Merritt Timber Supply Area
Ground Sample Data Analysis
Mature Stand Analysis

prepared for:
Ministry of Forests, Lands and Natural Resource Operations
Forest Analysis and Inventory Branch

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Executive Summary

This report documents the mature stand (51 years and older) audit for the Merritt Timber Supply Area (TSA). The target population was all mature stands in the crown land portion of the TSA (621,508 hectares, 55% of the total TSA area). Note that timber supply constraints were not considered in the definition of the target population. The average age of the target population was 147 years with 76% of the stands being 100 years or older. In 2013 a total of 65 plots were established or re-measured in the target population. 50 plots were re-measured VRI Phase II plots originally established in 1999 and 2000. 13 plots were from the National Forest Inventory (NFI) 20 km grid, and 2 plots were from the Young Stand Monitoring (YSM) 4 km grid sample that are now in stands 51 years or greater in age.

Ratios of ground (plot) averages to inventory averages and associated confidence intervals were determined (Table 1). Overall the audit of the mature stand inventory is positive with the only signficant ratios of ground/inventory values being for trees per hectare and dead volume. The ground samples have more trees per ha than the inventory (1,035 per ha vs 848 per ha) and more dead volume (73 m^3/havs 26 m^3/ha). Neither of these results are surprising given the difficulty in estimating trees per ha and volume losses to the mountain pine beetle epidemic. Both the ground live and dead volumes are higher than corresponding inventory volumes. Overall the total bias for the live merchantable volume was 10.4% (ground volumes slightly higher than inventory volumes, but the ratio was not statistically significant). The difference between the ground site indices (14.0) and those from the PSPL (17.6) is likely due to the ground site indices coming from mature stands, while the PSPL is based primarily on site index estimates for regenerating stands. The more appropriate check on the PSPL is comparisons to site indices from young stands as is done in the young stand monitoring analysis.

Table 1: Ratio statistics – mature population.

Attribute	Unit	n	Inventory	Ground	Ratio	Std. Err.	E	p	
Height	(m)	62	21.7	21.7	1.004	0.033	0.066	0.454	
Age	(yrs)	63	154.0	131.8	0.868	0.058	0.115	0.987	
Inv. SI	(m)	62	12.9	13.8	1.073	0.048	0.097	0.068	
BC SI	(m)	55	17.6	14.0	0.798	0.031	0.062	1.000	
Lorey Height	(m)	64	18.5	17.9	0.965	0.052	0.104	0.746	
Basal Area	(m^2/ha)	65	29.0	29.4	1.019	0.085	0.171	0.414	
Trees/ha	(n)	65	848.2	1,034.8	1.232	0.107	0.214	0.017	***
Live Merch Vol.	(m^3/ha)	65	158.9	175.4	1.134	0.136	0.273	0.165	
Dead Gross Vol.	(m^3/ha)	65	25.6	72.9	4.630	1.015	2.034	0.000	***
Ground Input Live Vol.	(m^3/ha)	65	195.3	175.4	0.904	0.042	0.085	0.986	

All significance tests were done at the 95% confidence level.

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1. Introduction

1.1 Merritt TSA Vegetation Resources Inventory (VRI) Background

There is a need for the continued maintenance of a forest growth and yield monitoring program in the Merritt Timber Supply Area (TSA) to estimate the growth of young stands (stands between 15 and 50 years old), to report on the status and growth of mature stands (stands greater than 50 years old), and to support a broader province wide Ministry of Forests, Lands and Natural Resource Operations (MFLRNO) monitoring initiative. A major concern has been the need to quantify the impacts of significant allowable annual cut (AAC) increases in the TSA, resulting from the mountain pine beetle epidemic (Table 1.1) (MFLNRO, FAIB (2013)).

Table 1.1: Merritt AAC

Year	AAC
1996	1,454,250
1999	2,004,250
2001	1,508,050
2005	2,814,171
2010	2,400,000

Previously completed growth and yield projects in the Merritt TSA include:

1. Change Monitoring Inventory (CMI) ground sample program established in 2005. Note that the CMI program has been renamed the Young Stand Monitoring (YSM) program.
2. VRI Phase II ground sampling program established in 1999 and 2000.

The ground sampling plan for this project is documented in MFLNRO, FAIB (2013). The ground sampling included re-measurement of a subset of the VRI Phase II plots, re-measurement of CMI (now YSM) plots, establishment of new YSM plots, and establishment and re-measurement of National Forest Inventory (NFI) plots (note that the NFI plots are also reffered to as 20 km grid plots as they are established on a 20 km grid).

1.2 Project Objectives

The Merritt TSA ground sample analysis project has two main objecitves:

1. Perform a VDYP7 based VRI analysis for the Merritt TSA, using current standards (MFLNRO, FAIB (2011)) for the mature population (51 years and older).
2. Perform a YSM analysis for stands 15-50 year old.

1.3 Report Objectives

This report addresses the first project objective. The second objective is addressed in a separate report (young stand analysis). A third report (stand and stock tables) includes stand and stock tables that provide additional information on both the mature and young stands. All reports are available from Forest Analysis and Inventory Branch (FAIB).

1.4 Terms of Reference

This project was completed by Associated Strategic Consulting Experts Inc. (ASCE) for FAIB. The ASCE team included Eleanor McWilliams, MSc RPF and Guilaume Thérien, PhD. The FAIB contacts were Graham Hawkins, RPF, Rene deJong, RPF and Peter Ott, MSc.

2. Target Population

2.1 Merritt TSA

The Merritt TSA is located in south central BC and covers approximately 1.1 million ha (Figure 2.1). It is surrounded to the South by the United States and clockwise from the West by the Fraser, Lillooett, Kamloops, and Okanagan TSAs. Three biogeoclimatic zones, the Interior Dry Fir (IDF), Montane Spruce (MS) and Engelmann Spruce Subalpine Fir (ESSF) make up 98% of the TSA area. The Merritt TSA also includes a narrow band of Coast-Interior transition along its border with the Fraser TSA. The two main cities in the Merritt TSA are Merritt and Princeton.

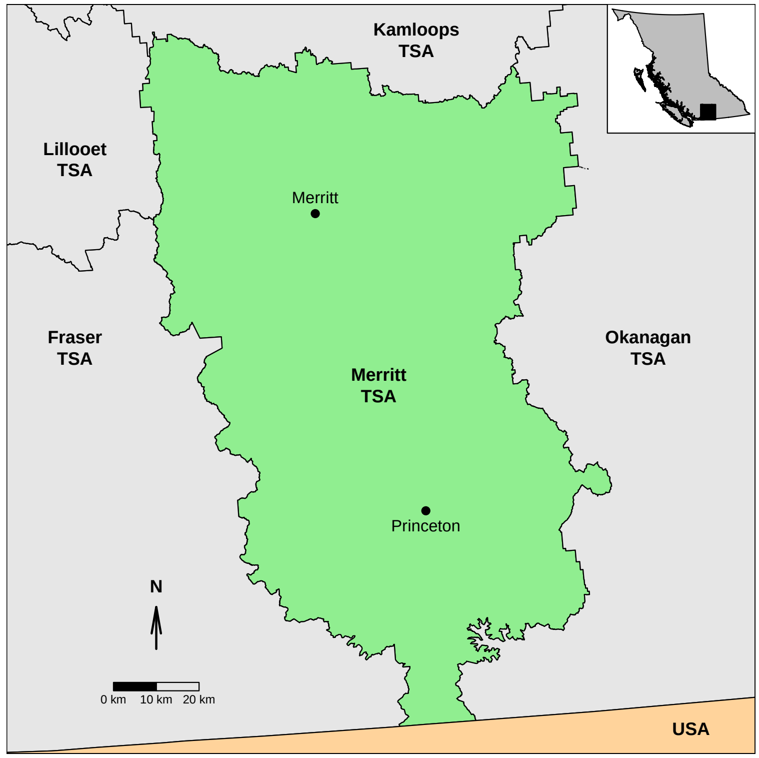

Figure 2.1: Location of the Merritt TSA in BC.

2.2 Target Population Definition

The target population for the entire project is all crown land within the Merritt TSA 15 years and older (Table 2.1). It is important to note that timber supply constraints are not considered when defining the target population. Of this target population, this report focuses on the mature (51 years and older) stands. The VRI Phase II samples (established in 1999 and 2000), a subset of which were remeasured for this project, were established in the vegetated treed portion of the entire TSA. The current mature target population differs as there have been updates for depletions, growth, changes to ownership, new parks and it is restricted to stands greater than 50 years old. Of the total TSA area, 55% is in stands greater than 50 years old.

Table 2.1: Area netdown.

Land Class	Area (ha)	%
Total TSA	1,131,166	100%
Non-Crown Lands	211,456	19%
Non-Target Crown	206,218	18%
Target Population	*713,493*	*63%*
Young	*91,985*	*8%*
Mature	*621,508*	*55%*

2.3 Description of Target Population

Almost half (48%) of the mature population is located within the IDF biogeoclimatic zone (Table 2.2), with the remainder primarily in the MS and ESSF. The two most prominent leading species in the mature population are lodgepole pine (Pl) (41%) and interior Douglas-fir (F) (37%) (Table 2.3). The majority of the mature population (64%) is older than 120 years.

Table 2.2: Area distribution by biogeoclimatic zone.

BEC Zone	Immature (ha)	Immature (%)	Mature (ha)	Mature (%)	Total (ha)	Total (%)
IDF	26,885	29%	296,408	48%	323,293	45%
MS	40,978	45%	185,982	30%	226,959	32%
ESSF	23,374	25%	128,037	21%	151,411	21%
PP	290	0%	9,391	2%	9,681	1%
CWH	456	0%	1,040	0%	1,497	0%
BG	2	0%	493	0%	495	0%
MH	0	0%	148	0%	148	0%
IMA	0	0%	9	0%	9	0%
Total	*91,985*	*100%*	*621,508*	*100%*	*713,493*	*100%*

Table 2.3: Area distribution by leading species and MFLNRO age class — mature population.

Species	MFLNRO Age Class 3	4	5	6	7	8	9	Total (ha)	%
PL	1,754	37,877	50,631	30,564	51,514	76,451	4,703	253,495	41%
F	3,754	14,093	22,157	32,469	37,848	103,114	19,417	232,852	37%
B	1,276	2,853	5,319	8,225	8,892	24,228	4,224	55,016	9%
S	86	961	1,534	2,545	5,606	29,547	13,886	54,164	9%
PY	136	609	697	1,138	1,680	8,090	4,368	16,718	3%
AT	383	1,371	2,075	2,310	851	236	0	7,225	1%
AC	4	56	97	143	138	475	0	912	0%
PA	0	0	0	29	0	387	24	441	0%
H	0	4	15	0	54	178	87	339	0%
L	0	0	0	0	11	155	47	213	0%
C	0	0	0	9	38	12	41	99	0%
E	0	5	19	0	0	0	0	24	0%
PW	0	0	0	0	10	0	0	10	0%
Total (ha)	*7,393*	*57,828*	*82,544*	*77,430*	*106,642*	*242,873*	*46,798*	*621,508*	*100%*
(%)	*1%*	*9%*	*13%*	*12%*	*17%*	*39%*	*8%*	*100%*	

3. Data Sources

3.1 Phase I

The VRI Phase I data for mature stands originally comes from photo interpretation and is updated using VDYP7. The majority of the Merritt TSA (92%) was photo interpreted prior to 2000, with (68%) last being done between 1990 and 1999 (Table 3.1). The Phase I variables used for this analysis are listed in (Table 3.2).

Table 3.1: Area distribution by year of photo.

	Immature		Mature		Total	
Decade	(ha)	(%)	(ha)	(%)	(ha)	(%)
1950-1959	0	0%	1,062	0%	1,062	0%
1960-1969	31	0%	72,221	12%	72,252	10%
1970-1979	601	1%	59,946	10%	60,548	8%
1980-1989	4,887	5%	19,016	3%	23,903	3%
1990-1999	37,521	41%	420,753	68%	458,274	64%
2000-2009	46,045	50%	24,623	4%	70,669	10%
2010-2013	2,899	3%	23,886	4%	26,785	4%
Total	*91,985*	*100%*	*621,508*	*100%*	*713,493*	*100%*

Table 3.2: Phase I data variable list.

Attribute	Source	Variable
Leading Species	VRI	SPECIES_CD_1
Height-Ldg Spp	VRI	PROJ_HEIGHT_1
Age-Ldg Spp	VRI	PROJ_AGE_1
Site Index-Ldg Spp	VRI	SITE_INDEX
BC SI-Ldg Spp	BC SI Layer	SI_SPC#
Lorey Height	VDYP7	L HGT
Basal Area	VRI	BASAL_AREA
Stems/ha	VRI	VRI_LIVE_STEMS_PER_HA
Live Volume	VRI	LIVE_STAND_VOLUME_125
Dead Volume	VRI	DEAD_STAND_VOLUME_125
Species Composition	VRI	SPECIES_CD_# and SPECIES_CD_PCT

3.2 Ground Sample Data

There are three sources (FAIB Programs) (Table 3.3) of ground sample data for mature stands:

1. Re-measured VRI Phase II ground sample plots.
2. Re-measured and newly established NFI plots.
3. Young stand plots established or re-measured in stands now greater than 50 years old.

Table 3.3: FAIB Merritt TSA ground sampling programs.

Program	Project Code	Project Description
Audit	DME1	VRI Phase II ground samples established in 1999 and 2000
NFI	CMI2	Monitoring plots established 2001 and 2003 on randomly chosen subset of NFI 20 km grid points
NFI	KAM1	Monitoring plots established 2013 on remaining NFI 20 km grid points
YSM	DME2	Original YSM plots established 2005 on 2 km grid that were dropped in 2013
YSM	DMEM	YSM plots on 4 km grid (subset of original 2 km grid) established or remeasured in 2013

3.2.1 Re-Measured VRI Phase II Audit Plots

A multiple pass ordered systematic (MPOS) sample design was used in the 1999 VRI Phase II sample selection in the Merritt TSA. 160 plot locations were chosen and 125 plots were established. In 2013 the target population for the mature audit was defined as mature stands (51 years and older) in the vegetated treed (VT) portion of the TSA. This eliminated 26 of the original 125 Phase II plots as they were outside the new target population definition (due to harvesting, new parks and ownership changes).

In 2000 and 2006 Net Volume Adjustment Factor (NVAF) sampling was conducted on 35 randomly chosen Phase II plots (35 out of 125). As the NVAF sampling is destructive sampling, these plots were not available for re-measurement. Six of these 35 NVAF plots were also outside the 2013 target population leaving 29 within the target population.

This left a total of 70 VRI Phase II plots available for re-measurement (125-26-29=70). Due to budget constraints, of these 70 plots, 50 were randomly chosen for re-measurement in 2013.

3.2.2 NFI Plots

There are 15 NFI plots established on the 20 km NFI grid in the Merritt TSA. Of these 15, 13 are in stands 51 years old and greater. These 13 plots were measured in 2013 and used for the mature stand analysis.

3.2.3 YSM Plots

There are 57 plots established on a 4 km grid in the Merritt TSA. Two of these plots are actually located in stands 51 years old or greater and are used for the mature stand analysis[1].

3.2.4 Combined Data sets

The above three sources of data were combined (weighting is described below) and the variables used are listed in Table 3.4. The sources listed for the variables refer to the output files from the

[1] YSM Plot 18 was less than 50 years old when established, but greater than 50 when re-measured. The intended location for YSM plot 68 was in a young stand but due to poor Phase I linework the plot location is actually in a mature stand.

MFLNRO ground data compilation. A summary of the numbers of ground plots (in the young and mature stands) is provided in (Table 3.5). A complete listing of all 226 ground plots (mature and young) established in the Merritt TSA with relevant information is included in Appendix A.

Table 3.4: Ground sample data variable list.

Attribute	Source	Variable	Utilization
Leading Species	SMY_NCS	SPECIES	4.0
Height	TREES_H	HEIGHT	7.5
Age	TREES_H	AGET_TOT	7.5
Site Index	TREES_H	SI_TREE	7.5
Lorey Height	SMY_NC	HT_MEAN2	7.5
Basal Area	SMY_NC	BA_HA	7.5
Stems/ha	SMY_NC	STEMS_HA	7.5
Live Volume	SMY_NC	NVL_NWB	12.5
Dead Volume	SMY_NC	GVL_WSVD	12.5
Species Composition	SMY_NCS	SPECIES and BA_HA	4.0

Table 3.5: Summary of Merritt ground sample plots by program.

Program	Outside Target 2013	NVAF Sample	Not Measured 2013	Measured 2013 Mature	Measured 2013 Young	Total
Audit	26	29	20	50	0	160
NFI	6	0	0	13	2	27
YSM	3	0	20	2	55	80
Total	35	29	40	65	57	226

3.3 Weighting

3.3.1 Overview

Plots availabe for the mature stand analysis come from three different sampling designs (Phase II, NFI, and YSM). Each individual design is a valid sample of the target population and we can weight the results from the three designs with what we refer to as "among-design" weights. For the NFI and YSM designs, each plot *within* these designs has the same weight. For the Phase II plots, determining the individual plot weights is more complicated due to the original MPOS sample design and the subsequent NVAF destructive sampling. For the Phase II plots we need to determine "within-pass weights" and "among-pass" weights.

3.3.2 Within-Pass Weights

The overlap between the 1999 target population for the Phase II sampling and the 2013 mature population is 607,603 ha (305,189 + 302,414) (Table 3.6). Within this area there were 99 Phase II plots established. These 99 plots come from 7 independent passes (sample selections) done in 1999. Each of these passes can be considered a random sample of the target population. The 1999 population was post-stratified into two strata for NVAF purposes (NVAF Immature 30-120 years, NVAF Mature 121+ years). In 2013 these two strata now cover:

- NVAF Immature $A_I = 305,189$ ha
- NVAF Mature $A_M = 302,414$ ha
- $A_T = 607,603$ ha

Table 3.6: Overlap between the 1999 and 2013 target populations.

1999 Pop	2013 Pop 15-50	2013 Pop 51+	Total
30-120	30,045	305,189	335,234
121+	4,014	302,414	306,427
Non-Target	57,926	13,906	71,832
Total	91,985	621,508	713,493

As the Phase II plots within each pass were selected with equal probability, each plot within each pass represents:

$$a_p = \frac{A_T}{n_p} ha$$

Where n_p is the number of plots from each pass that sampled the total area (A_T). This is why the "Plots/Pass" values in Table 3.7 are repeated for each of the NVAF stratum. The n_p sum to 99 for the 7 passes. The areas (a_p) represented by each plot within a pass are shown in Table 3.7 in the column titled "Inital Area/Plot".

Twenty-nine of the 99 Phase II plots were selected in a stratified random sample for NVAF purposes. This is the same as a stratified random selection of the NVAF survivors, making them a subsample of the 99 available plots. There were $n_I = 47$ plots in the NVAF immature stratum (30-120 years) and $n_M = 52$ plots in the NVAF mature stratum (121+ years). Of these, $s_I = 33$ were survivors in the immature stratum and $s_M = 37$ in the mature stratum. This means the area each plot represents is multiplied by the inverse of the sub-sampling ratio (47/33 for the immature stratum and 52/37 for the mature stratum). These fractions are shown in (Table 3.7) under the column "NVAF Mult." as decimal values.

The total number of plots that survived NVAF sampling was 70. Of these, 50 were randomly chosen for re-measurement. This selection was done without regard to the NVAF strata, the sub-sample of 50 was selected randomly across the entire set of 70 plots. This means the area each plot represents is again multiplied by the inverse of the sub-sampling ratio (70/50). This is shown as a decimal value in Table 3.7 under the column ”Sub-Smplg Mult.”. The final area each plot represents (Sampling Weight in Table 3.7) for the given inital MPOS pass and NVAF stratum (a_pI, a_pM) is determined by:

$$a_pI = a_p\frac{47}{33} * \frac{70}{50}ha$$

$$a_pM = a_p\frac{52}{37} * \frac{70}{50}ha$$

Table 3.7: Within-pass weights for the audit program.

1999 NVAF	Pass	Plots/ Pass	Initial Area/Plot (ha)	NVAF Mult.	Sub-Smplg Mult.	Reameas. Plots/Pass	Sampling Weight (ha)	Rel. Weight
30-120	1	15	40,507	1.4242	1.4	4	80,768	0.0196
	2	13	46,739	1.4242	1.4	1	93,194	0.0226
	3	15	40,507	1.4242	1.4	4	80,768	0.0196
	4	15	40,507	1.4242	1.4	3	80,768	0.0196
	5	14	43,400	1.4242	1.4	6	86,537	0.0210
	6	15	40,507	1.4242	1.4	5	80,768	0.0196
	7	12	50,634	1.4242	1.4	0	N/A	N/A
121+	1	15	40,507	1.4054	1.4	5	79,700	0.0193
	2	13	46,739	1.4054	1.4	1	91,961	0.0223
	3	15	40,507	1.4054	1.4	6	79,700	0.0193
	4	15	40,507	1.4054	1.4	6	79,700	0.0193
	5	14	43,400	1.4054	1.4	2	85,393	0.0207
	6	15	40,507	1.4054	1.4	5	79,700	0.0193
	7	12	50,634	1.4054	1.4	2	99,625	0.0242

3.3.3 Among-Pass Weights

For the MPOS design used in 1999, each pass can be considered a random sample of the population. After determining the within pass values based on the within pass weights, the pass estimates are weighted proportional to the number of plots in each pass (i.e, the number of plots in each pass divided by the total number of re-measured plots - 50) (Table 3.8).

Table 3.8: Among-pass weights for the audit program.

Pass	No Plots	Weight
1	9	0.18
2	2	0.04
3	10	0.20
4	9	0.18
5	8	0.16
6	10	0.20
7	2	0.04
Total	50	

3.3.4 Among-Design Weights

Each individual design can be considered a random sample of the population. The among-design weights are also proportional to the number of plots in each sampling design (i.e., the number of plots in a sampling design divided by the total number of plots - 65) (Table 3.9).

Table 3.9: Among-design weights.

Design	No.Plots	Weight
Phase II	50	0.7692
NFI	13	0.2000
YSM	2	0.0308
Total	65	

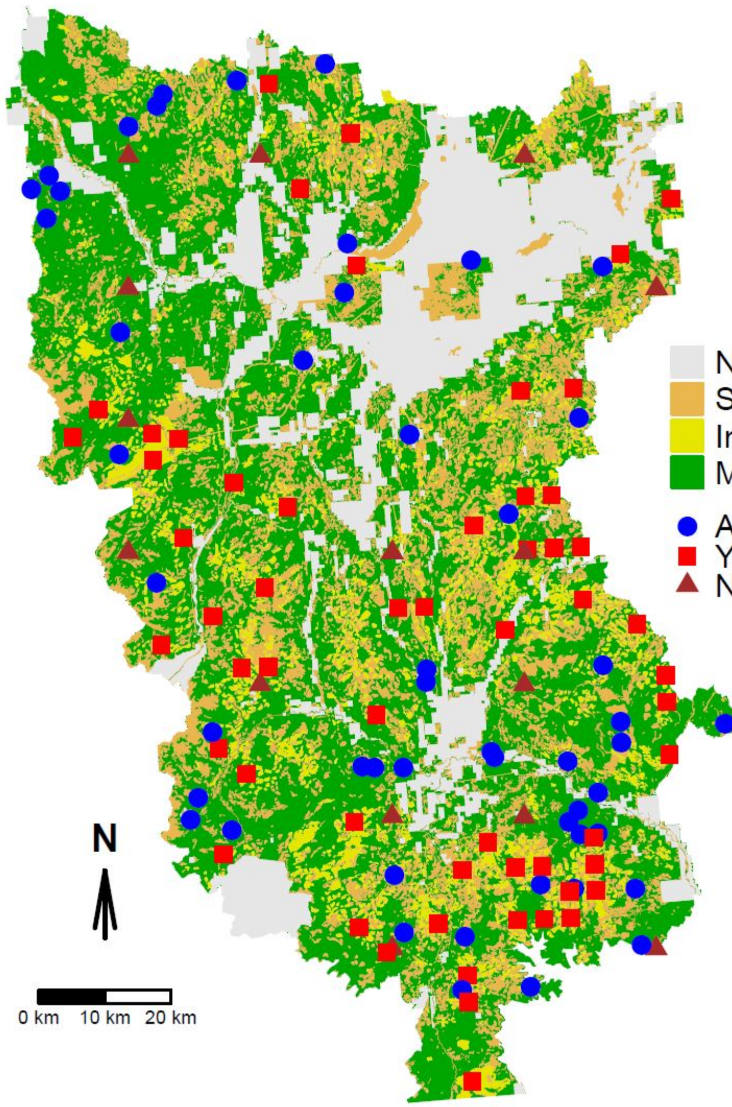

Figure 3.1: Geographic distribution of the ground plots in the Merritt TSA target population.

4. Methods

4.1 Species Labelling

The BC MFLNRO uses different species naming standards with the different tools it manages. For example, the VRI compiler accepts FDC (coastal Douglas-fir) as a valid species while VDYP7 uses FD and the taper equation system will require the code F.

For most of the analyses completed for this project, the species codes used were standardized to the VDYP7 species code standard. There were two exceptions to this general rule. First, the leading species comparison was done using the 16 species codes used by the taper equation system. Second, because four species represent over 95% of the target population, the minor species were grouped under two labels: minor conifers and minor deciduous. Table B.1 in Appendix B shows the species codes used for this project.

4.2 Phase I Data Preparation

Four spatial layers were required to define the target population

1. The Merritt TSA boundary (obtained on July 22, 2014)
2. Land ownership (obtained on August 15, 2014)
3. The Merritt 1999 NVAF strata (obtained from the J.S Thrower & Asscociates Ltd. archives)
4. The Merritt TSA VRI (obtained on August 19, 2014)

The first two layers were downloaded from the BC Data Services website[1]. The VRI layer was obtained from the BC MFLNRO. All layers were projected in the BC Albers system, using the NAD83 datum.

The first three layers were overlaid in-house using GRASS 6.4svn (GRASS Development Team, 2010). This intermediate resultant was then provided to the BC MFLNRO who overlaid it with the VRI layer. The final resultant was used for the project.

The projected height and age of the second species was recorded as 0 in 99% of the cases where a second species was present. Since height and age of the second species was unavailable for all practical purposes, the common VRI Audit analysis of matching the leading Phase II species with either the leading or the second Phase I species was not performed.

All VRI polygons were projected to January 1, 2013 to match with the year of ground sampling.

4.3 VDYP7 Input

The VDYP7 input file was obtained from the BC MFLNRO on August 6, 2014. Three variables in the file (reference data, disturbance start date, and disturbance end date) were rejected by VDYP7 and needed to be recoded from the YYYY-MM-DD to DD/MM/YYYY format. VDYP7 was used to generate Lorey height and volume based on Phase II data input. VDYP7 Console version 7.7a.33 was used for the projections.

[1] http://www.data.gov.bc.ca/dbc/geographic

4.4 Site Index Provincial Layer

For the last 20 years, the MFLNRO has been working on developing relationships between site productivity and ecological classification and bio-physical features. The acquired knowledge has been collated into the Provincial Site Productivity Layer (PSPL), which provides site index estimates for 22 species across the entire province[2]. The PSPL is another Phase I source for site index which accuracy can be determined using VRI Phase II ground data. The version used for this project was October 2013 ver. 3.1.

MFLNRO staff overlaid the Merritt ground sample data on the PSPL and provided us with the PSPL site index estimates available at each sampled point. The PSPL estimates of the ground leading species were unavailable for ten ground plot locations in the mature populations. Population-level PSPL estimates were not provided and population statistics could therefore not be estimated.

4.5 Phase II Data Preparation

The compiled ground sample data from all three sampling designs was provided by MFLNRO.

4.6 VRI Sample Data Analysis

The role of the ground sample data analysis is to evaluate the accuracy of the existing Phase I inventory data using the ground sample data as the benchmark for assessment. Ratios of ground averages to inventory averages (and associated confidence intervals) were determined for the following:

- Ground height (leading species) / Inventory height (leading species)
- Ground age (leading species) / Inventory age (leading species)
- Ground site index (leading species) / inventory site index (leading species)
- Ground site index (leading species) / PSPL site index (matching species)
- Ground basal area / inventory basal area (7.5 cm dbh +)
- Ground lorey height / inventory lorey height
- Ground trees per ha / inventory trees per ha (7.5 cm dbh +)
- Ground live merch vol per ha / inventory live merch vol per ha (12.5 cm dbh +)
- Ground live merch vol per ha / live merch vol per ha projected from VDYP with ground inputs (12.5 cm dbh +)
- Ground dead vol per ha / inventory vol per ha (12.5 cm dbh +)

[2] The PSPL site index estimates are not always available for all species at all points.

Inventory volumes are projected using VDYP7 and inventory Phase I attributes. As a result there are two potential sources of error (bias) in the inventory volumes:

- Attribute bias - errors resulting from the wrong inputs being supplied to VDYP7 (e.g., species composition, height, age, basal area, trees/ha) as well as errors resulting from projecting these inputs to the year of ground sampling.
- Model bias - errors resulting from the model itself, this is determined by inputing the ground sample data into the model.

For the purposes of determining the bias, the following variables are defined:

VOL A - Ground sample volume, this is assumed to be the true volume.

VOL B - Phase I inventory volume based on VDYP7 projections of Phase I inventory attributes.

VOL C - VDYP7 projection of volume using the ground sample data as inputs.

Total Bias = VOL A - VOL B

Attribute Bias = VOL C - VOL B

Model Bias = VOL A - VOL C

A summary of the process is illustrated in Figure 4.1.

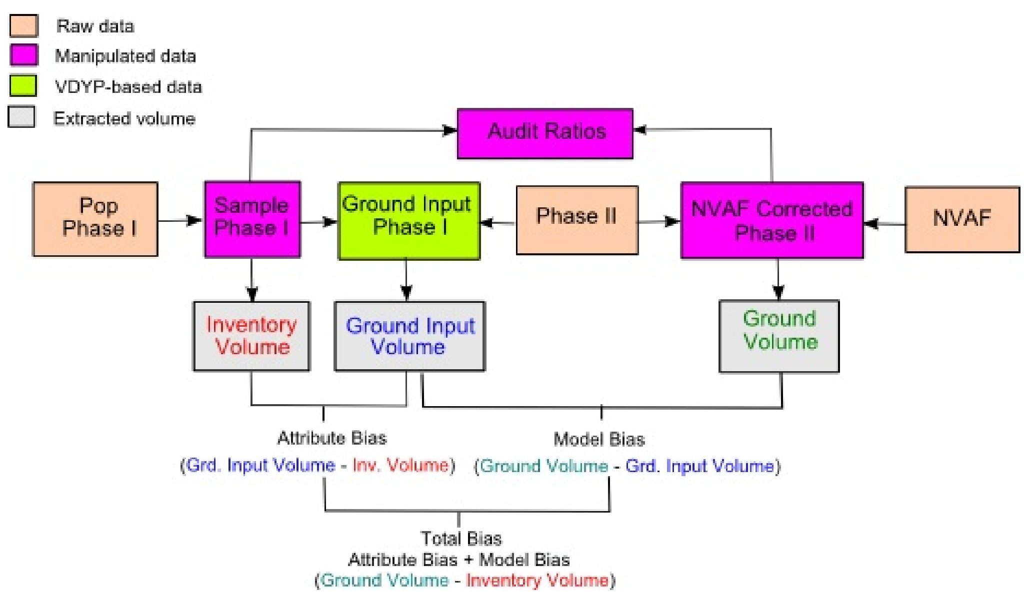

Figure 4.1: VRI sample data analysis flow-chart.

4.7 Height, Age and Site Index Data Matching

Heights, ages and site indices were estimated for the ground sample leading species if suitable measurements of height and age were available. In 62 of the 65 plots there were valid height measurements for the leading species. In 63 of the 65 plots there were valid age measurements for the leading species. The end result is that a valid site index estimate could be determined for the leading species on 62 of the 65 ground plots. Inventory (Phase I) estimates of heights, ages and site indices were only available for the inventory leading species, so no other matching could be done. The ratios calculated for height, age and inventory site index are simply the values for the ground leading species compared to the inventory leading species, with no attempt to match species. The ratio for the PSPL site index matches the ground leading species to the same species from the PSPL when it is available, this was possible in 55 of the 65 plots.

4.8 Mathematial Formulae for Ratio Estimation and Its Variance

4.8.1 Overview

The ratio estimate was a weighted ratio of means between the Phase II and Phase I within-pass weighted averages. The variance formula used to compute the standard error of the ratio was the variance formula of a random sample with unequal weights. This formula was used for all three sampling designs.

4.8.2 Description

Say we have a population with L sampling designs ($j = 1, \ldots, L$). In each sampling design, we have M_j passes ($k = 1, \ldots, M_j$) with n_{jk} observations ($i = 1, \ldots, n_{jk}$). The total number of observations within a design and in the overall sample is noted respectively as $n_{j.}$ and $n_{..}$. Let x_{ijk} and y_{ijk} be respectively the i^{th} Phase I and Phase II observations in pass k within sampling design j, with a within-pass sampling weight of w_{ijk}. The overall ratio of means is noted $r_{..}$. Finally, let $\bar{x}_{..}$ be the overall mean Phase I value, and $\hat{\bar{y}}_{..}$ be the predicted Phase II mean estimate (*ie.*, $\hat{\bar{y}}_{..} = r_{..} * \bar{x}_{..}$).

4.8.3 Ratio

The ratio formulae for the within-pass, among-pass and overall ratios respectively are:

$$r_{jk} = \frac{\sum_{i=1}^{n_{jk}} w_{ijk} * y_{ijk}}{\sum_{i=1}^{n_{jk}} w_{ijk} * x_{ijk}}$$

$$r_{j.} = \frac{\sum_{k=1}^{M_j} n_{jk} * r_{jk}}{n_{j.}}$$

$$r_{..} = \frac{\sum_{j=1}^{L} n_{j.} * r_{j.}}{n_{..}}$$

4.8.4 Variance

The variance of within-pass, among-pass and overall ratios respectively are:

$$\mathrm{Var}(r_{jk}) = \frac{n_{jk}}{(\sum_{i=1}^{n_{jk}} w_{ijk} * x_{ijk})^2} \quad * \quad \frac{\sum_{i=1}^{n_{jk}} (w_{ijk} * y_{ijk} - r_{jk} * w_{ijk} * x_{ijk})^2}{(n_{jk} - 1)}$$

$$\mathrm{Var}(r_{j.}) = \sum_{k=1}^{M_j} \left(\frac{n_{jk}}{n_{j.}}\right)^2 * \mathrm{Var}(r_{jk})$$

$$\mathrm{Var}(r_{..}) = \sum_{k=1}^{L} \left(\frac{n_{j.}}{n_{..}}\right)^2 * \mathrm{Var}(r_{j.})$$

and

$$\bar{x}_{jk} = \frac{\sum_{i=1}^{n_{jk}} w_{ijk} * x_{ijk}}{A_T}$$

$$\bar{x}_{j.} = \frac{\sum_{k=1}^{M_j} n_{jk} * \bar{x}_{jk}}{n_{j.}}$$

$$\bar{x}_{..} = \frac{\sum_{j=1}^{L} n_{j.} * \bar{x}_{j.}}{n_{..}}$$

4.9 Change Estimation

Change between the plot establishment and the 2013 measurement was estimated for eight variables:

1. Height
2. Age
3. Site index
4. Basal area
5. Trees/ha
6. Lorey Height
7. Live volume
8. Dead volume

The main method to estimate change was to compare the plot estimates at both measurements. A second method, Critical Height Sampling (CHS; Iles and Carter (2007), Thérien (2011)) was also used to estimate change for the last four variables. As outlined in Thérien (2011), there are many equivalent ways to multiply an individual tree value into a per-ha estimate. A modification of the stand table factor (STF), as described in Timberline Natural Resources Group Ltd. (2007) (p. 5) was used:

$$\mathrm{STF} = \frac{\mathrm{BAF}}{\mathrm{ba}} \times 3 \times \left(1 - \frac{\mathrm{d}}{\mathrm{R}}\right) \tag{4.1}$$

where BAF is the basal area factor, ba is the tree basal area (m^2), d is the distance (m) between the tree centre and the sampling point, and R is the tree-centered plot radius (m).

The CHS method requires tree distance, which is currently only collected at the integrated plot center (IPC) and not on the auxiliary plots. Consequently, only the IPC trees were used to estimate change with the CHS method.

5. Results

5.1 Mature Population

The mean attributes for the entire mature (51 + years) population, the sampled polygons and the ground samples are provided in Table 5.1. The average age of the population (147 years) is consistent with the fact that 76% of the mature population is 100 years or older.

Table 5.1: Mean attributes for the population and sample – mature population.

Attribute	Unit	Pop	Sample	
			Inventory	Ground
Height–Ldg Spp	(m)	22.2	21.8	21.7
Age–Ldg Spp	(yrs)	146.7	152.0	131.8
Inv. SI–Ldg Spp	(m)	13.3	13.0	13.8
PSPL SI–Ldg Spp	(m)	N/A	17.7	13.8
Lorey Height	(m)	19.0	18.5	17.9
Basal Area	(m^2/ha)	28.3	29.0	29.4
Stems/ha	(n)	776.2	848.2	1,034.8
Live Volume	(m^3/ha)	162.0	158.9	175.4
Dead Volume	(m^3/ha)	26.2	25.6	72.9
Ground Input Volume	(m^3/ha)	N/A	195.3	N/A

Note: The population covered 621,508 ha while the sample size was 65 plots.

5.2 Ratios

Ratios for 10 attributes are provided in Table 5.2. The same ratios are also presented for Pl and Fdi leading stands in Table 5.3 and Table 5.4. The only ratios significantly[1] different from 1.0 are for trees/ha and dead volume. The ground samples have more trees per ha than the inventory (1,035 per ha vs 848 per ha) and more dead volume (73 m^3/havs 26 m^3/ha). Neither of these results are surprising given the difficulty in estimating trees per ha and volume losses to the mountain pine beetle epidemic. Interestingly both the ground live and dead volumes are higher than corresponding inventory volumes. The difference between the ground site indices (14.0) and those from the PSPL (17.6) is likely due to the ground site indices coming from mature stands, while the PSPL is based primarily on site index estimates for regenerating stands.

[1] All significance tests were done at the 95% confidence level.

Table 5.2: Ratio statistics – mature population.

Attribute	Unit	n	Inventory	Ground	Ratio	Std. Err.	E	p	
Height	(m)	62	21.7	21.7	1.004	0.033	0.066	0.454	
Age	(yrs)	63	154.0	131.8	0.868	0.058	0.115	0.987	
Inv. SI	(m)	62	12.9	13.8	1.073	0.048	0.097	0.068	
BC SI	(m)	55	17.6	14.0	0.798	0.031	0.062	1.000	
Lorey Height	(m)	64	18.5	17.9	0.965	0.052	0.104	0.746	
Basal Area	(m^2/ha)	65	29.0	29.4	1.019	0.085	0.171	0.414	
Trees/ha	(n)	65	848.2	1,034.8	1.232	0.107	0.214	0.017	***
Live Merch Vol.	(m^3/ha)	65	158.9	175.4	1.134	0.136	0.273	0.165	
Dead Gross Vol.	(m^3/ha)	65	25.6	72.9	4.630	1.015	2.034	0.000	***
Ground Input Live Vol.	(m^3/ha)	65	195.3	175.4	0.904	0.042	0.085	0.986	

All significance tests were done at the 95% confidence level.

Table 5.3: Ratio statistics – Pl leading stands in mature population.

Attribute	Unit	n	Inventory	Ground	Ratio	Std. Err.	E	p
Height	(m)	26	20.3	21.3	1.053	0.049	0.103	0.149
Age	(yrs)	26	138.2	115.1	0.842	0.080	0.169	0.968
Inv. SI	(m)	26	13.6	14.2	1.057	0.052	0.110	0.144
PSPL SI	(m)	23	17.7	14.6	0.823	0.033	0.071	1.000
Lorey Height	(m)	27	17.2	17.8	1.046	0.074	0.156	0.273
Basal Area	(m^2/ha)	28	33.8	29.4	0.876	0.102	0.214	0.879
Trees/ha	(n)	28	1,182.9	1,349.6	1.137	0.133	0.277	0.157
Live Merch Vol.	(m^3/ha)	28	170.6	168.3	1.098	0.220	0.461	0.330
Dead Gross Vol.	(m^3/ha)	28	40.3	97.1	3.926	5.530	11.575	0.301
Ground Input Live Vol.	(m^3/ha)	28	214.8	168.3	0.781	0.050	0.104	1.000

Table 5.4: Ratio statistics – Fdi leading stands in mature population.

Attribute	Unit	n	Inventory	Ground	Ratio	Std. Err.	E	p
Height	(m)	23	23.0	22.0	0.962	0.058	0.123	0.737
Age	(yrs)	24	164.7	137.9	0.837	0.086	0.181	0.962
Inv. SI	(m)	23	13.2	14.2	1.087	0.093	0.197	0.182
PSPL SI	(m)	22	17.9	14.2	0.796	0.060	0.127	0.998
Lorey Height	(m)	24	20.4	17.7	0.862	0.081	0.171	0.946
Basal Area	(m^2/ha)	24	25.2	25.3	1.003	0.123	0.258	0.490
Trees/ha	(n)	24	553.8	676.4	1.226	0.530	1.114	0.337
Live Merch Vol.	(m^3/ha)	24	151.8	156.6	1.055	0.206	0.433	0.397
Dead Gross Vol.	(m^3/ha)	24	16.2	41.9	4.036	7.225	15.179	0.340
Ground Input Live Vol.	(m^3/ha)	24	154.0	156.6	1.004	0.093	0.196	0.483

The following scatter plots are provided for each of the attributes in Table 5.2 in Figure 5.1 - Figure 5.10:

- Ground (Phase II) versus inventory (Phase I) values
- Residuals (ground - predicted) versus predicted (Ratio X Phase I) values
- Predicted versus ground (Phase II) values

Note that the yellow areas on the graphs are the 95% confidence intervals around the line of interest.

5.3 Volume Total, Model and Attribute Bias

The volume bias statistics are summarized in Table 5.5. Overall the total bias is 10.4% but this results from compensating model (-10.2%) and attribute (22.9%) biases.

Table 5.5: Volume bias statistics – mature population.

Bias	Formula	n	Model Volume (B)	Gr.Input Volume (C)	Ground Volume (A)	Bias	Bias%
Total Bias	A - B	65	158.9		175.4	16.6	10.4%
Model Bias	A - C	65		195.3	175.4	-19.8	-10.2%
Attribute Bias	C - B	65	158.9	195.3		36.4	22.9%

5.4 Species Composition

The species composition of the mature population is shown in Table 5.6. The key points to note here are that the ground samples contain less Pl and more B than the inventory. There is also a slightly higher deciduous component in the ground samples. The trend of less Pl and more B is also shown in the leading species matching shown in Table 5.7. Nine of the 65 plots were B leading, of these, five (56%) were in B inventory leading polygons. Of the 28 Pl leading polygons with ground samples, 18 (64%) had plots that were Pl leading. However due to the within polygon variability, the overall match of 68% is quite high, and a positive result.

Table 5.6: Mean species composition – mature population.

Source	B	Conifers	Deciduous	F	PL	S
Population	10%	2.9%	1.6%	28.7%	43.4%	13.4%
Phase I Sample	9.7%	2.7%	0.9%	27.6%	47.4%	11.7%
Phase II Sample	18.4%	2.5%	2.6%	31.7%	30.8%	14%
Ratio	1.8976	0.9354	2.7259	1.1513	0.6495	1.1949

Table 5.7: Leading species confusion matrix – mature population.

Phase I	Phase II Spp								
Spp	AT	B	F	PL	PY	S	Empty	Total	Match %
AT	1	0	0	0	0	0	0	1	100%
B	0	5	0	0	0	2	0	7	71%
F	0	2	18	2	1	1	0	24	75%
PL	0	1	5	18	0	3	1	28	64%
PY	0	0	2	0	0	0	0	2	0%
S	0	1	0	0	0	2	0	3	67%
Empty	0	0	0	0	0	0	0	0	
Total	1	9	25	20	1	8	1	65	
Match %	100%	56%	72%	90%	0%	25%	0%		68%

5.5 Change

The 50 re-measured VRI Phase II audit plots were used for estimating change.

5.5.1 Traditional Estimator

The traditional estimates of change (time 2 - time 1) show no signficant differences with the exception of height (Table 5.8). The time 2 (2013) heights are significantly greater than time 1 (1999), but the difference is only 1.1 m. What appears to be happening, which is not surprising given the stand average ages and the mountain pine beetle impact, is that any growth has been offset by mortality losses. An additional confounding factor is a VRI protocol change. In 1999, auxillary plots were dropped if they fell outside the polygon. In 2013, all dropped auxillary plots were replaced using an expanded grid approach as described in Section 3.2.1 of the VRI Ground Sampling Manual (MFLNRO, FAIB (2014)).

Table 5.8: Change estimates – mature population.

Attribute	Unit	Establish.	Re-Meas.	Difference	Std. Err.	p	
Height	(m)	20.9	22.1	1.1	0.5	0.010	***
Age	(yrs)	144.0	142.0	-2.1	8.7	0.595	
Site Index	(m)	13.4	13.3	-0.1	0.4	0.560	
Basal Area	(m^2/ha)	31.0	29.2	-1.8	1.6	0.867	
Stems/ha	(n)	1,239.4	1,040.5	-198.9	96.4	0.977	
Lorey Height	(m)	19.4	19.1	-0.1	0.5	0.581	
Live Volume	(m^3/ha)	175.9	173.7	-2.2	10.9	0.581	
Dead Volume	(m^3/ha)	78.1	81.3	3.2	19.4	0.434	

5.5.2 Critical Height Sampling

The critical height sampling results show slightly different values as they are based on the IPC plots only (not the entire 5 plot cluster for the VRI Phase II plots). These results also show more significant differences. This is due in part the lower variances obtained in this approach. The CHS results show significant increases in live basal area and merchantable volume, as well as significant increases in dead basal area and stems/ha.

Table 5.9: Critical height sampling results.

Status	Attribute	Unit	Establish.	Re-Meas.	Difference	Std. Err.	p	
Live	Basal Area	(m^2/ha)	24.4	28.3	3.9	0.5	0.000	***
	Stems/ha	(n)	980.8	973.0	-7.8	19.6	0.653	
	Merch Vol.	(m^3/ha)	151.0	190.8	39.8	6.3	0.000	***
Dead	Basal Area	(m^2/ha)	16.5	18.4	1.9	0.9	0.020	***
	Stems/ha	(n)	576.5	607.7	31.2	16.1	0.029	***
	Merch Vol.	(m^3/ha)	100.6	92.0	-8.6	6.7	0.897	

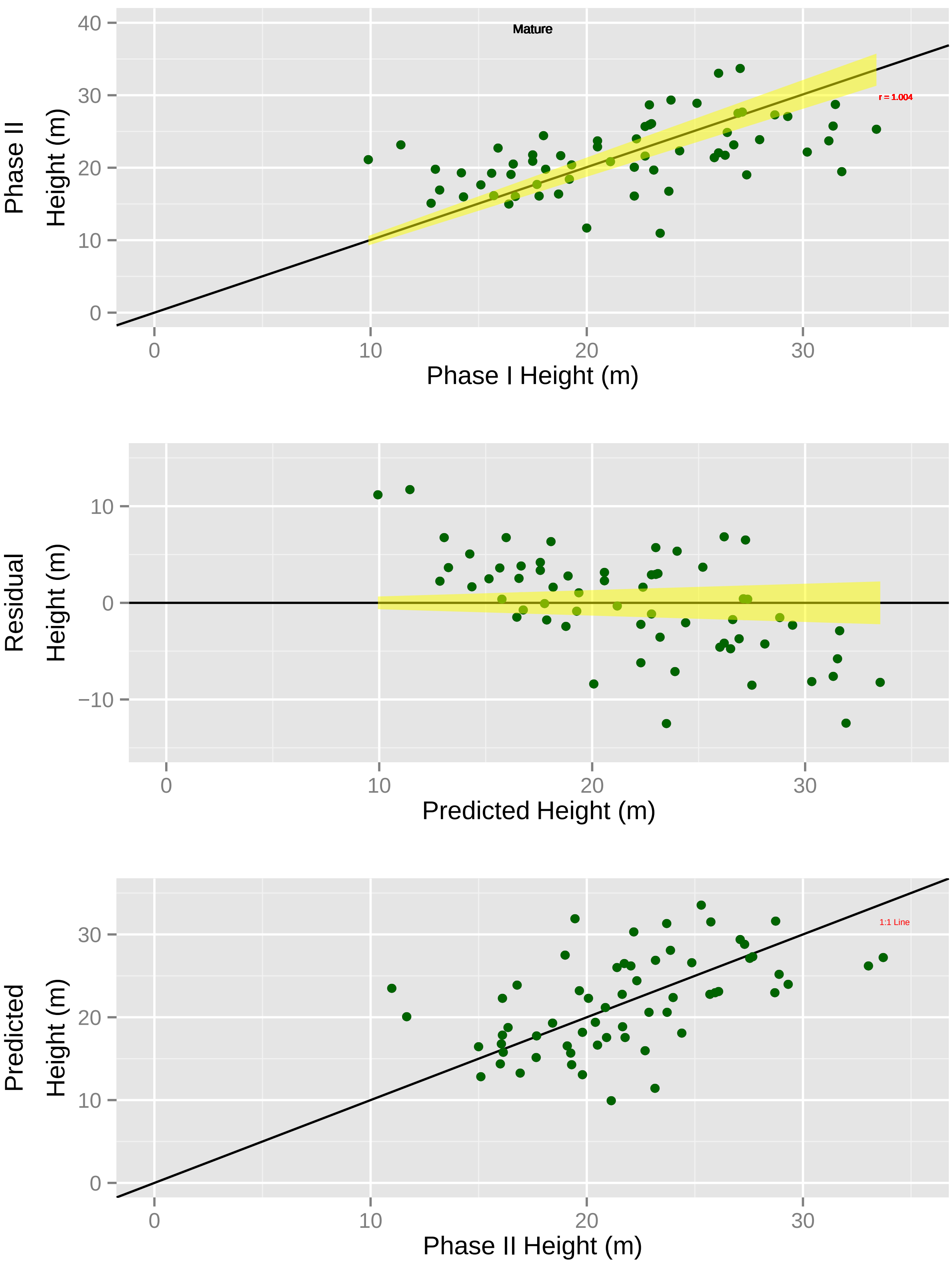

Figure 5.1: Field vs. inventory height in the Merritt TSA.

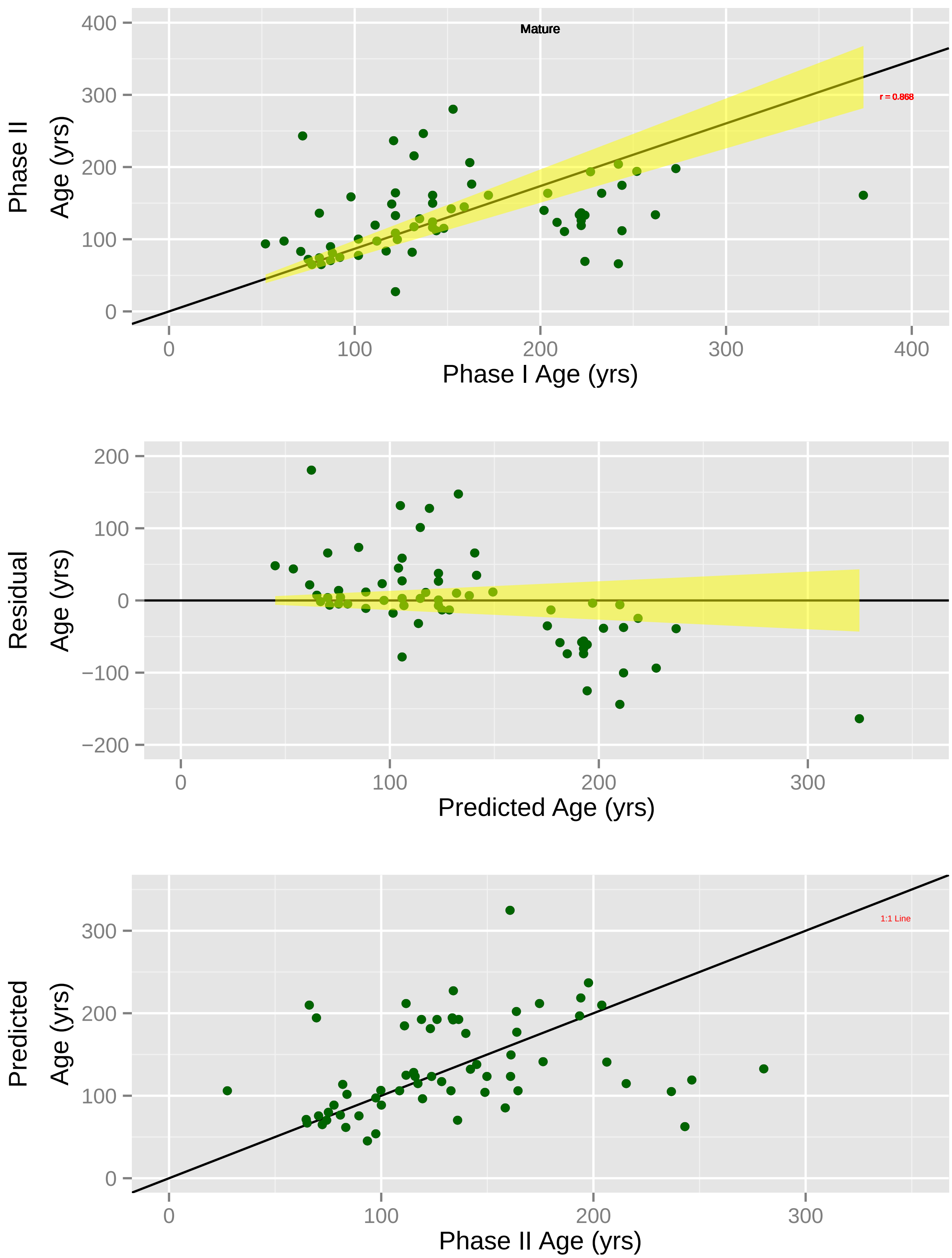

Figure 5.2: Field vs. inventory age in the Merritt TSA.

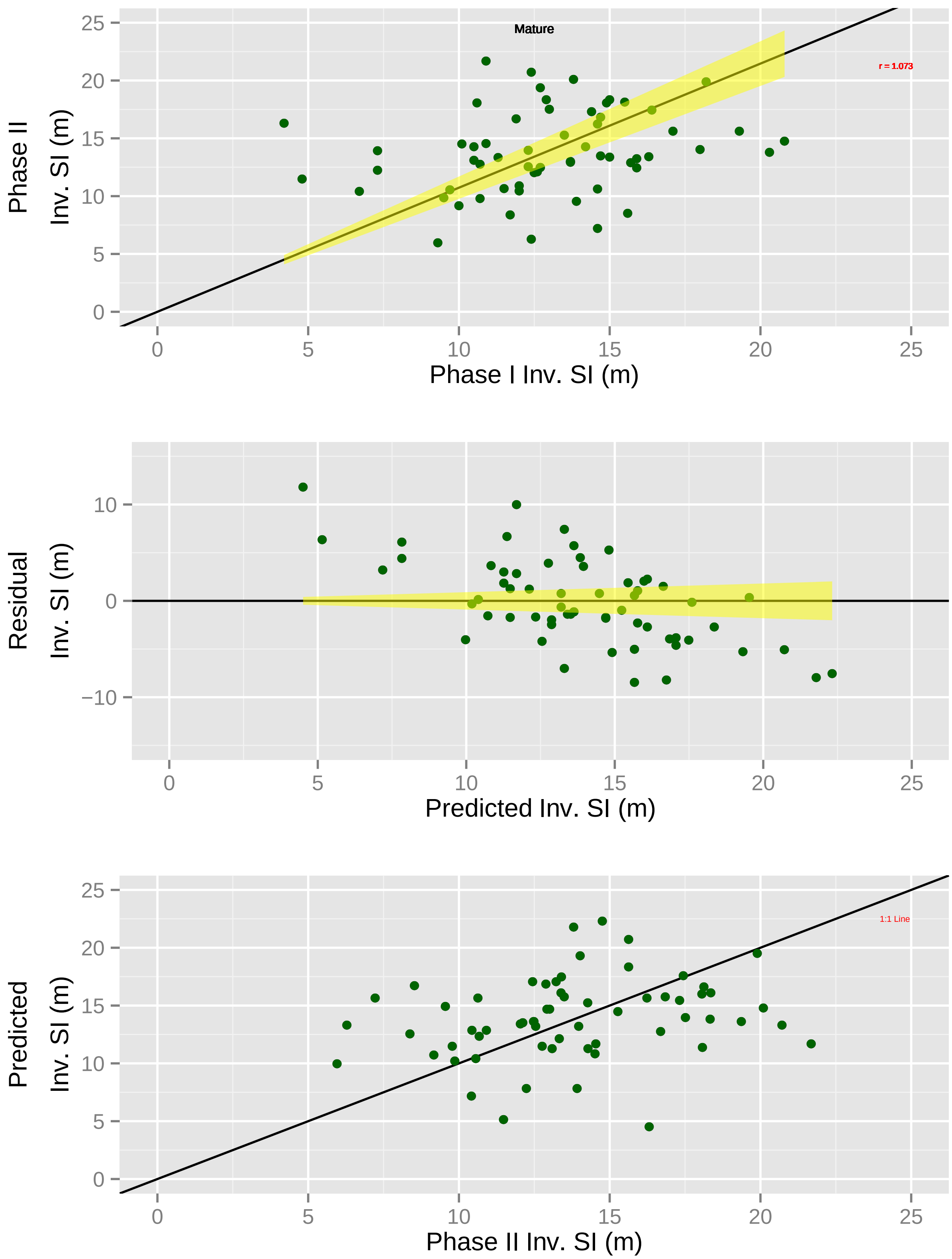

Figure 5.3: Field vs. inventory site index in the Merritt TSA.

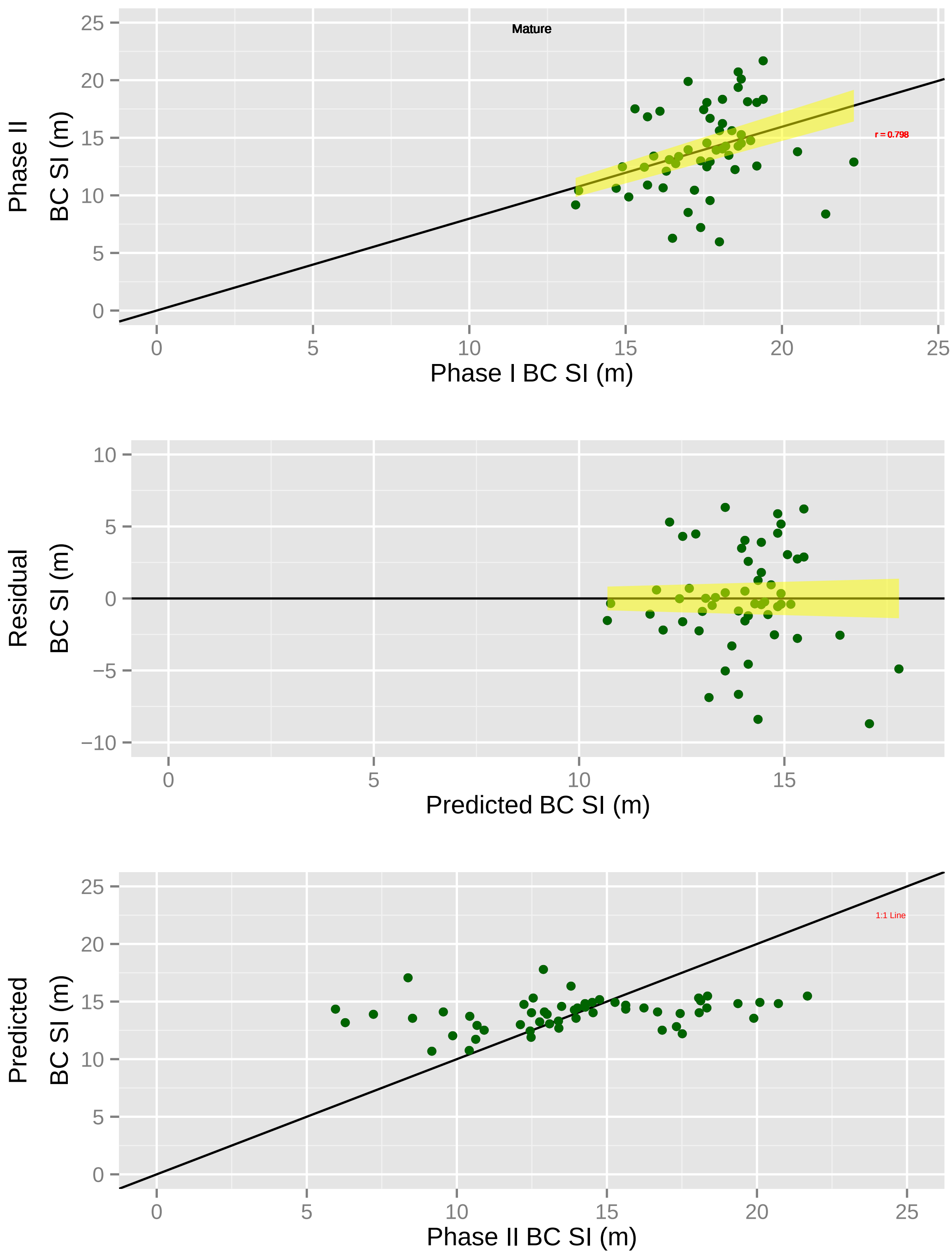

Figure 5.4: Field vs. provincial layer site index in the Merritt TSA.

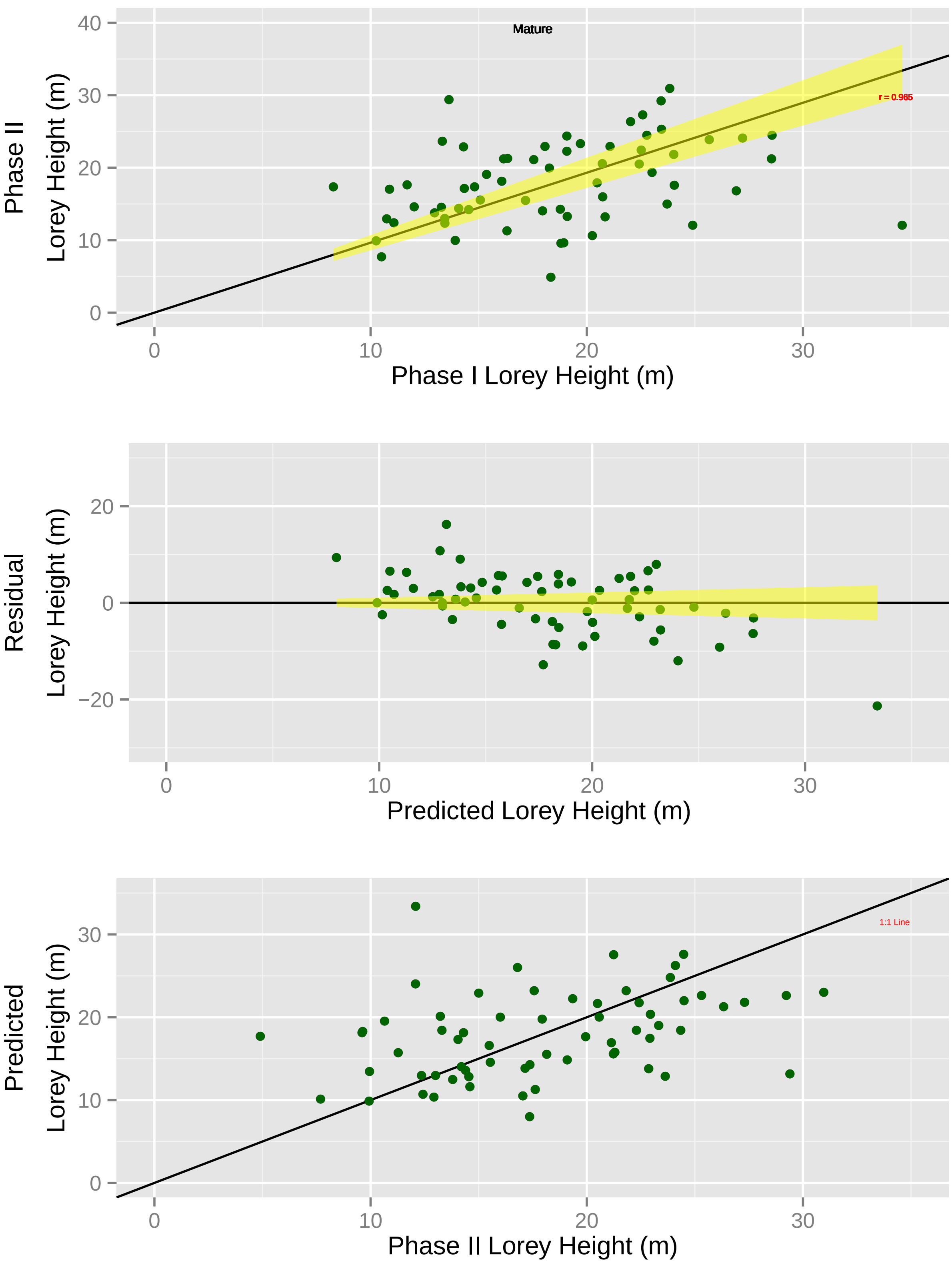

Figure 5.5: Field vs. inventory Lorey height in the Merritt TSA.

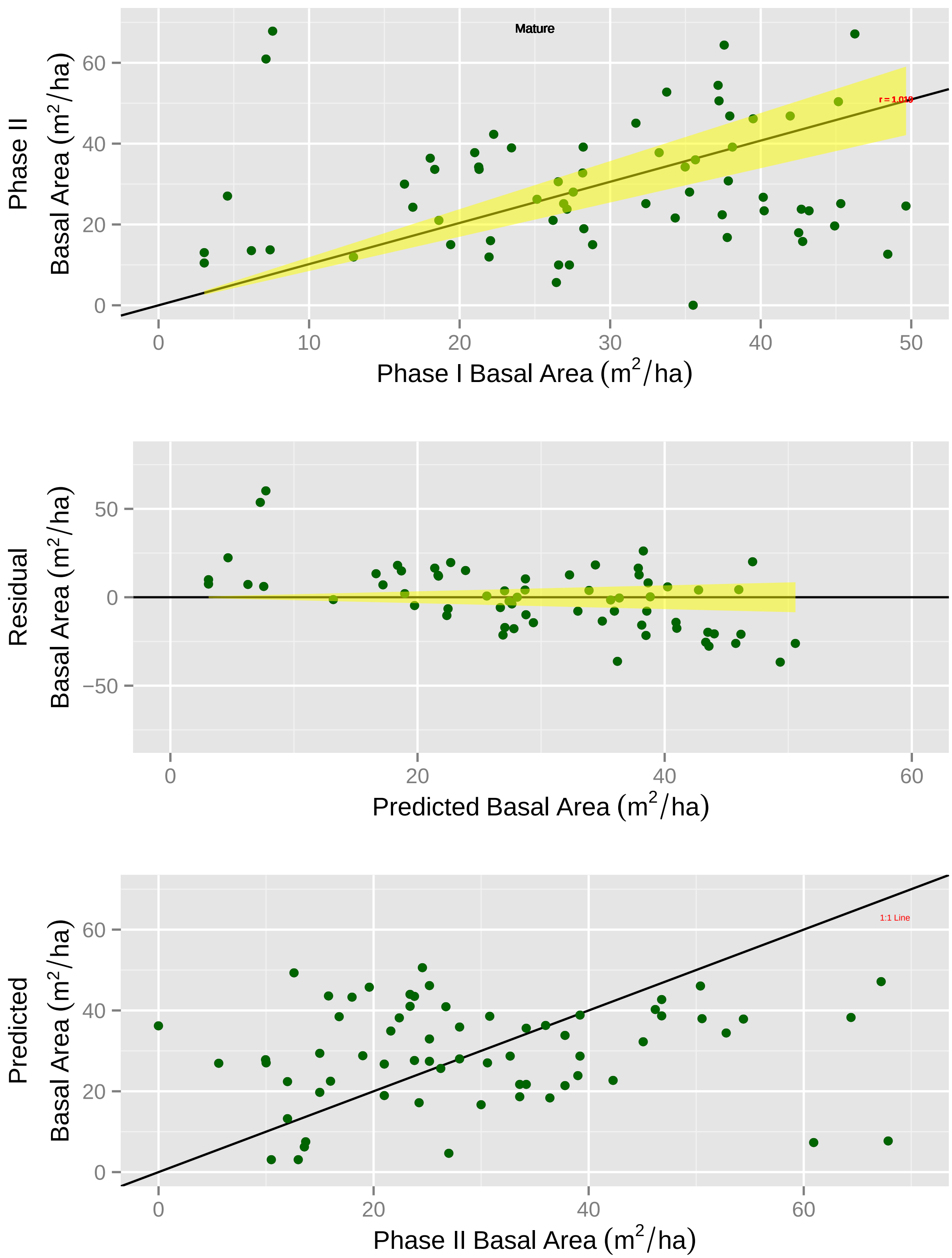

Figure 5.6: Field vs. inventory basal area in the Merritt TSA.

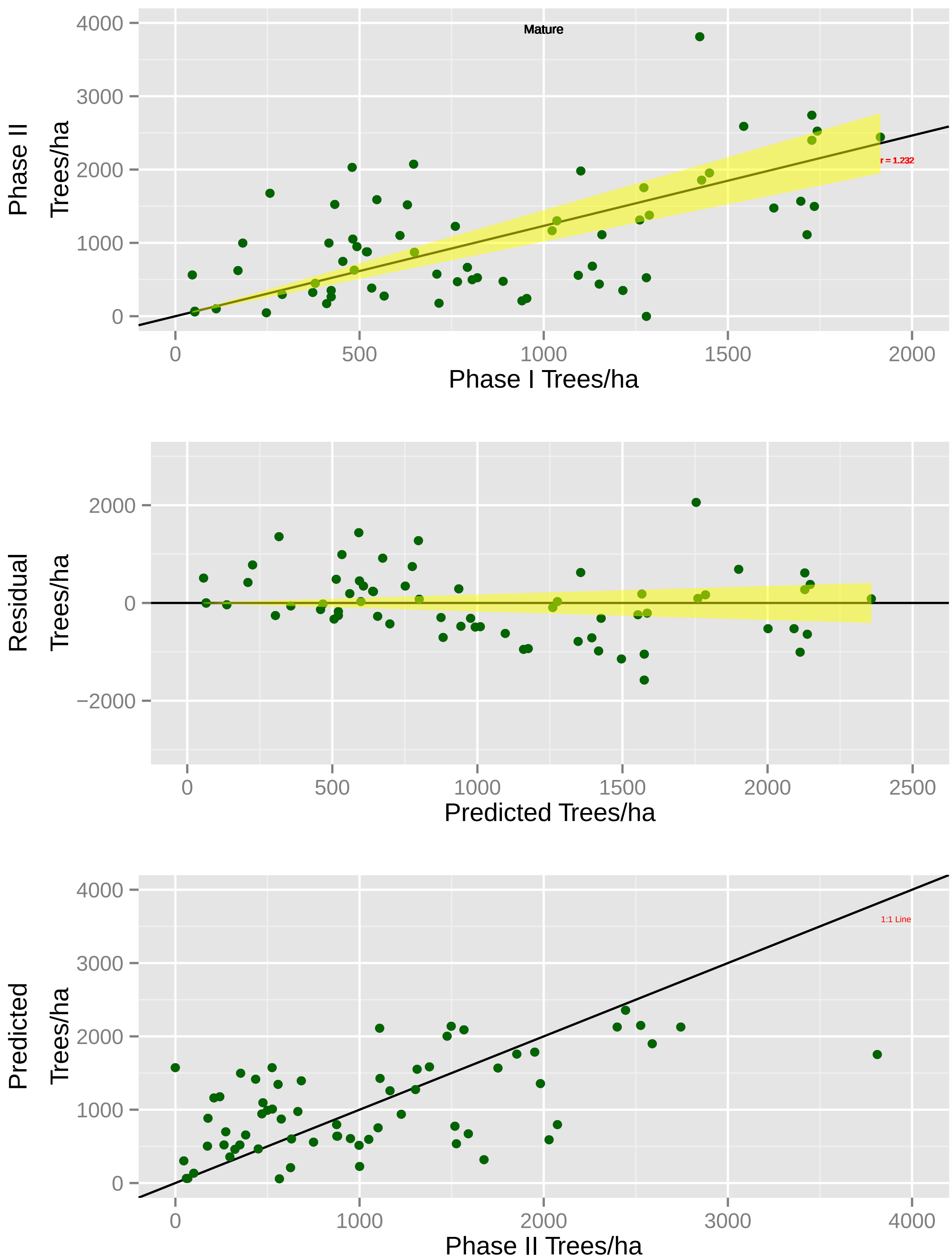

Figure 5.7: Field vs. inventory trees/ha in the Merritt TSA.

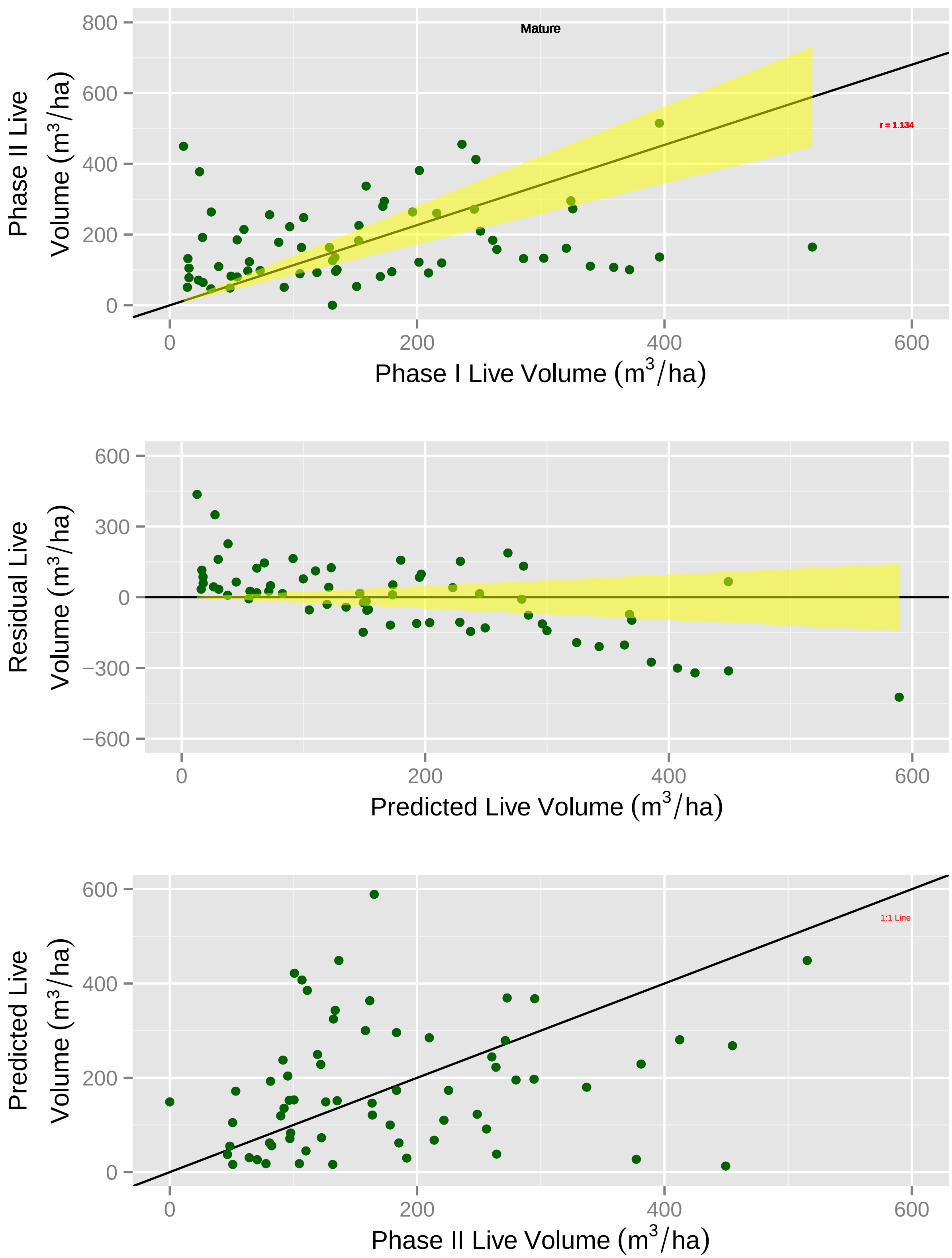

Figure 5.8: Field vs. inventory live volume in the Merritt TSA.

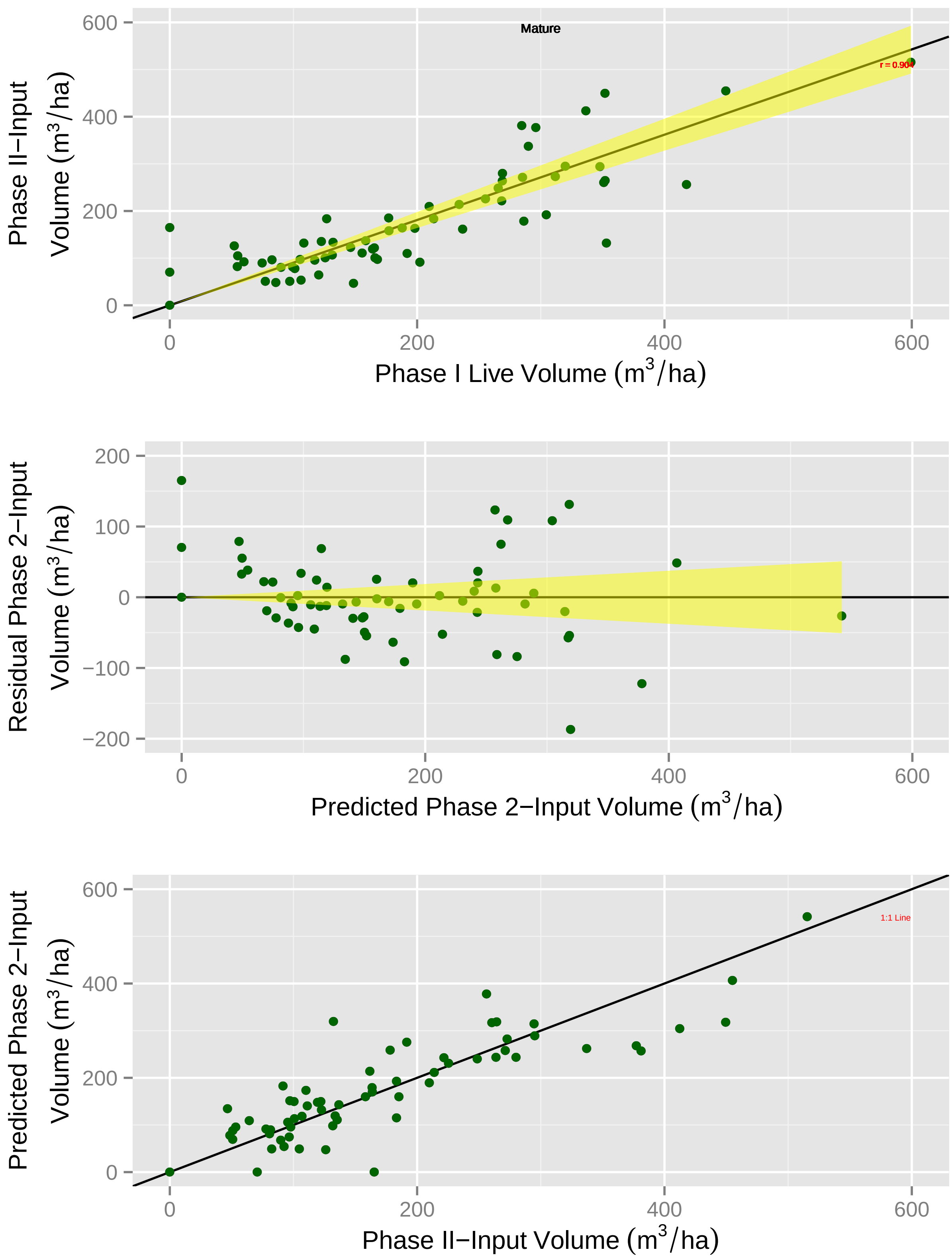

Figure 5.9: Field vs. Ground - input VDYP live volume in the Merritt TSA.

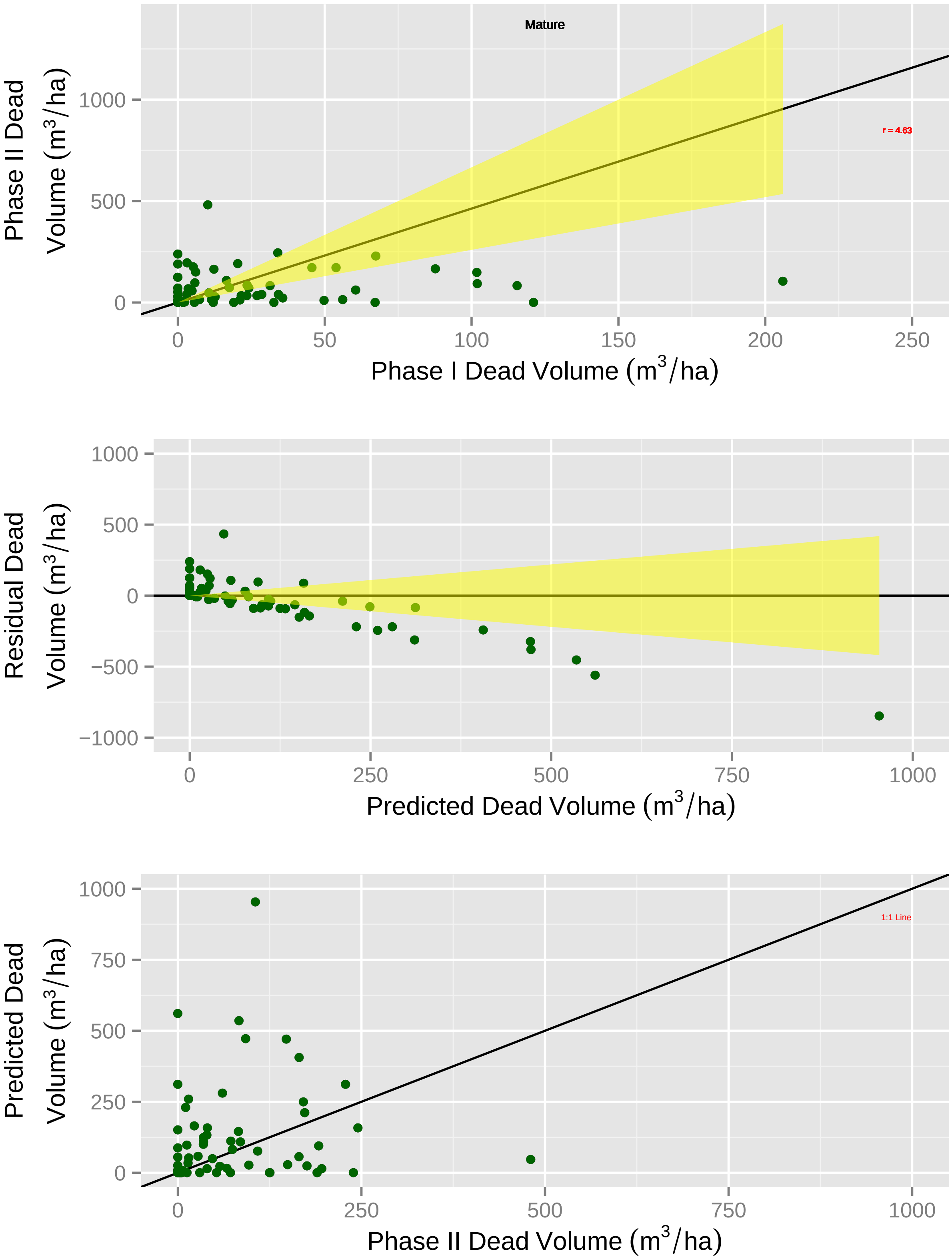

Figure 5.10: Field vs. inventory dead volume in the Merritt TSA.

6. Summary

Overall the audit of the mature stand inventory is positive with the only signficant ratios of ground/inventory values being for trees per hectare and dead volume. The ground plots had more trees/ha than the inventory values, and there was more dead volume in the ground plots than recorded in the inventory (Phase I). Overall the total bias for the live merchantable volume was 10.4% (ground volumes slightly higher than inventory volumes, but the ratio was not statistically significant).

6.1 Recommendations

The analysis conducted for this project brought to light some items that should be addressed to improve and simplify future analyses.

1. Archive all inventory spatial and atribute information used to define the target population. It is critically important to have a complete copy of the inventory used to define the target population at a given point in time for future reference. Inventory updates will change the target population. Future analyses may need to determine how plots were selected and which areas were included in the target population to determine sample weights. This can only be done by reconstructing the process with inventory spatial and attribute data. The sample weights for this project were only able to be determined by recovering archived inventory information from J.S. Thrower and Associates Ltd. archives. The required information was not available from FAIB.

2. Simplify and make consistent the terminology used to describe FAIB ground sampling programs. This should also include documentation of the various names used over the years (e.g., growth and yield monitoring, change monitoring inventory, young stand monitoring, National Forest Inventory, 20 km grid, VRI Phase II, audit plots) and the various projects (and their codes) associated with these different programs.

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A. Inventory and Ground Sample Data

Table A.1: All established ground sample plots in the Merritt TSA.

Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
DME1	3	1	Stands 121+ years	FALSE	Non-Crown Lands	FALSE	
DME1	4	1	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	5	1	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	6	1	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	7	1	Stands 121+ years	FALSE	Non-Crown Lands	FALSE	
DME1	8	1	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	9	1	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	10	1	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	11	1	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	12	1	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	13	1	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	14	1	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	15	1	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	16	1	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	17	1	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	18	1	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	19	1	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	20	1	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	24	2	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	25	2	Stands 30-120 years	TRUE	Stands 0-14 years	FALSE	
DME1	26	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	27	2	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	28	2	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	29	2	Stands 30-120 years	FALSE	Non-Crown Lands	FALSE	
DME1	30	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	31	2	Stands 121+ years	TRUE	Stands 0-14 years	FALSE	
DME1	32	2	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	33	2	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	34	2	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	35	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	36	2	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	37	2	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	

Continued on next page...

Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
DME1	38	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	39	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	40	2	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	43	3	Stands 30-120 years	FALSE	Non-Crown Lands	FALSE	
DME1	44	3	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	45	3	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	46	3	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	47	3	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	48	3	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	49	3	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	50	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	51	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	52	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	53	3	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	54	3	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	55	3	Stands 30-120 years	TRUE	Stands 0-14 years	FALSE	
DME1	56	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	57	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	58	3	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	59	3	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	60	3	Stands 121+ years	FALSE	Non-Crown Lands	FALSE	
DME1	63	4	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	64	4	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	65	4	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	66	4	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	67	4	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	68	4	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	69	4	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	70	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	71	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	72	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	73	4	Stands 30-120 years	FALSE	Stands 0-14 years	FALSE	
DME1	74	4	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	75	4	Stands 121+ years	FALSE	Stands 51+ years	FALSE	

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Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
DME1	76	4	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	77	4	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	78	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	79	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	80	4	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	84	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	85	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	86	5	Stands 30-120 years	FALSE	Stands 15-50 years	FALSE	
DME1	87	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	88	5	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	89	5	Stands 30-120 years	FALSE	Non-Crown Lands	FALSE	
DME1	90	5	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	91	5	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	92	5	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	93	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	94	5	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	95	5	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	96	5	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	97	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	98	5	Non-Target	FALSE	Stands 15-50 years	FALSE	
DME1	99	5	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	100	5	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	104	6	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	105	6	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	106	6	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	
DME1	107	6	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	108	6	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	109	6	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	110	6	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	111	6	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	112	6	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	113	6	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	114	6	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	
DME1	115	6	Stands 121+ years	FALSE	Stands 0-14 years	FALSE	

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Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
DME1	116	6	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	117	6	Stands 121+ years	FALSE	Stands 51+ years	FALSE	
DME1	118	6	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	119	6	Stands 30-120 years	FALSE	Stands 51+ years	TRUE	
DME1	120	6	Stands 30-120 years	FALSE	Stands 0-14 years	FALSE	
DME1	123	7	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	124	7	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	125	7	Stands 30-120 years	FALSE	Stands 0-14 years	FALSE	
DME1	126	7	Stands 121+ years	FALSE	Stands 51+ years	TRUE	
DME1	127	7	Stands 121+ years	FALSE	Non-Crown Lands	FALSE	
DME1	128	7	Stands 30-120 years	TRUE	Stands 0-14 years	FALSE	
DME1	129	7	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	130	7	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	131	7	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	132	7	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	133	7	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	134	7	Stands 30-120 years	TRUE	Stands 0-14 years	FALSE	
DME1	135	7	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	136	7	Stands 121+ years	TRUE	Stands 0-14 years	FALSE	
DME1	137	7	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	138	7	Stands 30-120 years	TRUE	Stands 51+ years	FALSE	
DME1	139	7	Stands 121+ years	TRUE	Stands 51+ years	FALSE	
DME1	140	7	Stands 30-120 years	FALSE	Non-Crown Lands	FALSE	
DME1	144	5	Stands 30-120 years	FALSE	Stands 51+ years	FALSE	Replacement for plot 81
DME1	156	6	Stands 121+ years	FALSE	Stands 51+ years	TRUE	Replacement for plot 101
CMI2	90				Stands 51+ years	TRUE	
CMI2	395				Stands 51+ years	TRUE	
KAM1	1				Stands 51+ years	TRUE	
KAM1	2				Stands 51+ years	TRUE	
KAM1	3				Stands 51+ years	TRUE	
KAM1	4				Stands 51+ years	TRUE	
KAM1	5				Stands 0-14 years	TRUE	
KAM1	6				Stands 51+ years	TRUE	
KAM1	7				Stands 0-14 years	TRUE	

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Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
KAM1	10				Stands 51+ years	TRUE	
KAM1	11				Stands 15-50 years	TRUE	
KAM1	12				Stands 0-14 years	TRUE	
KAM1	13				Stands 51+ years	TRUE	
KAM1	16				Stands 0-14 years	TRUE	
KAM1	17				Stands 51+ years	TRUE	
KAM1	18				Stands 51+ years	TRUE	
KAM1	19				Stands 15-50 years	TRUE	
KAM1	20				Stands 0-14 years	TRUE	
KAM1	22				Stands 51+ years	TRUE	
KAM1	24				Stands 0-14 years	TRUE	
KAM1	25				Stands 51+ years	TRUE	
DME2	1				Stands 51+ years	FALSE	Not on 4-km grid
DME2	2				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	3				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	4				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	5				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	6				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	8				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	9				Outside Resultant	FALSE	Not on 4-km grid
DME2	10				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	11				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	14				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	15				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	16				Stands 51+ years	FALSE	Not on 4-km grid
DME2	19				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	23				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	24				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	26				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	27				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	29				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	30				Stands 15-50 years	FALSE	Not on 4-km grid
DME2	35				Stands 0-14 years	FALSE	Not on 4-km grid
DME2	36				Stands 51+ years	FALSE	Not on 4-km grid

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Project ID	Sample No	MPOS Pass	NVAF Stratum	NVAF	2013 Category	Measured 2013	Notes
DMEM	7				Stands 15-50 years	TRUE	
DMEM	12				Stands 15-50 years	TRUE	
DMEM	13				Stands 15-50 years	TRUE	
DMEM	17				Stands 15-50 years	TRUE	
DMEM	18				Stands 51+ years	TRUE	
DMEM	20				Stands 15-50 years	TRUE	
DMEM	21				Stands 15-50 years	TRUE	
DMEM	22				Stands 15-50 years	TRUE	
DMEM	25				Stands 15-50 years	TRUE	
DMEM	28				Stands 15-50 years	TRUE	
DMEM	31				Stands 15-50 years	TRUE	
DMEM	32				Stands 15-50 years	TRUE	
DMEM	33				Stands 15-50 years	TRUE	
DMEM	34				Stands 15-50 years	TRUE	
DMEM	37				Stands 15-50 years	TRUE	
DMEM	41				Stands 15-50 years	TRUE	
DMEM	42				Stands 15-50 years	TRUE	
DMEM	43				Stands 15-50 years	TRUE	
DMEM	44				Stands 15-50 years	TRUE	
DMEM	45				Stands 15-50 years	TRUE	
DMEM	46				Stands 15-50 years	TRUE	
DMEM	47				Stands 15-50 years	TRUE	
DMEM	48				Stands 15-50 years	TRUE	
DMEM	49				Stands 15-50 years	TRUE	
DMEM	50				Stands 0-14 years	TRUE	
DMEM	51				Stands 15-50 years	TRUE	
DMEM	52				Stands 15-50 years	TRUE	
DMEM	53				Stands 15-50 years	TRUE	
DMEM	54				Stands 15-50 years	TRUE	
DMEM	55				Stands 15-50 years	TRUE	
DMEM	56				Stands 15-50 years	TRUE	
DMEM	57				Stands 15-50 years	TRUE	

Table A.2: Ground sample plot locations and within independent sample weights (within pass for Audit plots and within design for NFI and YSM plots).

Pop	Proj_ID	Pass	Samp_No	UTM Zone	UTM Easting	UTM Northing	Feature_ID	BEC	Sampling Weight
Young	DMEM	1	0007	10	710003	5500999	9175920	ESSF	1,600
Young	DMEM	1	0012	10	638002	5529000	9406673	MS	1,600
Young	DMEM	1	0013	10	638002	5532999	2584037	MS	1,600
Young	DMEM	1	0017	10	645998	5468999	2520251	ESSF	1,600
Young	DMEM	1	0020	10	649999	5496994	2551151	ESSF	1,600
Young	DMEM	1	0021	10	650004	5525004	6395205	IDF	1,600
Young	DMEM	1	0022	10	654001	5509005	9048432	MS	1,600
Young	DMEM	1	0025	10	670003	5557000	2604558	PP	1,600
Young	DMEM	1	0028	10	685995	5517007	9168920	MS	1,600
Young	DMEM	1	0031	10	694009	5464996	9185432	MS	1,600
Young	DMEM	1	0032	10	694008	5521002	9418083	MS	1,600
Young	DMEM	1	0033	10	697993	5521000	9459384	MS	1,600
Young	DMEM	1	0034	10	702004	5461005	9419614	MS	1,600
Young	DMEM	1	0037	10	710000	5557000	2606073	IDF	1,600
Young	DMEM	1	0041	10	682000	5432998	2486846	ESSF	1,600
Young	DMEM	1	0042	10	681999	5444995	9422034	MS	1,600
Young	DMEM	1	0043	10	682004	5449000	5845865	MS	1,600
Young	DMEM	1	0044	10	669997	5452997	5862010	MS	1,600
Young	DMEM	1	0045	10	666003	5457006	6368170	ESSF	1,600
Young	DMEM	1	0046	10	678004	5457000	9123813	MS	1,600
Young	DMEM	1	0047	10	690002	5456998	2512341	ESSF	1,600
Young	DMEM	1	0048	10	694002	5457001	9177028	MS	1,600
Young	DMEM	1	0049	10	698000	5456999	9422673	MS	1,600
Young	DMEM	1	0051	10	698000	5460997	9165034	MS	1,600
Young	DMEM	1	0052	10	682001	5465000	7706565	IDF	1,600
Young	DMEM	1	0053	10	689999	5464997	6126172	MS	1,600
Young	DMEM	1	0054	10	702002	5464999	9147529	MS	1,600
Young	DMEM	1	0055	10	686002	5469007	5862087	IDF	1,600
Young	DMEM	1	0056	10	702001	5469001	9169040	IDF	1,600
Young	DMEM	1	0057	10	666003	5473001	2520929	ESSF	1,600
Young	DMEM	1	0058	10	650001	5480997	6158588	ESSF	1,600
Young	DMEM	1	0059	10	713999	5481005	6383891	MS	1,600
Young	DMEM	1	0060	10	646001	5485000	2540907	ESSF	1,600
Young	DMEM	1	0061	10	670000	5488996	6341519	IDF	1,600
Young	DMEM	1	0062	10	714000	5488992	2544191	ESSF	1,600
Young	DMEM	1	0063	10	713998	5492999	2544576	ESSF	1,600
Young	DMEM	1	0064	10	654004	5497001	9411244	MS	1,600
Young	DMEM	1	0065	10	638003	5501000	2550472	CWH	1,600
Young	DMEM	1	0066	10	690002	5501002	9130294	IDF	1,600
Young	DMEM	1	0067	10	673999	5504997	9141452	IDF	1,600
Young	DMEM	1	0069	10	702000	5505002	2554105	MS	1,600
Young	DMEM	1	0070	10	694004	5513004	6294358	IDF	1,600
Young	DMEM	1	0071	10	698003	5513002	9138278	IDF	1,600
Young	DMEM	1	0072	10	701998	5513002	2565337	MS	1,600
Young	DMEM	1	0073	10	642001	5516998	2560939	ESSF	1,600
Young	DMEM	1	0074	10	658006	5521008	2573940	IDF	1,600
Young	DMEM	1	0075	10	626000	5533003	2583053	ESSF	1,600
Young	DMEM	1	0076	10	642002	5532000	2584455	IDF	1,600

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Pop	Proj_ID	Pass	Samp_No	UTM Zone	UTM Easting	UTM Northing	Feature_ID	BEC	Sampling Weight
Young	DMEM	1	0077	10	630002	5537001	2584055	ESSF	1,600
Young	DMEM	1	0078	10	694002	5536996	7721370	MS	1,600
Young	DMEM	1	0079	10	701999	5536998	2587866	MS	1,600
Young	DMEM	1	0080	10	718004	5565001	7661190	MS	1,600
Young	DMEM	1	0081	10	661998	5569001	9184507	IDF	1,600
Young	DMEM	1	0082	10	670005	5576996	7725123	MS	1,600
Young	DMEM	1	0083	10	658001	5584998	2619462	IDF	1,600
Young	KAM1	1	0011	10	671719	5473547	5853294	IDF	40,000
Young	KAM1	1	0019	10	693459	5512534	6294449	IDF	40,000
Mature	CMI2	1	0090	10	670822	5453633	6368272	MS	40,000
Mature	CMI2	1	0395	10	710685	5451806	7901987	ESSF	40,000
Mature	DME1	1	0004	10	699999	5469581	9168974	IDF	80,768
Mature	DME1	1	0005	10	681122	5446862	9136469	MS	80,768
Mature	DME1	1	0006	10	691368	5518585	6293961	MS	79,700
Mature	DME1	1	0009	10	687364	5557113	2605560	IDF	80,768
Mature	DME1	1	0014	10	632883	5530054	9174227	MS	79,700
Mature	DME1	1	0015	10	706839	5483160	6384021	ESSF	79,700
Mature	DME1	1	0016	10	672728	5456060	6368161	MS	79,700
Mature	DME1	1	0017	10	708519	5452513	2501803	ESSF	79,700
Mature	DME1	1	0018	10	645160	5487618	2541404	ESSF	80,768
Mature	DME1	2	0027	10	637686	5510481	2561386	ESSF	93,194
Mature	DME1	2	0036	10	633889	5548506	2593435	ESSF	91,961
Mature	DME1	3	0044	10	641898	5584217	9531051	MS	80,768
Mature	DME1	3	0045	10	669354	5481050	9163374	IDF	80,768
Mature	DME1	3	0050	10	671626	5464685	5863552	IDF	79,700
Mature	DME1	3	0051	10	621372	5570751	2608319	IDF	79,700
Mature	DME1	3	0052	10	653137	5585819	9535745	IDF	79,700
Mature	DME1	3	0053	10	699865	5473219	2522917	IDF	80,768
Mature	DME1	3	0054	10	698611	5480692	6370609	IDF	80,768
Mature	DME1	3	0056	10	704561	5494981	9424846	ESSF	79,700
Mature	DME1	3	0057	10	702619	5532525	6335036	MS	79,700
Mature	DME1	3	0059	10	687117	5482745	2531918	IDF	79,700
Mature	DME1	4	0063	10	667986	5553086	2604565	IDF	80,768
Mature	DME1	4	0064	10	640909	5582578	5851272	MS	80,768
Mature	DME1	4	0070	10	702699	5469705	2522771	IDF	79,700
Mature	DME1	4	0071	10	623475	5566214	6133029	IDF	79,700
Mature	DME1	4	0072	10	666631	5587754	9597768	MS	79,700
Mature	DME1	4	0074	10	706867	5486454	9149311	MS	80,768
Mature	DME1	4	0078	11	288036	5484907	2905684	ESSF	79,700
Mature	DME1	4	0079	10	687574	5481839	2531861	IDF	79,700
Mature	DME1	4	0080	10	668793	5560443	2604587	IDF	79,700
Mature	DME1	5	0084	10	681903	5455020	9407503	MS	86,537
Mature	DME1	5	0085	10	693695	5462253	6154597	MS	86,537
Mature	DME1	5	0087	10	647400	5472536	2520653	ESSF	86,537
Mature	DME1	5	0091	10	624121	5572615	2608815	IDF	85,393
Mature	DME1	5	0093	10	698371	5471577	2523301	IDF	86,537
Mature	DME1	5	0096	10	691490	5446896	9418800	ESSF	85,393
Mature	DME1	5	0097	10	677709	5493672	6144204	IDF	86,537
Mature	DME1	5	0099	10	677895	5495563	6144025	IDF	86,537

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				UTM					Sampling
Pop	Proj_ID	Pass	Samp_No	Zone	Easting	Northing	Feature_ID	BEC	Weight
Mature	DME1	6	0104	10	707922	5461032	9417973	MS	80,768
Mature	DME1	6	0105	10	636482	5579575	7724792	MS	80,768
Mature	DME1	6	0108	10	707196	5555335	5850981	IDF	80,768
Mature	DME1	6	0110	10	702948	5475773	2532954	IDF	79,700
Mature	DME1	6	0111	10	625697	5570247	2608484	IDF	79,700
Mature	DME1	6	0112	10	676909	5531166	6222606	IDF	79,700
Mature	DME1	6	0116	10	698747	5461437	9173886	MS	79,700
Mature	DME1	6	0118	10	641257	5474430	2529410	ESSF	80,768
Mature	DME1	6	0119	10	661346	5543058	9167878	IDF	80,768
Mature	DME1	7	0123	10	642533	5477651	6303488	ESSF	99,625
Mature	DME1	7	0126	10	667562	5481372	9133325	MS	99,625
Mature	DME1	6	0156	10	673727	5480844	2531435	IDF	79,700
Mature	DMEM	1	0018	10	645998	5505004	5847834	ESSF	1,600
Mature	DMEM	1	0068	10	678003	5505001	7093873	MS	1,600
Mature	KAM1	1	0001	10	633620	5515216	2560938	ESSF	40,000
Mature	KAM1	1	0002	10	634497	5535163	2584209	MS	40,000
Mature	KAM1	1	0003	10	635379	5555122	2602383	IDF	40,000
Mature	KAM1	1	0004	10	636268	5575081	2617053	IDF	40,000
Mature	KAM1	1	0006	10	652665	5494383	6184515	MS	40,000
Mature	KAM1	1	0010	10	656222	5574192	2610605	IDF	40,000
Mature	KAM1	1	0013	10	673509	5513433	6753947	IDF	40,000
Mature	KAM1	1	0017	10	691655	5472644	6126001	MS	40,000
Mature	KAM1	1	0018	10	692556	5492589	9423070	MS	40,000
Mature	KAM1	1	0022	10	696155	5572404	9412805	IDF	40,000
Mature	KAM1	1	0025	10	715217	5551549	9174420	MS	40,000

Table A.3: Phase I inventory data.

Feature_ID	Leading					Lorey	Basal	Stems/	Volume		
	Spp	Height (m)	Age (yrs)	Inv SI (m)	BC SI (m)	Height (m)	Area (m^2/ha)	Ha (n)	Live (m^3/ha)	Dead (m^3/ha)	Phase II Input (m^3/ha)
9175920	PL	8.6	28	16.0	15.6	7.8	3.5	430	1.6	0.0	179.3
9406673	PL	13.2	35	19.0	21.8	11.4	12.6	1,178	26.4	0.4	226.9
2584037	FD	15.0	42	20.0	22.3	13.1	20.1	1,329	63.0	0.3	0.0
2520251	PL	12.8	42	16.0	19.6	11.4	10.1	843	20.6	0.2	229.3
2551151	SX	7.8	33	19.0	19.9	7.8	2.5	333	1.2	0.0	136.3
6395205	FD	10.8	46	14.0	22.1	9.8	13.9	1,144	27.2	0.0	311.7
9048432	PL	9.9	32	16.0	20.7	9.1	4.5	497	5.4	0.0	47.0
2604558	FD	11.9	40	17.0		10.7	13.6	977	26.9	3.5	70.7
9168920	PL	8.9	29	16.0	18.0	8.3	3.3	384	2.9	0.0	151.0
9185432	PL	10.5	34	16.0	17.9	9.5	6.0	583	7.7	0.7	118.6
9418083	PL	13.1	30	21.0	17.6	11.5	9.0	845	18.1	0.9	180.7
9459384	PL	12.1	32	19.0	18.1	10.7	7.5	750	12.5	0.0	115.2
9419614	SX	4.4	30	15.0	17.3		0.0	0	0.0	0.0	49.6
2606073	FD	14.1	41	19.8	18.2	12.2	17.1	1,302	47.0	0.0	122.2
2486846	PL	7.9	26	16.0	17.5	7.2	2.8	367	1.0	0.0	44.0
9422034	PL	6.8	23	16.0	18.7		0.0	0	0.0	0.0	124.3
5845865	PL	14.7	37	20.0	18.9	12.8	11.7	974	33.4	0.0	214.6
5862010	PL			18.0	18.7		0.0	1,221	0.0	0.0	62.2
6368170	PL	7.0	21	18.0	16.6		0.0	0	0.0	0.0	63.5
9123813	PL	5.6	18	18.0	18.4		0.0	1,448	0.0	0.0	9.8
2512341	PL	8.3	27	16.0	14.4	7.6	3.3	413	1.5	0.0	23.7
9177028	PL	8.9	29	16.0		8.2	3.5	422	2.8	0.0	122.6
9422673	PL	7.8	23	18.0		7.2	2.5	344	1.0	0.0	33.7
9165034	PL	7.9	26	16.0	16.6	7.3	2.2	290	1.0	0.0	152.2
7706565	PL			21.0	19.0	8.8	6.6	753	6.5	0.0	68.5
6126172	PL	6.8	23	16.0	18.4		0.0	0	0.0	0.0	167.4
9147529	PL	4.6	19	15.0	18.2		0.0	5,084	0.0	0.0	6.4
5862087	PL	6.1	19	18.0	19.7		0.0	3,513	0.0	0.0	0.0

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Feature_ID	Leading Spp	Leading Height (m)	Leading Age (yrs)	Leading Inv SI (m)	Leading BC SI (m)	Lorey Height (m)	Basal Area (m^2/ha)	Stems/Ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)	Volume Phase II Input (m^3/ha)
9169040	FD	8.1	31	16.0	16.3	7.8	5.0	540	5.3	0.1	106.1
2520929	PL	7.2	24	16.0	16.5		0.0	2,118	0.0	0.0	22.7
6158588	BL	3.6	25	15.0	18.0		0.0	2,201	0.0	0.0	33.6
6383891	PL	4.6	17	16.0	16.4		0.0	1,983	0.0	0.0	17.9
2540907	SX	2.8	24	15.0	22.9		0.0	4,160	0.0	0.0	0.0
6341519	FD	5.0	20	17.0	18.9		0.0	2,091	0.0	0.0	80.4
2544191	PL	5.0	18	16.0	16.0		0.0	1,466	0.0	0.0	8.6
2544576	PL	6.3	24	15.0	16.2		0.0	2,000	0.0	0.0	131.3
9411244	FD			19.0			0.0	2,219	0.0	0.0	0.0
2550472	SX	10.1	27	24.0		9.5	10.8	1,020	16.7	0.3	87.4
9130294	PL	5.3	19	16.0	18.8		0.0	0	0.0	0.0	27.4
9141452	PL	3.7	18	13.0	18.7		0.0	2,026	0.0	0.0	111.1
2554105	PL	7.9	26	16.0	17.5	7.2	2.5	328	1.1	0.1	85.0
6294358	PL	3.9	17	15.0	18.0		0.0	0	0.0	0.0	0.0
9138278	PL	8.6	28	16.0	17.5	7.7	4.1	486	2.7	0.1	121.5
2565337	PL	5.3	19	16.0	17.5		0.0	0	0.0	0.0	34.7
2560939	PL	6.9	22	17.0	20.1		0.0	0	0.0	0.0	90.9
2573940	PL	6.1	21	16.0	19.8		0.0	0	0.0	0.0	88.4
2583053	PL	4.3	18	15.0	20.1		0.0	1,504	0.0	0.0	18.1
2584455	FD			12.0	21.0	6.8	3.2	329	2.6	0.0	1.5
2584055	SX	3.7	28	15.0	15.6		0.0	4,700	0.0	0.0	0.0
7721370	PL	6.1	21	16.0	17.9		0.0	2,165	0.0	0.0	153.3
2587866	PL	7.8	19	21.0	18.3	7.4	1.8	205	0.7	0.2	30.6
7661190	PL	4.8	16	18.0	19.2		0.0	0	0.0	0.0	9.5
9184507	PL	9.9	32	16.0	16.5	8.8	8.8	882	10.4	0.5	0.0
7725123	PL	6.1	21	16.0	17.1		0.0	2,600	0.0	0.0	72.5
2619462	AT	6.5	26	12.0	13.5		0.0	0	0.0	0.0	120.1
5853294	FD	5.0	20	17.0	18.1		0.0	0	0.0	0.0	90.5

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Feature_ID	Leading Spp	Leading Height (m)	Leading Age (yrs)	Leading Inv SI (m)	Leading BC SI (m)	Lorey Height (m)	Basal Area (m^2/ha)	Stems/Ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)	Volume Phase II Input (m^3/ha)
6294449	PL	4.3	15	18.0	18.0		0.0	0	0.0	0.0	39.7
6368272	FD	16.6	98	11.7	21.4	16.3	26.6	1,279	92.5	12.7	77.3
7901987	PL	17.8	144	10.7		15.1	37.2	1,625	172.3	4.8	269.0
9168974	PL	15.9	81	12.7	18.6	13.3	27.6	1,715	88.1	10.6	286.3
9136469	PL	19.3	132	12.3	19.2	16.3	37.8	1,543	209.2	16.6	202.3
6293961	PL	23.9	148	15.5	18.9	20.7	43.2	1,023	286.1	67.4	353.1
2605560	FD	22.2	120	13.9	17.7	18.8	25.1	630	134.2	0.0	82.7
9174227	FD	31.2	202	15.7	22.3	25.7	42.0	647	324.4	12.3	319.8
6384021	PL	24.3	135	16.3	15.9	20.5	45.3	1,132	320.7	6.1	236.8
6368161	PL	27.4	242	16.4	17.5	24.1	37.4	455	201.5	115.5	165.4
2501803	SX	30.2	244	10.0	13.4	23.0	44.9	820	359.0	3.1	131.4
2541404	B	15.7	102	9.7		13.3	4.6	183	14.7	0.0	108.4
2561386	B	18.7	132	9.3	18.0	14.3	35.7	1,158	152.8	0.0	126.9
2593435	PL	22.9	162	14.2	18.6	19.7	40.2	1,094	264.6	10.2	177.2
9531051	PL	12.8	75	10.7	16.6	10.8	21.3	1,424	26.9	11.5	120.5
9163374	PL	16.5	122	10.5	18.2	14.3	28.2	1,272	97.0	24.2	268.4
5863552	FD	26.1	142	15.0	19.4	22.6	33.3	533	173.5	87.7	347.9
2608319	FD	26.8	242	12.6	16.3	22.5	33.8	521	201.8	23.6	284.6
9535745	FD	27.1	227	13.0	15.3	23.8	35.0	423	246.3	5.8	285.3
2522917	PL	18.8	87	14.6	18.1	16.2	26.4	411	48.7	102.0	85.8
6370609	PL	20.5	121	13.7	17.7	18.3	26.2	766	133.6	35.7	122.6
9424846	PL	26.4	221	15.9	15.6	22.8	48.4	954	371.8	34.0	125.7
6335036	SX	29.3	153	14.6	17.4	24.0	38.1	760	326.0	0.0	311.8
2531918	FD	22.7	224	10.9	17.6	19.1	3.0	53	15.5	0.1	54.9
2604565	AT	19.2	82	14.7	15.7	18.0	16.3	547	64.4	0.0	146.2
5851272	PL	14.3	92	10.5	16.4	12.0	26.6	1,728	63.2	12.1	167.9
2522771	FD	26.1	142	15.0	16.7	22.4	28.3	482	170.3	19.1	99.4
6133029	FD	23.4	172	12.4	16.5	20.3	27.1	486	131.7	56.1	52.2

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Feature_ID	Leading					Lorey	Basal	Stems/	Volume		
	Spp	Height (m)	Age (yrs)	Inv SI (m)	BC SI (m)	Height (m)	Area (m^2/ha)	Ha (n)	Live (m^3/ha)	Dead (m^3/ha)	Phase II Input (m^3/ha)
9597768	FD	27.2	137	15.9		23.4	37.2	373	247.6	49.8	336.5
9149311	PL	20.5	122	13.7	17.4	17.6	37.6	1,429	236.3	3.5	449.6
2905684	SX	33.4	233	14.6	14.7	27.2	42.5	567	396.1	0.0	158.5
2531861	FD	22.7	224	10.9	19.4	19.1	3.0	53	15.6	0.0	101.1
2604587	PY	23.1	273	6.7	13.5	19.1	13.0	111	49.6	21.1	54.6
9407503	PL	12.2	72	10.4	19.2	10.3	18.6	1,735	23.2	3.1	0.0
6154597	PL	17.7	111	12.0	17.2	14.8	38.0	1,728	153.0	32.7	255.3
2520653	B	18.0	72	15.6	17.0	13.6	39.5	1,698	158.7	5.3	290.0
2608815	FD	23.8	222	11.5	16.2	20.9	22.1	290	105.3	27.0	74.7
2523301	PL	15.6	87	11.9	17.7	13.4	23.5	480	26.5	60.5	304.5
9418800	PL	22.3	204	12.7	14.9	18.3	42.7	1,215	251.2	21.6	209.8
6144204	PY	31.4	117	18.2	17.0	28.6	21.0	46	80.7	121.1	417.9
6144025	FD	26.5	81	20.8	19.0	21.1	28.8	941	179.6	0.0	117.2
9417973	PL	13.2	71	11.3		11.1	21.3	1,914	39.6	1.8	192.0
7724792	PL	18.1	112	12.3	17.0	15.4	34.3	1,287	135.2	45.7	166.0
5850981	FD	15.1	62	14.7	18.3	13.0	18.1	1,261	54.5	2.4	177.0
2532954	FD	17.5	142	10.1	18.7	14.5	19.4	716	73.1	0.0	105.4
2608484	FD	25.9	252	12.0	15.7	22.0	22.0	247	119.1	23.5	60.0
6222606	FD	31.5	163	17.1	18.4	26.9	35.3	423	261.2	31.4	213.4
9173886	PL	22.2	209	12.5		18.1	37.8	1,151	219.9	20.4	164.1
2529410	B	14.2	123	7.3	18.5	11.7	18.4	793	60.0	0.0	234.1
9167878	FD	11.4	122	7.3	17.9	10.5	7.4	519	14.2	1.9	97.0
6303488	B	22.9	374	4.2		16.1	45.2	1,101	215.9	0.0	351.0
9133325	PL	27.0	152	18.0	18.1	23.5	46.3	1,036	395.9	53.9	599.3
2531435	PL	31.8	244	20.3	20.5	28.6	32.4	417	302.4	34.3	132.0
5847834	B	9.9	52	12.9	18.1	8.3	7.1	649	11.2	0.0	351.9
7093873	PL	28.7	159	19.3	18.0	24.9	42.8	710	340.2	101.8	155.6
2560938	B	17.5	222	4.8		13.4	7.6	257	24.2	0.0	296.0

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Feature_ID	Leading					Lorey	Basal	Stems/	Volume		
	Spp	Height (m)	Age (yrs)	Inv SI (m)	BC SI (m)	Height (m)	Area (m^2/ha)	Ha (n)	Live (m^3/ha)	Dead (m^3/ha)	Phase II Input (m^3/ha)
2584209	PL			15.4	21.2	15.9	35.5	1,279	131.5	67.2	0.0
2602383	FD	28.0	222	13.5	18.7	23.7	31.7	433	196.3	28.6	268.9
2617053	FD	16.4	142	9.5	15.1	13.9	16.9	610	54.5	5.7	90.0
6184515	FD	41.0	262	19.2		34.6	49.7	493	519.6	0.0	0.0
2610605	FD	21.1	102	14.4	16.1	17.2	26.9	890	129.1	0.0	198.2
6753947	FD	20.0	122	12.4	18.6	18.8	6.2	170	33.3	1.6	148.6
6126001	PL	16.7	88	12.7	17.6	14.1	28.2	1,450	106.5	17.6	188.0
9423070	PL	13.0	77	10.6	17.6	10.9	22.3	1,743	33.6	7.4	352.0
9412805	FD	23.0	131	13.8	18.7	18.9	27.3	806	151.2	0.0	106.2
9174420	PL	25.1	213	14.9	19.2	20.7	40.2	380	108.3	206.0	265.6

Table A.4: Ground sample 2013 data.

Proj_ID	Samp_No	Spp	Height (m)	Age (yrs)	SI (m)	Lorey Height (m)	Basal Area (m^2/ha)	Stems/ ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)
DMEM	0007	PL	9.8	26	19.4	8.0	32.9	4,453	33.8	0.0
DMEM	0012	PL	18.0	38	23.3	14.1	27.2	1,376	128.9	29.9
DMEM	0013	FD		44		6.8	16.0	2,427	41.6	7.4
DMEM	0017	PL	13.8	48	15.7	11.3	45.9	4,028	143.2	25.7
DMEM	0020	BL	11.0	51	14.4	7.9	35.9	3,477	82.2	0.0
DMEM	0021	FD	26.1	68	24.1	21.8	34.5	700	315.4	136.6
DMEM	0022	PL	7.4	29	14.5	6.5	5.0	325	7.9	1.1
DMEM	0025	FD	11.4	46	15.4	7.7	22.1	3,778	21.7	0.0
DMEM	0028	PL	15.2	36	21.0	13.2	21.0	1,076	96.9	0.0
DMEM	0031	PL	12.6	32	19.8	9.1	21.1	2,076	68.1	0.0
DMEM	0032	PL	16.8	112	16.5	16.0	37.5	1,801	263.8	77.9
DMEM	0033	PL	12.3	30	20.5	10.9	19.5	1,226	58.9	0.0
DMEM	0034	SX	9.8	37	17.9	7.6	6.4	751	11.7	0.0
DMEM	0037	FD	13.2	46	16.8	11.6	28.5	1,251	101.1	12.0
DMEM	0041	PL	9.9	30	17.2	7.3	2.9	300	6.4	6.2
DMEM	0042	PL	13.6	31	21.9	9.4	25.1	3,502	41.6	0.0
DMEM	0043	PL	14.1	34	20.5	11.6	25.6	2,527	73.1	0.0
DMEM	0044	AT	13.9	78	10.9	10.9	18.3	1,701	53.3	0.0
DMEM	0045	PL	9.4	24	20.1	8.2	20.0	2,226	26.3	0.0
DMEM	0046	PL	5.4	15	20.0	4.4	4.0	1,326	0.0	5.4
DMEM	0047	PL	5.9	20	16.9	5.8	12.8	2,402	9.7	0.0
DMEM	0048	PL	9.3	26	17.3	6.6	21.8	3,652	15.9	0.0
DMEM	0049	BL	7.8	43	14.5	6.9	7.0	876	12.0	0.0
DMEM	0051	PL	13.3	38	18.5	12.2	28.9	1,776	109.9	0.0
DMEM	0052	AT	12.4	37	16.5	10.1	15.7	2,176	23.4	0.0
DMEM	0053	PL	16.1	38	21.5	12.3	25.3	2,402	91.8	2.8
DMEM	0054	PL	6.0	17	19.8	5.4	4.0	751	0.0	0.0
DMEM	0055	FD		94		9.7	0.7	25	2.1	0.0
DMEM	0056	FD	16.4	46	20.5	14.4	17.2	625	82.1	0.0
DMEM	0057	PL	4.8	16	17.6	4.9	3.6	650	2.7	0.0
DMEM	0058	BL	6.6	33	15.8	5.7	10.5	2,001	11.3	0.0
DMEM	0059	PL	7.2	19	19.8	5.6	10.2	2,827	0.0	4.5
DMEM	0060	PL				3.0	0.8	400	0.0	0.0
DMEM	0061	FD	8.7	26	20.8	7.2	11.7	1,926	15.8	0.0
DMEM	0062	PL	5.7	16	19.4	4.5	8.7	2,802	0.0	0.0
DMEM	0063	BL	9.6	37	17.5	7.8	20.9	2,827	26.1	0.0
DMEM	0064	NA					0.0	0	0.0	0.0
DMEM	0065	SX	10.8	24	25.4	5.8	3.1	250	5.2	0.0
DMEM	0066	PL	9.1	26	18.4	7.3	8.4	1,776	2.4	0.0
DMEM	0067	PL	8.1	18	21.7	7.6	12.9	1,351	19.7	7.6
DMEM	0069	PL	9.1	22	20.6	7.3	5.7	751	10.7	0.0
DMEM	0070	FD				14.0	10.6	200	67.6	0.0
DMEM	0071	PL	10.1	24	20.6	8.6	8.7	801	14.8	0.0
DMEM	0072	PL	9.1	27	18.0	7.3	21.5	5,579	5.3	0.0
DMEM	0073	PL	11.2	27	20.4	8.9	22.4	2,151	41.5	0.0
DMEM	0074	FD	17.7	115	11.8	10.9	19.6	1,451	69.1	99.2
DMEM	0075	PL	5.5	20	17.2	4.7	8.0	1,651	2.4	0.0
DMEM	0076	AT	6.2	49	8.1	5.5	6.2	2,101	1.7	0.0

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Proj_ID	Samp_No	Spp	Height (m)	Age (yrs)	SI (m)	Lorey Height (m)	Basal Area (m²/ha)	Stems/ ha (n)	Volume Live (m³/ha)	Volume Dead (m³/ha)
DMEM	0077	SX	6.3	32	15.6	5.5	5.3	876	4.8	0.0
DMEM	0078	PL	12.2	30	20.2	10.6	23.3	1,876	70.8	0.0
DMEM	0079	PL	8.5	22	19.9	7.3	19.4	4,503	2.7	0.0
DMEM	0080	PL	5.8	15	20.5	4.9	4.2	1,251	0.0	0.0
DMEM	0081	FD				9.3	18.2	776	81.0	0.0
DMEM	0082	PL	8.8	22	20.6	7.1	13.5	1,976	9.6	0.0
DMEM	0083	AT	19.2	87	14.8	16.4	24.5	625	144.7	0.0
KAM1	0011	PL	15.9	101	12.3	11.6	20.7	1,651	67.3	17.2
KAM1	0019	FD	16.0	84	12.6	10.6	6.3	275	22.6	0.0
CMI2	0090	PL	20.5	158	8.4	11.3	10.0	525	50.8	27.6
CMI2	0395	PL	16.1	112	9.8	15.5	50.5	1,476	280.0	57.3
DME1	0004	PL	22.7	74	19.4	23.6	28.0	1,110	178.2	47.1
DME1	0005	PL	20.4	117	12.5	21.3	30.8	2,589	91.6	108.7
DME1	0006	SX	29.3	115	18.1	16.0	23.4	1,166	132.4	228.4
DME1	0009	FD	16.1	149	9.6	14.3	26.2	1,518	96.6	30.0
DME1	0014	BL	23.7	140	12.9	23.9	46.8	2,075	295.2	165.1
DME1	0015	PL	22.3	128	13.4	17.9	25.2	684	161.8	149.6
DME1	0016	FD	19.0	66	17.4	17.6	22.4	750	122.2	83.3
DME1	0017	BL	22.2	175	9.2	19.4	19.6	527	106.9	196.0
DME1	0018	BL	16.1	100	10.6	14.6	27.0	1,000	131.9	2.0
DME1	0027	B	16.4	216	6.0	17.1	36.0	1,111	183.3	239.2
DME1	0036	FD	28.7	206	14.3	23.3	23.4	558	158.2	480.6
DME1	0044	PL	15.1	72	12.8	12.9	34.2	3,812	64.3	15.0
DME1	0045	PL	19.1	109	14.3	22.9	39.2	1,752	221.7	72.3
DME1	0050	FD	33.0	161	18.4	27.3	37.8	382	294.6	165.3
DME1	0051	FD	23.2	204	12.1	22.4	52.8	877	381.1	85.4
DME1	0052	FD	33.7	194	17.5	31.0	34.2	265	271.3	96.7
DME1	0053	PL	21.7	90	16.2	21.2	5.6	174	48.6	92.3
DME1	0054	FD	22.9	237	12.9	19.9	21.0	470	135.4	22.5
DME1	0056	PL	21.7	134	12.4	24.5	12.6	241	100.8	245.3
DME1	0057	SX	27.1	280	7.2	21.8	39.2	1,227	272.8	71.7
DME1	0059	FD	21.6	134	14.5	22.3	13.0	67	104.8	2.9
DME1	0063	AT	18.4	65	16.8	14.1	30.0	1,591	122.7	52.8
DME1	0064	PL	16.0	75	13.1	14.6	30.6	2,399	97.1	0.0
DME1	0070	FD	22.0	150	13.4	20.5	19.0	1,050	81.5	0.0
DME1	0071	FD	11.0	161	6.3	10.7	23.8	631	126.2	14.7
DME1	0072	FD	27.7	246	13.2	29.2	54.4	324	412.4	10.7
DME1	0074	PL	23.7	164	13.0	21.1	64.4	1,854	455.0	66.8
DME1	0078	SX	25.3	164	10.6	24.1	18.0	274	136.7	125.5
DME1	0079	PY	25.7	70	21.7	24.4	10.5	60	77.8	0.0
DME1	0080	FD	19.7	198	10.4	13.3	12.0	100	82.4	12.3
DME1	0084	PL				9.9	21.0	1,498	70.8	39.9
DME1	0085	PL	17.7	120	10.4	17.4	46.8	2,744	225.5	0.0
DME1	0087	B	24.4	243	8.5	29.4	46.2	1,567	337.1	176.0
DME1	0091	FD	16.8	126	10.7	13.2	16.0	296	89.7	35.1
DME1	0093	PL	19.3	70	16.7	12.4	39.0	2,030	191.7	60.7
DME1	0096	PL	24.0	164	12.5	4.9	23.8	354	209.9	34.8
DME1	0097	FD	25.7	84	19.9	24.5	37.8	565	256.1	0.0

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Proj_ID	Samp_No	Spp	Height (m)	Age (yrs)	SI (m)	Lorey Height (m)	Basal Area (m^2/ha)	Stems/ ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)
DME1	0099	FD	24.9	136	14.8	22.9	15.0	210	95.4	0.0
DME1	0104	PL	16.9	83	13.3	12.4	33.6	2,445	110.2	0.0
DME1	0105	PL	19.8	98	14.0	19.1	21.6	1,380	100.5	172.9
DME1	0108	FD	17.7	98	13.5	13.8	36.4	1,313	185.3	2.8
DME1	0110	FD	20.9	124	14.5	14.2	15.0	177	97.8	12.4
DME1	0111	FD	21.4	194	10.9	26.3	12.0	46	92.5	35.0
DME1	0112	FD	28.7	176	15.6	16.8	28.0	350	183.4	82.6
DME1	0116	BL	20.1	123	12.0	22.9	16.8	436	119.5	191.9
DME1	0118	SX	19.3	100	12.2	17.6	33.6	665	213.9	4.3
DME1	0119	FD	23.2	133	13.9	7.7	13.7	881	51.0	5.6
DME1	0123	SX	25.9	161	16.3	18.1	50.4	1,983	260.4	124.9
DME1	0126	SX	27.5	142	14.0	25.3	67.2	1,304	515.5	171.1
DME1	0156	FD	19.5	112	13.8	21.2	25.2	998	133.8	40.3
DMEM	0018	BL	21.1	94	18.3	17.4	60.9	876	449.5	4.1
DMEM	0068	FD	27.3	145	15.6	12.1	15.8	575	111.2	147.8
KAM1	0001	BL	21.8	136	11.5	13.0	67.9	1,676	377.3	5.2
KAM1	0002	NA					0.0	0	0.0	0.0
KAM1	0003	FD	23.9	119	15.3	15.0	45.1	1,526	263.7	39.5
KAM1	0004	FD	15.0	116	9.9	10.0	24.2	1,101	80.7	0.0
KAM1	0006	BL		134		12.1	24.5	951	165.3	189.7
KAM1	0010	FD	20.9	78	17.3	15.5	25.2	475	163.6	0.0
KAM1	0013	PL	11.7	28	20.7	9.6	13.6	625	46.7	7.1
KAM1	0017	PL	16.1	81	12.5	14.4	32.7	1,951	163.8	74.4
KAM1	0018	PL	19.8	65	18.1	17.0	42.3	2,527	264.4	14.0
KAM1	0022	SX	26.1	82	20.1	9.6	10.0	500	53.4	0.0
KAM1	0025	SX	28.9	111	18.1	20.6	26.7	450	248.6	105.7

Table A.5: Ground sample establishment data.

Proj_ID	Samp_No	Height (m)	Age (yrs)	SI (m)	Basal Area (m^2/ha)	Stems/ ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)
CMI2	0090	20.2	188	9.0	19.2	776	126.8	0.0
CMI2	0395	15.1	106	9.5	51.0	1,601	247.4	42.7
DME1	0004	18.6	67	16.7	35.0	1,971	171.4	17.9
DME1	0005	19.5	106	12.8	42.0	4,122	112.5	208.8
DME1	0006	25.3	120	16.4	33.8	866	251.5	0.0
DME1	0009	15.3	130	9.3	21.0	1,322	53.4	0.0
DME1	0014	21.9	98	14.7	51.0	2,208	249.2	85.5
DME1	0015	22.8	118	14.5	19.6	592	115.6	72.5
DME1	0016	17.4	151	10.7	22.4	752	131.2	161.8
DME1	0017	22.5	316	4.4	40.2	829	280.3	80.5
DME1	0018	15.8	94	11.0	12.5	541	52.5	12.1
DME1	0027	14.0	262	4.4	43.2	1,446	228.5	356.8
DME1	0036	25.4	199	11.9	56.2	777	443.7	516.7
DME1	0044	12.8	62	12.3	28.8	3,913	27.7	37.8
DME1	0045	22.4	118	14.4	59.5	2,906	304.1	49.2
DME1	0050	35.4	154	20.0	36.0	591	279.8	806.1
DME1	0051	19.1	139	12.7	54.0	1,603	358.3	0.0
DME1	0052	31.1	179	16.4	37.8	309	298.5	183.0
DME1	0053	21.1	72	18.2	12.6	734	71.9	118.7
DME1	0054	20.9	126	14.0	23.0	626	142.5	0.0
DME1	0056	23.1	131	13.7	33.6	502	298.3	0.0
DME1	0057	26.4	310	5.8	28.0	514	226.7	65.6
DME1	0059	19.2	119	12.6	12.0	81	92.3	0.0
DME1	0063				0.0	0	0.0	0.0
DME1	0064	15.2	63	14.2	31.5	3,456	20.2	0.0
DME1	0070	16.6	154	14.1	14.0	946	56.8	0.0
DME1	0071	13.2	312	6.0	28.0	871	135.8	0.0
DME1	0072	25.7	236	12.3	52.0	311	399.3	0.0
DME1	0074	22.2	121	13.2	50.4	1,362	359.7	0.0
DME1	0078	23.2	182	8.6	19.8	248	161.9	58.8
DME1	0079	17.0	30	26.3	4.9	100	27.1	0.0
DME1	0080	15.7	153	9.3	13.8	158	83.6	0.0
DME1	0084	12.9	51	14.6	26.2	2,419	57.2	0.0
DME1	0085	17.3	106	11.1	46.8	3,454	192.0	0.0
DME1	0087	38.1	288	16.4	7.0	51	64.4	662.4
DME1	0091	16.8	143	8.0	31.2	784	141.8	0.0
DME1	0093	17.8	58	17.6	36.2	1,484	195.2	0.0
DME1	0096	20.4	171	9.7	32.7	1,492	171.0	0.0
DME1	0097	24.1	70	20.9	40.5	730	262.9	0.0
DME1	0099	22.8	118	14.7	14.0	389	80.8	0.0
DME1	0104	13.3	61	12.8	42.0	4,680	59.4	0.0

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Proj_ID	Samp_No	Height (m)	Age (yrs)	SI (m)	Basal Area (m^2/ha)	Stems/ ha (n)	Volume Live (m^3/ha)	Volume Dead (m^3/ha)
DME1	0105	20.8	92	15.5	34.2	1,478	197.1	0.0
DME1	0108	16.4	99	11.8	37.3	2,129	148.7	0.0
DME1	0110	21.9	92	16.1	16.7	282	94.2	21.0
DME1	0111	22.9	410	9.8	17.0	89	130.2	10.2
DME1	0112	27.2	172	15.3	31.5	288	220.4	76.3
DME1	0116	23.4	312	7.4	23.3	698	184.7	281.1
DME1	0118	20.4	80	15.8	49.0	1,538	254.6	0.0
DME1	0119	17.8	77	17.9	9.8	425	45.0	27.5
DME1	0123	19.6	70	17.0	56.0	2,663	253.0	0.0
DME1	0126	27.3	114	16.5	56.0	1,081	439.3	0.0
DME1	0156	18.4	68	17.1	28.0	986	180.1	0.0
DMEM	0007	6.5	20	17.9	6.3	751	3.1	0.0
DMEM	0012	16.1	32	24.3	22.2	1,051	87.9	1.3
DMEM	0013	10.5	37	21.2	13.6	751	56.6	0.0
DMEM	0017	12.9	43	16.4	36.0	2,802	91.1	26.8
DMEM	0018	22.1	98	14.4	57.0	876	393.0	1.6
DMEM	0020	9.2	45	14.3	21.0	1,326	44.8	0.0
DMEM	0021	25.9	67	22.8	46.5	1,276	382.9	27.2
DMEM	0022	5.0	22	14.4	2.3	225	1.2	1.1
DMEM	0025	10.7	40	15.9	13.0	1,376	15.9	0.0
DMEM	0028	11.8	30	20.0	14.5	1,151	34.9	0.0
DMEM	0031	9.7	26	19.0	12.2	751	31.1	0.0
DMEM	0032	6.3	22	16.6	37.4	1,601	266.2	57.2
DMEM	0033	9.9	25	19.8	9.0	725	15.5	0.0
DMEM	0034	7.9	32	18.2	2.3	225	2.1	0.9
DMEM	0037	12.5	41	17.9	23.5	1,201	71.7	18.5

B. Species Labelling Convention

Table B.1: Species labelling convention.

VRI	VDYP	Phase II	Sp0	Spp Group
ACT	AC	AC	AC	Dec
AC	AC	AC	AC	Dec
AT	AT	AT	AT	Dec
AX	AX	N/A	N/A	Dec
B	B	B	B	B
BA	BA	BA	B	B
BG	BG	N/A	N/A	B
BL	BL	BL	B	B
CW	CW	CW	C	Con
D	D	N/A	N/A	Dec
E	E	N/A	N/A	Dec
EP	EP	EP	E	Dec
FDC	FD	FD	F	F
FDI	FD	FD	F	F
FD	FD	FD	F	F
H	H	N/A	N/A	Con
HM	HM	N/A	N/A	Con
HW	HW	HW	H	Con
L	L	N/A	N/A	Con
LA	LA	N/A	N/A	Con
LT	LT	N/A	N/A	Con
LW	LW	N/A	N/A	Con
PA	PA	PA	PA	Con
PLI	PL	PL	PL	PL
PL	PL	PL	PL	PL
PW	PW	PW	PW	Con
PY	PY	PY	PY	Con
SX	SX	SX	S	S
S	SX	SX	S	S
SE	SX	SX	S	S
SW	SX	SX	S	S
SXL	SXL	N/A	N/A	S
XH	XH	N/A	N/A	Dec
YC	YC	YC	Y	Con
N/A	P	P	PL	Con
N/A	XC	XC	F	Con
N/A	JR	JR	C	Con
N/A	J	J	C	Con
N/A	DR	DR	D	Dec