4.15)
Leader growth (cm)	Measure height of leader for current year, one year prior to data collection and two years prior to data collection. Measurement should be made from the point of germination to the top of the terminal bud of the dominant leader. Record leader growth by tree species type.	Vegetation Resources Inventory – Ground Sampling Procedures (2018)

MEASURABLE TARGET	DESCRIPTION OF DATA COLLECTION METHOD	REFERENCE
Percent cover of vegetation and invasive/non-native species in treatment/reference plot	Record percentage of the ground surface covered within plot when the crowns are projected vertically, for each vegetation type: <ul style="list-style-type: none"> • Tree/tall shrub • Shrub • Forb • Graminoid • Bryophyte • Lichen 	Field Manual for Describing Terrestrial Ecosystems (Figure 3.2 – visual estimation of foliage coverage)
Density of vegetation in treatment/reference plot	Density class determined through a fixed plot area, using classifications: <ul style="list-style-type: none"> • Low: 1 – 1000 stems/ha • Medium: 1001 – 2000 stems/ha • High: 2001 – 5000 stems/ha • Dense: >5000 stems/ha 	
Soil litter layers description	Dig a soil pit and record the average depths of the L, F, and H soil horizons (in centimeters).	Field Manual for Describing Terrestrial Ecosystems (Section 2, Table 2.20)
Survival of planted seedlings	Record the number of live and dead seedlings within the plot, where live = “trees have enough foliage to keep them alive (live cambium present), and are rooted into the ground” and dead = “trees are obviously dead, or roots are separated from the ground”.	Vegetation Resources Inventory – Ground Sampling Procedures (2018) (pg. 44, Table 4.2)
Vigour of planted seedlings	Describe general condition of seedlings using classification system 0 to 4, where: <ul style="list-style-type: none"> • 0 = dead • 1 = poor, yellow • 2 = fair, pale green • 3 = good, green • 4 = excellent, dark green 	Field Manual for Describing Terrestrial Ecosystems (Section 3, pg. 14)