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Interfor Hope Logging IFPA  
**Vegetation Resources Inventory**  
**Sampling Plan for the Fraser TSA**

*Submitted to:*

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Ministry of Forests  
Nanaimo, BC*

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## 1 INTRODUCTION

### 1.1 BACKGROUND

The inventory in the Fraser Timber Supply Area (TSA) is being upgraded. In 1996, the Ministry of Forests (MOF) Chilliwack Forest District and Vancouver Forest Region initiated a Vegetation Resources Inventory (VRI) Phase I (photo interpretation) project for the Fraser Timber Supply Area (TSA). This photo interpretation project has just been completed. As well, approximately 40 sample clusters have been installed in 1998 in the Chilliwack Landscape Unit (#417).

Interfor has been awarded an Innovative Forest Practices Agreement (IFPA) for the Manning, Yale, and Silverhope landscape units in the TSA.<sup>1</sup> Interfor plans to review and upgrade the existing inventory in the IFPA area over a two-year period.<sup>2</sup> This plan will include completion of Phase II ground sampling to check the accuracy of the new VRI Phase I in 1999, and to adjust the inventory in 2000. Interfor will also cooperate with the MOF to complete Phase II ground sampling in the remainder of the TSA (1999-2000). This document is a ground-sampling plan for the timber emphasis VRI in the Fraser TSA, including Interfor's IFPA area.

The ground sampling in the TSA will involve installing timber emphasis sample clusters and net volume adjustment factor (NVAF) sampling. This ground sampling, followed by statistical adjustment of the new Phase I estimates, will give higher confidence in the timber volume estimates in the TSA operable landbase. Specifically, the adjusted VRI will:

- Address the timber inventory accuracy concerns in the TSA- an inventory audit in 1995 and 1996 indicated that the inventory volume was over-stated on average by approximately 23%.

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<sup>1</sup> The objective of the IFPA is to increase the harvest level in the IFPA area while considering local social, environmental, and economic issues. The strategy to achieve the IFPA objective involves implementing various technical program components, including timber inventory review and upgrade. The purpose of the timber inventory review and upgrade is to ensure accurate estimates of the inventory and growth and yield.

<sup>2</sup> Interfor Hope Logging Innovative Forestry Practices Agreement, Draft Forestry Plan No.1 July 9, 1999.

- Meet the timber inventory needs of Interfor's IFPA. Interfor requires accurate estimates of the standing crop inventory and annual growth, to model the effects of forest management at the stand and forest levels in the spatial timber supply analysis process.

## 1.2 DOCUMENT OBJECTIVES

This report outlines the sampling plan for collecting inventory data to adjust the inventory in the Fraser TSA. A.Y. Omule, PhD, RPF of J.S. Thrower and Assoc. prepared this report under contract to Interfor. This report is submitted for approval by the MOF and Interfor. A preliminary plan was reviewed and verbally approved on July 29, 1999 by the MOF (Vancouver Forest Region, Chilliwack Forest District and Resources Inventory Branch) and Interfor.

## 2 FRASER TSA LANDBASE

The Fraser TSA is approximately 1,023,023 ha, of which approximately 751,912 ha are Vegetated Treed (VT) (BC Landcover Classification Scheme, or BCLCS).<sup>3</sup> Approximately 520,974 ha (or 51%) of the TSA landbase is considered operable (Table 1). The TSA area excludes the majority of urban areas, woodlots, Greater Vancouver Watershed District, major provincial parks and recreational areas, UBC research Forest, and the TFLs (26 and 43).

Interfor's Hope Logging IFPA total area is approximately 194,319 ha, which is about 13% of the total TSA area. The IFPA includes the Yale, Silverhope, and Manning landscape units in the TSA. Within the IFPA, 112,518 ha are VT; however, only about 70,157 ha of the IPFA area is considered operable.

Table 1. Chilliwack Forest District landbase.

Landbase	IFPA	Non-IFPA	Total
TSA			
VT - Operable	70,157	450,817	520,974
VT - Inoperable	42,361	191,577	233,938
Non-VT	19,584	248,527	268,111
<i>Subtotal - TSA</i>	<i>132,102</i>	<i>890,921</i>	<i>1,023,023</i>
<i>Other Areas*</i>	<i>62,218</i>	<i>328,557</i>	<i>*585,094</i>
<i>Total - District</i>	<i>194,319</i>	<i>1,219,478</i>	<i>1,413,797</i>

\* Majority of urban areas, woodlots, Greater Vancouver Watershed, provincial parks and recreational areas, TFLs and UBC Research Forest.

\*\*Does not include the lower mainland mapsheets not photo interpreted.

This ground sampling plan focuses on the VT areas of the TSA (754,910 ha), with emphasis on the VT operable landbase (69%).

<sup>3</sup> These area statistics are based on the new Phase I data.

### 3 GROUND SAMPLING PLAN

#### 3.1 OBJECTIVES

The objectives of the ground sampling are to:

1. Install adequate samples in the IFPA area to check the overall accuracy of the timber inventory (inventory audit) in the Vegetated Treed landbase.
2. Install adequate samples in the TSA to adjust the inventory in the VT landbase. Emphasis will be on the operable landbase (as defined in the database); the sampling will aim is to achieve a sampling error of  $\pm 10\%$  (90% probability)<sup>4</sup> for net timber volume (gross volume less stumps, tops, decay, waste and breakage) in the operable landbase.

#### 3.2 SAMPLING APPROACH

The overall approach is to select adequate sample clusters over the VT area in the IFPA to achieve Objective 1, and to install additional sample clusters in the remainder of the TSA area to achieve Objective 2. The IFPA Area and the Remaining Area (of the TSA) will be treated as two separate sub-populations for sampling and analysis purposes. The inventory results from the two sub-populations can then be combined to provide overall TSA totals (Section 3.8).

#### 3.3 TARGET POPULATION

The target population is the VT landbase in the IFPA area (Objective 1) (520,974 ha) and in the entire TSA (Objective 2) (754,910 ha) (Table 1). The VT classification is used to approximate the productive forestland. Within the VT area, for the IFPA area or the remainder of the TSA, about 80% of the sampling effort will be allocated to the operable landbase and 20% to the inoperable area.

#### 3.4 SAMPLE SIZE

A total of 137 sample clusters will be installed in the TSA, of which approximately 50 will be in the IFPA area (Table

Table 2. Sample sizes (number of sample clusters) for ground sampling in the Vegetated Treed area of the Fraser TSA.

Target Population	Operable	Inoperable	Total Sample
IFPA Area	40	10	50
Remainder of TSA	70	17	87
Grand Total	110	27	137

<sup>4</sup> The 90% probability, which is lower than the MOF standard of 95% probability, was chosen as a balance between cost and desired precision. The MOF standard is currently under review.



2). The 110 TSA sample clusters in the operable landbase (40 sample clusters in the IFPA area and 70 in the Remainder of the TSA) aim to achieve the sampling error stated in Objective 2 (assuming a coefficient of variation of approximately 55%). This target sampling error is associated with a 90% probability, meaning that there is a 10% chance the true overall net volume in the TSA may be outside the confidence limits estimated with the target sampling error. The MOF Region and District staff and Interfor have indicated, after considering other factors such as inventory costs, that this level of uncertainty was reasonable for timber supply analysis.<sup>5</sup>

The TSA sample clusters that fall in Landscape Unit 417 (Chilliwack) do not have to be installed as 40 sample clusters have already been installed in this Unit. The data from these 40 sample clusters will be appropriately weighted (by the number of hectares each sample cluster represents) and combined with the data from the new TSA sample clusters.

The number sample clusters in the IFPA area was based on available budget for the 1999 field season. The suggested sample size (50) could result in a sampling error of net volume of approximately 13% (90% probability, assuming a CV of 55%).

### 3.5 MEASUREMENTS

The ground samples will be VRI *Timber Emphasis (TE)* sample clusters. Measurements will be based on the VRI Ground Sampling manual Version 4. These TE sample clusters will also provide a sampling framework for additional sampling, such as District full-VRI, that may be required in the future.

### 3.6 SAMPLE SELECTION

The sample polygons for the IFPA area and for the Remainder of TSA samples will be selected separately by the MOF Resources Inventory Branch from two sorted lists compiled from the new Phase I file. Each list will include all the VT and will be sorted by land type (BCLCS), leading tree species, age, and site index (Appendices A, B, C, and D).

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<sup>5</sup> Reducing the level of uncertainty to 5% would have increased the sample size in the TSA by approximately 40%.

### 3.7 NET VOLUME ADJUSTMENT FACTOR SAMPLING

Net Volume Adjustment Factor (NVAF) sampling is one of the VRI support activities. It involves destructive sampling of sample trees to determine actual net volume, which is compared to the net volume estimated from the VRI call grading and net factoring process. The NVAF sampling, which is used to account for hidden decay and possible taper equation bias, will be conducted to check and adjust the net volume in the TSA. A total of 15 trees selected from approximately 5 locations will be destructively sampled for NVAF in the IFPA area in 1999. Approximately the same number will be selected in the Remaining Area of the TSA in 2000.

### 3.8 WITHIN POLYGON VARIATION SAMPLING

Within Polygon Variation (WPV) sampling is also a supporting activity of the VRI. It provides information for expressing the total inventory error and the accuracy of individual polygon estimates. The WPV sampling may be completed in 2000 in the entire TSA.

Sampling for WPV involves detailed sampling of individual sample polygons (10). The sample polygons should be selected at random if the selection is made from the polygons picked for the VRI ground sampling. Alternatively, the sample polygons can be selected independent of the VRI ground sampling, in which case they should be selected with probability proportional to area. Well-distributed clusters of 20 plots are established within each sampled polygon to estimate tree attributes.

Results from these detailed measurements will be assumed as the *true* values for the sampled polygons, and will be compared to the adjusted polygon values.

### 3.9 COMPILATION

The inventory in the TSA should be compiled such that adding samples to the Hope IFPA area within the TSA and compiling the IFPA area separately does not affect the estimates of volume in the remainder of the TSA. One way to compile the inventory is:

1. Consider the TSA operable landbase as having two sub-populations (strata): the *IFPA Area* and the *Remaining Area*.
2. Calculate the average volume in each stratum using the samples in the stratum.

3. Calculate the weight of each stratum as the relative areas of the strata.
4. Calculate the overall TSA average volume as an area-weighted average of the strata means in 2. above.

The addition of samples in the IFPA area will affect only the average volume in the IFPA area, but not the average volume in the Remaining Area. Furthermore, the change in the average volume in the IFPA area (before and after additional samples) will likely be small, thus the overall TSA volume change will also be small. A simple example of these calculations is given in Appendix E.

## 4 PROJECT IMPLEMENTATION PLAN

### 4.1 OVERVIEW

Completion of ground sampling in the TSA and IFPA area is planned for the 1999-2000 field seasons. Funding sources for the ground sampling include the IFPA, MOF, and Forest Renewal BC. In 1999, the 50 sample clusters falling in the IFPA area and the approximately 45 sample clusters in the remainder of the TSA will be installed. The remainder of the sample clusters will be installed in 2000.

Thrower & Associates will manage this project (the IFPA and Remaining Area) on behalf of Interfor. A separate schedule is developed for sampling the IFPA area and the remainder of the TSA.

### 4.2 SCHEDULE - IFPA AREA

The VRI in the IFPA area will be implemented in 1999 as follows (Figure 1):

1. Select the sample polygons (July 9-August 10) (Resources Inventory Branch).
2. Prepare and submit a Sampling Plan (this Plan) for approval by the MOF (June 11 - July 30) (J.S. Thrower & Associates for Interfor).
3. Select sample locations in polygons using GIS (August 10-13) (Vancouver Forest Region).
4. Prepare sample packages; each to include photo stereo-pair for access, document photo photocopies, sample cluster location map (1:10,000), and access maps (1:20,000) (August 10-13) (Vancouver Forest Region).
5. Tender and select contract crews and an independent Check-cruiser (August 16-23) (J.S. Thrower & Assoc.).
6. Award contracts to field crews (August 24) (Interfor).
7. Prepare a fieldwork plan that includes two batches of 32 and 18 sample clusters to ensure an unbiased sample at the end of the field season. Select at random a sub-sample of 5 sample polygons for NVAF sampling from the 50 sample clusters; identify these NVAF sample polygons and ensure they are sampled early in the field season, to enable sample tree selection (August 16-24) (J.S. Thrower & Assoc.).
8. Locate and measure VRI sample clusters in the first batch; enter and edit the data (September 1-30) (Field contract crew). The Vancouver Forest region will spot-check the data (compare field card data to the entered data).
9. Locate and measure VRI sample clusters in the remaining batch; enter and edit data (October 1-30) (Field contract crew).

10. Conduct quality assurance (10% check) (September 2-30 and October 2-30) (Independent Check-cruiser).
11. Sample NVAF sample clusters (September 1-13) (Independent Check-cruiser)
12. Complete stem analysis (September 15 to October 30) (Contract crew).<sup>6</sup>
13. Validate and compile data from completed sample clusters and prepare inventory summary reports (October 30- November 30) (MOF).<sup>7</sup>
14. Conduct statistical analysis and adjust inventory files (if necessary) prior to timber supply analysis (December 1-30) (J.S. Thrower & Assoc.).

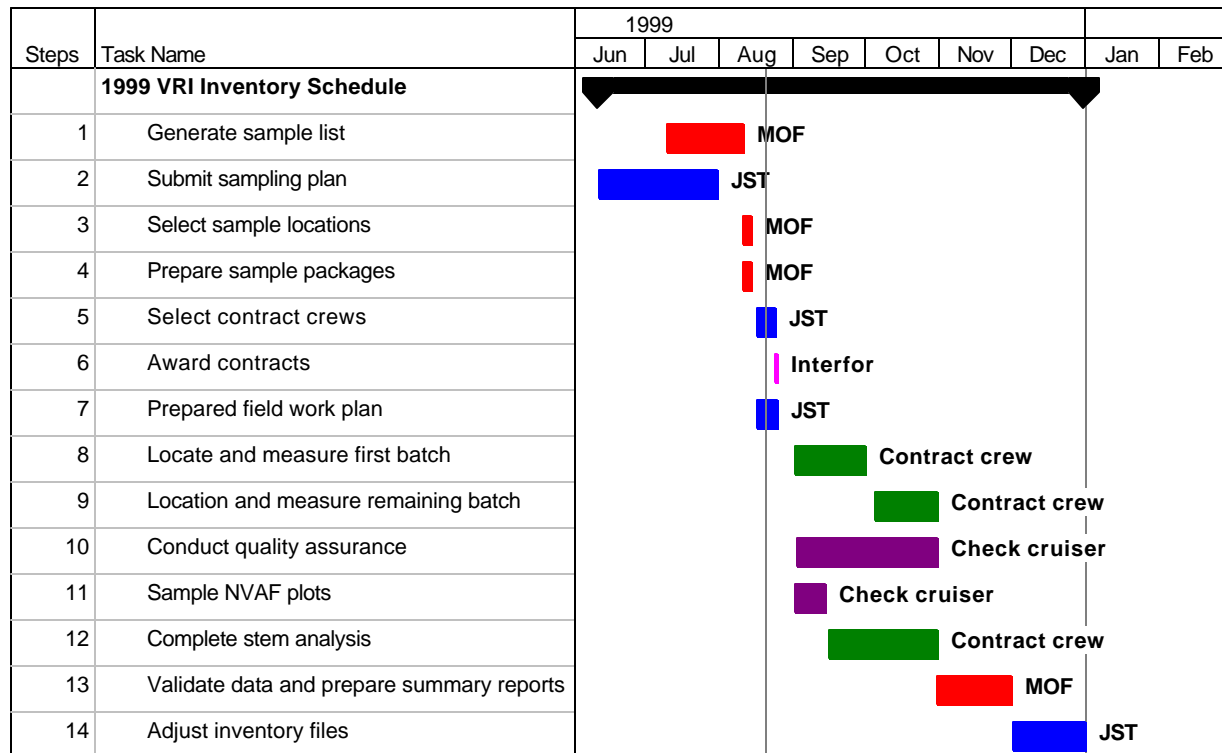


Figure 1. Project activities in the IFPA area of the Fraser TSA.

<sup>6</sup> J.S. Thrower & Assoc. will prepare the tree-sampling matrix, and select the sample trees.

<sup>7</sup> J.S. Thrower & Assoc. will ensure data submitted to MOF is clean.

#### 4.3 SCHEDULE - REMAINING AREA OF TSA

The VRI in the Remaining area of the TSA outside the IFPA area will be implemented over two field seasons: approximately 45 sample clusters in 1999 and the remainder (approximately 42) in 2000. The NVAF will be done in 2000. The project will be implemented as follows (Figure 2):

##### *1999 Field Season*

1. Select the sample polygons (July 9-August 10) (Resources Inventory Branch).
2. Prepare and submit a Sampling Plan (this Plan) for approval by the MOF (June 11 - July 30) (J.S. Thrower & Associates for Interfor).
3. Select sample locations in polygons using GIS (August 10-13) (Vancouver Forest Region).
4. Prepare sample packages; each to include photo stereo-pair for access, document photo photocopies, sample cluster location map (1:10,000), and access maps (1:20,000) (August 10-13) (Vancouver Forest Region).
5. Prepare a fieldwork plan that includes two batches of 30 and 15 sample clusters each, to ensure an unbiased sample at the end of the field season. Select at random a sub-sample of 5 sample polygons for NVAF sampling from the 87 sample clusters; identify these NVAF sample polygons and ensure they are sampled in 1999 or early in the 2000 field season, to enable sample tree selection (August 16-31) (J.S. Thrower & Assoc.).
6. Locate and measure VRI sample clusters in the first batch; enter and edit the data (September 1-October 8) (Field contract crew). The Vancouver Forest region will spot-check the data (compare field card data to the entered data).
7. Locate and measure VRI sample clusters in the second batch; enter edit data (October 11-30) (Field contract crew).
8. Conduct quality assurance (10% check) (September 2-8 and October 11-30) (Independent Check-cruiser).

##### *2000 Field Season*

9. Prepare for the second field season. This will include calculation of the CV based on the standard error of the regression for net volume. The remaining number of samples required to achieve the stated desired precision can then be accurately determined using standard procedures. (Week 1) (MOF)
10. Sample NVAF sample clusters (Week 2-3) (Independent Check-cruiser)

11. Complete stem analysis (Week 4-8) (Contract crew).<sup>8</sup>
12. Locate and measure remaining VRI sample clusters (calculated in Step 11) (Week 2-6) (Contract Crew).
13. Conduct WPV sampling (Week 7-8) (Contractor).
14. Validate and compile data from completed sample clusters and prepare inventory summary reports (Week 9) (MOF).<sup>9</sup>
15. Adjust inventory files prior to timber supply analysis (Week 10) (MOF).

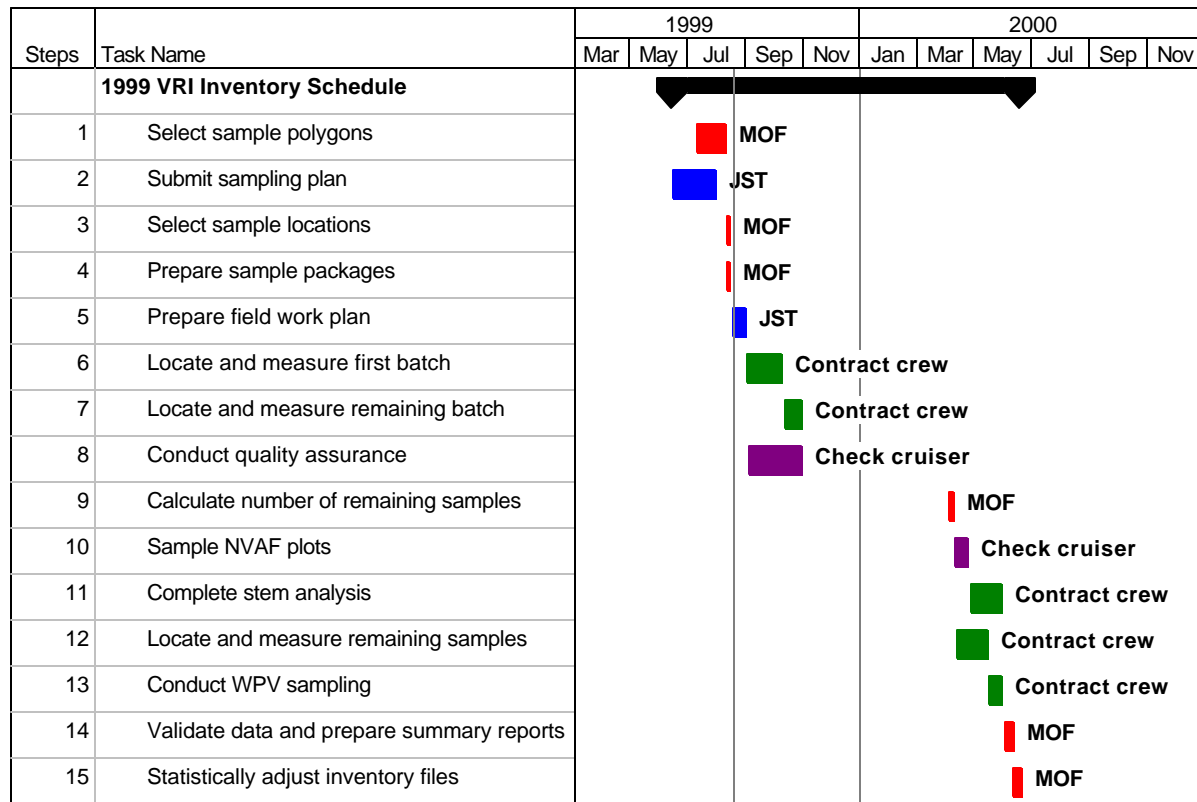


Figure 2. Project activities in the IFPA area of the Fraser TSA.

#### 4.4 SAMPLE PACKAGES

Field sample packages must be prepared and approved by the MOF prior to beginning fieldwork. They should include most current photo stereo-pairs for access, copy of document photo (where possible),

<sup>8</sup> J.S. Thrower & Assoc. will prepare the tree-sampling matrix, and select the sample trees.

<sup>9</sup> J.S. Thrower & Assoc. will ensure data submitted to MOF is clean.

sample cluster location maps (1:10,000), and access maps (1:20,000) clearly indicating sample cluster location and polygon boundaries; and overview maps (1:250,000) for general polygon location. Maps will be plotted showing the VRI grid overlays and selected sample locations. Sample locations within a polygon will be selected using GIS.

#### **4.5 PROJECT SUPPORT**

Provision of field supplies such as aluminum stakes, field maps, photos, field cards, and equipment (including GPS) will be the responsibility of the contract crews. Helicopter use will be provided and arranged by J.S. Thrower & Associates.

#### **4.6 FIELDWORK**

Fieldwork will be completed using VRI measurement protocols and certified crews. The VRI Card Types 1-3 and 8-11 will be completed according to the VRI Ground Sampling version 4. J.S. Thrower & Associates will manage the fieldwork contracts and ensure data quality.

#### **4.7 QUALITY ASSURANCE**

Quality assurance must be conducted. The VRI quality assurance standards require inspection of at least 10% of the samples. The field crews are responsible for the quality control of their own work.

#### **4.8 DATA COMPILATION, ANALYSIS, AND ADJUSTMENT**

The MOF Resources Inventory Branch will complete data compilation; contract field crews will do data entry. J.S. Thrower & Assoc. will complete the statistical analysis and database adjustment of the IFPA area. The Resources Inventory Branch and the Region may check the results of these analyses. The MOF will complete the statistical analysis in the Remainder of the TSA and combine the data with that in the IFPA area.

#### **4.9 ROLES AND RESPONSIBILITIES**

##### ***Ministry of Forests***

The MOF will:

- Select the sample polygons (Resources Inventory Branch).
- Select sample locations within polygons (Vancouver Forest region).



- Prepare all sample packages (Vancouver Forest Region)
- Mentor NVAF crews (Resources Inventory Branch).
- Conduct NVAF quality assurance (Resources Inventory Branch)
- Conduct sample cluster quality assurance (Vancouver Forest Region)
- Check data after initial compilation (Vancouver Forest Region).
- Validate and compile data (Resources Inventory Branch).
- Provide attribute files and minimum standards for statistical analysis (Resources Inventory Branch).
- Prepare and sign-off Standards Agreement and Schedule A (Agreement between Interfor and the MOF Vancouver Regional Office)(Vancouver Forest Region).

**Interfor**

Interfor will:

- Liaise with the MOF to ensure IFPA and TSA goals are met.
- Award fieldwork contracts for the IPFA and the TSA.

**J.S. Thrower & Associates**

J.S. Thrower & Assoc. will, on behalf of Interfor:

- Prepare Sampling Plan for entire TSA and the IFPA area.
- Provide mentor for field crews at the start of fieldwork.
- Coordinate project activities.
- Liaise with the MOF.
- Monitor and communicate project progress to MOF and Interfor.
- Ensure all contractors are qualified and certified; and tender and manage fieldwork contracts.
- Assess access and coordinate the use of helicopters.
- Monitor the budget.
- Identify access routes and potential tie points.
- Ensure sample packages in the IFPA area and TSA are assembled and complete.
- Oversee ground sampling activities.
- Ensure quality assurance (QA) is complete.
- Assist in coordinating technical expertise where required.
- Ensure the data submitted to MOF is clean.

**Field work contractors**

- Complete field sampling.
- Conduct internal quality control.
- Enter the sample data.

**Check-cruiser**

- Complete QA work for 10% of the VRI samples, and issue quality certificates.
- Complete call grading/net factoring of the NVAF samples.
- Enter the sample data.
- Prepare the QA report.

## 5 APPENDIX A

## MAP SHEET NUMBERS FOR THE FRASER TSA DATABASE SAMPLED

092G009	092G058	092H015	092H065
092G010	092G059	092H016	092H071
092G018	092G060	092H017	092H072
092G019	092G065	092H021	092H073
092G020	092G066	092H022	092H074
092G026	092G067	092H023	092H075
092G027	092G068	092H024	092H081
092G028	092G069	092H025	092H082
092G029	092G070	092H026	092H083
092G030	092G076	092H031	092H084
092G033	092G077	092H032	092H085
092G034	092G078	092H033	092H091
092G035	092G079	092H034	092H092
092G036	092G080	092H035	092H093
092G037	092G090	092H041	092H094
092G038	092G099	092H042	092I001
092G039	092G100	092H043	092I002
092G040	092H001	092H044	092I003
092G044	092H002	092H045	092I004
092G045	092H003	092H051	092I013
092G046	092H004	092H052	092I014
092G047	092H005	092H053	092J009
092G048	092H006	092H054	092J010
092G049	092H007	092H055	092J019
092G050	092H011	092H061	092J020
092G055	092H012	092H062	
092G056	092H013	092H063	
092G057	092H014	092H064	

**6 APPENDIX B**  
**LIST OF SAMPLE POLYGONS IN THE IFPA AREA**

PROJ_NO	SAMPLE	BATCH	MAP_NO	POLY_NO
<b>Batch 1(16 samples)</b>				
0302	1	1	092H023	595
0302	2	1	092H043	1124
0302	3	1	092H043	993
0302	4	1	092H014	371
0302	5	1	092H014	1188
0302	6	1	092H054	794
0302	7	1	092H004	209
0302	8	1	092H053	699
0302	9	1	092H014	1297
0302	10	1	092H053	649
0302	11	1	092H054	265
0302	12	1	092H024	456
0302	13	1	092H033	210
0302	14	1	092H033	204
0302	15	1	092H013	1260
0302	16	1	092H033	223

**Batch 2 (16 samples)**

0302	17	2	092H032	67
0302	18	2	092H024	696
0302	19	2	092H053	232
0302	20	2	092H023	1319
0302	21	2	092H043	1256
0302	22	2	092H053	431
0302	23	2	092H044	954
0302	24	2	092H023	1187
0302	25	2	092H023	602
0302	26	2	092H033	90
0302	27	2	092H014	545
0302	28	2	092H023	1426
0302	29	2	092H054	1566
0302	30	2	092H053	380
0302	31	2	092H004	662

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PROJ_NO	SAMPLE	BATCH	MAP_NO	POLY_NO
0302	32	2	092H014	906
<b>Batch 3 (18 samples)</b>				
0302	33	3	092H033	447
0302	34	3	092H013	1422
0302	35	3	092H043	82
0302	36	3	092H023	379
0302	37	3	092H023	760
0302	38	3	092H022	330
0302	39	3	092H043	385
0302	40	3	092H033	508
0302	41	3	092H043	383
0302	42	3	092H024	662
0302	43	3	092H053	835
0302	44	3	092H014	399
0302	45	3	092H054	1167
0302	46	3	092H033	650
0302	47	3	092H044	517
0302	48	3	092H054	1670
0302	49	3	092H054	1689
0302	50	3	092H043	1365

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## 7 APPENDIX C

LIST OF SAMPLE POLYGONS IN THE REMAINING (NON-IFPA) AREA OF  
TSA

PROJ_NO	SAMPLE	BATCH	MAP_NO	POLY_NO
<b>Batch 1 (15 samples)</b>				
0301	1	1	092H093	519
0301	2	1	092G030	307
0301	3	1	092H093	629
0301	4	1	092G036	668
0301	5	1	092G030	627
0301	6	1	092G030	1152
0301	7	1	092G050	205
0301	8	1	092H071	109
0301	9	1	092H061	757
0301	10	1	092H071	122
0301	11	1	092H002	307
0301	12	1	092H081	326
0301	13	1	092H013	433
0301	14	1	092G080	342
0301	15	1	092G018	63
<b>Batch 2 (15 samples)</b>				
0301	16	2	092H021	555
0301	17	2	092G040	778
0301	18	2	092H074	678
0301	19	2	092G058	1261
0301	20	2	092H041	481
0301	21	2	092G030	147
0301	22	2	092G050	683
0301	23	2	092H093	1261
0301	24	2	092H043	534
0301	25	2	092H002	499
0301	26	2	092H073	1505
0301	27	2	092H042	884
0301	28	2	092H055	150
0301	29	2	092H001	577
0301	30	2	092H033	1033

PROJ_NO	SAMPLE	BATCH	MAP_NO	POLY_NO
<b>Batch 3 (15 samples)</b>				
0301	31	3	092H031	674
0301	32	3	092G029	123
0301	33	3	092G050	292
0301	34	3	092H031	910
0301	35	3	092H052	332
0301	36	3	092H031	260
0301	37	3	092G040	532
0301	38	3	092H024	1379
0301	39	3	092H002	526
0301	40	3	092H073	1771
0301	41	3	092H042	655
0301	42	3	092H044	567
0301	43	3	092H044	518
0301	44	3	092G027	545
0301	45	3	092H082	786

**Batch 4 (15 samples)**

0301	46	4	092G019	234
0301	47	4	092G059	506
0301	48	4	092H062	43
0301	49	4	092H012	315
0301	50	4	092G039	368
0301	51	4	092G049	1314
0301	52	4	092H041	298
0301	53	4	092H034	921
0301	54	4	092G100	72
0301	55	4	092H073	1078
0301	56	4	092H091	1992
0301	57	4	092H034	1320
0301	58	4	092G050	1065
0301	59	4	092H071	411
0301	60	4	092H062	450

**Batch 5 (15 samples)**

0301	61	5	092H022	271
0301	62	5	092G069	1600
0301	63	5	092H031	495

PROJ_NO	SAMPLE	BATCH	MAP_NO	POLY_NO
0301	64	5	092H042	807
0301	65	5	092H021	456
0301	66	5	092H031	123
0301	67	5	092G060	1252
0301	68	5	092G050	310
0301	69	5	092H051	633
0301	70	5	092H001	958
0301	71	5	092G059	793
0301	72	5	092H042	470
0301	73	5	092H092	1276
0301	74	5	092H072	1030
0301	75	5	092G009	200

**Batch 6 (12 samples)**

0301	76	6	092G009	71
0301	77	6	092G050	861
0301	78	6	092H003	906
0301	79	6	092G067	520
0301	80	6	092H094	568
0301	81	6	092G100	1073
0301	82	6	092H094	242
0301	83	6	092H034	625
0301	84	6	092G039	412
0301	85	6	092H052	897
0301	86	6	092I002	981
0301	87	6	092H035	373

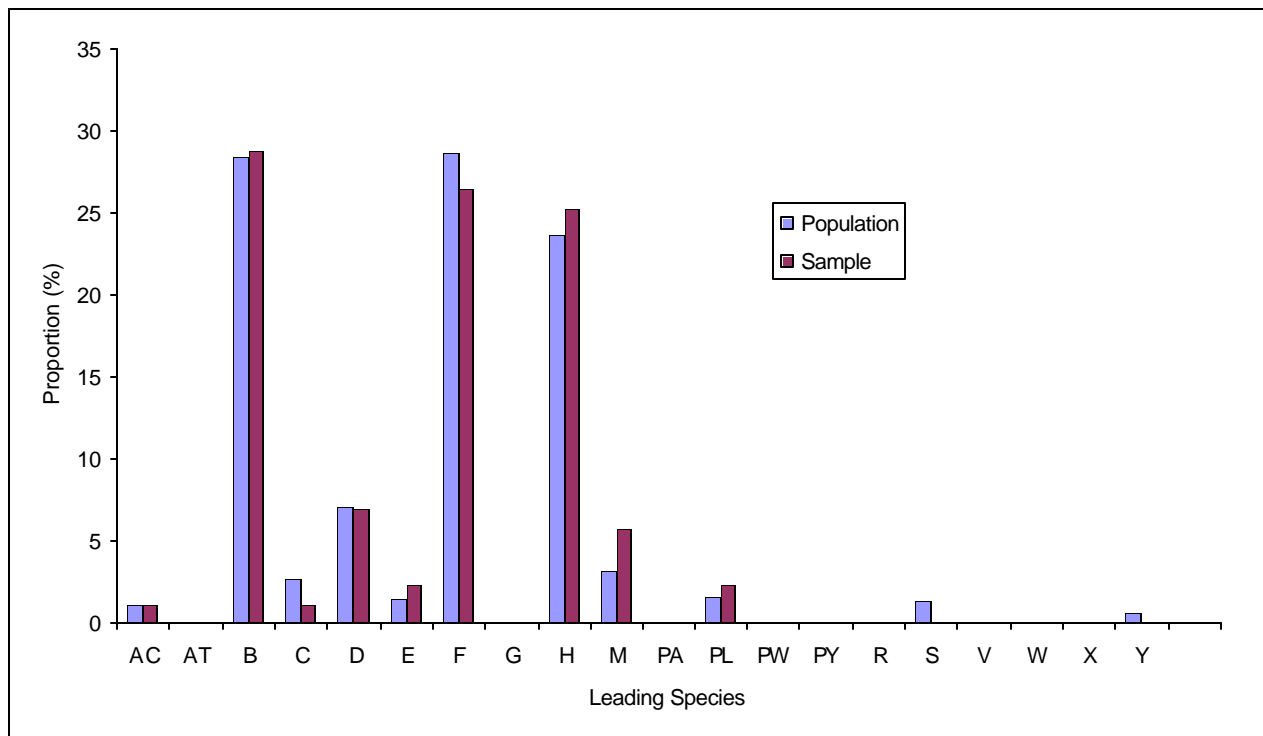


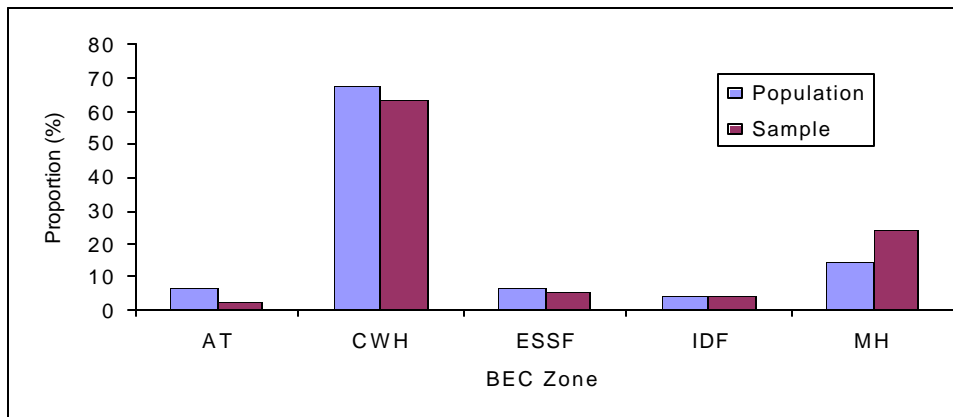
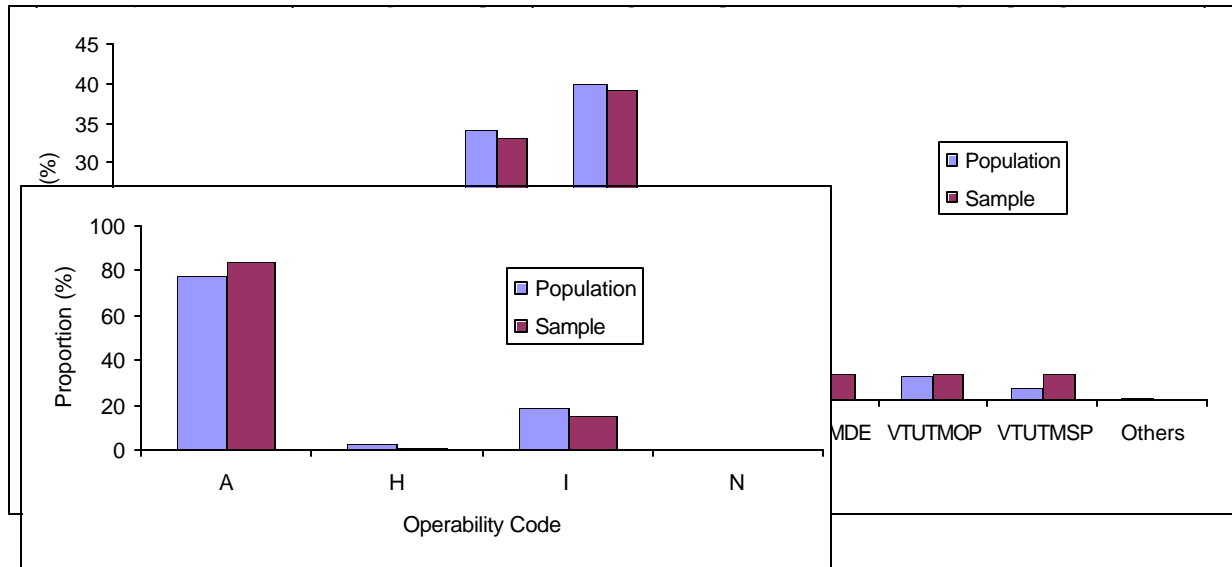
## 8 APPENDIX D

### COMPARISON BETWEEN POPULATION AND THE SAMPLE POLYGONS IN THE FRASER TSA

#### 9

The following four graphs depict the comparisons for the entire TSA (combined IFPA Area and Remaining Area of TSA) between population and sample percentages by Leading species, BC Landcover Classification scheme (BCLCS), Biogeoclimatic zone (BEC), and Operability. The population values are area percentages, and the sample values are proportions of number of samples. The graphs suggest that the selected sample (Appendices B and C) is representative of the entire Vegetated Treed TSA target population. (Similar observations were made when comparisons were made separately for the IFPA Area and for the Remaining Area; these graphs are, however, not shown here.)





## 10 APPENDIX E

### EXAMPLE: IMPACT OF ADDING SAMPLES IN THE IFPA AREA

We outline a simple example to illustrate one way to compile the inventory in the Fraser TSA. The purpose of this example is to demonstrate that adding samples to the Hope IFPA area within the Fraser TSA and compiling the IFPA area separately will not affect the estimates of volume in the remainder of the TSA. The example compilation involves 3 steps:<sup>10</sup>

1. Suppose we install an initial sample of 46 polygons over the entire TSA land base: 27 fall in the IPFA area and 19 in the Remaining Area.
2. Compile the inventory volumes separately for each area, and combine using the stratified sampling method (Table 3).

Table 3. Illustration of inventory compilation before adding samples to IPFA Area.

Target Population	Sample size	Average volume (m <sup>3</sup> /ha)	Area weights
Remaining Area	19	455.2	0.413
IFPA area	27	403.2	0.587
<i>Total (weighted)</i>	46	424.6	

1. Add a second batch of 100 samples in the IFPA area, and recompile the inventory separately for each area, and combine again using the stratified sampling method (Table 4).

Table 4. Illustration of inventory compilation *after* adding samples to IFPA Area.

Target Population	Sample size	Average volume (m <sup>3</sup> /ha)	Area weights*
Remaining Area	19	455.2	0.413
IFPA Area	127	451.9	0.587

<sup>10</sup> The volumes used in this example are based on the Fraser TSA inventory audit where, for illustration purposes, the TSA Operable landbase corresponds to the IFPA area and the Inoperable area corresponds to the remainder of the TSA

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<i>Total (weighted)</i>	146	453.3
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\* Area weights do not change, since strata sizes are still the same.

In this example, we observe that after adding samples in the IFPA area, the volume/ha in the Remaining area is unchanged, while that in the IFPA area and the new total volume have gone up.