

**HAIDA GWAI
GROUND SAMPLE PLAN
FOR**

**MATURE INVENTORY AUDIT PROGRAM
20KM GRID MONITORING PROGRAM
YOUNG STAND MONITORING PROGRAM**

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Project Number:

April 2016

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1.0 INTRODUCTION

1.1 Background

In 2013 new forest inventory mapping was completed over the full extent of Haida Gwaii. The new mapping conducted to the Vegetation Resource Inventory standard provides complete, consistent coverage over the Haida Gwaii archipelago. This replaces the previous inventory which was a set of disparate coverages, some very old, with gaps in some areas, and produced to varying inventory standards.

In 2015 the new inventory was compared against the previous old inventory and results were presented to representatives of the Haida Gwaii Management Council (HGMC). Relative to the old inventory, the new inventory estimated less timber volume. Concerns over the magnitude of change and consequence for the Allowable Annual Cut (AAC) were expressed by the HGMC and the Council of the Haida Nation (CHN). The HGMC and CHN have requested, and the ministry has agreed, to undertake a forest inventory ground sampling program in 2016.

1.2 Goals

The primary goals of the ground sampling programs are to i) assess volume estimates in the new inventory and provide a level of comfort (reduced risk for decision makers) on volume, volume growth, and health of all stands on Haida Gwaii, ii) acquire ground sample data to supplement the photo-interpreted inventory, and iii) establish a long-term forest monitoring plot network across Haida Gwaii.

1.3 Ground Sampling Programs

The three primary goals will be achieved by the three-part sampling objectives outlined below and described in further detail under separate sections of this plan.

- Mature Inventory Audit Program (VRI) : to audit / evaluate the new 2012-2013 VRI Phase 1 inventory on mature stands, and depending on analysis results recommend adjustments to key inventory attributes.
- Change Monitoring Inventory Program (CMI) : To expand the provincial 20km grid monitoring program to include Haida Gwaii in support of FAIB's regional business needs.
- Young Stand Monitoring Program (YSM) : To characterize and monitor the growth and yield of young stands, report on forest health conditions, assess accuracy of species mix and site productivity, and compare against growth model projections used in timber supply review (TSR).

1.4 Terms of Reference

This sample plan was completed by R. de Jong, Forest Analysis and Inventory Branch (FAIB). The subsequent ground sampling phase will be completed and coordinated by R. Bilek, FAIB during the 2016 field season.

1.5 Target Population

The target population for each of the three ground sampling programs is described in Table 1.

Table 1. Landbase area netdown steps used to define each ground sampling program.

Netdown Description	Deducted Area (ha)			Area after Deductions (ha)			Program
	TFL	TSA	Total	TFL ¹	TSA	Total ²	
Entire Haida Gwaii				158,400	848,400	1,006,800	
Parks ³		216,800	216,800	158,400	631,600	790,000	
Conservancy ⁴		247,700	247,700	158,400	383,900	542,300	
Private ⁵		22,700	22,700	158,400	361,200	519,600	
Lakes, Wetlands ⁶	4,648	50,643	55,291	153,752	310,557	464,309	
Operating Area⁷				153,752	310,557	464,309	CMI
Age Breakdown⁸							
<= 14 years old : all land				6,006	9,930	15,936	
15 - 50 yrs old : all land				51,410	46,841	98,251	YSM
>= 51 yrs old : forested				94,460	242,051	336,511	VRI
>= 51 yrs old : non-forest ⁹				1,876	11,735	13,611	
Operating Area				153,752	310,557	464,309	

1.6 Total Program Sample Size

This ground sample plan incorporates increased sampling effort than otherwise applied to other management units. YSM programs normally include a sampling grid size of 5km*10km, whereas this YSM program doubles the sampling intensity using a 5km*5km grid.

A total of 120 ground samples will be established across the three programs (Table 2). Since the CMI program falls on the 20km NFI grid, one previously established NFI sample will also be re-measured under the CMI program. The YSM program's 5km grid is a subset of the CMI program, resulting in four common ground samples between the two (CMI & YSM) programs. Therefore, while a total of 124 ground samples are identified across all three programs, 120 will actually be established.

Table 2. Total sample size by program and land classification.

	VRI	CMI	YSM	Total
TSA	49	9	15	73
TFL	19	3	24	46
Woodlot	1	0	0	1
Total	69	12	39	120

¹ TFL58 & TFL60 tenure coverage received from D. Louis, Haida Gwaii Forest District Feb. 2016.

² Areas are based on the VRI Phase I coverage accessed from GEOBC data warehouse January 2016 (ie., attributes projected to Jan. 2015).

³ Parks coverage from Tantalus Ownership coverage ver. Jan. 2016 (own=51,60,63).

⁴ Conservancy coverage from Tantalus Ownership coverage ver. Jan. 2016 (own=64).

⁵ Private and federal lands, and Indian Reserve coverage received from D.Louis, Haida Gwaii Forest District Feb. 2016.

⁶ Lakes and wetlands defined from the VRI Phase 1 BCLCS land classification system levels 2 (W) & 3 (W).

⁷ For this sample plan, 'Operating Area' is defined as TFLs, TSA, plus woodlot licenses, excluding parks, conservancy areas, private and federal lands, and Indian reserves.

⁸ Age is from the VRI Phase 1 rank 1 projected age of the leading species, adjusted to the end of 2015 growth season.

⁹ Non-forest includes alpine, rock, herb and low shrub dominated features, and treed polygons less than 10% crown closure as defined in the VRI Phase 1 BCLCS land classification system levels 3 (A) & 4 (BM,BY,EL,HE,HG,RO,SL).

2.0 MATURE VRI INVENTORY AUDIT PROGRAM

2.1 Objectives

To audit / evaluate the new 2012-2013 VRI Phase 1 inventory on mature stands, and depending on analysis results recommend adjustments to key inventory attributes.¹⁰

2.2 Target Population

The target population for ground sampling is all forested⁹ stands greater than 50 years of age in the Operating Area (336,511), representing 33% of Haida Gwaii and 72% of the operating area (Table 3).

Table 3. Area netdown summary of Mature VRI Audit target population.

Netdown Description	Area Deducted (ha)	Area Remaining (ha)	% of Haida Gwaii	% of Operating Area
Entire Haida Gwaii		1,006,800	100%	
Parks / Conservancy / Private	487,200	519,600	52%	
Lakes / Wetlands	55,291	464,309	46%	
Operating Area		464,309	46%	100%
< 15 yrs old	15,936	448,373	45%	97%
15-50 yrs old	98,251	350,122	35%	75%
>= 51 yrs old : non-forested	13,611	336,511	33%	72%
>50yrs old forested (target pop)¹¹		336,511	33%	72%

2.3 Sample Design and Sample Size

VRI phase 1 polygon-based ground samples were randomly selected from the target population, proportional to polygon size with replacement (PPSWR), and pre-stratified by leading species.¹² A total of 69 ground samples are identified, allocated across three leading species strata : 40 in Cw/Yc leading stands, 21 in Hw/Hm leading stands, and 8 in Ss leading plus all other stands (Figure 1).

VRI Mature Audit ground samples are temporary 5-point variable radius clusters, comprising both full measure & count plots. Ground samples will be established as **plot type 'T: Timber-Emphasis plus Succession plots'**. Ground sample establishment and measurements will follow provincial VRI Phase II standards and procedures.¹³

¹⁰ The 'Mature VRI Audit program' is analogous to previous VRI Phase II ground sample programs, except the source VRI phase 1 inventory is no longer targeted for polygon level attribute adjustments. Rather, adjustment ratios are computed as part of approved analysis methods, and used as justification to apply strata-level adjustments during the TSR process.

¹¹ Refer to table 1 for netdown definition criteria and coverage sources used.

¹² The procedure "SurveySelect" in SAS was used to select samples using PPSWR. Three species strata were defined from the VRI phase 1 rank 1 leading species, comprising Cw (Cw & Yc), Hw (Hw & Hm), and Ss+ (Ss & all remaining species). The resultant spatial coverage was intersected with the HectaresBC 1ha*1ha grid, to generate an aspatial dataset for analysis.

¹³ Vegetation Resources Inventory Ground Sampling Procedures, Ver. 5.2. Prepared by BC Ministry of Forests, Lands and Resource Management Operations. June 2015.

https://www.for.gov.bc.ca/hts/vri/standards/RISC/2015/vri_ground_sampling_procedures_2015.pdf.

2.4 Decay Sampling

Cruiser-called net factoring will be assessed as per current VRI ground sampling standards. However, net volume adjustment factor (NVAF) destructive sampling will not be completed, and will instead be replaced by a previous decay sampling project completed during the 1990s.

A design-based volume decay sampling program¹⁴ was completed across all tenures in Haida Gwaii between 1992-1995, totaling approximately 750 destructively sampled trees. While differing from current NVAF sampling protocols, these data nevertheless provide strong unbiased estimates of decay volume for the major tree species in Haida Gwaii. Local decay factors will be developed from this previous sampling program, and will be applied as part of the compilation procedures of the 2016 ground sample data.

2.5 Northern Goshawk / Marbled Murrelet Habitat Assessments

In addition to recording the standard set of wildlife attribute features as part of standard VRI ground sample protocols, successional interpretation will also be completed (plot type 'T'), specifically to assess Northern Goshawk and / or marbled murrelet potential habitat requirements. This will include a field day of training with an onsite specialist at the start of field sampling. Implementation of any other variation from standards will be confirmed prior to commencement of field sampling.

2.6 Analysis & Interpretation

Analysis will follow provincial analysis methods.¹⁵ Opportunities to implement ratio adjustments by strata to the VRI phase 1 coverage will be dependent on sample sizes and resulting significance of ratios. In addition to the 69 mature audit samples, eight of the CMI samples >50yrs old will be included to augment the analysis.

2.7 Replacement Samples

Up to 14 replacement samples, pre-stratified by species, have been selected to provide replacements within a given strata, in the event a given ground sample cannot safely be established.

¹⁴ Haida Gwaii Volume and Loss Adjustments for VRI. Internal document prepared for FAIB by W.Smith., March 2016. 5pp.

¹⁵ Vegetation Resources Inventory Sample Data Analysis Procedures and Standards, ver. 1.0 June 2011. https://www.for.gov.bc.ca/hts/risc/pubs/teveg/attribute_adjust_2k4/Production_VRI_Analysis_Procedures_Final.pdf

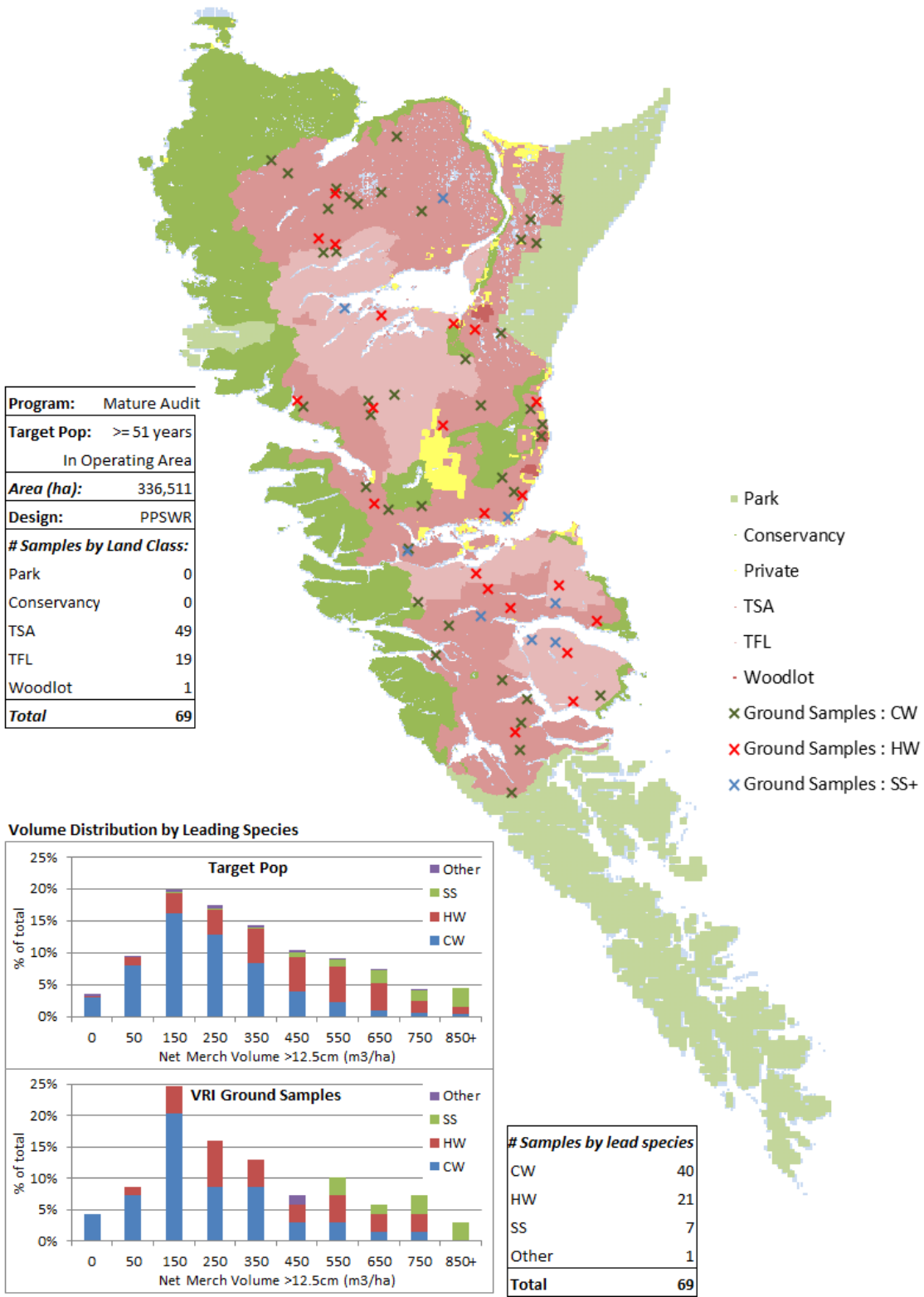


Figure 1. VRI Mature Audit ground sample location (crosses) by leading species groups (Cw:Cw&Yc, Hw:Hw&Hm, Ss:Ss+other). Operating Area colour-coded in three shades of pink (TFL:light, TSA:medium, Woodlot:dark).

3.0 20KM GRID CHANGE MONITORING INVENTORY PROGRAM

3.1 Objectives

To expand the BC Provincial 20km grid monitoring program to also include Haida Gwaii, in support of FAIB's region-wide business needs.

3.2 Target Population

The target population for ground sampling comprises all stands in the Operating Area (464,309ha) representing 46% of Haida Gwaii (Table 4).

Table 4. Area netdown summary of CMI target population.

Netdown Description	Area Deducted (ha)	Area Remaining (ha)	% of Haida Gwaii	% of Operating Area
<i>Entire Haida Gwaii</i>		1,006,800	100%	
Parks / Conservancy / Private	487,200	519,600	52%	
Lakes / Wetlands	55,291	464,309	46%	
Operating Area (target pop)¹¹		464,309	46%	100%

3.3 Sample Design and Sample Size

A total of 12 CMI ground samples will be established on the 20km NFI grid in the Operating Area (Figure 2).¹⁶ Ground samples are circular fixed-area (0.04ha) permanent sample plots. Ground sample establishment and measurement will follow provincial CMI standards and procedures.¹⁷

3.4 Established NFI Plot

One sample point on the 20km grid was previously established under the Federal NFI monitoring program initiative in 2003. This sample will be re-measured in 2016, and will follow previously established NFI standards.

3.5 Analysis

In addition to addressing FAIB's region-wide business needs, the 20km CMI plots will also be used to augment the YSM program (by an additional 4 samples) and the Mature audit program (by an additional eight samples).

¹⁶ While the 20km grid includes a total of 21 grid points across Haida Gwaii, nine samples occurring in parks (6), conservancy areas (2), and private lands (1), will be completed separately as air-photo plot estimates.

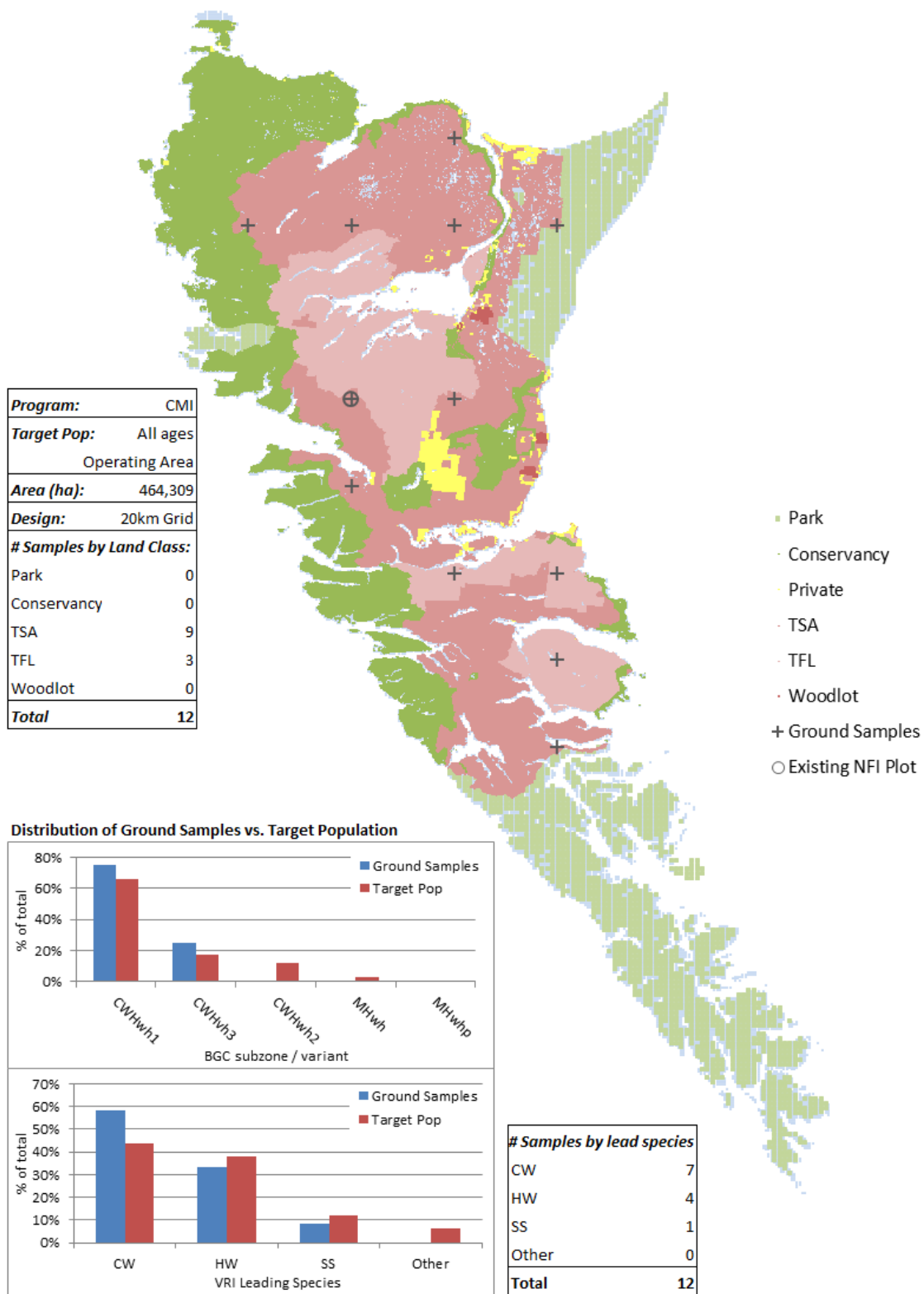


Figure 2. CMI samples on the 20km grid (crosses), plus previously established NFI sample (open circle). Leading species groups (Cw:Cw&Yc, Hw:Hw&Hm, Ss:Ss+other). Operating Area colour-coded in three shades of pink (TFL:light, TSA:medium, Woodlot:dark).

4.0 YOUNG STAND MONITORING PROGRAM

4.1 Objectives

To characterize and monitor the growth and yield of young stands, report on forest health conditions, assess accuracy of species mix and site productivity, and compare against growth model projections used in TSR.

4.2 Target Population

The target population for ground sampling is all young stands between 15 and 50 years of age in the Operating Area. This age range is used to limit sampling to stands that have merchantable volume and are generally of (but not restricted to) post-harvest origin. The target population will evolve over time as mature stands are disturbed (e.g., by harvesting, fire, blow down, epidemic infestation), subsequently regenerated and attain age 15 years, and as the previously younger stands mature (> 50 years). Young stands total 98,251 ha, representing 10% of Haida Gwaii and 21% of the operating area (Table 5).

Table 5. Area netdown summary of YSM target population.

Netdown Description	Area Deducted (ha)	Area Remaining (ha)	% of Haida Gwaii	% of Operating Area
Entire Haida Gwaii		1,006,800	100%	
Parks / Conservancy / Private	487,200	519,600	52%	
Lakes / Wetlands	55,291	464,309	46%	
Operating Area		464,309	46%	100%
< 15 yrs	15,936	448,373	45%	97%
> 50 yrs	350,122	98,251	10%	21%
15-50 yrs (target pop)¹¹		98,251	10%	21%

4.3 Sample Design and Sample Size

The YSM ground samples are located on a 5km*5km grid that intersects with the target population. The grid is referenced from a sub-division of the National Forest Inventory (NFI) 20km national grid. This results in a total sample size of 43 ground samples, where 4 of the ground samples also overlap as CMI ground samples on the 20km grid (Figure 3).

Ground samples are circular fixed-area (0.04ha) permanent sample plots. Ground sample establishment and measurement will follow provincial YSM standards and procedures.¹⁷

4.4 Black-out Field Sampling Dates

To minimize field sampling within the peak growth period for young stands, YSM samples will have a black-out period defined as June 15 to August 1 during which time no YSM samples will be established. For samples established before June 15, heights will be measured to the top of the previous year's height node. For samples established after August 1, heights will be measured to the top of the current year's height node. This criteria applies to all YSM samples, plus the four CMI samples that overlap as YSM samples.

¹⁷ BC Ministry of Forests, Lands and Resource Management Operations. June 2015. Change Monitoring Inventory BC. Change Monitoring procedures for provincial reporting. Ver. 2.2.
https://www.for.gov.bc.ca/hts/vri/standards/RISC/2015/cmi_ground_sampling_procedures_2015.pdf.

4.5 Walk-through Method

The walkthrough method (as specified in the CMI ground sampling standards) will be assessed for all YSM ground samples in proximity to a potential out-of-population polygon boundary. A total of 21 potential walk-through method samples have been identified; however, application of the walkthrough method is a field-based assessment that will be evaluated in the field at each YSM sample location. This criteria applies to all YSM samples, plus the four CMI samples that overlap as YSM samples.

4.6 Analysis & Interpretation

Analysis will follow standard YSM analysis procedures. Since all 43 ground samples are located on a 5km square grid, the average of all samples will provide an unbiased estimate of the young stand population across the operating area. Depending on sample sizes, post-stratification of the data may also include leading species and / or BGC classification.

First-measurement results can be used to audit inventory attributes of young stands, and include volume, site index, species composition, stand structure, and pest or disease incidence. After the second measurement is completed, differences between measured and predicted growth and yield can be estimated. YSM ground samples will also provide important comparisons against estimates used in and expectations coming from TSR (eg., site index from the provincial site productivity tile, and managed stand yield tables derived from TASS / TIPSy).

4.7 Future Considerations

The size of the YSM program will increase over time as future recruitment YSM samples enter the minimum age of 15 years. It is estimated an additional 6 or 7 new YSM grid points currently < 15 years old will become part of the target population over the next 15 years.

Ground sample re-measurement intervals will likely be between 5 and 10 years. Older YSM samples leaving the upper YSM age limit will be re-measured at least once in order to assess change.

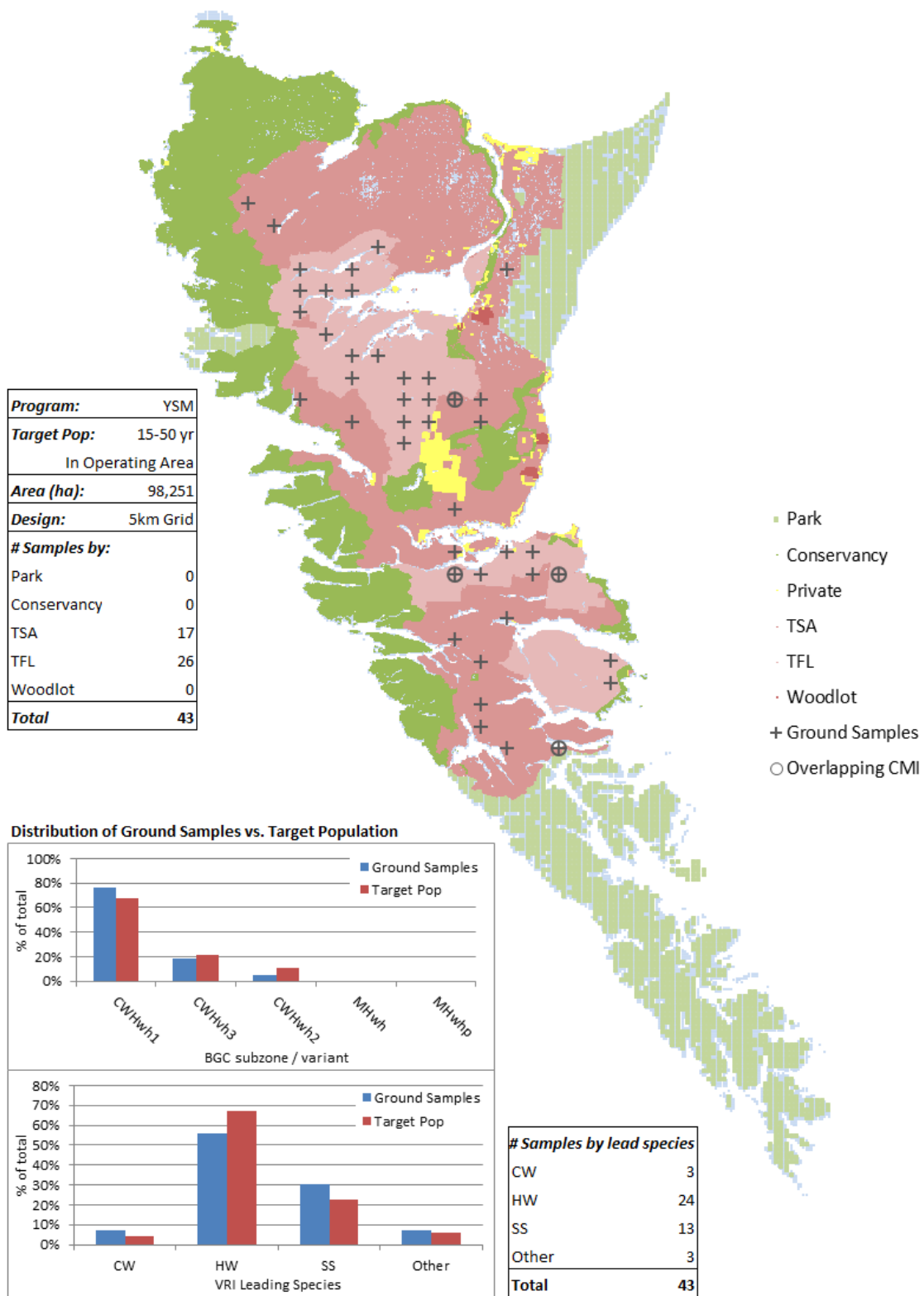


Figure 3. YSM samples on the 5km grid (crosses), plus overlapping CMI samples on the 20km grid (open circle). Leading species groups (Cw:Cw&Yc, Hw:Hw&Hm, Ss:Ss+other). Operating Area colour-coded in three shades of pink (TFL:light, TSA:medium, Woodlot:dark).

5.0 APPENDIX 1 – GROUND SAMPLE LISTS

Table 6. Sample List for all three ground sample programs (CMI, YSM, VRI).

Main Samples (1) Replacements (2)	Ground Sample Program	Overlapping sample type	VRI Audit leading species stratum	Proj_id	Type_cd	Samp_no	Cistr_id	Mapsheet	Polygon id	Feature id	BCAlbers X coord	BCAlbers Y coord	Tenure	BGC subzone / variant	Species_cd_1	Species_pct_1	Proj_adjage_1	Proj_height_1	Live_standing Volume CUI2.5	Harvest year
1	CMI			0251	MO1	0001	0251-0001-MO1	103F086	40408759	9009847	550395.8	1001574.8	TSA	CWHvh3	CW	60	248	18.2	152.7	
1	CMI			0251	MO1	0003	0251-0003-MO1	103F088	59789266	9628606	570378.5	1001597.6	TSA	CWHwh1	CW	50	258	20.2	191.3	
1	CMI			0251	MO1	0004	0251-0004-MO1	103F038	62883903	9345886	570383.2	941342.7	TSA	CWHvh3	CW	50	308	15.1	93.4	
1	CMI			0251	MO1	0006	0251-0006-MO1	103F089	74119220	9281982	590362.6	1001620.6	TSA	CWHwh1	CW	40	358	16.1	88.0	
1	CMI			0251	MO1	0007	0251-0007-MO1	103K009	70590788	9022178	590364.5	1021707.6	TSA	CWHwh1	CW	70	308	14.1	93.4	
1	CMI			0251	MO1	0009	0251-0009-MO1	103G081	95449189	9023803	610346.5	1001641.0	TSA	CWHwh1	CW	85	228	14.2	124.8	
1	CMI			0251	MO1	0011	0251-0011-MO1	103B091	90550070	9937547	610356.8	901224.8	TFL	CWHwh1	CW	85	218	20.2	182.2	
1	CMI	YSM		0251	MO1	0018	0251-0018-MO1	103F050	73485487	9348822	590363.5	961448.3	TSA	CWHwh1	HW	80	21	7.2		1995
1	CMI	YSM		0251	MO1	0019	0251-0019-MO1	103F020	73952004	9415225	590368.9	921282.6	TFL	CWHwh1	SS	85	48	34.4	691.0	1967
1	CMI	YSM		0251	MO1	0020	0251-0020-MO1	103G011	92122031	9945577	610352.2	921303.5	TFL	CWHwh1	HW	60	22	6.1		1994
1	CMI	YSM		0251	MO1	0021	0251-0021-MO1	103B072	90988306	9935235	610359.0	881149.7	TSA	CWHwh1	HW	60	48	23.1	340.6	1967
1	CMI	NFI		CMI6	FR1	0280	CMI6-0280-FR1	103F048	55605656	9633568	570380.7	961426.0	TSA	CWHvh3	HW	55	308	30.2	403.5	2007
1	YSM			025Y	YO1	0022	025Y-0022-YO1	103F086	39542128	9634523	550395.8	1006634.8	TSA	CWHvh3	HW	50	22	7.4	2.7	1983
1	YSM			025Y	YO1	0023	025Y-0023-YO1	103F087	65389051	9284193	555391.4	1001616.3	TSA	CWHvh3	HW	75	38	12.7	45.9	1977
1	YSM			025Y	YO1	0024	025Y-0024-YO1	103F067	96207194	9340837	560386.9	981537.3	TFL	CWHwh1	HW	80	26	8.5	15.3	1986
1	YSM			025Y	YO1	0025	025Y-0025-YO1	103F067	290308	9341061	560387.0	986557.2	TFL	CWHwh2	SS	50	22	7.0		1991
1	YSM			025Y	YO1	0026	025Y-0026-YO1	103F077	96403231	9467537	560387.1	991577.1	TFL	CWHwh1	HW	60	19	6.2		1995
1	YSM			025Y	YO1	0027	025Y-0027-YO1	103F047	97945611	9346316	560389.7	961404.4	TSA	CWHvh3	CW	60	20	6.7		1982
1	YSM			025Y	YO1	0028	025Y-0028-YO1	103F077	26240411	9468020	565382.9	986556.7	TFL	CWHwh1	CW	60	36	12.2	76.4	
1	YSM			025Y	YO1	0029	025Y-0029-YO1	103F068	26814442	9340144	565382.9	976516.8	TFL	CWHwh1	HW	60	31	10.7	37.9	1984
1	YSM			025Y	YO1	0030	025Y-0030-YO1	103F078	58970345	9353044	570378.8	986556.3	TFL	CWHwh1	HW	55	34	13.8	39.9	1980
1	YSM			025Y	YO1	0031	025Y-0031-YO1	103F078	57073443	9353069	570378.9	991576.9	TFL	CWHwh1	SS	50	30	11.7	76.0	1984
1	YSM			025Y	YO1	0032	025Y-0032-YO1	103F058	56361550	9357016	570379.0	971495.8	TFL	CWHwh1	HW	60	20	7.0		1997
1	YSM			025Y	YO1	0033	025Y-0033-YO1	103F058	56148572	9356992	570379.1	966475.9	TFL	CWHvh3	SS	70	23	12.0	42.4	1995
1	YSM			025Y	YO1	0034	025Y-0034-YO1	103F048	54452425	9347037	570381.5	956388.1	TSA	CWHvh3	SS	85	39	32.5	762.3	1976

Main Samples (1) Replacements (2)	Ground Sample Program	Overlapping sample type	VRI Audit leading species stratum	Proj_id	Type_cd	Samp_no	Cistr_id	Mapsheet	Polygon id	Feature id	BCAlbers X coord	BCAlbers Y coord	Tenure	BGC subzone / variant	Species_cd_1	Species_pct_1	Proj_adjage_1	Proj_height_1	Live_standing Volume CU12.5	Harvest year
1	YSM			025Y	YO1	0035	025Y-0035-YO1	103F078	85436125	9352900	575374.9	996597.8	TFL	CWHwh1	HW	60	21	6.3		1994
1	YSM			025Y	YO1	0036	025Y-0036-YO1	103F058	86601464	9357130	575375.0	971494.5	TFL	CWHwh1	HW	90	37	23.0	249.3	1978
1	YSM			025Y	YO1	0037	025Y-0037-YO1	103F059	14428296	9336283	580371.2	966472.6	TFL	CWHwh1	SS	50	48	21.6	321.1	1964
1	YSM			025Y	YO1	0038	025Y-0038-YO1	103F049	14555567	9354731	580372.7	961413.0	TFL	CWHwh1	HW	55	31	10.7	49.5	1984
1	YSM			025Y	YO1	0039	025Y-0039-YO1	103F049	10372655	9355068	580373.1	956393.0	TFL	CWHwh1	SS	40	20	5.7		1994
1	YSM			025Y	YO1	0040	025Y-0040-YO1	103F039	14159409	9332773	580373.5	951373.0	TFL	CWHwh1	HW	90	20	7.0		1995
1	YSM			025Y	YO1	0041	025Y-0041-YO1	103F059	43638271	9336672	585367.2	966471.0	TFL	CWHwh1	SS	70	43	28.7	626.7	1971
1	YSM			025Y	YO1	0042	025Y-0042-YO1	103F049	39695514	9354944	585368.4	961415.1	TFL	CWHwh1	HW	70	30	11.4	44.1	1985
1	YSM			025Y	YO1	0043	025Y-0043-YO1	103F049	43632511	9354714	585368.9	956395.4	TFL	CWHwh1	SS	100	48	33.3	733.9	1967
1	YSM			025Y	YO1	0047	025Y-0047-YO1	103F030	73080849	9374968	590366.6	936320.3	TSA	CWHwh1	HW	50	47	28.7	545.5	1975
1	YSM			025Y	YO1	0048	025Y-0048-YO1	103F020	73584943	9415074	590367.5	926281.5	TSA	CWHwh1	HW	70	37	15.2	137.7	1974
1	YSM			025Y	YO1	0049	025Y-0049-YO1	103F010	76223203	9948122	590372.0	906215.6	TSA	CWHwh1	DR	90	50	17.8	175.7	1965
1	YSM			025Y	YO1	0050	025Y-0050-YO1	103F060	3065635	9358481	595359.9	961419.4	TSA	CWHwh1	CW	45	16	4.2		1999
1	YSM			025Y	YO1	0051	025Y-0051-YO1	103F050	2672691	9626642	595360.4	956400.3	TSA	CWHwh1	HW	90	17	5.1		1999
1	YSM			025Y	YO1	0052	025Y-0052-YO1	103F020	1922079	9656170	595365.4	921276.7	TFL	CWHwh1	DR	75	48	24.3	377.4	
1	YSM			025Y	YO1	0053	025Y-0053-YO1	103C100	5009892	10069568	595368.5	901200.7	TSA	CWHwh1	DR	90	43	19.3	245.8	1971
1	YSM			025Y	YO1	0054	025Y-0054-YO1	103C090	2944170	10064730	595370.4	891166.0	TSA	CWHvh3	SS	80	44	21.8	355.5	1971
1	YSM			025Y	YO1	0055	025Y-0055-YO1	103C090	21311	10066109	595371.4	886148.7	TSA	CWHvh3	HW	50	26	9.4	12.4	1989
1	YSM			025Y	YO1	0056	025Y-0056-YO1	103F080	32573155	9361733	600350.1	991562.5	TSA	CWHwh1	HW	50	22	6.7		1992
1	YSM			025Y	YO1	0057	025Y-0057-YO1	103F020	32274908	9415289	600359.4	926290.1	TFL	CWHwh1	SS	60	45	19.5	282.7	1970
1	YSM			025Y	YO1	0058	025Y-0058-YO1	103G001	32406124	9932853	600362.7	911242.4	TSA	CWHwh1	HW	75	43	29.2	576.6	1972
1	YSM			025Y	YO1	0059	025Y-0059-YO1	103B071	29328395	9911915	600367.9	881135.9	TSA	CWHvh3	SS	70	26	15.2	163.3	1989
1	YSM			025Y	YO1	0060	025Y-0060-YO1	103G011	61234914	9946031	605355.3	926294.4	TFL	CWHwh1	SS	70	39	23.7	377.4	1976
1	YSM			025Y	YO1	0061	025Y-0061-YO1	103G011	56011606	9946124	605356.9	921283.0	TFL	CWHwh2	HW	60	23	7.2		1992
1	YSM			025Y	YO1	0062	025Y-0062-YO1	103B092	44329701	9942789	620346.9	901222.4	TFL	CWHwh1	HW	55	33	13.4	126.4	1982
1	YSM			025Y	YO1	0063	025Y-0063-YO1	103B092	49556955	9942537	620347.7	896205.3	TFL	CWHwh1	HW	50	30	9.2	17.1	1985
1	VRI		CW	0252	TO1	0101	0252-0101-TO1	103B061	38192182	9907233	601337.5	870637.5	TSA	CWHvh3	YC	40	188	13.2	79.3	
1	VRI		CW	0252	TO1	0102	0252-0102-TO1	103B071	48427745	9911317	602937.5	880337.5	TSA	CWHvh3	CW	50	258	21.2	228.9	
1	VRI		CW	0252	TO1	0103	0252-0103-TO1	103B081	49121416	9924772	603037.5	886537.5	TSA	CWHwh1	CW	50	258	28.3	392.8	
1	VRI		CW	0252	TO1	0104	0252-0104-TO1	103B081	55884785	9924682	604337.5	892137.5	TSA	CWHwh1	CW	65	168	17.3	163.2	

Main Samples (1) Replacements (2)	Ground Sample Program	Overlapping sample type	VRI Audit leading species stratum	Proj_id	Type_cd	Samp_no	Cistr_id	Mapsheet	Polygon id	Feature id	BCAlbers X coord	BCAlbers Y coord	Tenure	BGC subzone / variant	Species_cd_1	Species_pct_1	Proj_adjage_1	Proj_height_1	Live_standing Volume CU12.5	Harvest year
1	VRI		CW	0252	TO1	0105	0252-0105-TO1	103B091	29227272	9937429	599437.5	896337.5	TSA	CWHwh1	CW	50	308	38.3	701.4	
1	VRI		CW	0252	TO1	0106	0252-0106-TO1	103B092	38655193	9942773	618437.5	892837.5	TFL	CWHwh1	CW	60	208	16.2	131.2	
1	VRI		CW	0252	TO1	0107	0252-0107-TO1	103C100	50290734	10070076	586537.5	902237.5	TSA	CWHvh3	YC	60	128	4.1		
1	VRI		CW	0252	TO1	0108	0252-0108-TO1	103F009	32257534	9944566	583137.5	914337.5	TFL	CWHwh2	YC	50	108	3.1		
1	VRI		CW	0252	TO1	0109	0252-0109-TO1	103F010	63174701	9947673	589137.5	908937.5	TSA	CWHwh2	YC	40	158	8.1		
1	VRI		CW	0252	TO1	0110	0252-0110-TO1	103F019	21325145	9414025	581437.5	926637.5	TSA	CWHwh1	CW	60	308	20.1	168.8	
1	VRI		CW	0252	TO1	0111	0252-0111-TO1	103F029	37980842	9374285	583937.5	936437.5	TSA	MHwh	YC	60	308	19.1	161.3	
1	VRI		CW	0252	TO1	0112	0252-0112-TO1	103F029	97230357	9373639	577437.5	935537.5	TSA	CWHwh2	CW	40	308	24.2	225.9	
1	VRI		CW	0252	TO1	0113	0252-0113-TO1	103F038	72343482	9466623	573137.5	940937.5	TSA	CWHvh3	CW	50	308	21.1	182.4	
1	VRI		CW	0252	TO1	0114	0252-0114-TO1	103F040	31984418	9342395	599437.5	943037.5	TSA	CWHwh1	CW	45	243	25.3	280.0	
1	VRI		CW	0252	TO1	0115	0252-0115-TO1	103F047	1704269	9346968	561137.5	959337.5	TSA	CWHvh3	CW	55	308	16.1	131.9	
1	VRI		CW	0252	TO1	0116	0252-0116-TO1	103F048	74813274	9347238	574037.5	957437.5	TFL	CWHvh3	CW	50	288	22.2	271.6	
1	VRI		CW	0252	TO1	0117	0252-0117-TO1	103F048	75185139	9347404	573537.5	960637.5	TFL	CWHwh1	YC	70	308	13.1	11.4	
1	VRI		CW	0252	TO1	0118	0252-0118-TO1	103F049	6145821	9355119	578537.5	961937.5	TFL	CWHwh1	CW	55	308	37.3	507.8	
1	VRI		CW	0252	TO1	0119	0252-0119-TO1	103F050	2364324	9349286	595337.5	959537.5	TSA	CWHwh1	CW	50	238	34.4	474.0	
1	VRI		CW	0252	TO1	0120	0252-0120-TO1	103F060	85870899	9358370	592437.5	970337.5	TFL	CWHwh1	CW	50	208	26.3	337.9	
1	VRI		CW	0252	TO1	0121	0252-0121-TO1	103F070	25074247	9350830	599137.5	976337.5	TSA	CWHwh1	CW	60	173	23.4	327.0	
1	VRI		CW	0252	TO1	0122	0252-0122-TO1	103F077	23464995	9467306	564937.5	994737.5	TFL	CWHwh1	CW	50	283	30.3	558.5	
1	VRI		CW	0252	TO1	0123	0252-0123-TO1	103F078	38805404	9352446	567537.5	995137.5	TFL	CWHwh2	YC	60	228	19.2	143.4	
1	VRI		CW	0252	TO1	0124	0252-0124-TO1	103F087	29760900	9628646	565937.5	1004837.5	TSA	CWHwh1	CW	60	308	22.2	218.8	
1	VRI		CW	0252	TO1	0125	0252-0125-TO1	103F088	53162685	9276136	570037.5	1007637.5	TSA	CWHwh1	CW	60	258	25.2	336.4	
1	VRI		CW	0252	TO1	0126	0252-0126-TO1	103F088	59551693	9275596	571437.5	1006037.5	TSA	CWHwh1	CW	50	258	24.2	369.6	
1	VRI		CW	0252	TO1	0127	0252-0127-TO1	103F089	35300605	9282119	583837.5	1004337.5	TSA	CWHwh1	CW	60	408	18.1	183.1	
1	VRI		CW	0252	TO1	0128	0252-0128-TO1	103F090	48756831	9277047	603137.5	997737.5	TSA	CWHwh1	CW	60	218	20.2	173.5	
1	VRI		CW	0252	TO1	0129	0252-0129-TO1	103F090	58259742	9277115	604837.5	1002437.5	TSA	CWHwh1	CW	75	228	16.2	125.4	
1	VRI		CW	0252	TO1	0130	0252-0130-TO1	103F090	65726384	9276996	606037.5	996937.5	TSA	CWHwh1	CW	60	218	18.2	160.9	
1	VRI		CW	0252	TO1	0131	0252-0131-TO1	103F096	64037544	9026886	554837.5	1016037.5	TSA	CWHvh3	YC	50	348	14.1	78.0	
1	VRI		CW	0252	TO1	0132	0252-0132-TO1	103F097	36893828	9633691	567537.5	1009337.5	TSA	CWHwh1	CW	70	104	16.3	190.7	
1	VRI		CW	0252	TO1	0133	0252-0133-TO1	103F097	83095882	9012040	558037.5	1013037.5	TSA	CWHvh3	CW	50	333	21.1	159.5	
1	VRI		CW	0252	TO1	0134	0252-0134-TO1	103F098	90043433	9275782	576137.5	1008537.5	TSA	CWHwh1	CW	40	308	15.1	107.4	

Main Samples (1) Replacements (2)	Ground Sample Program	Overlapping sample type	VRI Audit leading species stratum	Proj_id	Type_cd	Samp_no	Cistr_id	Mapsheet	Polygon id	Feature id	BCAlbers X coord	BCAlbers Y coord	Tenure	BGC subzone / variant	Species_cd_1	Species_pct_1	Proj_adjage_1	Proj_height_1	Live_standing Volume CU12.5	Harvest year
1	VRI		CW	0252	TO1	0135	0252-0135-TO1	103G031	42812902	9375299	601837.5	939737.5	TSA	CWHwh1	CW	60	328	30.2	436.5	
1	VRI		CW	0252	TO1	0136	0252-0136-TO1	103G041	59124016	9375403	605037.5	958837.5	TSA	CWHwh1	CW	50	188	26.4	351.9	
1	VRI		CW	0252	TO1	0137	0252-0137-TO1	103G041	67871856	9375554	607237.5	955137.5	TSA	CWHwh1	CW	50	318	35.2	656.3	
1	VRI		CW	0252	TO1	0138	0252-0138-TO1	103G041	72480226	9375742	607037.5	952637.5	Woodlot	CWHwh1	CW	85	253	25.1	263.4	
1	VRI		CW	0252	TO1	0139	0252-0139-TO1	103G091	87072660	9032289	609937.5	1007037.5	TSA	CWHwh1	CW	65	168	11.2	76.9	
1	VRI		CW	0252	TO1	0140	0252-0140-TO1	103K008	12290432	9020969	579137.5	1021437.5	TSA	CWHwh1	CW	60	348	14.1	96.5	
1	VRI		HW	0252	TO1	0141	0252-0141-TO1	103B081	41890130	9925222	602037.5	884337.5	TSA	CWHvh3	HW	55	268	24.2	254.1	
1	VRI		HW	0252	TO1	0142	0252-0142-TO1	103B082	6484399	9925897	613137.5	891437.5	TFL	CWHwh2	HW	40	208	24.4	304.4	
1	VRI		HW	0252	TO1	0143	0252-0143-TO1	103B092	830845	9942743	612037.5	902837.5	TFL	CWHwh1	HW	50	248	27.3	380.5	
1	VRI		HW	0252	TO1	0144	0252-0144-TO1	103F020	8799550	9414930	596637.5	917337.5	TSA	CWHwh1	HW	60	58	32.0	734.1	
1	VRI		HW	0252	TO1	0145	0252-0145-TO1	103F020	97901840	9415219	594437.5	921037.5	TFL	CWHwh1	HW	60	63	33.8	765.8	
1	VRI		HW	0252	TO1	0146	0252-0146-TO1	103F029	81371195	9466735	574737.5	937037.5	TSA	CWHvh3	HW	40	308	25.2	264.9	
1	VRI		HW	0252	TO1	0147	0252-0147-TO1	103F030	8759751	9374822	596037.5	934737.5	TSA	CWHwh1	HW	60	378	38.2	181.5	
1	VRI		HW	0252	TO1	0148	0252-0148-TO1	103F047	95475082	9346362	559837.5	960637.5	TSA	CWHvh3	HW	45	338	22.2	249.4	
1	VRI		HW	0252	TO1	0149	0252-0149-TO1	103F048	82903947	9347391	574637.5	958937.5	TFL	CWHwh2	HW	55	308	16.1	121.9	
1	VRI		HW	0252	TO1	0150	0252-0150-TO1	103F049	59771735	9355019	588037.5	954937.5	TSA	CWHwh2	HW	80	338	38.2	580.8	
1	VRI		HW	0252	TO1	0151	0252-0151-TO1	103F068	89626755	9340365	576037.5	980237.5	TFL	CWHwh1	HW	65	183	32.6	549.2	
1	VRI		HW	0252	TO1	0152	0252-0152-TO1	103F069	71935613	9339156	590037.5	978337.5	TFL	CWHwh1	HW	75	52	28.3	552.9	
1	VRI		HW	0252	TO1	0153	0252-0153-TO1	103F070	97154529	9352141	594237.5	976937.5	TSA	CWHwh1	HW	55	183	29.5	448.2	
1	VRI		HW	0252	TO1	0154	0252-0154-TO1	103F078	38216293	9352660	567237.5	996737.5	TSA	CWHwh1	HW	50	358	35.2	642.8	
1	VRI		HW	0252	TO1	0155	0252-0155-TO1	103F087	18047122	9284109	564037.5	998037.5	TSA	CWHwh2	HW	50	308	23.2	272.3	
1	VRI		HW	0252	TO1	0156	0252-0156-TO1	103F087	36022832	9284013	567237.5	1008237.5	TSA	CWHwh1	HW	70	333	31.1	649.0	
1	VRI		HW	0252	TO1	0157	0252-0157-TO1	103G001	36097207	9933093	601037.5	913137.5	TSA	CWHwh1	HW	75	53	15.9	107.4	
1	VRI		HW	0252	TO1	0158	0252-0158-TO1	103G002	36015120	9929123	617837.5	910137.5	TSA	CWHwh2	HW	65	123	11.4	57.1	
1	VRI		HW	0252	TO1	0159	0252-0159-TO1	103G011	93060236	9946200	610337.5	918237.5	TFL	CWHwh1	HW	50	54	22.6	341.6	
1	VRI		HW	0252	TO1	0160	0252-0160-TO1	103G031	50982225	9416204	603337.5	938937.5	TSA	CWHwh1	HW	60	57	26.7	425.2	
1	VRI		HW	0252	TO1	0161	0252-0161-TO1	103G051	66245078	9375535	606037.5	960537.5	TSA	CWHwh1	HW	45	208	25.4	294.7	
1	VRI		SS+	0252	TO1	0162	0252-0162-TO1	103F010	1685846	9947407	595237.5	911037.5	TSA	CWHwh1	SS	100	57	35.5	721.0	
1	VRI		SS+	0252	TO1	0163	0252-0163-TO1	103F019	18484865	9414702	581137.5	926237.5	TSA	CWHwh2	SS	50	408	40.2	523.8	
1	VRI		SS+	0252	TO1	0164	0252-0164-TO1	103F030	34469290	9374900	600537.5	933937.5	TSA	CWHwh1	SS	60	358	46.2	863.8	

Main Samples (1) Replacements (2)	Ground Sample Program	Overlapping sample type	VRI Audit leading species stratum	Proj_id	Type_cd	Samp_no	Cistr_id	Mapsheet	Polygon id	Feature id	BCAlbers X coord	BCAlbers Y coord	Tenure	BGC subzone / variant	Species_cd_1	Species_pct_1	Proj_adjage_1	Proj_height_1	Live_standing Volume CU12.5	Harvest year
1	VRI		SS+	0252	TO1	0165	0252-0165-TO1	103F068	48057686	9340375	569037.5	981937.5	TFL	CWHwh1	SS	55	84	39.1	929.0	
1	VRI		SS+	0252	TO1	0166	0252-0166-TO1	103F099	60052561	9281235	587937.5	1007137.5	TSA	CWHwh1	SS	60	283	38.3	712.5	
1	VRI		SS+	0252	TO1	0167	0252-0167-TO1	103G001	59972685	9932964	605137.5	905637.5	TFL	CWHwh1	SS	60	58	33.3	649.2	
1	VRI		SS+	0252	TO1	0168	0252-0168-TO1	103G001	88872110	9959945	609737.5	905137.5	TFL	CWHwh1	DR	85	61	27.8	480.6	
1	VRI		SS+	0252	TO1	0169	0252-0169-TO1	103G001	89417698	9933238	609737.5	914237.5	TFL	CWHwh1	SS	70	59	33.2	583.1	
2	VRI		CW	0252	TO1	0170	0252-0170-TO1	103B071	53258606	9911481	604137.5	881537.5	TSA	MHwh	YC	40	188	14.2	122.9	
2	VRI		CW	0252	TO1	0171	0252-0171-TO1	103B081	35710383	9924752	601137.5	884537.5	TSA	CWHwh2	YC	60	188	6.1		
2	VRI		CW	0252	TO1	0172	0252-0172-TO1	103C100	16557692	10069730	597737.5	897037.5	TSA	CWHwh1	CW	80	228	17.2	197.8	
2	VRI		CW	0252	TO1	0173	0252-0173-TO1	103F068	89007014	9340004	575937.5	980937.5	TFL	CWHwh1	CW	60	258	35.3	540.0	
2	VRI		CW	0252	TO1	0174	0252-0174-TO1	103F087	26052674	9284191	565237.5	1007637.5	TSA	CWHwh1	CW	70	308	24.2	215.9	
2	VRI		CW	0252	TO1	0175	0252-0175-TO1	103F088	59551693	9275596	571037.5	1005837.5	TSA	CWHwh1	CW	50	258	24.2	369.6	
2	VRI		CW	0252	TO1	0176	0252-0176-TO1	103F098	60975356	9029648	571337.5	1012737.5	TSA	CWHwh1	CW	40	310	18.1	142.5	
2	VRI		CW	0252	TO1	0177	0252-0177-TO1	103K009	75751609	9022314	590737.5	1022737.5	TSA	CWHwh1	CW	50	208	27.3	406.6	
2	VRI		HW	0252	TO1	0178	0252-0178-TO1	103B092	52758285	9942296	620637.5	898237.5	TFL	CWHwh1	HW	50	248	27.3	422.8	
2	VRI		HW	0252	TO1	0179	0252-0179-TO1	103F039	97239579	9333115	577737.5	951237.5	TFL	CWHwh2	HW	55	358	38.2	698.9	
2	VRI		HW	0252	TO1	0180	0252-0180-TO1	103F068	85513711	9340138	575537.5	975437.5	TFL	CWHwh1	HW	50	83	34.9	691.0	
2	VRI		HW	0252	TO1	0181	0252-0181-TO1	103G001	32472955	9933055	600837.5	905937.5	TSA	CWHwh1	HW	65	93	39.1	977.4	
2	VRI		SS+	0252	TO1	0182	0252-0182-TO1	103F086	56311153	9284201	554337.5	1004837.5	TSA	CWHwh3	SS	71	261	48.6	853.4	
2	VRI		SS+	0252	TO1	0183	0252-0183-TO1	103G002	48176881	9929739	619937.5	912737.5	TSA	CWHwh1	PLC	40	238	20.1	208.5	