

Okanagan Timber Supply Area

Amendment to the Okanagan TSA VRI Phase II Vegetation Resources Inventory Pilot Project Implementation Plan for Additional Net Volume Adjustment Factor Ground Sampling, 2007/08

Nona Phillips Forestry Consulting

July 10, 2007

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Executive Summary

This amendment to the Okanagan Timber Supply Area (TSA) Vegetation Resource Inventory (VRI) Project Implementation Plan (VPIP) has been written to detail a specific activity associated with the VRI project in the Okanagan TSA. It is the 'operational' planning document that will guide additional VRI Net Volume Adjustment Factor (NVAF) work that will be undertaken during the 2007/08 field season.

The following NVAF related work is planned for the Okanagan TSA:

1. Destructive sampling will be carried out on 57 trees on 17 samples that are primarily a sub-set of the original 32 Net Volume Adjustment Factor sampling project conducted in 2002. (To obtain sufficient Cedar and Hemlock trees, several additional samples were chosen from a subset of the VRI samples.) This work will be conducted by a certified NVAF sampler.
2. The basis of this additional sampling is the desire to augment the previous NVAF sampling. In this planning process, specific strata have had their number of destructively sampled trees increased to increase the confidence in analysis of the trends observed for a stratum. The mature age classes (polygons 101 plus years of age) have been targeted for the project.
3. For the live trees, a tree list is provided in this planning document. This destructive sampling will occur on trees from the auxiliary plots that were not part of the NVAF work in 2002 (for the former NVAF samples). Since these auxiliary plots were not 'enhanced'¹ in previous field sampling, these trees will need to be enhanced by a certified VRI timber emphasis ground sampler.
4. For the dead trees, there was no data collected to this point in time on the auxiliary plots. As a result, the dead trees required for the project will need to be selected according to the NVAF Standard, Section 4.5 Dead Tree Selection if Not Previously Tallied.

For the Okanagan NVAF work, the population is divided into two age classes. Immature includes all stands up to 100 years of age. Mature includes all stands 101 years of age and older. The focus of the sampling in 2007/08 is in the Mature age class. This is due to several factors: it is felt that there was a representative sampling in the immature stratum in the previous NVAF project; there is a fairly large mature component in this TSA; and there is the likelihood of more variability in the Mature age class that can benefit from analysis during additional destructive sampling.

The previous NVAF project included 92 trees across all strata. The 2007/08 NVAF sampling project has allocated samples to individual strata to increase their overall sample size. Sampling will be distributed as follows:

- Spruce = 14 trees
- Douglas Fir = 9 trees
- Pine = 11 trees

¹ Enhancing an NVAF sample tree means providing full tree data collection, similar to a tree at the Integrated Plot Centre. It includes height, net factoring and call grading, tree loss and wildlife tree codes.

- Cedar = 5 trees
- Hemlock = 5 trees
- Other (minor species) = 6 trees
- Dead = 7 trees
- Total sample size = 57 trees

Costs and timelines for this project have been outlined in this plan.

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1.0 Introduction

1.1 Document Objectives

The Vegetation Resources Inventory (VRI) Project Implementation Plan (VPIP) provides operational details for VRI activities planned in a project area. This amendment to the original Okanagan VPIP identifies the steps, specific timelines, roles and responsibilities, and deliverables for a project involving additional Net Volume Adjustment Factor (NVAF) sampling.

This plan also references subsequent analyses for this project.

The document will provide a record of the work undertaken, so future users of the data will have the knowledge to correctly interpret the data.

1.2 State of VRI Inventory Plans and the NVAF Activity specifically

Plans previously written for VRI ground sampling activities on this Timber Supply Area (TSA) include:

1. Okanagan TSA VRI Phase II Ground Sampling Pilot Project Implementation Plan. JS Thrower & Associates Ltd. May 2002
2. Okanagan TSA VRI Phase II Ground Sampling Pilot Project Implementation Plan Amendment. JS Thrower & Associates Ltd. March 2007
3. Updating the Okanagan TSA Phase II Samples for Mountain Pine Beetle Impacts Project Implementation Plan. JS Thrower & Associates Ltd. June 2006

Some of the general details for the NVAF sampling activity were included in the original plan. It was stated that 30 samples in the original VRI sampling population would be potential NVAF samples, and 2 auxiliary plots in each sample would be enhanced. Trees from these auxiliary plots would be eligible for selection for destructive sampling. The actual NVAF sample list was not included in the 2002 VPIP.

Referencing the provincial data base, 32 samples were identified by the VRI code 'NO1', the N denoting NVAF. The list of these samples can be found in Appendix C of this amendment.

In cooperation with the MoFR, Forest Analysis & Inventory Branch (FAIB), VRI section staff, the analyst for this project will determine how to integrate previous data (from NVAF destructive sampling) with the data collected under this project.

2.0 Ground Sampling Plan

2.1 Sampling objectives

The Okanagan TSA is comprised of a fairly mixed species representation. The primary objective of this sampling project is to provide additional data to allow for analysis of the separate NVAF strata which have been chosen to represent each of the 6 major species in the population. From a statistical perspective, confidence in the results comes with a sample size of 15 to 20 trees in a stratum. Given the results of the 2002 NVAF sampling project, the sample errors are expected to be below 10% for each of the major species.

It is also the goal of this sampling to achieve a broad geographic distribution for this NVAF project.

2.2 Target Population

At the beginning of this planning exercise, the Executive Director of the Okanagan Innovative Forestry Society asked that the option of minimizing the destructive sampling on the VRI population be investigated. One way of achieving this would be by returning to the original NVAF samples. Following some evaluation, the population that has been proposed for this study is the NVAF samples selected in the original planning exercise and visited in 2002. To minimize the complications of not knowing which trees were felled in the previous NVAF project, only the auxiliary plots not visited in the past will be utilized in the tree selection.

For the cedar and the hemlock strata, there were an insufficient number of cedar and hemlock trees available in the NVAF sample population. As a result, the contractor making the selection chose 3 additional samples to use for the tree selection. The following steps were taken to avoid any bias:

1. Utilizing the original ground sample population (0221), a subset was developed from the cedar and hemlock leading samples.
2. Three (3) samples were randomly selected from this subset. They are 32, 33 and 42.

2.3 Strata

The population was stratified for sample selection. In an attempt to achieve the objective of increased confidence in the trends being observed for each species, the following strata will be sampled:

- Strata 1: Douglas Fir
- Strata 2: Spruce
- Strata 3: Pine
- Strata 4: Balsam
- Strata 5: Hemlock
- Strata 6: Cedar
- Strata 7: Other species

Mature includes all polygons 101 Plus years of age. Mature represents a significant proportion of the population.

Dead trees will be sampled under a separate stratum, which includes all species.

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

2.4 Sample Size

The primary objective stated in Section 2.1 was to increase the number of destructively sampled trees for strata of particular interest to 15 to 20 trees. In the 'other species' stratum (all species not captured in strata 1 to 6), there is a lot of variability and when there was difficulty in finding 10 trees in the population, the decision was made to destructively sample the 9 trees that were available and to be satisfied with that population. The number of dead trees in total (10) was based on direction from Will Smith, the Ministry of Forests & Range (MoFR) Volume and Decay Officer in the Forest Analysis & Inventory Branch, VRI section.

2.5 Sample Size and Strata

NVAF sample sizes were developed with the support of the Forest Analysis and Inventory Branch (FAIB) based on the previous NVAF project in the TSA.² The mature age class has been targeted for this work, with the age of stands being greater than 100 years. The complete NVAF population can be found in Appendix A. In addition to these live trees, NVAF projects also target increasing the number of dead trees sampled.

The existing Okanagan NVAF sample will be pooled with the new NVAF data to produce TSA wide application. Statistical weights based on the selection probabilities will be calculated to allow for the data pooling. The sample size

² The work was completed by consultants Gitte Churlish and Karen Jahraus and approved by Will Smith.

for the new sample strata is based on a guideline that a minimum of 20 trees per stratum will allow for increased confidence in the results. Departures from the minimum stratum sample size guideline have occurred for the less abundant major species of cedar and hemlock, for all minor species and for dead trees. The sample size by species in the mixed species strata immature and mature other strata is proportional to the area of leading species.

Table 1. NVAF Stratum Sample Size

| Age Grouping | No of New Sample Trees | Existing Okanagan NVAF Sample Trees | Total sampled trees |
|---|------------------------|-------------------------------------|---------------------|
| Immature | 0 | 20 | 20 |
| Mature S | 14 | 6 | 20 |
| Mature Fd | 9 | 11 | 20 |
| Mature B | 0 | 20 | 20 |
| Mature PI | 11 | 9 | 20 |
| Mature C | 5 | 10 | 15 |
| Mature Hw | 5 | 10 | 15 |
| Mature Other (At Act,Lw, Ep, Pa, Py, minor species) | 6 | 3 | 9 |
| Dead | 7 | 3 | 10 |
| Total | 57 | 92 | 149 |

2.6 Sample Selection

Gitte Churlish of Churlish Consulting Ltd. has considerable experience in the Sample Selection process. Gitte was sub-contracted by Nona Phillips Forestry Consulting to complete the sample selection for the additional NVAF. She consulted with FAIB staff including Sam Otukol, Gary Johansen and Will Smith to ensure that the process meets the expectations of FAIB. On this project, it was primarily Will.

Documentation of the sample selection process is included in Appendix A.

2.7 Sampling Approach

The crews will be visiting a minimum of 17 samples to complete the destructive sampling process. In addition to completing NVAF work, at each sample they will be required to complete several preliminary steps, including:

1. enhancing any trees prior to falling
2. sweeping a randomly selected auxiliary plot for dead trees. (The procedure outlined in the NVAF Procedure manual, section 4.5 will need

- to be followed. This procedure is also included in Appendix D of this plan.)
3. replacing sample trees as outlined in section 4.4 of the NVAF procedures, as required. (A revised draft of the Sample Tree Procedure is included in Appendix D of this plan.)

Mentoring will occur on actual samples to focus the interaction on operational procedures and maintain production.

3.0 Implementation Plan

3.1 Scheduling

Table 2 – Schedule of Activities

| Timing – 2007/08 | NVAF Activity |
|------------------|--|
| May | Amendment to VPIP preparation -includes Sampling plan development and package preparation |
| June | Plan Amendment -Finalize and get sign off. Bid and award NVAF work to a contractor. Hire a NVAF QA contractor. |
| July | NVAF sampling of 57 live and dead trees, including start up mentoring and Quality Assurance reporting. |
| August | NVAF data completed and submitted to provincial data base by contractor |
| September plus | Analysis of NVAF data collection. |

3.2 Sample Packages

The crews will be provided with a project overview map, packages from the 2002 VRI ground sampling project and data from the previous field work. In some cases, the data provided may include remeasurement conducted on samples in 2006. As required, 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. These are located at the website:

<http://ilmbwww.gov.bc.ca/risc/pubs/teveg/index.htm>

The following is a list for the critical Standards and Procedures for the Okanagan TSA NVAF project:

Planning:

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

Ground Sampling:

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

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:

Glen Dick, Lead Proponent, Executive Director, Okanagan Innovative Forestry Society

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 contact, Southern Interior Forest Region:

Operational: Matt Makar, VRI Phase II Inventory Forester

MoFR District contacts and representative, Okanagan Shuswap Forest District:

Bernie Kaplun

The preparation of the VRI planning documents for the Okanagan NVAF Addendum has been contracted to Nona Phillips Forestry Consulting. It is Nona Phillips' understanding that she will follow through with coordinating the field activities undertaken on this project as the Project Manager including bidding out the work and overseeing the work of the field crews and QA contractor.

In regard to supplies for the Ground sampling, the Licensees will provide:

- Helicopter access as required

3.4.1 Field Work

In the 2007/08 fiscal year, fieldwork will be tendered and contracted out for the NVAF ground sampling to crews made up of a Certified NVAF sampler with a qualified VRI timber sampler for the enhancement work

3.4.2 Quality Assurance

All mentoring and Quality Assurance for the NVAF ground sampling is the responsibility of the Licensee and will be funded through the FIA allocation. The QA will be conducted by a MoFR approved 3rd Party Contractor.

The MoFR will be involved in approving the conduct of the QA for this project. Dependent on their availability, Will Smith or Matt Makar may have a field presence, as well as an office review involvement.

3.4.3 Data Compilation, Analysis and Adjustment

Following the completion of the NVAF destructive sampling field work in 2007/08, follow up work will include:

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

The first task is part of the NVAF project. The additional items will be completed under the direction of the Okanagan Innovative Forestry Society.

3.5 Sample List

Please Note: A complete sample list is provided in Appendix A.

Table 3 – 2007 sample list by of LIVE trees by sample number and auxiliary plot

| Sample # | N Aux | E Aux | S Aux | West | Total |
|----------|-------|-------|-------|------|-------|
| 8 | 3 | | 2 | | 5 |
| 10 | | | 2 | | 2 |
| 18 | | 2 | | | 2 |
| 20 | | 1 | 3 | | 4 |
| 22 | | | 1 | | 1 |
| 24 | | | 1 | | 1 |
| 32 | 1 | | 1 | 3 | 5 |
| 33 | 1 | | | | 1 |
| 40 | | 2 | | | 2 |
| 42 | | 1 | 1 | 1 | 3 |
| 73 | 2 | 2 | | | 4 |
| 86 | 3 | | | 1 | 4 |
| 90 | | 2 | 1 | | 3 |
| 93 | | | | 1 | 1 |
| 101 | | 1 | | 6 | 7 |
| 103 | 3 | | 1 | | 4 |
| 105 | | 1 | | | 1 |
| | | | | | |
| Total | 13 | 12 | 13 | 12 | 50 |

*Note: dead trees are not included in this table as their location will be determined as part of the field work.

3.6 Deliverables

One of the major responsibilities of the Project Manager is to insure that all deliverables for the ground sampling projects are delivered to the appropriate MoFR, FAIB, and 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

- Return of the Project packages
- Digital sample data on CD and proof of their submission directly to the MoFR
- Additional data collected as require for this project, in the format specified in the contract and at the pre-work
- Documentation of any modifications to the sample lists

From the Quality Assurance Contractor

- Project files regarding the QA Sample selection
- A record of the mentoring day including a summary of any concerns
- Quality Assurance records including a summary spreadsheet on the work completed and the QA reports
- Sign off letter with seal

From the Project Manager

- Project files regarding the planning process and the Sample selection
- Project records related to contracting the field work, including the competitive bidding process
- Records from Branch regarding receipt of the data by Branch
- From the QA contractor, the Quality Assurance records including a spreadsheet summarizing the overall project, the QA reports and a sign off letter
- Documentation of any modifications to the sample lists

3.7 Costs

Table 4 – NVAF Costs Based on Activities and Sample Size

| VRI Activity | Sample Size | Unit Cost | Total Cost |
|--|--------------------|------------------|-------------------|
| <u>NVAF GROUND</u> | | | |
| <u>SAMPLING</u> | | | |
| Amendment to current VRI VPIP including sub-contractor | | | \$10,000 |
| Project Management of the field work | | | \$5,000 |
| NVAF destructive sampling | 57 | \$600/tree | \$34,200 |
| Helicopter access | | | \$10,000 |
| Mentoring and QA | | | \$5,000 |
| Final Compilation/analysis for NVAF | | | \$5,000 |
| Total | | | \$69,200 |

3.8 Sign-off sheet

Okanagan Timber Supply Area Vegetation Resources Inventory Project Implementation Plan – Addition for Supplementary Net Volume Adjustment Factor Sampling

It is the intention of the Okanagan Innovative Forestry Society (OIFS) to implement this Addition to the Okanagan Timber Supply Area Vegetation Resources Inventory Project Implementation Plan for Ground Sampling (VPIP) as described. As a key stakeholder in the inventory, the MoFR VRI staff has been consulted throughout the development of this plan.

Glen Dick, R.P.F.
Executive Director

Date

I have reviewed this Addition to the Okanagan Timber Supply Area Vegetation Resources Inventory Project Implementation Plan for Ground Sampling (VPIP). The work proposed in this plan meets Vegetation Resources Inventory Standards and MOFR business needs.

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

Date

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1. J.S. Thrower & Associates, Okanagan TSA VRI Phase II Ground Sampling Pilot Project Implementation Plan. JS Thrower & Associates Ltd. May 2002
2. J.S. Thrower & Associates Ltd. Okanagan TSA VRI Phase II Ground Sampling Pilot Project Implementation Plan Amendment. JS Thrower & Associates Ltd. March 2007
3. Updating the Okanagan TSA Phase II Samples for Mountain Pine Beetle Impacts Project Implementation Plan. JS Thrower & Associates Ltd. June 2006
4. J.S. Thrower & Associates Ltd. Final Report Mountain Pine Beetle Impacts using VRI Phase II Samples in the Okanagan TSA. January 31, 2007.
5. 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>

Appendix A

NVAF Profile

During the spring of 2007, the Executive Director of the OIFS stated his intention to follow the MoFR's advice to augment their NVAF sampling in order to strengthen the statistics around specific strata. In collaboration with the government, the contracting community has developed a plan to provide a more defensible number of trees in each species group so that the NVAF statistics could be discussed by species in the mature age class.

This Appendix includes a series of spreadsheets provided by Churlish Consulting Ltd that provide a full documentation of the sample selection for this NVAF project.

Previous NVAF sample

| lv_d_nvaf | age_grp | sp_nvaf | COUNT |
|-----------|---------|---------|-------|
| D | Mat | BL | 2 |
| D | Mat | SE | 1 |
| L | Imm | BL | 2 |
| L | Imm | CW | 2 |
| L | Imm | EP | 1 |
| L | Imm | FD | 3 |
| L | Imm | FDI | 3 |
| L | Imm | HW | 1 |
| L | Imm | PLI | 5 |
| L | Imm | SX | 3 |
| L | Mat | ACT | 1 |
| L | Mat | AT | 1 |
| L | Mat | BL | 20 |
| L | Mat | CW | 10 |
| L | Mat | FD | 2 |
| L | Mat | FDI | 9 |
| L | Mat | HW | 10 |
| L | Mat | LW | 1 |
| L | Mat | PL | 1 |
| L | Mat | PLI | 8 |
| L | Mat | SE | 4 |
| L | Mat | SX | 2 |
| | | | 69 |

*This data is obtained from the destructively sampled data files.

Plots Used during previous NVAF sampling, 2002

| Samp_# | N | E | S | W |
|--------|---|---|---|---|
| 0003 | | 2 | | |
| 0008 | | | 3 | 3 |
| 0010 | 4 | | | |
| 0014 | | | 3 | 2 |
| 0018 | | | | 3 |
| 0020 | | | | 1 |
| 0022 | 1 | | | 3 |
| 0024 | 2 | | | |
| 0028 | | | 2 | |
| 0034 | | | 1 | |
| 0037 | 1 | 2 | | |
| 0040 | 1 | | 2 | 1 |
| 0043 | 3 | | | 1 |
| 0045 | | 3 | | |
| 0048 | | | 1 | 1 |
| 0052 | | 4 | 1 | |
| 0072 | 2 | | | 1 |
| 0073 | | | 3 | 2 |
| 0076 | 1 | | 1 | |
| 0077 | 1 | 2 | | 2 |
| 0082 | 1 | | | |
| 0086 | | 1 | | |
| 0089 | 3 | 1 | 1 | 1 |
| 0090 | 2 | | | 3 |
| 0095 | 1 | | | |
| 0100 | 2 | | 1 | |
| 0103 | | 1 | | 5 |
| 0105 | 1 | | | 2 |

Species available in the previously unsampled plots

| sp_grp | age_grp | LV_D | species | COUNT |
|--------|---------|------|---------|-------|
| Bal | Mat | L | BL | 10 |
| Ced | Mat | L | CW | 34 |
| Fir | Mat | L | FDI | 10 |
| Hem | Mat | L | HW | 11 |
| Ot | Mat | L | AT | 1 |
| Ot | Mat | L | EP | 2 |
| Ot | Mat | L | LW | 2 |
| Ot | Mat | L | PY | 1 |
| PL | Mat | L | PLI | 33 |
| Sp | Mat | L | SE | 10 |
| Sp | Mat | L | SX | 10 |

Plot list available

| SAMP_NO | N | E | S | W |
|---------|---|---|---|-----|
| 0008 | 5 | | 2 | |
| 0010 | | | 3 | |
| 0018 | 2 | 3 | | |
| 0020 | | 5 | 4 | |
| 0022 | | | 4 | |
| 0024 | | | 2 | 2 |
| 0033 | 3 | | 2 | 1 2 |
| 0040 | | 4 | | |
| 0042 | 1 | 4 | 4 | 1 |
| 0045 | | | | 2 |
| 0052 | 4 | | | |
| 0073 | 2 | 2 | | |
| 0086 | 3 | | | 1 |
| 0090 | | 6 | 3 | |
| 0093 | 4 | | | 1 |
| 0101 | | | 2 | 8 |
| 0103 | 5 | | 3 | |
| 0105 | | 4 | 2 | |

indicates selected

Sample list

| age_gr | | PROJ_I | SAMP_N | | | | | |
|--------|--------|--------|--------|------|---------|------|---------|------|
| p | sp_grp | D | O | plot | tree_no | LV_D | species | dbh |
| Mat | Ced | 0221 | 0040 | E | 002 | L | CW | 23 |
| Mat | Ced | 0221 | 0042 | S | 003 | L | CW | 33.2 |
| Mat | Ced | 0221 | 0032 | W | 004 | L | CW | 46.9 |
| Mat | Ced | 0221 | 0032 | W | 001 | L | CW | 58.8 |
| Mat | Ced | 0221 | 0032 | N | 005 | L | CW | 70.8 |
| Mat | Fir | 0221 | 0073 | E | 004 | L | FDI | 22 |
| Mat | Fir | 0221 | 0073 | E | 003 | L | FDI | 26.5 |
| Mat | Fir | 0221 | 0086 | N | 001 | L | FDI | 32.8 |
| Mat | Fir | 0221 | 0101 | W | 006 | L | FDI | 63.3 |
| Mat | Fir | 0221 | 0101 | W | 004 | L | FDI | 67.7 |
| Mat | Fir | 0221 | 0101 | W | 002 | L | FDI | 83.6 |
| Mat | Fir | 0221 | 0101 | W | 005 | L | FDI | 86.6 |
| Mat | Fir | 0221 | 0101 | W | 009 | L | FDI | 92.2 |
| Mat | Fir | 0221 | 0101 | W | 007 | L | FDI | 96.9 |
| Mat | Hem | 0221 | 0033 | N | 006 | L | HW | 20.1 |
| Mat | Hem | 0221 | 0042 | W | 002 | L | HW | 34.2 |
| Mat | Hem | 0221 | 0042 | E | 005 | L | HW | 39 |
| Mat | Hem | 0221 | 0032 | S | 006 | L | HW | 49.4 |
| Mat | Hem | 0221 | 0032 | W | 003 | L | HW | 77 |
| Mat | Ot | 0221 | 0086 | N | 002 | L | AT | 22.1 |
| Mat | Ot | 0221 | 0073 | N | 003 | L | LW | 27.4 |
| Mat | Ot | 0221 | 0086 | N | 003 | L | EP | 30.8 |
| Mat | Ot | 0221 | 0040 | E | 004 | L | EP | 32.7 |
| Mat | Ot | 0221 | 0073 | N | 001 | L | LW | 35.6 |
| Mat | Ot | 0221 | 0086 | W | 003 | L | PY | 72.3 |
| Mat | PL | 0221 | 0103 | N | 009 | L | PLI | 12.9 |
| Mat | PL | 0221 | 0103 | N | 007 | L | PLI | 14.3 |
| Mat | PL | 0221 | 0105 | E | 005 | L | PLI | 15 |
| Mat | PL | 0221 | 0103 | S | 003 | L | PLI | 17.2 |
| Mat | PL | 0221 | 0101 | E | 006 | L | PLI | 18.4 |
| Mat | PL | 0221 | 0090 | S | 002 | L | PLI | 18.9 |
| Mat | PL | 0221 | 0090 | E | 006 | L | PLI | 22 |
| Mat | PL | 0221 | 0103 | N | 008 | L | PLI | 22.5 |
| Mat | PL | 0221 | 0020 | S | 002 | L | PLI | 24.6 |
| Mat | PL | 0221 | 0020 | S | 004 | L | PLI | 25 |
| Mat | PL | 0221 | 0020 | E | 004 | L | PLI | 36.9 |
| Mat | Sp | 0221 | 0090 | E | 005 | L | SE | 12.7 |
| Mat | Sp | 0221 | 0010 | S | 004 | L | SX | 15.8 |
| Mat | Sp | 0221 | 0008 | N | 005 | L | SX | 18.4 |
| Mat | Sp | 0221 | 0018 | E | 002 | L | SE | 20 |
| Mat | Sp | 0221 | 0018 | E | 003 | L | SE | 26.3 |
| Mat | Sp | 0221 | 0093 | W | 001 | L | SX | 29.4 |
| Mat | Sp | 0221 | 0024 | S | 002 | L | SE | 29.5 |
| Mat | Sp | 0221 | 0008 | S | 002 | L | SX | 30.1 |
| Mat | Sp | 0221 | 0010 | S | 006 | L | SX | 35.1 |
| Mat | Sp | 0221 | 0020 | S | 001 | L | SE | 37.2 |
| Mat | Sp | 0221 | 0008 | N | 001 | L | SX | 41.5 |

| | | | | | | | | |
|-----|----|------|------|---|-----|---|----|------|
| Mat | Sp | 0221 | 0008 | S | 006 | L | SX | 44.3 |
| Mat | Sp | 0221 | 0022 | S | 004 | L | SE | 57.8 |
| Mat | Sp | 0221 | 0008 | N | 003 | L | SX | 59.3 |

List by sample number

| age_gr | | PROJ_I | SAMP_N | | | | | |
|--------|--------|--------|--------|------|---------|------|---------|------|
| p | sp_grp | D | O | plot | tree_no | LV_D | species | dbh |
| Mat | Ced | 0221 | 0040 | E | 002 | L | CW | 23 |
| Mat | Ced | 0221 | 0042 | S | 003 | L | CW | 33.2 |
| Mat | Ced | 0221 | 0032 | W | 004 | L | CW | 46.9 |
| Mat | Ced | 0221 | 0032 | W | 001 | L | CW | 58.8 |
| Mat | Ced | 0221 | 0032 | N | 005 | L | CW | 70.8 |
| Mat | Fir | 0221 | 0073 | E | 004 | L | FDI | 22 |
| Mat | Fir | 0221 | 0073 | E | 003 | L | FDI | 26.5 |
| Mat | Fir | 0221 | 0086 | N | 001 | L | FDI | 32.8 |
| Mat | Fir | 0221 | 0101 | W | 006 | L | FDI | 63.3 |
| Mat | Fir | 0221 | 0101 | W | 004 | L | FDI | 67.7 |
| Mat | Fir | 0221 | 0101 | W | 002 | L | FDI | 83.6 |
| Mat | Fir | 0221 | 0101 | W | 005 | L | FDI | 86.6 |
| Mat | Fir | 0221 | 0101 | W | 009 | L | FDI | 92.2 |
| Mat | Fir | 0221 | 0101 | W | 007 | L | FDI | 96.9 |
| Mat | Hem | 0221 | 0033 | N | 006 | L | HW | 20.1 |
| Mat | Hem | 0221 | 0042 | W | 002 | L | HW | 34.2 |
| Mat | Hem | 0221 | 0042 | E | 005 | L | HW | 39 |
| Mat | Hem | 0221 | 0032 | S | 006 | L | HW | 49.4 |
| Mat | Hem | 0221 | 0032 | W | 003 | L | HW | 77 |
| Mat | Ot | 0221 | 0086 | N | 002 | L | AT | 22.1 |
| Mat | Ot | 0221 | 0073 | N | 003 | L | LW | 27.4 |
| Mat | Ot | 0221 | 0086 | N | 003 | L | EP | 30.8 |
| Mat | Ot | 0221 | 0040 | E | 004 | L | EP | 32.7 |
| Mat | Ot | 0221 | 0073 | N | 001 | L | LW | 35.6 |
| Mat | Ot | 0221 | 0086 | W | 003 | L | PY | 72.3 |
| Mat | PL | 0221 | 0103 | N | 009 | L | PLI | 12.9 |
| Mat | PL | 0221 | 0103 | N | 007 | L | PLI | 14.3 |
| Mat | PL | 0221 | 0105 | E | 005 | L | PLI | 15 |
| Mat | PL | 0221 | 0103 | S | 003 | L | PLI | 17.2 |
| Mat | PL | 0221 | 0101 | E | 006 | L | PLI | 18.4 |
| Mat | PL | 0221 | 0090 | S | 002 | L | PLI | 18.9 |
| Mat | PL | 0221 | 0090 | E | 006 | L | PLI | 22 |
| Mat | PL | 0221 | 0103 | N | 008 | L | PLI | 22.5 |
| Mat | PL | 0221 | 0020 | S | 002 | L | PLI | 24.6 |
| Mat | PL | 0221 | 0020 | S | 004 | L | PLI | 25 |
| Mat | PL | 0221 | 0020 | E | 004 | L | PLI | 36.9 |
| Mat | Sp | 0221 | 0090 | E | 005 | L | SE | 12.7 |
| Mat | Sp | 0221 | 0010 | S | 004 | L | SX | 15.8 |
| Mat | Sp | 0221 | 0008 | N | 005 | L | SX | 18.4 |
| Mat | Sp | 0221 | 0018 | E | 002 | L | SE | 20 |
| Mat | Sp | 0221 | 0018 | E | 003 | L | SE | 26.3 |
| Mat | Sp | 0221 | 0093 | W | 001 | L | SX | 29.4 |
| Mat | Sp | 0221 | 0024 | S | 002 | L | SE | 29.5 |

| | | | | | | | | |
|-----|----|------|------|---|-----|---|----|------|
| Mat | Sp | 0221 | 0008 | S | 002 | L | SX | 30.1 |
| Mat | Sp | 0221 | 0010 | S | 006 | L | SX | 35.1 |
| Mat | Sp | 0221 | 0020 | S | 001 | L | SE | 37.2 |
| Mat | Sp | 0221 | 0008 | N | 001 | L | SX | 41.5 |
| Mat | Sp | 0221 | 0008 | S | 006 | L | SX | 44.3 |
| Mat | Sp | 0221 | 0022 | S | 004 | L | SE | 57.8 |
| Mat | Sp | 0221 | 0008 | N | 003 | L | SX | 59.3 |

Population

| sp_grp | age_grp | PROJ_ID | SAMP_NO | plot | tree_no | LV_D | species | dbh | comment |
|--------|---------|---------|---------|------|---------|------|---------|------|----------|
| Bal | Mat | 0221 | 0090 | S | 001 | L | BL | 16.5 | |
| Bal | Mat | 0221 | 0010 | S | 001 | L | BL | 16.7 | |
| Bal | Mat | 0221 | 0022 | S | 003 | L | BL | 20 | |
| Bal | Mat | 0221 | 0090 | E | 008 | L | BL | 23.7 | |
| Bal | Mat | 0221 | 0020 | E | 002 | L | BL | 32.3 | |
| Bal | Mat | 0221 | 0022 | S | 002 | L | BL | 36.3 | |
| Bal | Mat | 0221 | 0020 | E | 003 | L | BL | 37.1 | |
| Bal | Mat | 0221 | 0024 | E | 005 | L | BL | 41.1 | |
| Bal | Mat | 0221 | 0024 | E | 002 | L | BL | 47 | |
| Bal | Mat | 0221 | 0024 | S | 001 | L | BL | 51.6 | |
| Ced | Mat | 0221 | 0052 | N | 001 | L | CW | 12.9 | |
| Ced | Mat | 0221 | 0040 | E | 002 | L | CW | 23 | Selected |
| Ced | Mat | 0221 | 0033 | W | 002 | L | CW | 27.4 | |
| Ced | Mat | 0221 | 0052 | N | 006 | L | CW | 30.3 | |
| Ced | Mat | 0221 | 0033 | W | 001 | L | CW | 31.1 | |
| Ced | Mat | 0221 | 0040 | E | 003 | L | CW | 32 | |
| Ced | Mat | 0221 | 0042 | S | 003 | L | CW | 33.2 | Selected |
| Ced | Mat | 0221 | 0040 | E | 001 | L | CW | 34.9 | |
| Ced | Mat | 0221 | 0042 | E | 001 | L | CW | 42.8 | |
| Ced | Mat | 0221 | 0042 | N | 002 | L | CW | 45.4 | |
| Ced | Mat | 0221 | 0033 | E | 003 | L | CW | 45.7 | |
| Ced | Mat | 0221 | 0032 | W | 004 | L | CW | 46.9 | Selected |
| Ced | Mat | 0221 | 0042 | S | 004 | L | CW | 48.1 | |
| Ced | Mat | 0221 | 0042 | E | 008 | L | CW | 53.3 | |
| Ced | Mat | 0221 | 0042 | E | 007 | L | CW | 57.3 | |
| Ced | Mat | 0221 | 0032 | W | 001 | L | CW | 58.8 | Selected |
| Ced | Mat | 0221 | 0042 | S | 002 | L | CW | 61.2 | |
| Ced | Mat | 0221 | 0032 | E | 003 | L | CW | 62.6 | |
| Ced | Mat | 0221 | 0042 | S | 008 | L | CW | 62.6 | |
| Ced | Mat | 0221 | 0032 | E | 004 | L | CW | 70 | |
| Ced | Mat | 0221 | 0032 | N | 005 | L | CW | 70.8 | Selected |
| Ced | Mat | 0221 | 0032 | W | 002 | L | CW | 89.3 | |
| Ced | Mat | 0221 | 0045 | W | 001 | L | CW | 101 | |
| Ced | Mat | 0221 | 0045 | W | 002 | L | CW | 109 | |
| Fir | Mat | 0221 | 0073 | E | 004 | L | FDI | 22 | Selected |
| Fir | Mat | 0221 | 0073 | E | 003 | L | FDI | 26.5 | Selected |
| Fir | Mat | 0221 | 0086 | N | 001 | L | FDI | 32.8 | Selected |

| | | | | | | | | | |
|-----|-----|------|------|---|-----|---|-----|------|----------|
| Fir | Mat | 0221 | 0101 | W | 006 | L | FDI | 63.3 | Selected |
| Fir | Mat | 0221 | 0101 | W | 004 | L | FDI | 67.7 | Selected |
| Fir | Mat | 0221 | 0101 | W | 002 | L | FDI | 83.6 | Selected |
| Fir | Mat | 0221 | 0101 | W | 005 | L | FDI | 86.6 | Selected |
| Fir | Mat | 0221 | 0101 | W | 008 | L | FDI | 91.9 | |
| Fir | Mat | 0221 | 0101 | W | 009 | L | FDI | 92.2 | Selected |
| Fir | Mat | 0221 | 0101 | W | 007 | L | FDI | 96.9 | Selected |
| | | | | | | | | | |
| Hem | Mat | 0221 | 0033 | N | 006 | L | HW | 20.1 | Selected |
| Hem | Mat | 0221 | 0033 | E | 001 | L | HW | 25.6 | |
| Hem | Mat | 0221 | 0033 | N | 004 | L | HW | 30.6 | |
| Hem | Mat | 0221 | 0032 | S | 005 | L | HW | 31.8 | |
| Hem | Mat | 0221 | 0042 | W | 002 | L | HW | 34.2 | Selected |
| Hem | Mat | 0221 | 0033 | N | 003 | L | HW | 34.3 | |
| Hem | Mat | 0221 | 0033 | S | 001 | L | HW | 36.1 | |
| Hem | Mat | 0221 | 0042 | E | 005 | L | HW | 39 | Selected |
| Hem | Mat | 0221 | 0032 | S | 004 | L | HW | 40.3 | |
| Hem | Mat | 0221 | 0052 | N | 003 | L | HW | 40.3 | |
| Hem | Mat | 0221 | 0032 | N | 003 | L | HW | 49.1 | |
| Hem | Mat | 0221 | 0032 | S | 006 | L | HW | 49.4 | Selected |
| Hem | Mat | 0221 | 0032 | W | 006 | L | HW | 57 | |
| Hem | Mat | 0221 | 0052 | N | 004 | L | HW | 60 | |
| Hem | Mat | 0221 | 0032 | W | 003 | L | HW | 77 | Selected |
| Hem | Mat | 0221 | 0032 | N | 001 | L | HW | 84 | |
| Hem | Mat | 0221 | 0032 | E | 001 | L | HW | 92.8 | |
| | | | | | | | | | |
| Ot | Mat | 0221 | 0086 | N | 002 | L | AT | 22.1 | Selected |
| Ot | Mat | 0221 | 0073 | N | 003 | L | LW | 27.4 | Selected |
| Ot | Mat | 0221 | 0086 | N | 003 | L | EP | 30.8 | Selected |
| Ot | Mat | 0221 | 0040 | E | 004 | L | EP | 32.7 | Selected |
| Ot | Mat | 0221 | 0073 | N | 001 | L | LW | 35.6 | Selected |
| Ot | Mat | 0221 | 0086 | W | 003 | L | PY | 72.3 | Selected |
| | | | | | | | | | |
| PL | Mat | 0221 | 0103 | N | 009 | L | PLI | 12.9 | Selected |
| PL | Mat | 0221 | 0105 | S | 003 | L | PLI | 13.2 | |
| PL | Mat | 0221 | 0103 | S | 005 | L | PLI | 13.9 | |
| PL | Mat | 0221 | 0103 | N | 007 | L | PLI | 14.3 | Selected |
| PL | Mat | 0221 | 0090 | E | 007 | L | PLI | 14.9 | |
| PL | Mat | 0221 | 0105 | E | 004 | L | PLI | 15 | |
| PL | Mat | 0221 | 0105 | E | 005 | L | PLI | 15 | Selected |
| PL | Mat | 0221 | 0093 | N | 005 | L | PLI | 16.3 | |
| PL | Mat | 0221 | 0103 | S | 002 | L | PLI | 16.6 | |
| PL | Mat | 0221 | 0103 | S | 003 | L | PLI | 17.2 | Selected |
| PL | Mat | 0221 | 0101 | E | 008 | L | PLI | 17.5 | |
| PL | Mat | 0221 | 0103 | N | 011 | L | PLI | 18.1 | |
| PL | Mat | 0221 | 0101 | E | 006 | L | PLI | 18.4 | Selected |
| PL | Mat | 0221 | 0105 | E | 001 | L | PLI | 18.4 | |
| PL | Mat | 0221 | 0105 | E | 002 | L | PLI | 18.4 | |
| PL | Mat | 0221 | 0090 | S | 002 | L | PLI | 18.9 | Selected |
| PL | Mat | 0221 | 0093 | N | 004 | L | PLI | 19.5 | |

| | | | | | | | | | |
|----|-----|------|------|---|-----|---|-----|------|----------|
| PL | Mat | 0221 | 0090 | S | 004 | L | PLI | 20 | |
| PL | Mat | 0221 | 0090 | E | 006 | L | PLI | 22 | Selected |
| PL | Mat | 0221 | 0090 | E | 002 | L | PLI | 22.1 | |
| PL | Mat | 0221 | 0090 | E | 009 | L | PLI | 22.4 | |
| PL | Mat | 0221 | 0103 | N | 008 | L | PLI | 22.5 | Selected |
| PL | Mat | 0221 | 0093 | N | 001 | L | PLI | 22.8 | |
| PL | Mat | 0221 | 0105 | S | 001 | L | PLI | 24.2 | |
| PL | Mat | 0221 | 0020 | S | 002 | L | PLI | 24.6 | Selected |
| PL | Mat | 0221 | 0020 | S | 003 | L | PLI | 24.6 | |
| PL | Mat | 0221 | 0093 | N | 002 | L | PLI | 24.6 | |
| PL | Mat | 0221 | 0020 | S | 004 | L | PLI | 25 | Selected |
| PL | Mat | 0221 | 0103 | N | 005 | L | PLI | 26.1 | |
| PL | Mat | 0221 | 0101 | W | 003 | L | PLI | 36.8 | |
| PL | Mat | 0221 | 0020 | E | 004 | L | PLI | 36.9 | Selected |
| PL | Mat | 0221 | 0018 | N | 003 | L | PLI | 43.6 | |
| PL | Mat | 0221 | 0020 | E | 005 | L | PLI | 46.4 | |
| Sp | Mat | 0221 | 0090 | E | 005 | L | SE | 12.7 | Selected |
| Sp | Mat | 0221 | 0010 | S | 004 | L | SX | 15.8 | Selected |
| Sp | Mat | 0221 | 0018 | N | 001 | L | SE | 16.7 | |
| Sp | Mat | 0221 | 0008 | N | 005 | L | SX | 18.4 | Selected |
| Sp | Mat | 0221 | 0018 | E | 002 | L | SE | 20 | Selected |
| Sp | Mat | 0221 | 0018 | E | 003 | L | SE | 26.3 | Selected |
| Sp | Mat | 0221 | 0008 | N | 004 | L | SX | 29.4 | |
| Sp | Mat | 0221 | 0093 | W | 001 | L | SX | 29.4 | Selected |
| Sp | Mat | 0221 | 0024 | S | 002 | L | SE | 29.5 | Selected |
| Sp | Mat | 0221 | 0018 | E | 001 | L | SE | 29.6 | |
| Sp | Mat | 0221 | 0008 | S | 002 | L | SX | 30.1 | Selected |
| Sp | Mat | 0221 | 0010 | S | 006 | L | SX | 35.1 | Selected |
| Sp | Mat | 0221 | 0022 | S | 001 | L | SE | 36.8 | |
| Sp | Mat | 0221 | 0020 | S | 001 | L | SE | 37.2 | Selected |
| Sp | Mat | 0221 | 0008 | N | 001 | L | SX | 41.5 | Selected |
| Sp | Mat | 0221 | 0008 | S | 006 | L | SX | 44.3 | Selected |
| Sp | Mat | 0221 | 0020 | E | 001 | L | SE | 46.3 | |
| Sp | Mat | 0221 | 0022 | S | 004 | L | SE | 57.8 | Selected |
| Sp | Mat | 0221 | 0008 | N | 003 | L | SX | 59.3 | Selected |
| Sp | Mat | 0221 | 0008 | N | 002 | L | SX | 62.3 | |

Cedar and Hemlock Possible

| CLSTR_ID | Cedar | Hemlock | Age | |
|---------------|-------|---------|-----|-------------|
| 0221-0032-TO1 | 6 | 8 | 286 | |
| 0221-0033-TO1 | 3 | 5 | 127 | |
| 0221-0034-TO1 | | 1 | 296 | Used |
| 0221-0037-TO1 | 3 | 5 | 336 | Used |
| 0221-0039-TO1 | 16 | 2 | 327 | |
| 0221-0040-TO1 | 8 | 1 | 138 | used |
| 0221-0042-TO1 | 8 | 2 | 128 | |
| 0221-0043-TO1 | 3 | 1 | 327 | |
| 0221-0050-TO1 | 2 | 5 | 57 | * too young |
| 0221-0051-TO1 | 1 | 4 | 40 | * too young |
| 0221-0052-TO1 | 4 | 9 | 227 | Used |
| 0221-0054-TO1 | 1 | 1 | 25 | * too young |
| 0221-0055-TO1 | 3 | 4 | 57 | * too young |
| 0221-0057-TO1 | 3 | 3 | 98 | * too young |
| 0221-0059-TO1 | 2 | 6 | 97 | * too young |
| 0221-0064-TO1 | 5 | 7 | 88 | * too young |
| 0221-0065-TO1 | | 5 | 87 | * too young |
| 0221-0089-TO1 | 5 | 1 | 74 | * too young |

Selected

Proportions of Dead trees in the IPC's of all the current TEP plots

| sp_grp | LV_D | COUNT | PERCENT | Percents excluding X | | |
|-----------|-----------|-------|---------|----------------------|------|---------|
| B | D | 27 | 16.07 | 19% | 1.9 | done |
| C | D | 14 | 8.33 | 10% | 1.0 | |
| E | D | 1 | 0.60 | 1% | 0.1 | |
| F | D | 20 | 11.90 | 14% | 1.4 | |
| H | D | 4 | 2.38 | 3% | 0.3 | |
| P | D | 63 | 37.50 | 45% | 4.5 | |
| S | D | 12 | 7.14 | 9% | 0.9 | done |
| X | D | 27 | 16.07 | 19% | | |
| | all dead | 168 | | | 10.0 | total # |
| | dead no x | 141 | | | | desired |
| recommend | 1 cedar | | | | | |
| | 1-2 fir | | | | | |
| | 4-5 PL | | | | | |

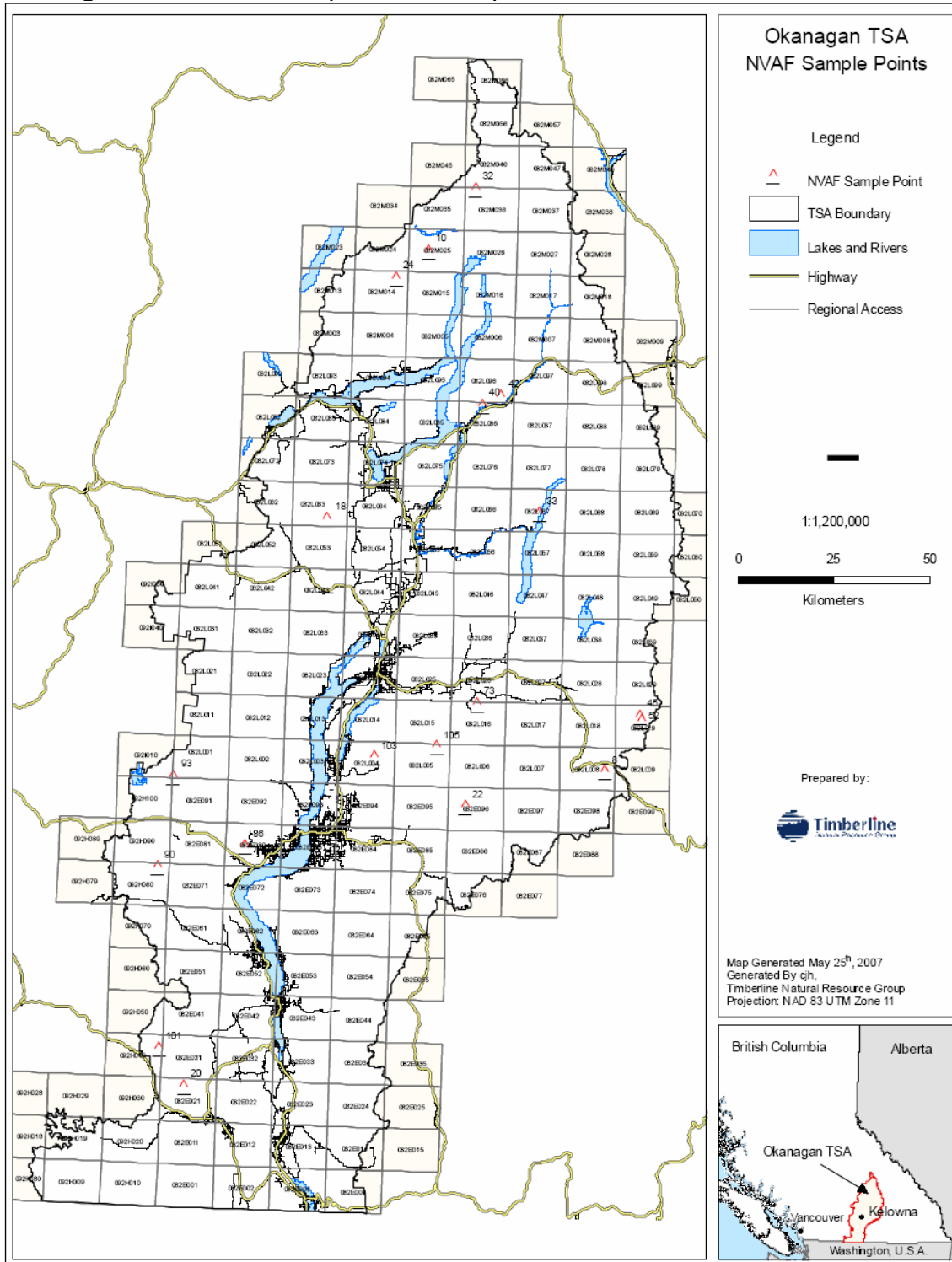
for a total of 7 dead trees

Sample List 2007 – Distribution by species

| Sample # | N Aux | E Aux | S Aux | West | Total |
|----------|-----------|---------------|---------------|--------------|-------|
| 8 | 3 | | 2 | | 5 |
| spp | Sx-3 | | Sx-2 | | |
| 10 | | | 2 | | 2 |
| spp | | | Sx-2 | | |
| 18 | | 2 | | | 2 |
| spp | | Se-2 | | | |
| 20 | | 1 | 3 | | 4 |
| spp | | Pli-1 | Pli-2 Sx-1 | | |
| 22 | | | 1 | | 1 |
| spp | | | Se-1 | | |
| 24 | | | 1 | | 1 |
| spp | | | Se-1 | | |
| 32 | 1 | | 1 | 3 | 5 |
| spp | Cw-1 | | Hw-1 | Cw-2 Hw-1 | |
| 33 | 1 | | | | 1 |
| spp | Hw-1 | | | | |
| 40 | | 2 | | | 2 |
| spp | | Cw-1 Ep-1 | | | |
| 42 | | 1 | 1 | 1 | 3 |
| spp | | Hw-1 | Cw-1 | Hw-1 | |
| 73 | 2 | 2 | | | 4 |
| spp | Lw-2 | Fdi-2 | | | |
| 86 | 3 | | | 1 | 4 |
| spp | At-1 Ep-1 | | | Py-1 | |
| | Fdi-1 | | | | |
| 90 | | 2 | 1 | | 3 |
| spp | | Pli-1 Se-1 | Pli-1 | | |
| 93 | | | | 1 | 1 |
| spp | | | | Sx-1 | |
| 101 | | 1 | | 6 | 7 |
| spp | | Pli-1 | | Fdi-6 | |
| 103 | 3 | | 1 | | 4 |
| spp | Pli-3 | | Pli-1 | | |
| 105 | | 1 | | | 1 |
| spp | | Pli-1 | | | |
| Total | 13 | 12 | 13 | 12 | 50 |

Appendix B

Okanagan TSA NVAF Sample Points Map



Appendix C

Original NVAF sample list

For this project, the samples targeted are the ones selected for the project in the 2002 planning process. This data was obtained using the provincial data base. The three samples at the bottom of this list were selected for their cedar and hemlock content.

| proj_id | samp_no | type_cd | meas_dt | utm | easting | northing | map_no | polygon |
|---------|---------|---------|-----------|-----|---------|----------|---------|---------|
| 0221 | 0003 | NO1 | 6/18/2002 | 11 | 321607 | 5612173 | 082L063 | 00650 |
| 0221 | 0008 | NO1 | 6/22/2002 | 10 | 397299 | 5544478 | 082L008 | 00304 |
| 0221 | 0010 | NO1 | 7/12/2002 | 11 | 351651 | 5679612 | 082M025 | 00010 |
| 0221 | 0014 | NO1 | 6/23/2002 | 10 | 314048 | 5581097 | 082L032 | 00257 |
| 0221 | 0018 | NO1 | 7/8/2002 | 11 | 325290 | 5610188 | 082L063 | 00505 |
| 0221 | 0020 | NO1 | 7/6/2002 | 11 | 287873 | 5463011 | 082E021 | 00056 |
| 0221 | 0022 | NO1 | 7/4/2002 | 11 | 361092 | 5535251 | 082E096 | 00250 |
| 0221 | 0024 | NO1 | 7/9/2001 | 11 | 343201 | 5672625 | 082M014 | 00130 |
| 0221 | 0028 | NO1 | 7/2/2002 | 11 | 284566 | 5471863 | 082E031 | 00299 |
| 0221 | 0034 | NO1 | 6/12/2002 | 11 | 370656 | 5691105 | 082M036 | 00137 |
| 0221 | 0037 | NO1 | 6/20/2002 | 11 | 36870 | 5706582 | 082M046 | 00020 |
| 0221 | 0040 | NO1 | 5/31/2002 | 11 | 365327 | 5639773 | 082L086 | 00446 |
| 0221 | 0043 | NO1 | 6/18/2002 | 10 | 401775 | 5607918 | 082L069 | 00496 |
| 0221 | 0044 | NO1 | 5/26/2002 | 10 | 384316 | 5534917 | 082E097 | 00345 |
| 0221 | 0045 | NO1 | 5/28/2002 | 10 | 406278 | 5558796 | 082L019 | 00098 |
| 0221 | 0048 | NO1 | 6/17/2002 | | | | 082L037 | 00600 |
| 0221 | 0052 | NO1 | 6/22/2002 | 10 | 406850 | 5557719 | 082L019 | 00196 |
| 0221 | 0067 | NO1 | 5/25/2002 | 10 | 369506 | 5584836 | 082L046 | 00442 |
| 0221 | 0072 | NO1 | 7/5/2002 | 10 | 707955 | 5449044 | 092H020 | 00078 |
| 0221 | 0073 | NO1 | 5/27/2002 | | 364021 | 5562165 | 082L016 | 00032 |
| 0221 | 0076 | NO1 | 5/26/2002 | 11 | 316735 | 5531508 | 082E093 | 00186 |
| 0221 | 0077 | NO1 | 5/27/2002 | | | | 082E022 | 00515 |
| 0221 | 0082 | NO1 | 5/24/2002 | 10 | 318662 | 5588860 | 082L043 | 00210 |
| 0221 | 0086 | NO1 | 5/25/2002 | 11 | 303964 | 5525181 | 082E082 | 00240 |
| 0221 | 0089 | NO1 | 6/15/2002 | 11 | 338913 | 5643635 | 082L094 | 00055 |
| 0221 | 0090 | NO1 | 6/13/2002 | 10 | 713017 | 5519474 | 092H080 | 00685 |
| 0221 | 0093 | NO1 | 5/30/2002 | 11 | 285357 | 5543262 | 082L001 | 00004 |
| 0221 | 0095 | NO1 | 5/31/2002 | 10 | 714300 | 5544786 | 092I010 | 02002 |
| 0221 | 0100 | NO1 | 7/13/2002 | 11 | 325338 | 5585103 | 082L033 | 00339 |
| 0221 | 0101 | NO1 | 7/3/2002 | 10 | 717131 | 5472696 | 092H040 | 00251 |
| 0221 | 0103 | NO1 | 6/21/2002 | 10 | 337375 | 5548226 | 082L004 | 00156 |
| 0221 | 0105 | NO1 | 6/12/2002 | 11 | 353620 | 5550794 | 082L005 | 00064 |
| 0221 | 0032 | TO1 | | 11 | 363805 | 5695991 | 082M036 | 14 |
| 0221 | 0033 | TO1 | | 11 | 380265 | 5611462 | 082L067 | 275 |
| 0221 | 0042 | TO1 | | 11 | 370339 | 5641859 | 082L096 | 76 |

Appendix D

Draft NVAF Tree Replacement Process and Dead Tree Selection if not Previously Tallied¹

¹ Provided by Will Smith in an Email dated May 8, 2007

4.3.4 Assessment of Sample Tree List

The sample tree list must be assessed to determine and correct problems around insufficient numbers or and inadequate geographic distribution of trees tallied in the selection matrix cells. These problems can arise because of the small number of the NVAF ground samples, particularly for uncommon species. Solutions will depend on type of problem, as per:

- **Inadequate distribution – where all of the sample trees may come from one or two samples:** Use the sample tree replacement process, outlined in section 4.4, to select similar trees first from other NVAF ground samples and secondly from other VRI ground samples. A minimum distribution of four ground samples is recommended. Do not use these replacement samples to select other NVAF sample trees.
- **Insufficient number of tallied trees – where the selection matrix and application stratum consists of a single species:** identify the ground samples that contain the species of interest and make a random selection of one to several additional ground samples. Do not use these additional samples to select other NVAF sample trees.
- **Insufficient number of tallied trees – where the application stratum consists of multiple species:** group species together into one selection matrix.

4.4 Sample Tree Replacement

All selected trees should be used in the computation of the NVAF. However, there are a number of situations where one or more selected NVAF trees may need to be replaced. These situations include:

- A selected tree is unsafe to fall.
- A selected tree is situated in such a way that if felled, it would be impossible to measure, i.e. the tree is above a bluff or a waterway.
- A selected tree is found to be an active wildlife tree or has other characteristics that would outweigh its importance to the NVAF sample.
- The tree conditions no longer match the matrix cell used to classify the tree for the selection process or the dbh is substantially different from the one used in the selection. For example, the tree could have died or have been heavily damaged by fire or other causes.

If this occurs, then select a replacement tree from the same selection matrix cell and with a similar dbh. It is essential to select the replacement trees without bias. Replacement selection methods vary on circumstance as per:

Individual tree found to be unsuitable for sampling:

1. Select the replacement tree from one of the tallied trees in any of the auxiliary plots of the ground sample. This is the most efficient from a sampling perspective and is used when the felling or sampling restriction applies to an individual tree rather than an entire sample, or
2. If there are no suitable trees amongst the tallied trees, a replacement tree can be selected from elsewhere in the polygon through the use of a random bearing from the center of the auxiliary plot. The replacement tree should be given a non

sequential tree number, such as #99 and fully enhanced prior to felling and sectioning.

Ground sample found to be unsuitable for sampling:

1. Select a replacement tree from the list of trees tallied in the auxiliary plots of the remaining NVAF ground samples.
2. If there are an insufficient number of trees for the replacement selection or their distribution is limited as can occur with uncommon species, then select additional ground samples for NVAF. Identify the subset of ground samples that contain tallied trees of the same selection matrix cell and make a random selection of enough ground samples to satisfy the number of replacement trees. Usually this will amount to 1 to 3 additional ground samples.

4.5 Dead Tree Selection if Not Previously Tallied

If enhancements are being done concurrent with the destructive sampling, then all dead trees within the selected auxiliary plot must be tallied and enhanced prior to selection. Once the subset of dead potential trees is identified, the sample tree can be selected without bias. Steps to take for the selection process are:

1. Randomly select an auxiliary plot from each of the NVAF ground samples
2. Once at the selected auxiliary plot, tally all dead trees
3. Estimate the subset of dead potential trees through an estimate of % sound of each dead tree. Trees that are obviously under 50% sound wood can be ignored. Trees that are borderline 50% sound should be properly net factored.
4. Use the following formula to determine the trees that are actually dead potential:

$$Tree _ \% \ sound _ wood = \frac{\sum (\log_ length * \log_ \% _ sound)}{\sum (\log_ length)}$$

Any tree that is more than or equal to 50% sound wood can be considered to be dead potential.

5. Use the random number table to select one tree for destructive sampling.
6. Enhance the selected dead sample trees using the regular enhancement process.