Robson Valley Timber Supply Area

Vegetation Resources Inventory
Project Implementation Plan for Ground Sampling and Net Volume Adjustment Factor Sampling

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Executive Summary

This Vegetation Resource Inventory (VRI) Project Implementation Plan (VPIP) provides details for the VRI project in the Robson Valley Timber Supply Area (TSA). It is the 'operational' planning document that will guide VRI activities during future field seasons.

The following VRI work is planned for the Robson Valley TSA:

1. A total of 100 VRI ground samples will be established randomly throughout the selected TSA landbase, their location based on the Vegetation Resources Inventory Sample Selection Procedures for Ground Sampling v3.3. In addition to the regular Timber Emphasis data collection, field crews will be collecting data on dead trees in the auxiliary plots and additional 'small tree plot' data.
2. Destructive sampling will be carried out on 115 trees selected from a 39 sample sub-set of the original 100 samples in a Net Volume Adjustment Factor (NVAF) sampling project.
3. There will be an Analysis & Adjustment of the current Photo Interpreted Inventory based on the ground sampling and NVAF sampling data.
4. Data collected for additional attributes will be analyzed or incorporated in model development or research work.
5. The investigation of a Monitoring project will occur in a future amendment to this VPIP. Twenty-five (25) samples will be established as a long-term Monitoring project, with both certified timber and ecology data collection.

This plan also documents other critical decisions that have been made in preparation for the project. The target population is the 'Vegetated Treed' land base in the operable[1] segment of the TSA, greater than 30 years of age. The following have been excluded; private land, Indian reserves, parks and protected areas. Ground sample selection has been completed based on four strata:

- Strata 1: Spruce
- Strata 2: Balsam
- Strata 3: Douglas Fir - Pine and other minor species (Deciduous)
- Strata 4: Cedar – Hemlock

The VRI Samples will be distributed as follows:

- Strata 1, 2, 3 & 4 = 80 samples, proportionately distributed according to each stratum's area
- Strata 4 – An additional 20 samples
- Total sample size = 100

Each stratum will also be subdivided into 3 volume classes, or "sub strata".

Costs and timelines for the activities in this project have been provided in this plan.

[1] Through this planning process, for the purpose of sample establishment for sample selection, an elevation limit of 1750 m. has been used to define the operable land base.

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1.0 Introduction

The Vegetation Resources Inventory (VRI) was designed to answer two questions: Where is, and how much of, a vegetation resource is located in an inventory unit? This inventory has the ability to include the entire vegetation resource, including ecology and timber data collection. Another critical element is the statistically based ground sampling program that results in the establishment of randomly located samples across the selected landbase.

The initial step in any effective inventory process is planning. VRI planning involves three parts:

- Consultation with licensee and government stakeholders to identify issues that can be addressed by executing part or all of the Vegetation Resources Inventory, according to its Procedures and Standards.

- Development of a VRI Strategic Inventory Plan (VSIP) to provide general background on the various VRI activities then identifies which ones would address local needs.

- **Development of a VRI Project Implementation Plan (VPIP). "The VPIP is a working document that details the specific operational activities associated with implementation and documentation of the inventory project."[2] A VPIP includes the sampling details including population, strata and sample lists, activity specifics, steps in the process and timelines, costs and deliverables for the project.**

The Strategic Plan provided background on the two phases in the Vegetation Resources Inventory. Phase 1 or photo interpretation delineates polygons of homogenous land cover types and provides estimates of the vegetation attributes for each polygon. Phase 2 is ground sampling to verify or adjust Phase 1 vegetation attributes. The VSIP written for the Robson Valley Timber Supply Area (TSA) assessed the current forest cover inventory needs for this TSA in the context of the VRI.

1.1 Document Objectives

Based on the direction determined in the VSIP, this VPIP describes proposed activities associated with Phase 2 ground and Net Volume Adjustment Factor (NVAF) sampling. It will reference subsequent analyses and proposes future consideration of a monitoring project. The plan will be stored on the Ministry of Forest & Range (MoFR) VRI website[3] and will be readily available to provide a guideline to both those undertaking this project

[2] From the Executive Summary of the VRI Standard – Guidelines for Preparing a Project Implementation Plan for Ground Sampling and Net Volume Adjustment Factor Sampling.
[3] http://www.for.gov.bc.ca/hts/vri/reports&pub/vri_vripub.html#top

and those in the future requiring a reference when investigating the activities completed under its guidance.

1.2 Landbase (adapted from the Robson Valley TSA AAC Rationale – August 4, 2006)

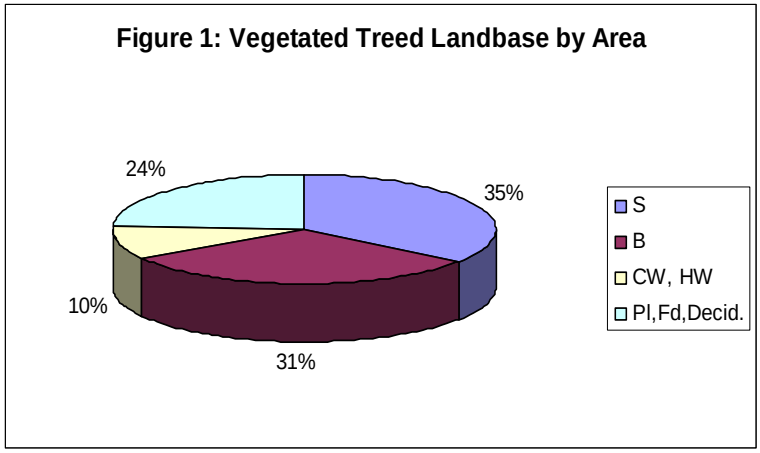
The Robson Valley TSA is located in east central BC between Bowron Lake and Wells Gray Provincial Parks on the west and the Province of Alberta on the east. It comprises approximately 1.46 million hectares of the Headwaters Forest District which is administered from Ministry of Forest and Range office in Clearwater with a field office in McBride. The population of the TSA is 3963 people about half of which live in the two largest communities of McBride and Valemount. The smaller communities of Crescent Spur, Dunster, Tete Jaune Cache, and Albreda are also in the TSA. Mount Robson Provincial Park is located in the TSA. Figure 2 is an overview map of the area.

The terrain is quite variable. The Rocky Mountain Trench runs through the center of the TSA which is a broad valley bottom. Steep rugged ground is found in the Rocky Mountains to the east and the Cariboo and Monashee Mountains to the west.

Of the total area for the TSA, only about 15% is considered available for timber harvesting under current management practices.

There are four biogeoclimatic zones in the TSA including Alpine Tundra, Engelmann Spruce-Subalpine Fir, Interior Cedar-Hemlock, and Sub-boreal Spruce. Spruce and balsam leading stands predominate the vegetated treed component of the landbase. The licensees have expressed an interest in obtaining data on the cedar and hemlock leading stands. Figure 1 provides a breakdown of the Vegetated Treed Landbase by the strata outlined in Section 2.4.1. Over 50% of the stands are greater than 140 years of age.

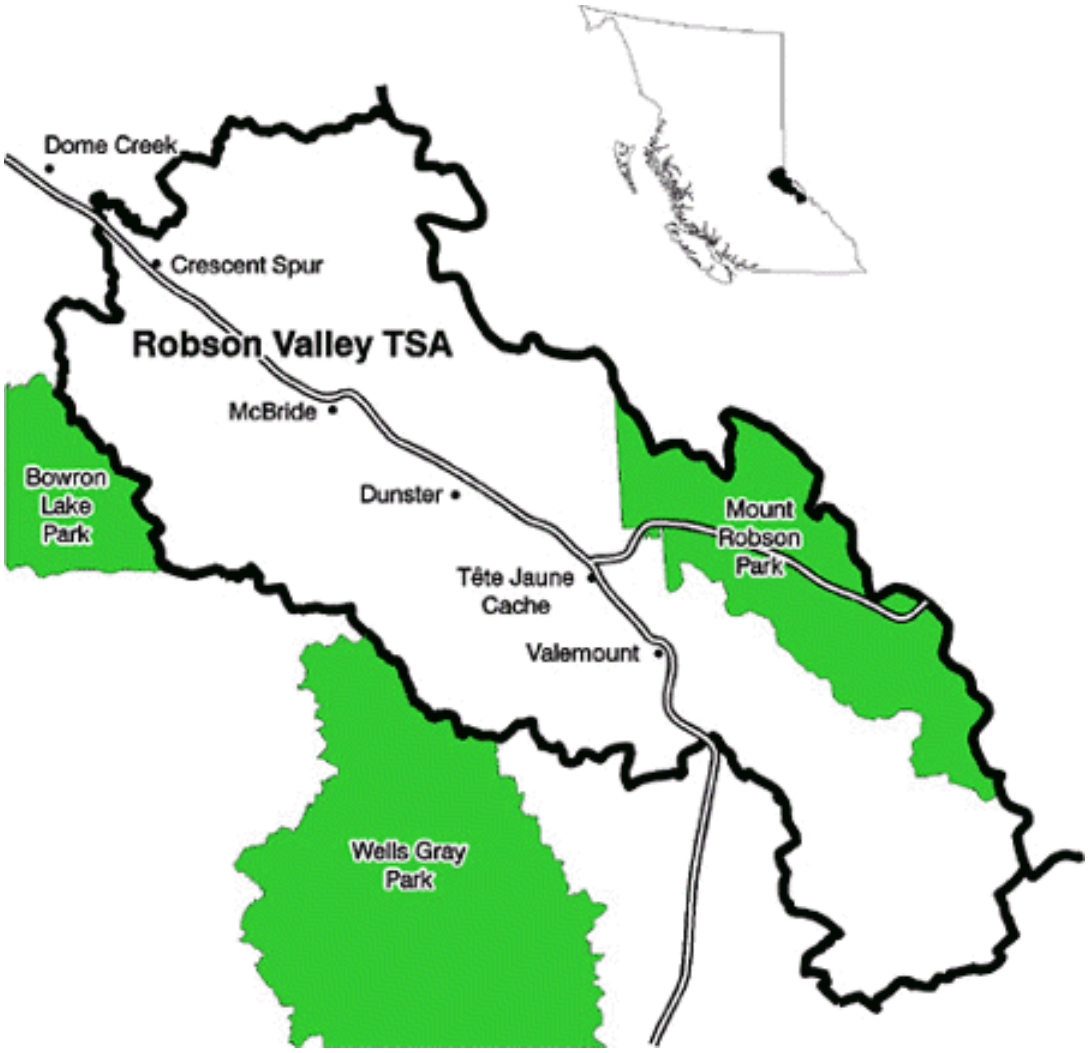
Figure 1: Vegetated Treed Landbase by Area



There are no First Nation communities in the TSA but the following four assert territorial interests in the area.

- Lheidli T'enneh Nation
- North Thompson Band (Simpcw First Nation)
- Canim Lake Band
- Red Bluff Band

Figure 2. Robson Valley TSA



The gross area of the Robson Valley TSA has been confirmed to be 1,458,549 hectares.[4] Included in this area are parks and protected areas, including Mount Robson Park. The landbase of the Robson Valley TSA for this project is 435,896.62 hectares in the Vegetated Treed (VT) land cover classification[5], with 426,799.7 hectares in all species, age 31+[6]. This area excludes private land, Indian reserve, parks, and protected areas and alpine tundra (At). For this project, an operability line has been drawn at 1750 metres[7] in an attempt to address the operable versus inoperable area. More details on the project landbase can be found in Appendix A.

1.3 State of the Inventory

The Ministry of Forests completed a forest cover reinventory of the TSA (excluding Mount Robson Park) in 1994-95. The most current update year for the Veg files for the Robson Valley TSA in the Land & Resource Data Warehouse (LRDW) is 2002.

The inventory audit that occurred in the Robson Valley TSA in 1998 was part of a provincial program to assess the accuracy of the current forest inventory. For this TSA, the audit results showed that in the mature forest there is no statistically significant difference between the average volume for the audit and the inventory. The population of samples was then stratified to assess the operable forested area. Again, there was no statistically significant difference between the mean audit volume and the mean inventory volume. Audit results for the immature component of the inventory suggest an acceptable level of accuracy for site index assignment in young stands.

There have been no previous plans written for VRI activities that incorporate part or all of this TSA.

2.0 Ground Sampling Plan

2.1 Sampling objectives

This project was initiated and has been supported by the local Licensees including BC Timber Sales, Prince George Business Area. Various government

[4] Numbers related to identifying the sampling population are the result of GIS work conducted for this project by Meridian Mapping Ltd., Nanaimo B.C.
[5] B.C. Land Cover Classification Scheme
[6] Land mass VT, without Non Productive codes and non forest description from Gitte Churlish.
[7] The 1750 metre line was developed based on personal communication between the Inventory contractor, the Regional Ecologist and Licensees. In regard to polygons crossing this line, if they are greater than 50% in the operable side of the line then they will be kept in the operable land base and therefore in the sampling population.

agencies including the MoFR inventory personnel in the Southern Interior Forest Region (SIFR) and Forest Analysis Inventory Branch (FAIB) have provided their expertise during the Stakeholders' meeting and plan development.

The primary objective is to install an adequate number of VRI sample clusters to achieve a sampling error of ± 10% (95% probability) for overall net timber volume. This will allow for the statistical adjustment of the timber inventory for the project population.

Through the completion of VRI ground sampling and NVAF activities data may be collected to provide information on the following issues of particular interest to the Stakeholder group:

- Provide dead wood volume
- Obtain more accurate volume in Cedar and Hemlock through increased ground sampling and NVAF destructive sampling
- Improve current site index estimates
- Provide better data on species composition in mixed wood stands
- Improve information on potential future volume of wood coming from the understory

2.2 Target Population

The population of interest for this study includes polygons greater than 30 years of age and all species in the operable area (as defined in Section 1.2) of the Vegetated Treed land classification.

The following will be excluded from sampling:

- Private land
- Indian Reserves
- Parks
- Protected Areas
- Samples showing the forest to be harvested at the IPC (Integrated Plot Centre) during a pre-screening process

All Community Forests and woodlots (Crown land only) are included.

The target population encompasses a total area of 426,799.7 hectares.

2.3 Sample Size

To obtain an estimate of the coefficient of variation (CV), the MoFR Guidelines for the Preparation of a VPIP recommends using the CV from the inventory audit, increased by an additional 10% to account for differences in the sampling

methodology. The 1998 inventory audit for the mature component (>60 years of age) of the total forested area of the Robson Valley TSA indicated a CV of 33%. If the audit showed a 33% CV, the Ministry's guidelines would suggest that we use 43% for the VRI CV. The increase from the audit CV by 10% reflects the fact that we expect more variability in the VRI results than we would in the audit results." (This is based on the different sample design - the audit 9 point cluster compared with the VRI 5 point cluster.) Hence a reasonable estimate of the CV for this project is likely around 43%. Based on the target sampling error of 10% and a 95% probability level ($t \approx 2$), estimated CVs of 43% would produce a sample size of 75[8].

These sample size estimates were used to indicate the minimum number of samples necessary to achieve the target sampling error objective for this project. To allow for sufficient sample size within sub-strata, it was decided to allocate a total of100 samples.

2.4 Strata

2.4.1 Ground Sampling

The population was stratified for sample selection. An option of breaking down the population into strata based on species proportional to representation in the population was suggested in an excerpt from the VSIP circulated to the licensees. The feedback received suggested the desire for information on some species groups was greater than their proportion in the population, and so this has been discussed and investigated by the MoFR and contractors supporting this plan's preparation. As a result of this process, the following strata have been identified for VRI ground sample selection:

- Strata 1: Spruce
- Strata 2: Balsam
- Strata 3: Pine-Douglas Fir and other minor species including deciduous species
- Strata 4: Cedar – Hemlock

There will be a total of 100 samples established for the project. 80 samples will be selected based on proportional representation in the population. An additional 20 samples will be added to the Cedar-Hemlock stratum. The Licensees repeatedly stated that they wanted additional information on Balsam, Cedar and Hemlock. Since Balsam is well represented in the population, using proportional representation to derive samples will provide an excess of 20 samples in this stratum. Cedar and Hemlock are more minor

[8] Inventory audit CVs and calculated samples sizes were provided by Karen Jahraus, RPF (Jahraus & Associates Consulting Inc.).

components of the landbase, so to obtain a reasonable sample size for this stratum and obtain more data on these species for analysis, there was a need to take an alternate approach to deriving this enhanced sample number. The strata have been separated into sub-strata based on 3 volume classes.

Appendix A shows how strata and volume class sub strata are defined and how samples were distributed among them.

The planned distribution of samples is shown in Table 1 below.

Table 1: Planned Distribution of Samples

Stratum	Population Area (ha)	Planned number of samples	Number of hectares represented by each sample
Spruce	148807	28	5314.54
Balsam	131940	25	5277.60
Pine –Douglas Fir-other	102901	19	5415.84
Cedar - Hemlock	43151	8 + 20	1541.11
Total	426,799	100	

2.4.2 NVAF

In this project planning process, the NVAF sample size was approved by FAIB staff[9] and the selection of NVAF samples was completed to the Standard[10]. Table 2 below shows the distribution of ground samples for NVAF by age class. The complete NVAF profile can be found in Appendix D. There will be a total of 115 trees sampled of which 10 will be dead.

The sample size for the new sample strata is based on a guideline that a minimum of 20 trees per stratum will allow for some confidence in the results. For dead trees, the sample size has been reduced to 10 dead trees[11]. The live mature Pl stratum has been reduced to 15 trees and has been combined with other minor species represented in the population due to the expectation that pine is in decline and is not expected to be a component of the mature inventory in the near future. The sample size by species in the other species' mature strata and the mixed species immature strata will be proportional to either the area of leading species or the per hectare volumes of the NVAF

[9] Will Smith, Volume and Decay Sampling Officer for the Forest Analysis & Inventory Branch.
[10] Net Volume Adjustment Factor Sampling Standards and Procedures, located at the website: http://ilmbwww.gov.bc.ca/risc/pubs/teveg/nvaf_2k6/nvaf_2k6.pdf
[11] Based on personal communication with Will Smith on February 5, 2007. There is currently an assessment being made of the NVAF Standard which may allow a reduction of the number of dead trees. The overall NVAF destructive sample would remain at a minimum of 100 trees.

ground samples OR weighted, depending on availability of the information. The NVAF (destructive) sample plan will be produced after the NVAF ground samples are established.
In the development of the VRI plans, the licensees were consulted regarding NVAF strata. They supported the suggestion of destructively sampling 20 trees of each of the following species: Cedar, Hemlock, Spruce, Balsam and Pine.

Table 2. NVAF Ground Sample Distribution

Age Class (years)	**NVAF Samples**
Immature 31-120	4
Mature 121+	35
Total	**39**

Table 2.1. NVAF Stratum Sample Size

Age Grouping	No of New Sample Trees
Immature	10
Mature S-Fd	20
Mature Balsam	20
Mature Cedar	20
Mature Hemlock	20
Mature Pl-other minor species	15
Dead	10
Total	115

2.5 Sample Selection

The Standard 'VRI Sample Selection Procedures for Ground Sampling' outlines the process in detail and will be used as a guideline for this work.

Documentation of the Sample Selection process is included in Appendix A.

2.5.1 Ground Sampling

The initial step was to properly identify the population of the Robson Valley TSA. Details in the Appendices to this planning document provide a District Distribution and summarize the vegetated treed landbase by:

- Strata
- Strata by Species by Age Group (Immature or Mature)
- Species distribution

- Projected Age Classes
- Species by Projected Age Class
- Mapsheet

A number of sampling lists were developed, each with 100 samples. More than one list was required to allow replacement of samples not selected with ones in the same stratum and volume class sub stratum. It is worthwhile to select extra samples at this point in the project – there is little extra cost compared to starting the process again later if the project runs short on samples.

Sample polygons were reviewed for overlaps with private land, Indian Reserves, parks, protected areas, and cutblocks. Polygons were not selected if there was a 100% overlap with one or more of the above noted issues. Sample polygons were reviewed and selected first from list 1. Polygons to replace those not selected in list 1 were chosen from the same stratum and sub-stratum as those rejected, in order of sample number, from the "selected" polygons in list 2.

Sample points were next located randomly within the sample polygon using GIS techniques according to procedures outlined in *Vegetation Resources Inventory –Sample Selection Procedures for Ground Sampling-Section 4.0*.[12]

Sample locations were then reviewed to determine if they were in private land, Indian Reserves, parks, protected areas or cutblocks. If the Integrated Plot Center (IPC) was located in any one of these restricted areas it was rejected. Replacement of samples was again done according to the stratum and sub stratum from which the rejected sample came by order of sample number, from lists 2, etc., as necessary.

In addition to the initial 100 samples, "contingency" samples were identified for each sub stratum in the likely event that some of the initial samples are rejected in the field for any of the above reasons or due to safety issues, following field reconnaissance. Appendix B describes the systematic process of sample replacement and provides a complete list for the field project.

2.5.2 NVAF

Will Smith has been involved in decisions related to the NVAF sampling selection. The MoFR will provide mentoring support for this aspect of the project.

[12] This GIS exercise was completed by Meridian Mapping Limited.

The NVAF samples are a subset of the VRI sample selection. The selection of 39 NVAF samples will be derived from the 'final' ground sample list. NVAF sample selections will be proportional to area for all stands greater than 30 years.

Enhancement of auxiliary plots will be completed at the time of the establishment of the ground samples.

Specific NVAF trees cannot be selected until the associated ground sampling has been completed and the data is compiled. If the data is collected in the first year of sampling, the tree selection can occur over the winter months. The work can be bid, and the destructive sampling phase started as early as the following field season. If the data collection is not prioritized and is part of the overall multi-year program to complete the ground samples, then the NVAF destructive sampling may be delayed for a year. Completing the data collection for the NVAF samples could be made a priority.

2.5.3 Monitoring

The Monitoring project plan in the Robson Valley TSA still has not been formulated. It is proposed that a monitoring plan will be written as an amendment to the VPIP at a later date. At this time, a 'best estimate' for the number of monitoring samples would be 25. This will be reviewed when the monitoring plan is developed.

On these projects, the monitoring protocols currently in use were developed for the National Forest Inventory. Modifications have included:

- Adding shelf life study work in pine leading stands
- Increasing the size and classes in the 'small tree plot'
- Changing the Coarse Woody Debris (CWD) to drop the 'small woody debris' data from the last 10 metres of the transect
- Reducing VRI certified ecology data collection to follow the protocols of the VRI manual

It should be noted that the protocol for establishing monitoring plots is being investigated for field work in 2007 by the MoFR. If new protocols are developed prior to undertaking a monitoring project, they will be incorporated into the Robson Valley TSA work.

2.6 Sampling Approach

This planning work has been prepared based on the proponent's desire to start the ground sampling work for the TSA. Once the VRI plans have been reviewed and signed off, since the overview map and packages are prepared, the work

could be bid to certified VRI staff when this project is seen as a priority and funding can be secured.

There are two issues related to initiating this project at this time:

1. The discussion of Provincial prioritization for undertaking VRI projects: If this is the case, then it will be important for the licensees to put this project before the group making the decisions and build a case for starting this project.
2. Delay in approval to bid out the work for this project: It is recognized that VRI ground sampling activity has currently escalated across the province. The intention of bidding work early in a new fiscal year is that this will facilitate the obtaining of skilled field crews to get the timber data collected for a number of samples in the first field season.

Execution of this plan in subsequent fiscal years does not negate its use. Therefore, in writing the plan, 'year 1, year 2 or year 3' has been used for the first and subsequent years of activity on the project, rather than a specific fiscal year. Since the project is dependent on funding approval and availability, it is possible that 3 field seasons may be required to complete all of the Phase 2 ground samples and NVAF destructive sampling. This plan has been written based on this timeframe, and can be abbreviated if more funding is available to facilitate reducing the project completion timeframe.

The completion of 100 VRI ground samples will require 100 crew days based on an average of 1 sample per day. Mentoring will occur on actual samples to focus the interaction on operational procedures and maintain production. If ground sampling requires two field seasons to complete, there needs to be a decision whether the priority in completing the ground samples will be associated with NVAF data collection or whether to 'risk' completing the samples systematically across the land base for operational efficiency.

2.7 Sample Type

The ground sampling for the Robson Valley TSA will be Timber Emphasis conducted by certified VRI Timber contractors. Additional data collection planned outside of the VRI Standards will involve the following:

1. Following discussion with David Coates of the MoFR, the regeneration plot will be increased in size to a 3.99 meter radius[13]. In addition to the current 3 classes, there will be a dot count of:
    i) 4 to 7.4 cm. dbh trees
    ii) 7.5 cm+ dbh trees.
2. The auxiliary plot data will include dead tree measurements[14].

[13] Based on David Coates paper on Secondary Structure (see Bibliography). This increased detail in the small tree plot has been developed to provide an opportunity for better assessment of secondary structure.

If it is deemed that the additional data collection will add to the cost of completing data collection on a sample, the Project Manager may bid the work with the Standard data and with the Additional Data. FIA funds do not cover additional data collection, so the Licensee would need to pay for the difference in cost.

3.0 Implementation Plan

3.1 Scheduling

Table 3 – Schedule of Activities

Timing	VRI Activity
Preliminary Year	VSIP and VPIP preparation -includes Sampling plan development and package preparation
Year 1	Contract administration 50 Timber Emphasis Plots – timber data collection. Mentoring – additional attributes, as required QA-10% or 5 samples
Year 2	Contract administration 50 Timber Emphasis Plots – timber data collection Mentoring – additional attributes, as required QA – 10% or 5 samples
Year 2 or 3	NVAF destructive sampling Quality Assurance-NVAF Final Compilation/analysis and inventory file adjustment based on Ground Sampling work
To be determined	Monitoring project – All phases, from preparation of packages to establishment
Annually	Helicopter, as required to access samples

3.2 Sample Packages

The crews will be provided with a large scale overview map of the project area. There will be a project list that includes the geographic location (UTMs) for each sample IPC, highlight of the NVAF samples, and a rough estimate of the access type (i.e. heli, truck – 4X4, quad).

[14] Personal Communication, Matt Makar. The MoFR is considering modifying standards to include the tallying of dead trees in the Auxiliary plots. This would require tallying species, live/dead status, dead/fallen status and diameter on dead trees. As well, the first dead tree of a species encountered would need to be "enhanced".

Sample packages will be prepared for each sample for each Ground Sampling activity. These will contain the information required for field crews to navigate to, and establish the sample. Depending on whether the Monitoring sample locations are unique from the Ground Samples, there may be separate packages prepared for this part of the project.

The crews will be provided with overall project information in the bid packages, in their contract and at the pre-work including the data to be collected, both standard and additional for this project and directions on how to record the data.

Sample packages will include:

- an envelope with sample details on the outside, including sample number, basemap number, UTM coordinates of the IPC and a line each for crew initials and completion date.
- one 8 ½ X 14 map at a 1:10,000 scale showing the IPC, as well as the Forest Cover polygons. TRIM features including contours, BGC (legacy or Big BEC, as available), major roads
- one 8 ½ X 14 orthophoto with the IPC marked
- both of the above will have the forest cover polygon that the sample is in outlined
- orthophoto mapsheets at 1:20,000 scale for each basemap in the project area

Other items that will help with the locating samples may also be made available.

3.3 Standards

The most recent edition of the Vegetation Resources Inventory Standards and Procedures will be followed for the completing this project. The Standards relevant to this project are listed following the Bibliography in this document. They are located at the website:
http://ilmbwww.gov.bc.ca/risc/pubs/teveg/index.htm

3.4 Roles and Responsibilities

This is a Licensee-lead initiative. There is also support from the VRI inventory section of the Ministry of Forests & Range. The main participants in the project include:

Tony Bild, Lead Proponent, Forester for Valemount Forest Products Ltd.
(Tony will work with the other Licensees, including the Community Forest representatives and BC Timber Sales, Prince George Business Area)

MoFR Forest Analysis and Inventory Branch, VRI section contacts:
Planning: Gary Johansen, VRI Audit Coordinator
NVAF: Will Smith, Volume & Decay Sampling Officer

MoFR Regional staff contacts, Southern Interior Forest Region:
Operational: Matt Makar, VRI Inventory Forester

MoFR District contact and representative, McBride Satellite office of the Headwaters Forest District:
Norma Stromberg-Jones, Stewardship Forester

The preparation of the VRI planning documents for the Robson Valley TSA has been contracted out to Nona Phillips Forestry Consulting.
In regard to supplies for the Ground sampling, the Licensees will provide:

- Aluminum pins
- Overview maps and Sample Packages as described in Section 3.2
- Helicopter access as required

The MoFR Inventory group from Victoria will provide:

- VRI numbered tags

For the Monitoring work, in addition to these items, crews will also be supplied with numbered trees tags.

3.4.1 Field Work

Fieldwork will be tendered and contracted out as follows:

1. Year 1 – Ground sampling – Certified Timber data collection on a sub-set of the 100 samples. Guidance from the MoFR with come from the Region.
2. Year 2 – Ground sampling – Certified Timber on the remaining ground samples not completed in the 2007 field season. Again, with Regional guidance.
3. Year 2 or 3 – NVAF ground sampling. Certified NVAF destructive sampling with guidance from the Victoria staff.

3.4.2 Quality Assurance

All mentoring and Quality Assurance for both the Phase II ground sampling and NVAF ground sampling is the responsibility of the Licensee and will be funded through the FIA allocation. It will be conducted by a 3rd party contractor.

Initial mentoring on actual samples for any of the VRI activities undertaken on this project will be a critical first step.

The bidding for Ground Sampling activity on this project may include the requirement for the field crew's presence on each QA plot. This has been done on other projects and has proved to be effective with little cost increase.

The QA for the Monitoring project will involve a contractor certified for the timber data collection and a certified ecology contractor.

3.4.3 Data Compilation, Analysis and Adjustment

The licensees would like this project to be completed within a reasonable timeframe, and certainly in time to be utilized for the next TSR process. The Community Forest would also like to have as much data available for their Timber Supply which is a separate process.

The data compilation, analysis and adjustment will include the following components:

- Final review of data through the validation process to identify any errors before the samples are compiled;
- Data compilation
- Statistical analysis
- Inventory file adjustment

3.5 Sample List

- A complete sample list is provided in Appendix B. A description of how samples were distributed across the population is included in Appendix A.

3.6 Deliverables

One of the underlying tasks of the Project Manager is to insure that all deliverables for the ground sampling projects are delivered to the appropriate Licensee and MoFR, FAIB, and Regional VRI section staff and that they follow RISC Procedures and meet the appropriate Standards.

All project files will be provided including:

From the Field contractors

- Completed Project packages
- Digital sample data on CD and provided directly to the MoFR
- Additional data collected as per this project, in the format specified in the contract and at the pre-work
- Documentation of any modifications to the sample lists

From the VRI Planning Contractor

- Project files regarding the planning processes and the Sample selection. This includes digital data used in sample selection.

From the VRI Ground Sampling Project Manager

- All project records related to the field work, including the competitive bidding process
- Quality Assurance records including spreadsheets on the work completed and the QA reports
- Documentation of any modifications to the sample lists

3.7 Costs

Table 4 – VRI Costs Based on Activities and Sample Size

VRI Activity	Sample Size	Unit Cost	Total Cost
GROUND SAMPLING			
Contract administration & materials-All years			$15,000
Preliminary Year-VSIP and VPIP preparation -includes Sampling plan development and package preparation and contract Administration			$30,000
Year 1-Timber Emphasis Plots	50	$1,800/sample	$90,000
Yr.2-Timber Emphasis Plots	50	$1,800/sample	$90,000
NVAF destructive sampling	130	$750/tree	$97,500
Helicopter access-VRI Est. Year 1-$30,000 and Year 2-$30,000			$60,000
Helicopter access-NVAF			$35,000
Mentoring (crew training) Year 1-$3,000 Year 2-$3,000			$6,000
Quality Assurance-Timber Year 1-$5,000 Year 2-$5,000			$10,000
Quality Assurance-NVAF			$7,000
Final Compilation/analysis and inventory file adjustment			$15,000
Total Phase II			**$455,500**

ALSO PLEASE NOTE: Crew availability and the requirement for helicopter access will be critical factors in project costs overall.

Table 5 – VRI Monitoring Project Costs

MONITORING			
Contract Administration – plan amendment and GIS work, bidding etc.			$8,000
Sample Establishment	25	$2,500/sample	$62,500
Helicopter Access			$10,000
Mentoring	1 crew	$2,000	$2,000
Quality Assurance		$3000	$3,000
Total Monitoring			**$85,500**

Table 6 - Estimated funding breakdown by year, based on timing of VRI activities

Year	Activity	Costs
Preliminary year - 2006/07	All costs for plan preparation and package preparation	$30,000
Preliminary Year Total		**$30,000**
Year 1- fieldwork	Contract Administration	$5,000
	Ground sampling – timber	$90,000
	Timber mentoring & QA	$8,000
	Helicopter	$30,000
Year 1 total		**$133,000**
Year 2- fieldwork	Contract Administration	$5,000
	Ground sampling – timber	$90,000
	Timber mentoring & QA	$8,000
	Helicopter	$30,000
Year 2 total		**$133,000**
Year 3- fieldwork & Analysis	Contract Administration	$5,000
	NVAF	$97,500
	NVAF QA	$7,000
	Helicopter	$35,000
	Analysis & Adjustment	$15,000
Year 3 total		**$157,500**
Grand Total		**$455,500**

3.8 Sign-off sheet

Robson Valley Timber Supply Area Vegetation Resources Inventory
Project Implementation Plan for Ground Sampling and Net Volume Adjustment Factor Sampling

I have read and concur that the Robson Valley TSA Vegetation Resources Inventory Project Implementation Plan for Ground Sampling and NVAF (VPIP) dated May 18, 2007 meets current VRI standards and business needs and considerations. It is understood that this is an agreement-in-principle and does not commit the signatories to completing the inventory activities outlined in this plan.

Valemount Forest Products Ltd. *(lead proponent)* — May 25.2007 — Date

Ian Hamann, P.Eng., R.P.F.
Timber Sales Manager
BC Timber Sales, Prince George Business Area — JUNE 11, 2007 — Date

Jon Vivian, R.P.F.
Manager
Vegetation Resources Inventory Section
Forest Analysis and Inventory Branch
Ministry of Forests and Range
Victoria, British Columbia — 07.06.21 — Date

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9. Phillips, Nona. September, 2006. Lakes TSA Vegetation Resources Inventory Project Implementation Plan for Ground Sampling.

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11. Robson Valley TSA Defined Forest Area Management (DFAM) Group. October, 2005. Robson Valley TSA Timber Supply Review 3 Draft Analysis Report.

12. Timberline Forest Inventory Consultants. March 31, 2005. A User's Guide to the Vegetation Resources Inventory. FIA/ Tolko Industries Limited.

The most recent edition of the **Vegetation Resources Inventory Standards and Procedures** will be followed for the completing this project. These are located at the website:
http://ilmbwww.gov.bc.ca/risc/pubs/teveg/index.htm

The following is a list of the critical Standards and Procedures for the Robson Valley TSA VRI project.

Ground Sampling:

Vegetation Resources Inventory Guidelines for Preparing a Project Implementation Plan for Ground Sampling and Net Volume Adjustment Factor Sampling Version 2.0, March 2006

Vegetation Resources Inventory Sample Selection Procedures for Ground Sampling Version 3.3, December 2002

Vegetation Resources Inventory Sample Selection Procedures for Ground Sampling Version 3.3 Errata No. 1, April 2005

Vegetation Resources Inventory Ground Sampling Procedures Version 4.5, March 2004

Vegetation Resources Inventory Ground Sampling Procedures Version 4.5 Errata No. 1, February 2005

Vegetation Resources Inventory Quality Assurance Procedures for VRI Ground Sampling Version 3.0, March 2004

Vegetation Resources Inventory Data Collection Standards for VRI Ground Sampling Version 2.1, March 2006

Vegetation Resources Inventory Ground Sampling Data Collection Procedures for Inaccessible Samples Version 1.0, March 2003

Net Volume Adjustment Factor Sampling Standards and Procedures Version 4.1, March 2006

VRI – Analysis and Adjustment

Vegetation Resources Inventory Procedures and Standards for Data Analysis Attribute Adjustment and Implementation of Adjustment in a Corporate Database Version 2.0, March 2004

Monitoring

National Forest Inventory BC Change Monitoring Procedures for Provincial and National Reporting Version 1.4, March 2005

Change Monitoring Inventory Ground Sampling Quality Assurance Procedures Version 1.1, March 2002

Change Monitoring Inventory Ground Sampling Quality Assurance Standards Version 1.1, March 2002

Appendix A

Sampling Selection Process and Methodology for Robson Valley TSA

Sampling Process and Methodology for Robson Valley

The process followed is outlined in the document "Sample Selection Procedures for Ground Sampling" produced by the Ministry of Forests, Forests Analysis and Inventory Branch, in December 2002.

The Inventory attribute data was obtained from Forests Analysis Inventory Branch. The 3 DBF files for map blocks 083D, 083E, and 093H covered all of the map sheets within the Robson Valley TSA. In addition, inventory attribute data was obtained from the LRDW as a few attributes were missing on the DBF files. All the data was projected to 2006.

A series of GIS overlays were performed to net out parks, private land and other areas that would not be included in the sample population. This included an elevation cut off of 1750 m.

The resulting set of map and polygon numbers with new areas were further reduced by

- Removing any polygon slivers where the total new area was less than .01 ha[15]
- Selecting only Vegetated Treed polygon
- Removing all polygons with non_productive codes of AF (Alpine forest) and NP (non-productive)
- Removing all polygons with non-forest descriptors of NCBR (non commercial brush) and NSR (not sufficiently restocked).

This reduced the number of polygons from 33,983 to 25,596. For purposes of sample selection, the original polygon area was used. The "new area" represents the area that in a polygon is under the elevation limit, or not private land , etc. At this time, the strata as defined in the VPIP were also applied. The population breakdown by strata was:

strata	No of polygons	POLYGON Area	Min age	Min ht	Max age	Max ht	Mean age	Mean ht
total	25596	435896.62	10	0.7	924	49.3	180.6	23.42
Balsam	8517	133067.48	15	0.9	924	39.5	185.9	19.84
C H	2140	43626.00	10	1.2	614	49.3	243.8	27.59
FP_dec	6515	106177.51	10	1.4	924	45.5	107.6	22.17
Spruce	8424	153025.63	10	0.7	516	46.5	215.5	26.94

The population was further reduced, as the population was defined as > 30 in 2007. This meant using polygons with an age of 30 or greater in 2006.

strata	No of polygons	POLYGON_AREA	Min age	Min ht	Max age	Max ht	Mean age	Mean ht
Totals	25073	426799.69	30	1.3	924	49.3	183.9	23.8
Balsam	8461	131940.38	30	1.4	924	39.5	187.0	19.9
C H	2096	43150.78	30	2.5	614	49.3	248.5	28.1
FP_dec	6309	102901.5	30	1.8	924	45.5	110.4	22.7
Spruce	8207	148807.03	30	1.3	516	46.5	220.7	27.6

[15] This was the smallest polygon size found in the TSA and was therefore chosen as the cut off size.

The task was then to assign 80 samples proportionally by area, across the 4 strata. The table below illustrates the strata proportions and the number of samples selected. An additional 20 samples were added to the Cedar Hemlock strata.

strata	No of polygons\	POLYGON AREA	% of area	Proportional distribution	# to be selected
	25073	426799.7	100		
Balsam	8461	131940.4	30.9	24.7	25
C H	2096	43150.78	10.1	8.1	28
FP_dec	6309	102901.5	24.1	19.3	19
Spruce	8207	148807	34.9	27.9	28
					100

Within each strata, 3 volume classes were assigned[16], as follows

strata	Volume Class	# of polygons	Volume range from	To
Balsam	0	2820	0	171.2
Balsam	1	2822	171.3	222.7
Balsam	2	2819	222.7	450.2
C H	0	698	0	341
C H	1	699	341.1	406.9
C H	2	699	407	744.2
FP_dec	0	2103	0	165.4
FP_dec	1	2105	165.5	245
FP_dec	2	2101	245.1	639.5
Spruce	0	2736	0	267.3
Spruce	1	2735	267.4	328.4
Spruce	2	2736	328.4	671.5

[16] Volume class was assigned using SAS® procedure Proc Rank which was instructed to determine 3 equal and unique volume classes per strata

- Each strata volume class now required a sampling rate. This was determined as equally as possible.

strata	vol_cls	# of samples
Balsam	0	8
Balsam	1	9
Balsam	2	8
C H	0	9
C H	1	10
C H	2	9
FP_dec	0	6
FP_dec	1	6
FP_dec	2	7
Spruce	0	10
Spruce	1	9
Spruce	2	9

- Samples were then selected[17] by the probability of selection proportional to size with replacement (PPSWR) method as specified in the standards.

- Three lists were run using unique random numbers[18]. . The three lists will allow for replacement samples, as some samples may be not be suitable.

- Sample statistics illustrating the similarity of the samples to the population for the first 2 lists are attached.

[17] Samples were selected using SAS® procedure Proc Surveyselect using PPSWR and the sampling plan above

[18] The random numbers were generated in MS/Excel® using the RAND() function

Appendix B

Sample list for Ground Samples

Sample List

The following is a list of 100 planned samples (identified as "S" and "R") and 60 contingency samples. The contingency samples are provided to replace those samples rejected during field sampling. Samples replacing rejected one must be from the same stratum and sub-stratum.

Samples can be rejected during the sampling phase if they are in an unsafe location or in a cutover at the Integrated Plot Centre (IPC) that was not identified at the time of sample selection. The project manager must be consulted if samples are rejected.

Y=Selected sample during review without reason to reject.
S=Sample that should be attempted.
R=replacement sample for those rejected[19] from list #1. These are coming from Sample List #2.
C=contingency samples to replace those rejected during field sampling. These will come from Sample List #2 and #3.

strata	vol_cls	samp_number	MAP_ID	POLYGON_ID	Area	Select?	Comments	S,R or C
Balsam	0	1	083D046	1601	13	Y	steep	S
Balsam	0	2	093H050	261	70	Y		S
Balsam	0	3	083D066	216	16	Y	steep	S
Balsam	0	4	093H059	322	26	Y	steep	S
Balsam	0	5	093H039	664	33	Y	steep	S
Balsam	0	6	093H049	82	7	Y	very steep	S
Balsam	0	7	093H068	355	2	Y	very steep	S
Balsam	0	8	093H037	271	46	Y	steep	S
Balsam	1	9	083E061	287	14	Y		S
Balsam	1	10	083E061	37	72	Y	steep	S
Balsam	1	11	083E061	217	62	Y	steep	S
Balsam	1	12	093A099	1103	8	N	extreme steep	
Balsam	1	13	093H017	201	13	Y	steep	S
Balsam	1	14	093H009	145	10	Y	steep	S
Balsam	1	15	083E031	1078	11	Y	steep	S
Balsam	1	16	093H070	403	72	Y	steep	S
Balsam	1	17	093H050	18	13	Y	steep	S
Balsam	2	18	093H037	113	72	Y	steep	S
Balsam	2	19	083D071	36	11	Y	steep	S
Balsam	2	20	093H017	75	5	Y	very steep	S
Balsam	2	21	083D074	569	39	Y	steep	S
Balsam	2	22	083D074	676	38	Y	steep	S
Balsam	2	23	083D081	253	37	Y	very steep	S
Balsam	2	24	083D071	268	32	Y		S
Balsam	2	25	083E022	173	90	Y	steep	S
C H	0	26	093H009	472	78	Y	very steep	S
C H	0	27	093H030	596	10	Y		S

[19] Samples were rejected if they were located in private land, Indian reserve, parks, or protected areas.

C H	0	28	093H068	165	48	Y	very steep	S
C H	0	29	093H056	318	13	Y	steep	S
C H	0	30	093H039	628	16	Y	steep	S
C H	0	31	093H068	61	28	Y	steep	S
C H	0	32	093H049	525	12	N	private	
C H	0	33	093H067	557	28	Y	steep	S
C H	0	34	093H057	556	16	N	in CP	
C H	1	35	093H057	471	19	Y		S
C H	1	36	093H047	47	20	N	in protected area	
C H	1	37	093H046	14	60	Y	very steep	S
C H	1	38	083D027	225	20	Y	steep	S
C H	1	39	093H048	581	61	Y		S
C H	1	40	093H049	372	13	Y	steep	S
C H	1	41	083E001	328	47	Y	very steep	S
C H	1	42	093H048	412	29	Y		S
C H	1	43	093H029	152	24	Y		S
C H	1	44	083D047	647	10	Y		S
C H	2	45	083D074	431	77	Y	steep	S
C H	2	46	093H057	612	93	Y		S
C H	2	47	093H068	136	75	Y	very steep	S
C H	2	48	093H067	195	106	Y		S
C H	2	49	083D037	220	105	Y	steep	S
C H	2	50	093H029	51	40	Y	steep	S
C H	2	51	083D038	378	62	Y	steep	S
C H	2	52	083D028	506	140	Y	steep	S
C H	2	53	083D047	320	30	Y		S
FP_dec	0	54	083D047	539	23	Y		S
FP_dec	0	55	093H030	353	8	N	private	
FP_dec	0	56	083D074	880	14	Y		S
FP_dec	0	57	083D046	1551	5	Y		S
FP_dec	0	58	083E021	213	132	Y	steep	S
FP_dec	0	59	083D087	411	339	N	in Robson Park	
FP_dec	1	60	083D093	391	10	Y		S
FP_dec	1	61	083D084	293	49	Y		S
FP_dec	1	62	083E011	227	15	Y		S
FP_dec	1	63	083D094	344	24	Y	steep	S
FP_dec	1	64	083E011	6	61	Y		S
FP_dec	1	65	083E002	133	84	Y	steep	S
FP_dec	2	66	083E002	536	27	N	in CP	
FP_dec	2	67	083D065	1687	30	Y	steep	S
FP_dec	2	68	083D074	401	88	Y		S
FP_dec	2	69	083D093	892	69	N	in CP	
FP_dec	2	70	083D084	161	9	Y	steep	S
FP_dec	2	71	083D084	369	26	Y		S
FP_dec	2	72	083D048	273	60	N	in CP	
Spruce	0	73	083E041	385	37	Y	steep	S
Spruce	0	74	093H057	541	42	Y	steep	S
Spruce	0	75	093H029	237	23	Y	steep	S

Spruce	0	76	093H070	34	20	Y		S
Spruce	0	77	083E022	177	18	Y	steep	S
Spruce	0	78	093H058	324	140	Y		S
Spruce	0	79	083E061	62	56	Y	steep	S
Spruce	0	80	093H057	514	14	Y	very steep	S
Spruce	0	81	093H060	225	18	Y		S
Spruce	0	82	093H047	107	36	Y	steep	S
Spruce	1	83	083D067	93	26	Y		S
Spruce	1	84	093H030	244	9	Y		S
Spruce	1	85	093H070	211	74	Y	steep	S
Spruce	1	86	093A099	1079	117	Y	steep	S
Spruce	1	87	083D048	16	22	Y	steep	S
Spruce	1	88	093H069	118	85	Y	very steep	S
Spruce	1	89	083D071	159	12	Y	steep	S
Spruce	1	90	093H036	142	6	Y	steep	S
Spruce	1	91	083D071	316	55	Y		S
Spruce	2	92	093H027	101	42	Y	steep	S
Spruce	2	93	083D081	254	114	Y	steep	S
Spruce	2	94	093H057	544	53	Y		S
Spruce	2	95	093H069	95	275	Y	very steep	S
Spruce	2	96	083E023	190	49	Y	steep	S
Spruce	2	97	083D048	184	284	Y		S
Spruce	2	98	083D037	204	117	Y	steep	S
Spruce	2	99	093H047	294	36	Y		S
Spruce	2	100	083E021	77	46	Y		S
Balsam	0	101	093H009	350	32	Y	very steep	C
Balsam	0	102	093H070	205	23	Y	very steep	C
Balsam	0	103	083D075	811	12	Y		C
Balsam	0	104	083E062	40	72	Y		C
Balsam	0	105	093H029	338	34	Y	very steep	C
Balsam	0	106	083D064	442	13	Y	very steep	
Balsam	0	107	093H040	226	13	Y	steep	
Balsam	0	108	083E031	967	24	Y	very steep	
Balsam	1	109	083D074	714	51	Y	very steep	R
Balsam	1	110	083D028	557	22	Y	very steep	C
Balsam	1	111	093H079	54	15	Y		C
Balsam	1	112	093H050	362	34	Y	very steep	C
Balsam	1	113	093H078	59	58	Y	very steep	C
Balsam	1	114	093H080	70	107	Y	steep	C
Balsam	1	115	093A099	1161	4	Y	very steep	
Balsam	1	116	083D081	262	2	Y	very steep	
Balsam	1	117	083D094	91	5	Y	very steep	
Balsam	2	118	083D048	87	28	Y	steep	C
Balsam	2	119	093H007	74	21	Y	very steep	C
Balsam	2	120	083D092	384	35	Y	steep	C
Balsam	2	121	083D064	313	31	Y	steep	C
Balsam	2	122	093H047	158	128	Y	very steep	C
Balsam	2	123	093H067	1045	62	Y	steep	

Balsam	2	124	083D093	333	57	Y	steep	
Balsam	2	125	093H039	408	35	Y		
C H	0	126	093H009	38	196	Y	very steep	R
C H	0	127	083D027	244	7	Y	very steep	R
C H	0	128	083D056	1676	4	Y		C
C H	0	129	093H050	245	61	Y	steep	C
C H	0	130	083D057	568	14	Y	steep	C
C H	0	131	093H066	440	235	N	in CP	
C H	0	132	093H066	440	235	N	in CP	
C H	0	133	093H057	356	52	Y		C
C H	0	134	083D027	170	21	Y	very steep	C
C H	1	135	093H068	161	21	Y	very steep	R
C H	1	136	093H068	505	67	Y	steep	C
C H	1	137	083D074	563	10	Y	steep	C
C H	1	138	093H057	349	21	Y		C
C H	1	139	093H047	85	136	Y	very steep	C
C H	1	140	083D056	1539	15	Y	steep	C
C H	1	141	083D073	397	31	Y	very steep	
C H	1	142	083D081	12	73	Y	very steep	
C H	1	143	083D075	484	33	Y	steep	
C H	1	144	093H029	537	3	Y		
C H	2	145	093H058	123	431	N	in CP	
C H	2	146	093H058	464	27	Y	steep	C
C H	2	147	083D037	122	33	Y	steep	C
C H	2	148	083D027	289	43	Y	very steep	C
C H	2	149	093H049	241	65	Y	steep	C
C H	2	150	083D028	312	100	Y	steep	C
C H	2	151	083D037	205	19	Y	steep	
C H	2	152	083D028	486	51	Y	steep	
C H	2	153	083D028	194	101	Y	steep	
FP_dec	0	154	083D057	64	10	Y	steep	R
FP_dec	0	155	083D075	239	18	Y		R
FP_dec	0	156	093H040	328	28	Y	very steep	C
FP_dec	0	157	083E021	281	31	Y	very steep	C
FP_dec	0	158	093H030	97	14	N	in CP	
FP_dec	0	159	083E002	411	35	Y	steep	C
FP_dec	1	160	093H049	531	47	N	private	
FP_dec	1	161	083D074	347	18	Y		C
FP_dec	1	162	083D094	414	21	N	in CP	
FP_dec	1	163	083D093	528	38	Y		C
FP_dec	1	164	083D038	332	7	Y	steep	C
FP_dec	1	165	083D094	920	16	Y		C
FP_dec	2	166	083D093	843	75	Y		R
FP_dec	2	167	083D047	265	20	Y	very steep	R
FP_dec	2	168	093H030	250	15	Y	very steep	R
FP_dec	2	169	083D093	676	27	Y		C
FP_dec	2	170	083D093	847	54	Y	in CP	C
FP_dec	2	171	083D047	663	14	Y	very steep	C

FP_dec	2	172	083D075	261	22	N	in CP	
Spruce	0	173	083E031	50	23	Y	steep	C
Spruce	0	174	083D047	552	13	Y	very steep	C
Spruce	0	175	083D057	202	25	Y	steep	C
Spruce	0	176	093H078	361	31	Y	steep	C
Spruce	0	177	083E061	63	7	Y		C
Spruce	0	178	093H069	179	52	Y	very steep	
Spruce	0	179	083D066	388	33	Y	very steep	
Spruce	0	180	093H078	176	29	Y	steep	
Spruce	0	181	083E001	455	6	Y		
Spruce	0	182	083D094	353	41	N	in CP	
Spruce	1	183	093H036	442	52	Y	steep	C
Spruce	1	184	083D071	118	17	Y	very steep	C
Spruce	1	185	093H050	87	106	Y		C
Spruce	1	186	083D027	72	24	Y	very steep	C
Spruce	1	187	093H050	384	85	Y	very steep	C
Spruce	1	188	083E033	195	62	Y	steep	
Spruce	1	189	083E061	135	160	Y	steep	
Spruce	1	190	093H038	177	75	Y	steep	
Spruce	1	191	093H036	265	29	Y	steep	
Spruce	2	192	083D067	187	119	Y	very steep	C
Spruce	2	193	083D074	257	193	Y	steep	C
Spruce	2	194	083D048	15	42	Y	very steep	C
Spruce	2	195	093H008	4	17	Y		C
Spruce	2	196	083D057	118	18	Y		C
Spruce	2	197	093H068	95	78	Y	steep	
Spruce	2	198	093H020	628	37	Y	very steep	
Spruce	2	199	083E003	246	61	Y		
Spruce	2	200	083D039	213	159	Y	very steep	
FP_dec	0	254	083E021	151	17	Y	very steep	C
FP_dec	0	255	083E021	222	43	Y	very steep	C
FP_dec	0	256	083D074	360	244	Y		
FP_dec	0	257	083D093	372	1	Y		
FP_dec	0	258	083E021	580	12	Y	in woodlot	
FP_dec	0	259	083D048	319	6	N	extreme steep	
FP_dec	1	260	083D085	711	3	Y	very steep	C
FP_dec	1	261	083E012	511	0.2	N	private	
FP_dec	1	262	093H029	225	15	Y	very steep	
FP_dec	1	263	083D093	150	16	Y		
FP_dec	1	264	083D093	977	18	N	in CP	
FP_dec	1	265	083D075	410	104	Y	very steep	
FP_dec	2	266	083D084	706	176	Y	steep	C
FP_dec	2	267	083E003	451	101	Y	very steep	C
FP_dec	2	268	083E005	331	1	N	in Robson Park	
FP_dec	2	269	083D094	585	57	N	in CP	
FP_dec	2	270	083D038	17	17	Y		
FP_dec	2	271	083E004	290	6	N	in CP	
FP_dec	2	272	083E001	448	67	Y	very steep	

Appendix C

Comparison of the Sample and Population

The SAS System

'map stats for Robson Valley list 1'
Comparison of Sample and Population by map no

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083D018	.	.	15	203.00	0.05
083D026	.	.	11	170.33	0.04
083D027	1	1.00	314	4980.41	1.14
083D028	1	1.00	384	7073.34	1.62
083D029	.	.	90	856.92	0.20
083D036	.	.	55	748.00	0.17
083D037	2	2.00	294	6125.82	1.41
083D038	1	1.00	330	4973.25	1.14
083D039	.	.	104	1988.24	0.46
083D046	2	2.00	147	1972.46	0.45
083D047	3	3.00	521	7228.32	1.66
083D048	3	3.00	317	5560.88	1.28
083D049	.	.	156	2662.17	0.61
083D056	.	.	394	4646.91	1.07
083D057	.	.	407	4808.05	1.10
083D058	.	.	90	1224.33	0.28
083D059	.	.	4	65.72	0.02
083D061	.	.	10	270.40	0.06
083D062	.	.	6	31.35	0.01
083D063	.	.	95	1090.07	0.25
083D064	.	.	284	4168.48	0.96
083D065	1	1.00	315	3476.66	0.80
083D066	1	1.00	482	6417.88	1.47

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083D067	1	1.00	163	2093.79	0.48
083D068	.	.	136	1564.18	0.36
083D071	4	4.00	230	3592.24	0.82
083D072	.	.	62	1261.67	0.29
083D073	.	.	273	4133.06	0.95
083D074	5	5.00	580	10990.32	2.52
083D075	.	.	455	7233.85	1.66
083D076	.	.	254	3015.04	0.69
083D077	.	.	8	111.64	0.03
083D081	2	2.00	258	3862.74	0.89
083D082	.	.	120	1114.95	0.26
083D083	.	.	260	4354.38	1.00
083D084	3	3.00	627	10289.35	2.36
083D085	.	.	411	3974.01	0.91
083D086	.	.	101	1101.56	0.25
083D087	1	1.00	26	976.04	0.22
083D088	.	.	22	1249.28	0.29
083D091	.	.	247	3642.31	0.84
083D092	.	.	175	2355.42	0.54
083D093	2	2.00	645	10065.86	2.31
083D094	1	1.00	616	7727.58	1.77
083D095	.	.	41	355.51	0.08
083D096	.	.	1	61.15	0.01
083D097	.	.	6	177.83	0.04
083E001	1	1.00	400	6684.35	1.53
083E002	2	2.00	535	10772.85	2.47
083E003	.	.	399	6069.19	1.39

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083E004	.	.	121	1666.47	0.38
083E005	.	.	12	607.38	0.14
083E011	2	2.00	596	9459.66	2.17
083E012	.	.	380	6223.24	1.43
083E013	.	.	245	3416.36	0.78
083E014	.	.	30	250.28	0.06
083E021	2	2.00	373	5957.71	1.37
083E022	2	2.00	172	2257.22	0.52
083E023	1	1.00	180	2933.73	0.67
083E024	.	.	64	530.01	0.12
083E031	1	1.00	376	5651.29	1.30
083E032	.	.	270	4225.78	0.97
083E033	.	.	138	2925.41	0.67
083E034	.	.	38	396.88	0.09
083E041	1	1.00	203	4288.87	0.98
083E042	.	.	20	252.74	0.06
083E051	.	.	166	3446.81	0.79
083E061	4	4.00	163	5777.93	1.33
083E062	.	.	62	1320.54	0.30
083E071	.	.	54	1873.19	0.43
093A090	.	.	39	806.77	0.19
093A099	2	2.00	150	1998.47	0.46
093A100	.	.	18	290.75	0.07
093H007	.	.	70	1054.41	0.24
093H008	.	.	86	1292.67	0.30
093H009	2	2.00	284	5051.27	1.16
093H010	.	.	152	2337.46	0.54

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
093H017	2	2.00	219	5107.24	1.17
093H018	.	.	201	2417.27	0.55
093H019	.	.	221	2004.06	0.46
093H020	.	.	457	6094.27	1.40
093H026	.	.	32	687.77	0.16
093H027	1	1.00	141	3431.51	0.79
093H028	.	.	188	2395.09	0.55
093H029	3	3.00	267	4753.41	1.09
093H030	3	3.00	468	8532.23	1.96
093H035	.	.	13	122.05	0.03
093H036	1	1.00	372	8492.85	1.95
093H037	2	2.00	342	6101.96	1.40
093H038	.	.	86	1951.12	0.45
093H039	2	2.00	495	9951.75	2.28
093H040	.	.	341	6011.71	1.38
093H045	.	.	12	111.12	0.03
093H046	1	1.00	181	4432.65	1.02
093H047	3	3.00	367	8454.96	1.94
093H048	2	2.00	279	5881.99	1.35
093H049	3	3.00	555	8574.89	1.97
093H050	2	2.00	381	6278.86	1.44
093H056	1	1.00	114	1662.15	0.38
093H057	6	6.00	540	10753.17	2.47
093H058	1	1.00	358	8448.22	1.94
093H059	1	1.00	285	5088.42	1.17
093H060	1	1.00	181	3790.88	0.87
093H066	.	.	142	2586.35	0.59

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
093H067	2	2.00	243	4560.45	1.05
093H068	4	4.00	438	9581.94	2.20
093H069	2	2.00	276	7042.30	1.62
093H070	3	3.00	257	7861.50	1.80
093H077	.	.	20	297.28	0.07
093H078	.	.	202	3513.19	0.81
093H079	.	.	309	7167.42	1.64
093H080	.	.	275	5888.15	1.35
	100	**100.00**	**25596**	**435896.6**	**100.0**

The SAS System

'map stats for Robson Valley list 1'

Comparison of Sample and Population Species Distribution

SPECIES_CD_1	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
AC	1	1.00	297	2884.64	0.66
AT	4	4.00	1319	21591.75	4.95
B	.	.	36	611.59	0.14
BL	25	25.00	8481	132455.9	30.39
CW	15	15.00	1062	22591.28	5.18
EP	.	.	267	4053.86	0.93
FD	3	3.00	1107	17164.67	3.94
H	.	.	19	262.23	0.06
HW	13	13.00	1059	20772.49	4.77
PA	.	.	67	1019.92	0.23
PL	11	11.00	3457	59444.44	13.64
PW	.	.	1	18.23	0.00
S	28	28.00	8284	150873.9	34.61
SB	.	.	23	229.14	0.05
SE	.	.	18	266.04	0.06
SW	.	.	99	1656.58	0.38
	100	**100.00**	**25596**	**435896.6**	**100.0**

The SAS System

'map stats for Robson Valley list 1'
Comparison of Sample and Population Species Distribution

ageclprj	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
1	1	1.00	225	3588.41	0.82
2	4	4.00	704	11697.42	2.68
3	3	3.00	616	11250.83	2.58
4	1	1.00	716	11327.99	2.60
5	7	7.00	2785	44638.52	10.24
6	8	8.00	2430	38954.00	8.94
7	5	5.00	1717	23628.34	5.42
8	38	38.00	10173	159044.7	36.49
9	33	33.00	6230	131766.4	30.23
	100	**100.00**	**25596**	**435896.6**	**100.0**

The SAS System

'map stats for Robson Valley list 2'
Comparison of Sample and Population by map no

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083D018	.	.	15	203.00	0.05
083D026	.	.	11	170.33	0.04
083D027	4	4.00	314	4980.41	1.14
083D028	4	4.00	384	7073.34	1.62
083D029	.	.	90	856.92	0.20
083D036	.	.	55	748.00	0.17
083D037	2	2.00	294	6125.82	1.41
083D038	1	1.00	330	4973.25	1.14
083D039	1	1.00	104	1988.24	0.46
083D046	.	.	147	1972.46	0.45
083D047	3	3.00	521	7228.32	1.66
083D048	2	2.00	317	5560.88	1.28
083D049	.	.	156	2662.17	0.61
083D056	2	2.00	394	4646.91	1.07
083D057	4	4.00	407	4808.05	1.10
083D058	.	.	90	1224.33	0.28
083D059	.	.	4	65.72	0.02
083D061	.	.	10	270.40	0.06
083D062	.	.	6	31.35	0.01
083D063	.	.	95	1090.07	0.25
083D064	2	2.00	284	4168.48	0.96
083D065	.	.	315	3476.66	0.80
083D066	1	1.00	482	6417.88	1.47
083D067	1	1.00	163	2093.79	0.48

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083D068	.	.	136	1564.18	0.36
083D071	1	1.00	230	3592.24	0.82
083D072	.	.	62	1261.67	0.29
083D073	1	1.00	273	4133.06	0.95
083D074	4	4.00	580	10990.32	2.52
083D075	4	4.00	455	7233.85	1.66
083D076	.	.	254	3015.04	0.69
083D077	.	.	8	111.64	0.03
083D081	2	2.00	258	3862.74	0.89
083D082	.	.	120	1114.95	0.26
083D083	.	.	260	4354.38	1.00
083D084	.	.	627	10289.35	2.36
083D085	.	.	411	3974.01	0.91
083D086	.	.	101	1101.56	0.25
083D087	.	.	26	976.04	0.22
083D088	.	.	22	1249.28	0.29
083D091	.	.	247	3642.31	0.84
083D092	1	1.00	175	2355.42	0.54
083D093	5	5.00	645	10065.86	2.31
083D094	4	4.00	616	7727.58	1.77
083D095	.	.	41	355.51	0.08
083D096	.	.	1	61.15	0.01
083D097	.	.	6	177.83	0.04
083E001	1	1.00	400	6684.35	1.53
083E002	1	1.00	535	10772.85	2.47
083E003	1	1.00	399	6069.19	1.39
083E004	.	.	121	1666.47	0.38

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
083E005	.	.	12	607.38	0.14
083E011	.	.	596	9459.66	2.17
083E012	.	.	380	6223.24	1.43
083E013	.	.	245	3416.36	0.78
083E014	.	.	30	250.28	0.06
083E021	1	1.00	373	5957.71	1.37
083E022	.	.	172	2257.22	0.52
083E023	.	.	180	2933.73	0.67
083E024	.	.	64	530.01	0.12
083E031	2	2.00	376	5651.29	1.30
083E032	.	.	270	4225.78	0.97
083E033	1	1.00	138	2925.41	0.67
083E034	.	.	38	396.88	0.09
083E041	.	.	203	4288.87	0.98
083E042	.	.	20	252.74	0.06
083E051	.	.	166	3446.81	0.79
083E061	2	2.00	163	5777.93	1.33
083E062	1	1.00	62	1320.54	0.30
083E071	.	.	54	1873.19	0.43
093A090	.	.	39	806.77	0.19
093A099	1	1.00	150	1998.47	0.46
093A100	.	.	18	290.75	0.07
093H007	1	1.00	70	1054.41	0.24
093H008	1	1.00	86	1292.67	0.30
093H009	2	2.00	284	5051.27	1.16
093H010	.	.	152	2337.46	0.54
093H017	.	.	219	5107.24	1.17

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
093H018	.	.	201	2417.27	0.55
093H019	.	.	221	2004.06	0.46
093H020	1	1.00	457	6094.27	1.40
093H026	.	.	32	687.77	0.16
093H027	.	.	141	3431.51	0.79
093H028	.	.	188	2395.09	0.55
093H029	2	2.00	267	4753.41	1.09
093H030	2	2.00	468	8532.23	1.96
093H035	.	.	13	122.05	0.03
093H036	2	2.00	372	8492.85	1.95
093H037	.	.	342	6101.96	1.40
093H038	1	1.00	86	1951.12	0.45
093H039	1	1.00	495	9951.75	2.28
093H040	2	2.00	341	6011.71	1.38
093H045	.	.	12	111.12	0.03
093H046	.	.	181	4432.65	1.02
093H047	2	2.00	367	8454.96	1.94
093H048	.	.	279	5881.99	1.35
093H049	2	2.00	555	8574.89	1.97
093H050	4	4.00	381	6278.86	1.44
093H056	.	.	114	1662.15	0.38
093H057	2	2.00	540	10753.17	2.47
093H058	2	2.00	358	8448.22	1.94
093H059	.	.	285	5088.42	1.17
093H060	.	.	181	3790.88	0.87
093H066	2	2.00	142	2586.35	0.59
093H067	1	1.00	243	4560.45	1.05

MAP_ID	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
093H068	3	3.00	438	9581.94	2.20
093H069	1	1.00	276	7042.30	1.62
093H070	1	1.00	257	7861.50	1.80
093H077	.	.	20	297.28	0.07
093H078	3	3.00	202	3513.19	0.81
093H079	1	1.00	309	7167.42	1.64
093H080	1	1.00	275	5888.15	1.35
	100	**100.00**	**25596**	**435896.6**	**100.0**

The SAS System

'map stats for Robson Valley list 2'

Comparison of Sample and Population Species Distribution

SPECIES_CD_1	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
AC	.	.	297	2884.64	0.66
AT	3	3.00	1319	21591.75	4.95
B	.	.	36	611.59	0.14
BL	25	25.00	8481	132455.9	30.39
CW	17	17.00	1062	22591.28	5.18
EP	2	2.00	267	4053.86	0.93
FD	4	4.00	1107	17164.67	3.94
H	.	.	19	262.23	0.06
HW	11	11.00	1059	20772.49	4.77
PA	.	.	67	1019.92	0.23
PL	10	10.00	3457	59444.44	13.64
PW	.	.	1	18.23	0.00
S	27	27.00	8284	150873.9	34.61
SB	.	.	23	229.14	0.05
SE	.	.	18	266.04	0.06
SW	1	1.00	99	1656.58	0.38
	100	**100.00**	**25596**	**435896.6**	**100.0**

The SAS System

'map stats for Robson Valley list 2'
Comparison of Sample and Population Species Distribution

ageclprj	Sample Count	% of sample list	# of polygon_ids	Population polygon_id area	Area percent
1	1	1.00	225	3588.41	0.82
2	3	3.00	704	11697.42	2.68
3	1	1.00	616	11250.83	2.58
4	4	4.00	716	11327.99	2.60
5	10	10.00	2785	44638.52	10.24
6	8	8.00	2430	38954.00	8.94
7	7	7.00	1717	23628.34	5.42
8	27	27.00	10173	159044.7	36.49
9	39	39.00	6230	131766.4	30.23
	100	**100.00**	**25596**	**435896.6**	**100.0**

Appendix D

NVAF Profile

NVAF Sample Selection Process and Methodology for Robson Valley.

The sample size and selection basis for NVAF ground samples was modified to account for unequal weighting of the VRI ground samples and the interest in NVAF strata for the relatively uncommon species of cedar and hemlock. A total of 4 immature and 35 ground samples were selected for NVAF enhancements, based on a polygon age of 120 years for the age break between immature and mature strata.

Due to the interest in the cedar and hemlock component of the Robson Valley TSA inventory, polygons leading in these species were selected at a higher proportion for ground sampling than polygons leading in other species. In order to minimize the complexity of the weighting calculation for NVAF, the extra cedar and hemlock samples (20 in number) were excluded from the NVAF sample selection. The interest in cedar and hemlock also showed up in the NVAF sample size where species specific strata were set up for these two species. Since these two species represent a small proportion of the population, it was possible that the standard rule of thumb of one ground sample for every three live NVAF sample trees could result in an insufficient number of trees tallied to fill the sample selection matrix. The inventory audit data was analysed to determine the frequency of the two species across the population and indicated that sufficient trees would be tallied by slightly increasing the mature sample size from 32 samples to 35 samples.

The NVAF ground samples were selected systematically using a random start from the VRI ground sample list, excluding the extra 20 CH samples, sorted by species and volume. The resulting NVAF list is attached.

Proportional breakdowns are as follows:

age_cat	Leading species	Nvaf samples	Total samples
Imm	AC		1
Imm	AT	1	4
Imm	BL		2
Imm	CW		1
Imm	FD	1	3
Imm	PL	1	8
Imm	S	1	4
Mat	BL	14	23
Mat	CW	2	4
Mat	HW	2	3
Mat	PL	2	3
Mat	S	15	24
total		39	80

age_cat	Strata	Nvaf samples	# of samples
Imm	Balsam		2
Imm	C H		1
Imm	FP_dec	3	16
Imm	Spruce	1	4
Mat	Balsam	14	23
Mat	C H	4	7
Mat	FP_dec	2	3
Mat	Spruce	15	24
total		39	80

NVAF Sample List

strata	vol_cls	Sample	MAP_ID	POLY #	Select?	NVAF
Balsam	0	1	083D046	1601	Y	
Balsam	0	2	093H050	261	Y	
Balsam	0	3	083D066	216	Y	
Balsam	0	4	093H059	322	Y	Yes
Balsam	0	5	093H039	664	Y	Yes
Balsam	0	6	093H049	82	Y	
Balsam	0	7	093H068	355	Y	Yes
Balsam	0	8	093H037	271	Y	
Balsam	0	101	093H009	350	Y	
Balsam	0	102	093H070	205	Y	
Balsam	0	103	083D075	811	Y	
Balsam	0	104	083E062	40	Y	
Balsam	0	105	093H029	338	Y	
Balsam	0	106	083D064	442	Y	
Balsam	0	107	093H040	226	Y	
Balsam	0	108	083E031	967	Y	
Balsam	1	9	083E061	287	Y	Yes
Balsam	1	10	083E061	37	Y	Yes
Balsam	1	11	083E061	217	Y	
Balsam	1	12	093A099	1103	N	**Yes**
Balsam	1	13	093H017	201	Y	Yes
Balsam	1	14	093H009	145	Y	R-Yes
Balsam	1	15	083E031	1078	Y	Yes
Balsam	1	16	093H070	403	Y	
Balsam	1	17	093H050	18	Y	Yes
Balsam	1	109	083D074	714	Y	
Balsam	1	110	083D028	557	Y	
Balsam	1	111	093H079	54	Y	
Balsam	1	112	093H050	362	Y	
Balsam	1	113	093H078	59	Y	
Balsam	1	114	093H080	70	Y	
Balsam	1	115	093A099	1161	Y	
Balsam	1	116	083D081	262	Y	
Balsam	1	117	083D094	91	Y	
Balsam	2	18	093H037	113	Y	Yes
Balsam	2	19	083D071	36	Y	
Balsam	2	20	093H017	75	Y	Yes
Balsam	2	21	083D074	569	Y	
Balsam	2	22	083D074	676	Y	Yes
Balsam	2	23	083D081	253	Y	Yes
Balsam	2	24	083D071	268	Y	
Balsam	2	25	083E022	173	Y	Yes
Balsam	2	118	083D048	87	Y	
Balsam	2	119	093H007	74	Y	
Balsam	2	120	083D092	384	Y	

Balsam	2	121	083D064	313	Y	
Balsam	2	122	093H047	158	Y	
Balsam	2	123	093H067	1045	Y	
Balsam	2	124	083D093	333	Y	
Balsam	2	125	093H039	408	Y	
C H	0	26	093H009	472	Y	
C H	0	27	093H030	596	Y	
C H	0	28	093H068	165	Y	Yes
C H	0	29	093H056	318	Y	Yes
C H	0	30	093H039	628	Y	
C H	0	31	093H068	61	Y	
C H	0	32	093H049	525	N	
C H	0	33	093H067	557	Y	Yes
C H	0	34	093H057	556	N	
C H	0	126	093H009	38	Y	
C H	0	127	083D027	244	Y	
C H	0	128	083D056	1676	Y	
C H	0	129	093H050	245	Y	
C H	0	130	083D057	568	Y	
C H	0	131	093H066	440	N	
C H	0	132	093H066	440	N	
C H	0	133	093H057	356	Y	
C H	0	134	083D027	170	Y	
C H	1	35	093H057	471	Y	
C H	1	36	093H047	47	N	
C H	1	37	093H046	14	Y	
C H	1	38	083D027	225	Y	
C H	1	39	093H048	581	Y	
C H	1	40	093H049	372	Y	Yes
C H	1	41	083E001	328	Y	
C H	1	42	093H048	412	Y	
C H	1	43	093H029	152	Y	
C H	1	44	083D047	647	Y	
C H	1	135	093H068	161	Y	
C H	1	136	093H068	505	Y	
C H	1	137	083D074	563	Y	
C H	1	138	093H057	349	Y	
C H	1	139	093H047	85	Y	
C H	1	140	083D056	1539	Y	
C H	1	141	083D073	397	Y	
C H	1	142	083D081	12	Y	
C H	1	143	083D075	484	Y	
C H	1	144	093H029	537	Y	
C H	2	45	083D074	431	Y	
C H	2	46	093H057	612	Y	
C H	2	47	093H068	136	Y	
C H	2	48	093H067	195	Y	
C H	2	49	083D037	220	Y	

C H	2	50	093H029	51	Y	
C H	2	51	083D038	378	Y	
C H	2	52	083D028	506	Y	
C H	2	53	083D047	320	Y	
C H	2	145	093H058	123	N	
C H	2	146	093H058	464	Y	
C H	2	147	083D037	122	Y	
C H	2	148	083D027	289	Y	
C H	2	149	093H049	241	Y	
C H	2	150	083D028	312	Y	
C H	2	151	083D037	205	Y	
C H	2	152	083D028	486	Y	
C H	2	153	083D028	194	Y	
FP_dec	0	54	083D047	539	Y	
FP_dec	0	55	093H030	353	N	
FP_dec	0	56	083D074	880	Y	
FP_dec	0	57	083D046	1551	Y	
FP_dec	0	58	083E021	213	Y	
FP_dec	0	59	083D087	411	N	
FP_dec	0	154	083D057	64	Y	
FP_dec	0	155	083D075	239	Y	
FP_dec	0	156	093H040	328	Y	
FP_dec	0	157	083E021	281	Y	
FP_dec	0	158	093H030	97	N	
FP_dec	0	159	083E002	411	Y	
FP_dec	0	254	083E021	151	Y	
FP_dec	0	255	083E021	222	Y	
FP_dec	0	256	083D074	360	Y	
FP_dec	0	257	083D093	372	Y	
FP_dec	0	258	083E021	580	Y	
FP_dec	0	259	083D048	319	N	
FP_dec	1	60	083D093	391	Y	
FP_dec	1	61	083D084	293	Y	
FP_dec	1	62	083E011	227	Y	Yes
FP_dec	1	63	083D094	344	Y	
FP_dec	1	64	083E011	6	Y	Yes
FP_dec	1	65	083E002	133	Y	
FP_dec	1	160	093H049	531	N	
FP_dec	1	161	083D074	347	Y	R-Yes
FP_dec	1	162	083D094	414	N	
FP_dec	1	163	083D093	528	Y	
FP_dec	1	164	083D038	332	Y	
FP_dec	1	165	083D094	920	Y	
FP_dec	1	260	083D085	711	Y	
FP_dec	1	261	083E012	511	N	
FP_dec	1	262	093H029	225	Y	
FP_dec	1	263	083D093	150	Y	
FP_dec	1	264	083D093	977	N	

FP_dec	1	265	083D075	410	Y	
FP_dec	2	66	083E002	536	N	
FP_dec	2	67	083D065	1687	Y	
FP_dec	2	68	083D074	401	Y	Yes
FP_dec	2	69	083D093	892	N	**Yes**
FP_dec	2	70	083D084	161	Y	
FP_dec	2	71	083D084	369	Y	R-Yes
FP_dec	2	72	083D048	273	N	**Yes**
FP_dec	2	166	083D093	843	Y	
FP_dec	2	167	083D047	265	Y	
FP_dec	2	168	093H030	250	Y	
FP_dec	2	169	083D093	676	Y	
FP_dec	2	170	083D093	847	Y	
FP_dec	2	171	083D047	663	Y	
FP_dec	2	172	083D075	261	N	
FP_dec	2	266	083D084	706	Y	
FP_dec	2	267	083E003	451	Y	
FP_dec	2	268	083E005	331	N	
FP_dec	2	269	083D094	585	N	
FP_dec	2	270	083D038	17	Y	
FP_dec	2	271	083E004	290	N	
FP_dec	2	272	083E001	448	Y	
Spruce	0	73	083E041	385	Y	
Spruce	0	74	093H057	541	Y	Yes
Spruce	0	75	093H029	237	Y	
Spruce	0	76	093H070	34	Y	Yes
Spruce	0	77	083E022	177	Y	
Spruce	0	78	093H058	324	Y	Yes
Spruce	0	79	083E061	62	Y	Yes
Spruce	0	80	093H057	514	Y	
Spruce	0	81	093H060	225	Y	Yes
Spruce	0	82	093H047	107	Y	
Spruce	0	173	083E031	50	Y	
Spruce	0	174	083D047	552	Y	
Spruce	0	175	083D057	202	Y	
Spruce	0	176	093H078	361	Y	
Spruce	0	177	083E061	63	Y	
Spruce	0	178	093H069	179	Y	
Spruce	0	179	083D066	388	Y	
Spruce	0	180	093H078	176	Y	
Spruce	0	181	083E001	455	Y	
Spruce	0	182	083D094	353	N	
Spruce	1	83	083D067	93	Y	Yes
Spruce	1	84	093H030	244	Y	
Spruce	1	85	093H070	211	Y	Yes
Spruce	1	86	093A099	1079	Y	
Spruce	1	87	083D048	16	Y	Yes
Spruce	1	88	093H069	118	Y	

Spruce	1	89	083D071	159	Y	Yes
Spruce	1	90	093H036	142	Y	Yes
Spruce	1	91	083D071	316	Y	
Spruce	1	183	093H036	442	Y	
Spruce	1	184	083D071	118	Y	
Spruce	1	185	093H050	87	Y	
Spruce	1	186	083D027	72	Y	
Spruce	1	187	093H050	384	Y	
Spruce	1	188	083E033	195	Y	
Spruce	1	189	083E061	135	Y	
Spruce	1	190	093H038	177	Y	
Spruce	1	191	093H036	265	Y	
Spruce	2	92	093H027	101	Y	Yes
Spruce	2	93	083D081	254	Y	Yes
Spruce	2	94	093H057	544	Y	
Spruce	2	95	093H069	95	Y	Yes
Spruce	2	96	083E023	190	Y	
Spruce	2	97	083D048	184	Y	Yes
Spruce	2	98	083D037	204	Y	Yes
Spruce	2	99	093H047	294	Y	
Spruce	2	100	083E021	77	Y	Yes
Spruce	2	192	083D067	187	Y	
Spruce	2	193	083D074	257	Y	
Spruce	2	194	083D048	15	Y	
Spruce	2	195	093H008	4	Y	
Spruce	2	196	083D057	118	Y	
Spruce	2	197	093H068	95	Y	
Spruce	2	198	093H020	628	Y	
Spruce	2	199	083E003	246	Y	
Spruce	2	200	083D039	213	Y	
NVAF replacements-March 27/2007 #12 replaced with #14 #69 replaced with #71 #72 replaced with #161						

Appendix E

Glossary of Terms

Glossary of Terms (From 14 March 2006 RISC Standard, VRI Guidelines for Preparing a Project Implementation Plan for Ground Sampling and Net Volume Adjustment Factor Sampling)

Ground Sampling
Ground sampling is the field measurement of timber, ecology, range, and/or coarse woody debris values at one or more locations within each sample polygon. The sample polygons are selected proportional to their area from a sorted list. To accommodate the wide variety of resources, various types and sizes of sampling units (e.g., fixed and variable plots, transects) are used to make the measurements.

Inventory Unit
An inventory unit is the target population from which the samples are chosen. For management unit inventories, the unit is usually a TSA or TFL.

Land Cover Classification
The BC Land Cover Classification Scheme (BCLCCS) was designed specifically to meet the requirements of the VRI, in addition to providing general information useful for "global vegetation accounting" and "integrated resource management." The BCLCCS is hierarchical and reflects the current state of the land cover (e.g., presence or absence of vegetation, type and density of vegetation) and such fixed characteristics as landscape position (i.e., wetland, upland, alpine). There are two main classes of polygons: Vegetated and Non-Vegetated.

Management Unit.
A management unit is an administrative area used for inventory reporting purposes. The most common inventory units are TFLs and TSAs. However, forest districts or provincial parks could also be considered as inventory units if they were identifies as areas of interest for reporting purposes.

Net Volume Adjustment Factor (NVAF) Sampling
NVAF sampling provides factors to adjust net tree volume from the ground sampling, where net tree volume is estimated from the VRI net factoring process and taper equations. The factors account for hidden decay and possible taper equation bias. Sampling involves detailed stem analysis of sample trees to calculate actual net volume. The actual net volume is compared to the estimated net volume. March 2004 13 Preparing a VRI Project Implementation Plan for Ground Sampling

Photo Interpretation
Photo-interpretation involves the subjective delineation of polygons and the photo estimation of attributes for all polygons in an inventory unit. Medium scale aerial photographs are most often used in the photo-interpretation process.
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Post-Stratification
Post-stratification involves the division of an inventory unit into mutually exclusive sub-populations (strata) after ground sampling has been completed. Samples that fall in each

post-stratum are analyzed separately, and the results may be applied to the corresponding population post-strata to improve the precision of the inventory's overall averages and totals. In the VRI, these strata (leading species) are usually pre-defined in the sample selection phase.

Pre-Stratification
Pre-stratification involves the division of an inventory unit into mutually exclusive sub-populations (strata) before ground sampling to provide estimates for specific areas, or to increase the confidence in the overall estimates by considering the special characteristics of each stratum.

Sample
A set of sampling units selected randomly to represent a population.

Sample Size
The sample size for an inventory is the minimum number of ground samples to be established in an inventory unit to meet the target precision. The current sampling error requirement for a management unit is +/- 10% at the 95% level of probability.

Sampling Unit
The smallest indivisible unit in the population that is eligible for sample selection.

Statistical Adjustment
Statistical adjustment is the application of adjustment factors, computed from a random sample, to adjust timber attributes.

Sub-unit
A sub-unit is a small area or stratum of interest within an inventory unit such as a TSA or a TFL

Target Population
The population is the portion of a forest district, TFL, or TSA, for which statistical estimates are required. For instance, in a TSA where vegetated treed, vegetated non-treed and non vegetated polygons are delineated, the target population may be only the vegetated treed (VT) polygons.

Target Sampling Error
Is the precision we expect a sample of a given sample size to produce. This precision depends on confidence we wish to place on a sample and the variability (CV) within the population.

Vegetation Resources Inventory (VRI)

The VRI is the MOFR standard for assessing the quantity and quality of BC's vegetation resources. The VRI process is designed to include a flexible set of sampling procedures

for collecting vegetation resource information. The VRI is essentially a toolbox of procedures, which include:

- *Photo Interpretation*: the delineation of polygons from aerial photography and the estimation of resource attributes.
- *Ground Sampling*: the establishment of plot clusters in selected polygons to measure timber, ecological, and/or range attributes.
- *NVAF Sampling*: Stem analysis sampling of individual trees for net volume adjustment.
- *Statistical Adjustment*: the adjustment of the photo-interpreted estimates for all polygons in an inventory unit or management unit using the values measured during ground sampling.

The VRI can be deployed over a management unit measuring selected resources in specific portions of the landbase. The VRI sampling process produces spatial and non-spatial databases that can be used in multiple resource management applications including timber, ecosystem, and wildlife habitat management.