DAWSON CREEK TSA
PHASE II VRI STATISTICAL ADJUSTMENT REPORT

Prepared for:

Ministry of Forests, Lands and Natural Resource Operations
Forest Analysis and Inventory Branch
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Attention:
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Prepared by:

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March 2012

March 31st, 2012

Ministry of Forests, Lands and Natural Resource Operations
Forest Analysis and Inventory Branch
7th Floor, 727 Fisgard Street
P.O. Box 9512 Stn Prov Gov
Victoria, BC
V8W 9C2

Attention: Sam Otukol

Subject: Dawson Creek TSA Phase II VRI Statistical Adjustment Report

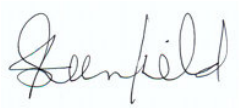
Dear Sam:

Please find enclosed the final report for the Phase II VRI Statistical Adjustment for the Dawson Creek TSA. This report accompanies the following additional deliverables and together completes the requirements of the current contract for this project:

- The adjusted inventory file projected to 2012; (adjusted_att_toDoug.csv);
- The VDYP input file used in the inventory projection (vdyp_2012_in.csv);
- Digital versions of the analysis data and summaries (p2_data.xlsx)

Please do not hesitate to call if you have any questions on the report or associated work.

Yours Truly,



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EXECUTIVE SUMMARY

With the completion of the Phase I VRI for the Dawson Creek Timber Supply Area (TSA) and the need for an adjusted inventory in the upcoming timber supply review process, the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) has commissioned a statistical adjustment of the Dawson Creek TSA Phase I VRI using Phase II ground sample data.

Following the process outlined in the *Vegetation Resources Inventory Interim Procedures and Standards for Statistical Adjustment of Baseline VRI Timber Attributes Version 1.1 January 2008* (MoFR, 2008) (the adjustment procedures), pre-compiled Phase II VRI sample data has been combined with Phase I VRI interpreted attributes to calculate attribute adjustment ratios for the six VRI attributes identified in the adjustment procedures.

The results of this analysis show that on average, net merchantable volume may be underestimated by approximately 2.4% with a sampling error of +/- 17.4% (95% probability). Overall, the adjustment results in very little change in average stand age; small reductions in average stand height and lorey height and slight increases in basal area. Stems per hectare and net volume all increased by between 2 and 7%. (Table i).

Table i: Overall Adjustment Statistics

Attribute	Overall
Sample Size	***165***
Stand Age	
Average Phase II Measured Age	97.1
Average Phase I Interpreted Age	97.1
Ratio of Averages	1.0003
Average Stand Height	
Average Phase II Measured Height	15.1
Average Phase I Interpreted Height	15.6
Ratio of Averages	0.9653
Lorey Height	
Average Phase II Measured Lorey Height	14.3
Average Phase I Interpreted Lorey Height	14.7
Ratio of Averages	0.9747
Basal Area	
Average Phase II Measured Basal Area	29.0
Average Phase I Interpreted Basal Area	28.6
Ratio of Averages	1.0128
Stems Per Hectare	
Average Phase II Measured SPH	1,173.0
Average Phase I Interpreted SPH	1,114.1
Ratio of Averages	1.0529
Attribute Adjusted Net Volume	
Average Phase II Measured Net Volume	150.4
Average Phase I Interpreted Adjusted[1] Net Volume	139.3
Ratio of Averages	1.0792
Unadjusted Net Volume	
Average Phase II Measured Net Volume	151.2
Average Phase I Interpreted Net Volume	147.7
Ratio of Averages	1.0239

When assessed at the TSA-level, the inventory adjustment increases the overall inventory volume by approximately 1.2% as shown in Figure i. On average, stand volumes increases by 1.7 m^3/ha, increasing the inventory volume by approximately 2.5 million m^3.

[1] Photo Adjusted Net Volume is based on adjusted age, height, basal area and sph attributes.
[2] http://www.for.gov.bc.ca/hts/tsa/tsa41/map.gif

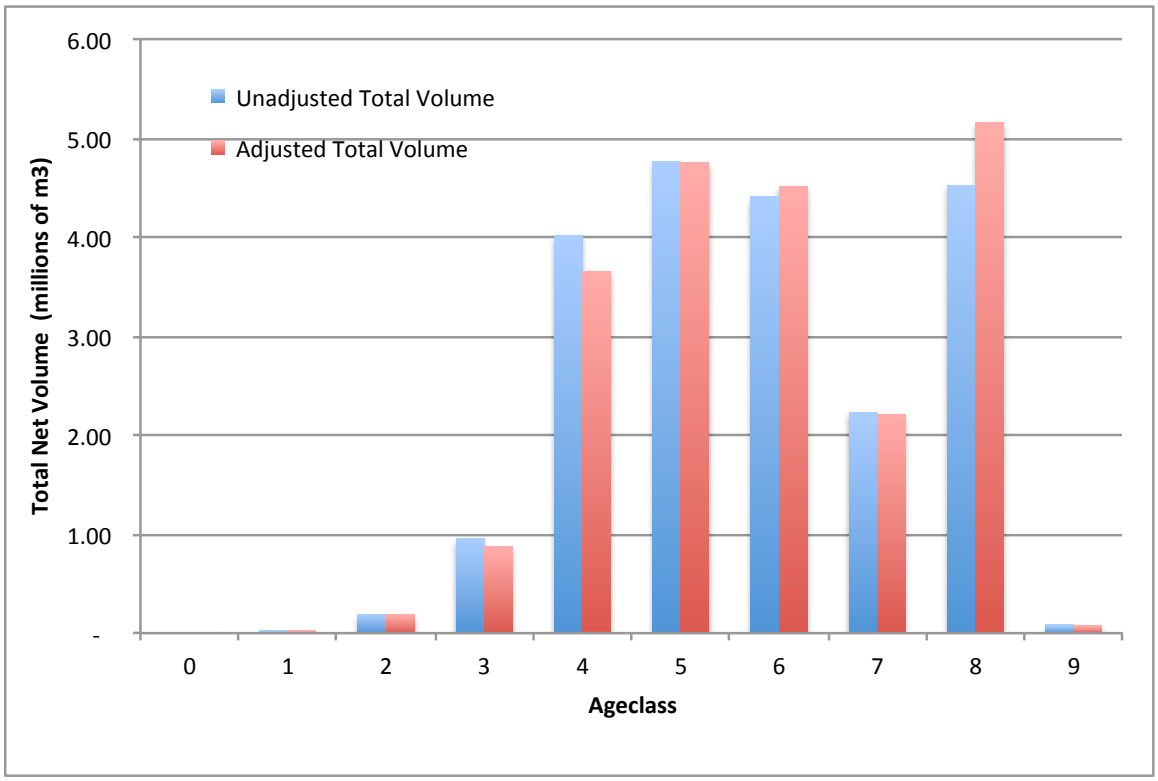

Figure i: Total Adjusted and Unadjusted Net Volume by Ageclass

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1 INTRODUCTION

According to the Dawson Creek Vegetation Resources Inventory (VRI) Strategic Inventory Plan (VSIP) (Timberline, 2006), the Phase I VRI for the Dawson Creek Timber Supply Area (TSA) was initiated in the winter of 2003 for a portion of 62 British Columbia Geographic System (BCGS) map sheets, representing approximately 37% of the total area of the TSA. This portion of the VRI was completed in October 2005 with the remainder of the TSA (approximately 1.5 million ha) to be completed between 2006 and 2016. The reference year summary shown in Table 1 demonstrates that less than 3% of the area has a reference year earlier than 2001 and that most of the area was inventoried using 2006 photography. This confirms that the Phase I VRI was completed earlier than the 2016 schedule and that this analysis uses the complete Phase I VRI.

Table 1: Area by Reference Year

Reference Year	Area (ha)	Percent of Area (%)
1960s	12	0%
1970s	583	0%
1980s	10,661	1%
1990s	25,426	1%
2000	52	0%
2001	543,472	31%
2002	89	0%
2003	2,546	0%
2004	3,611	0%
2005	228,046	13%
2006	912,952	52%
2007	16,575	1%
2008	8,850	1%
2009	1,189	0%
Total	**1,754,065**	

There have been two interim VRI analyses completed by the Ministry of Forests and Range (MoFR) for the Dawson Creek TSA. The first interim analysis, completed in 2000, utilizes the “Fraser Protocol” to calculate attribute adjustment ratios based on the 106 Phase II samples that had been collected prior to 2000. This analysis utilizes the old forest cover inventory.

The 2002 analysis utilizes a total of 128 Phase II samples and includes net volume adjustment factor (NVAF) measurements. This analysis also appears to utilize the old forest cover inventory.

The Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) has commissioned this third Phase II VRI Adjustment to:

1. Calculate adjustment ratios as defined in the *Vegetation Resources Inventory Interim Procedures and Standards for Statistical Adjustment of Baseline VRI Timber Attributes. Version 1.1 January 2008,*
2. Apply these adjustment ratios to the recently completed Phase I VRI for the TSA, and
3. Project this inventory to 2012 for use in the upcoming timber supply review (TSR).

According to the 1997 *Dawson Creek TSA Vegetation Resources Inventory Ground Sampling Plan Revised Final Report* (J.S. Thrower & Associates) (the VPIP), there are two primary objective of the Phase II inventory:

1. *Estimate overall vegetation totals and averages for the District; provide initial conditions for measuring indicators of sustainable management; and provide a framework for sub-unit inventories. The number of samples will aim to target a sampling error of +/- 10% (95% probability) for timber volume in the treed portion of the District, and allow for calculation of sampling errors for other VRI attributes.*

2. *To conduct supplemental decay sampling across the District to estimate merchantability (net volume and value) of specific old-growth forest types identified of the MOF and the licencee.*

2 DESCRIPTION OF THE INVENTORY UNIT

The Dawson Creek TSA (shown in Figure 1) is located along the B.C.-Alberta border in the northeastern portion of British Columbia and is approximately 2.3 million hectares in size. Tree Farm Licence (TFL) is encompassed by the TSA and represents an additional 636,000 ha that has been excluded from this analysis. According to the 2002 Dawson Creek TSA Analysis Report (Ministry of Forests):

> *"The Dawson Creek TSA is bounded to the north by the Peace River and to the east by the Alberta border. To the west are the Hart Ranges and to the far south lie the Front Ranges, which are characterized by the mountainous terrain and steep valleys of the Rocky Mountains. The TSA also encompasses the rolling terrain of the Peace and Hart Foothills, and the relatively flat Kiskatinaw Plateau. Major tributaries of the Peace River that flow through the TSA include the Pine, Moberly, Sukunka, Murray and Kiskatinaw rivers."*

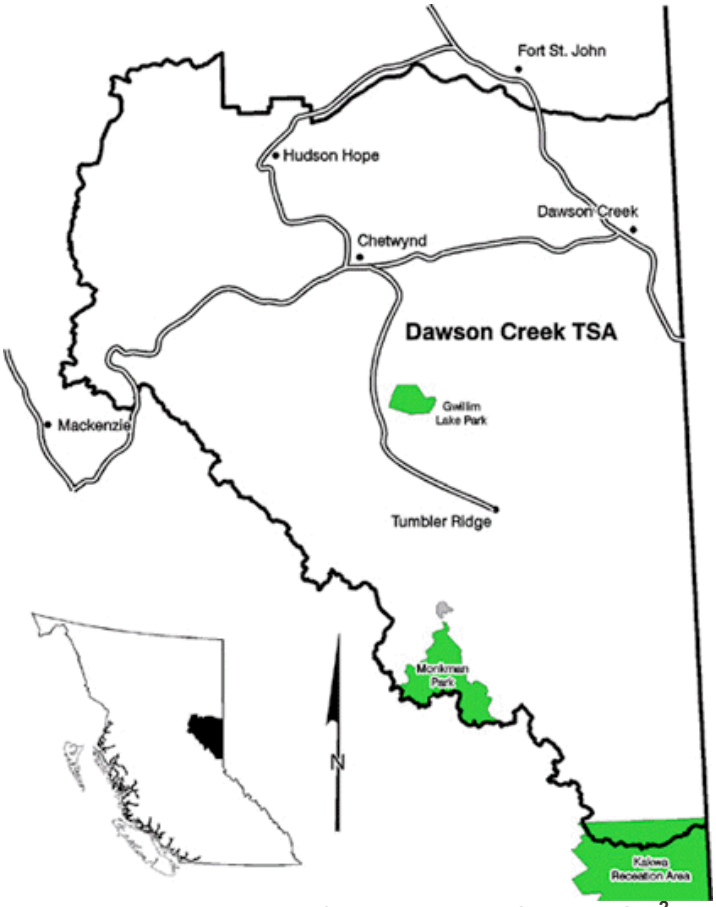

Figure 1: Map of the Dawson Creek TSA[2]

[2] http://www.for.gov.bc.ca/hts/tsa/tsa41/map.gif

As shown in Table 2, the gross area of the inventory file is approximately 3.0 million ha. This includes approximately 652,000 ha of TFL 48, most of which is un-classified in the inventory. Approximately 1.48 million hectares of the TSA is classified as treed. Of this approximately 92,000 ha has an age less than 30 years and is removed from the adjusted land base. Overall the adjustment is applied to approximately 1.38 million ha as shown in Table 2.

Table 2: Land Classification Summary

Land Classification	Area (ha)
Gross Area on File	**2,989,893**
TFL 48	652,269
Non-Crown Ownership	583,559
Crown TSA Land Base	**1,754,065**
Non-Vegetated Lake / Wetland	57,838
Un-Classified	90
Vegetated Non-Treed	219,510
Vegetated Treed – < 30 years	92,601
Vegetated Treed – Adjusted Land Base	**1,384,026**

Table 3 shows the distribution of BGC zones for the crown portion of the Dawson Creek TSA.

Table 3: BGC Zone Summary

BGC Zone	Area (ha)	Percent of Area (%)
BAFA	56,497	3%
BWBS	1,015,706	58%
ESSF	576,536	33%
SBS	105,326	6%
Total	**1,754,065**	

3 SUMMARY OF PHASE I AND PHASE II ISSUES

The Phase II ground samples were collected prior to the completion of the Phase I inventory and therefore plot locations were determined based on the existing forest cover inventory polygons. With the new Phase I line work now available, MFLNRO staff reviewed the Phase II plot clusters in relation to the new line work to ensure that plot clusters reasonably reflected the new Phase I polygons. Phase II plot data was re-compiled by MFLNRO to exclude any auxiliary plots that fell outside the Phase I polygon.

Phase I VRI data was originally provided by the MFLNRO at the onset of the project in the form of an MS Access database. The inventory file had been projected to 2010 and contained only projected attributes; interpreted attributes required for the analysis were not included in the file. This inventory file included all of TFL 48 with no attributes available to exclude this portion of the land base and ownership information was also not included. As defined in the VPIP and interim analyses, the adjusted land base is described as the crown–treed portion of the TSA. In order to adequately define the *adjusted land* base and complete the analysis, other data sources had to be acquired and linked to the inventory file as described below.

MFLNRO staff directed the use of the Variable Density Yield Prediction (VDYP) input file (VEG_VDYP_Input)[3] from its GeoBC website in order to link the interpreted attributes to the inventory file. Using feature_id to link this data set to the original MS Access inventory file it was determined that the VEG_VDYP_Input file was not a complete match to the MS ACCESS version of the inventory file provided. Through subsequent analysis it was determined that the version on the GeoBC website was not up-to-date. A version from the MFLNRO's internal database was then provided. This version of the inventory file was then used throughout the analysis.

This version of the inventory still included all of TFL 48 and did not identify non-crown land within the TSA. An Interim data file from the timber supply review process was provided and was used to determine the non-TFL crown-land area for each VRI polygon in the inventory file. This data was linked to the inventory file using feature_id and was used to determine the adjusted land base.

The Variable Density Yield Prediction program version 7 (VDYP7) was used to project inventory attributes back to the year 1999 – the year in which the majority of the Phase II ground samples were measured.

Phase II data was collected through a series of Phase II projects between 1998 and 2001. Planning for these projects was undertaken through the preparation of the *Dawson Creek Forest District Vegetation Resources Inventory Ground Sampling Plan Revised Final Report* (J.S. Thrower & Associates, 1997). The sampling plan document does not include a list of selected samples but rather proposes an approach to sample

[3] https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordSet=ISO19115&recordUID=58019

selection. The sampling plan identifies the target population as the entire Dawson Creek District land base, both vegetated and non-vegetated and suggests that samples are to be selected systematically from a sorted list that includes all polygons in the District.

Compiled plot data for the Dawson Creek TSA was provided by the MFLNRO in Microsoft Excel format. As discussed above, Phase II plot selection and location was conducted before the Phase I VRI was complete, using an older forest cover inventory. Therefore, the opportunity exists for Phase II plots to be located in two or more Phase I VRI polygons. To address this, the Phase II plot data was re-compiled by the MFLNRO to exclude any auxiliary plots that did not fall within the same polygon as the integrated plot centre. This re-compiled plot data was provided in MS Excel format and was used in the analysis. Phase II plot data consists of three different project ids sampled over four different measurement years (Table 4).

Table 4: Plot Summary

Project ID	Number of Plots By Sample Year				
	1998	**1999**	**2000**	**2001**	**Total**
DDCX	18	49	18	8	**93**
DDCY	23	41	23	11	**98**
DDCZ				24	**24**
Total	**41**	**90**	**41**	**36**	**215**

4 DATA SCREENING

This Phase II VRI Adjustment for the Dawson Creek TSA has been carried out according to the procedures detailed in the *Vegetation Resources Inventory Interim Procedures and Standards for Statistical Adjustment of Baseline VRI Timber Attributes Version 1.1 January 2008* (MoFR, 2008) as provided in Schedule C of the request for tenders. The procedure includes a description of the recommended process for data screening and the calculation of Phase II adjustment ratios and descriptive statistics.

Based on the inability of VDYP to generate heights and volumes for young stands and through direction from MFLNRO staff, the sample population was limited to stands with an age (in 2002) greater than 30 years and therefore nine samples were dropped. In addition, one monitoring plot (DDCX-0006-Q 1) was dropped and one duplicate measurement was dropped. A review of plot notes conducted by MFNLRO staff (Will Smith, pers. comm.) indicated that two plots had been incorrectly tagged to the Dawson Creek TSA and one plot was located in the wrong polygon and was to be dropped. An additional 36 plots were outside the VT land base and where dropped[4]. The remaining 165 plots have been subjected to a more detailed data screening process as described below.

As described in the above referenced adjustment procedures, the matching of Phase I ages and heights with Phase II age and height measurements is carried out through a series of five steps that compare the Phase I leading and secondary species with the Phase II leading species to determine which heights and ages to use in the calculation of adjustment ratios. In the event that none of the first four rules apply to a particular sample then the procedures specify that the age and height measurements be dropped from the analysis.

A total of 165 plots were incorporated into the analysis. Each observation was assessed and a review of outliers was undertaken. Outliers were defined as any observation with a ratio outside three standard deviations of the mean. All observations including outliers are shown in Figures 12 to 18 in Appendix II.

A plot by plot review of the Phase I and Phase II data was undertaken in conjunction with MFNRO staff on several occasions on how to address missing plot data as well as the inability of VDYP to generate volumes for young and / or very short stands. The results of these discussions are summarized in the comments column in Appendix I.

4.1 Stratification and Weighting

The VRI Phase I land base was post-stratified according to leading species, stand age and site index creating a total of seven strata as defined in Table 5. Options for including age breaks within each stratum were examined however only the ATAC stratum contained enough plots to support age breaks in the stratum definition. Based on this, and in consultation with MFLNFO staff, strata were combined to those shown in Table 5.

[4] A listing of all plots with notes and comments is included in Appendix I (Table 15).

Table 5: Strata Summary

Strata	Leading Species	Age Criteria (yrs)	Site Index Criteria	Phase I VRI Area (ha)	Percent of Area (%)
ATAC_imm	AT, AC, ACT, ACB	<=80 & > 30	All	189,623	13%
ATAC_mat	AT, AC, ACT, ACB	>80	All	173,788	12%
BL_all	BL, B	> 30	All	179,684	12%
OTHER_all	SB, LW, L, LA, LT	> 30	All	141,511	10%
PL_good	PLI, P, PL	> 30	>12	177,097	12%
PL_poor	PLI, P, PL	> 30	<=12	204,111	14%
SX_all	SW, S, SE, SX	> 30	All	318,212	22%
None	Remainder of VT land base			92,601	6%
Total Vegetated-Treed (VT) Area				**1,476,626**	

Although not identified in the original (1997) sampling plan, a review of the interim analysis reports, as well as the sample distributions relative to the land base strata distribution, suggest that the ATAC strata may have been preferentially selected in subsequent sample selections indicating that stratum weights should be used in calculating overall land base statistics. As shown in Table 6 and Figure 2, 22% of the plots were allocated to the ATAC_mat stratum, which represents only 13% of the land base. Strata weights are calculated by dividing the total area per stratum by the number of plots per stratum producing the area represented by each plot. Area per plot is applied to each stratum in calculating overall land base statistics but does not affect the ratio or statistics for each individual stratum.

Table 6: Plot-Strata Summary

Strata	Number of Plots	% of Plots	Land Base Area (ha)	% of Land Base	Area / Plot
ATAC_imm	26	16%	189,623	13%	7,293
ATAC_mat	37	22%	173,788	12%	4,697
BL_all	24	15%	179,684	12%	7,487
OTHER_all	11	7%	141,511	10%	12,865
PL_good	16	10%	177,097	12%	11,069
PL_poor	22	13%	204,111	14%	9,278
SX_all	29	18%	318,212	22%	10,973
	165		**1,384,026**		

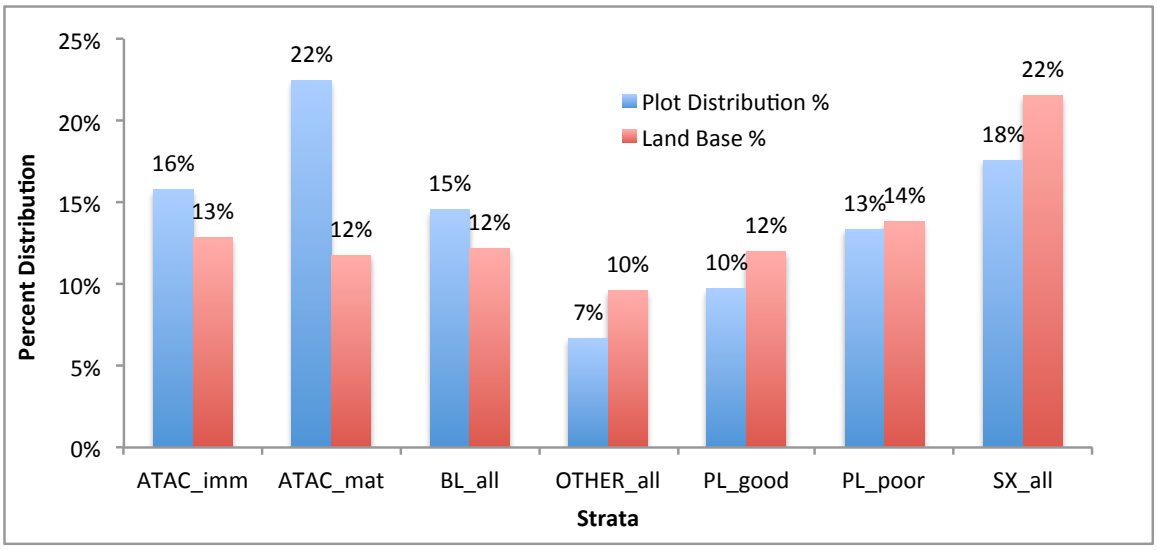

Figure 2: Strata Plot Distribution versus Land Base Distribution.

5 RESULTS

As defined in the adjustment procedures, a total of six Phase I VRI attributes are adjusted based on the ratio of means (ROM) of the ground measured Phase II data to the Phase I interpreted attributes. The adjusted attributes described below are:

1. Stand Height;
2. Stand Age;
3. Number of trees per hectare at 7.5cm+ dbh utilization level;
4. Basal area at 7.5 cm+ dbh utilization level;
5. Lorey Height at 7.5cm+ dbh utilization level; and
6. Volume net top, stump, decay, waste and breakage at 12.5 cm+ dbh utilization level.

All inventory attributes have been projected to the year 1999, the date in which the majority of the Phase II data was collected. Adjustment ratios are calculated according to the *Vegetation Resources Inventory Interim Procedures and Standards for Statistical Adjustment of Baseline VRI Timber Attributes Version 1.1 January 2008* (MoFR, 2008).

5.1 Adjustment Ratios

Adjustment ratios for age, height, basal area and stems per hectare are calculated first and applied to the Phase I inventory attributes. Net volume and lorey height are then calculated using the adjusted attributes as inputs to VDYP 7. This attribute adjusted net volume and lorey height are then compared with the Phase II ground measured volume and lorey height to determine the final volume adjustment ratios for these attributes. These ratios are then applied to the attribute adjusted volume and lorey height to determine the final net volume for each adjusted polygon.

The following section provides a summary of each of the adjusted attributes by stratum as well as for the land base as a whole. Appendix I provides the Phase I and Phase II attributes used in these calculations. Appendix II provides a table of summary statistics for each stratum. Plots showing the relationship between each of the Phase I and Phase II observations as well as the calculation of outliers are also included in Appendix II.

Overall, the analysis shows almost no change in the Phase I ages on average (Table 7). Individually, the adjustments vary from stratum to stratum with the largest increase in the OTHER_all stratum. The OTHER_all stratum had the most variability in the observations and the largest sampling error.

Table 7: Age Adjustment Ratio

Stratum	Phase II Ground Measured Age (years)	Phase I Interpreted Age (years)	Ratio of Averages
ATAC_imm	60.8	64.8	0.9373
ATAC_mat	83.6	102.2	0.8177
BL_all	149.1	140.3	1.0630
OTHER_all	94.7	76.9	1.2310
PL_good	91.3	92.9	0.9826
PL_poor	105.2	103.5	1.0156
SX_all	96.0	96.2	0.9970
Overall	**97.1**	**97.1**	**1.0003**

Phase I heights have been overestimated by approximately 4% (or 0.5m) compared with the Phase II measurements (Table 8). With the exception of the BL_all stratum, height ratios showed a similar trend to the age ratios with ATAC_imm, ATAC_mat, PL_good, and SX_all strata getting younger and shorter as a result of the adjustment. The OTHER_all and PL_poor strata got older and taller while the BL_all stratum got older and shorter.

Table 8: Height Adjustment Ratio

Stratum	Phase II Ground Measured Average Height (m)	Phase I Interpreted Average Height (m)	Ratio of Averages
ATAC_imm	15.7	16.9	0.9269
ATAC_mat	19.0	22.4	0.8493
BL_all	14.3	14.3	0.9994
OTHER_all	11.8	10.4	1.1308
PL_good	17.9	18.9	0.9477
PL_poor	14.8	13.9	1.0652
SX_all	13.1	13.5	0.9697
Overall	**15.1**	**15.6**	**0.9653**

Basal area is a significant driver for VDYP 7 volumes and, on average, is approximately 1.3% higher than the Phase I interpreted values (Table 9). Consistent with other analyses, basal area shows considerably more variability than age and height, as this attribute is not directly photo interpreted. The OTHER_all stratum showed a substantial increase in basal area and also had the greatest variability in the observations.

Table 9: Basal Area Adjustment Ratio

Stratum	Phase II Ground Measured Basal Area (cm2/ha)	Phase I Interpreted Basal Area (cm2/ha)	Ratio of Averages
ATAC_imm	22.9	28.5	0.8016
ATAC_mat	28.3	34.3	0.8243
BL_all	36.9	24.7	1.4959
OTHER_all	21.5	17.4	1.2376
PL_good	32.4	32.4	0.9987
PL_poor	35.6	29.9	1.1905
SX_all	25.7	29.8	0.8622
Overall	**29.0**	**28.6**	**1.0128**

Stems per hectare is a difficult attribute to photo interpretation consistently and accurately and therefore there is considerable variability in the both the Phase I attributes and the adjustment ratios. Stems per hectare has been overestimated in the ATAC_imm, ATAC_mat SX_all strata while being underestimated in the BL_all, PL_good and PL_poor strata. The OTHER_all stratum receives very little adjustment. Overall, the Phase II values are, on average, 5% higher that the Phase I interpreted values (Table 10).

Table 10: Stems per Hectare (SPH) Adjustment Ratio

Stratum	Phase II Ground Measured Stems Per Hectare	Phase I Interpreted Stems Per Hectare	Ratio of Averages
ATAC_imm	1,047.5	1,313.3	0.7976
ATAC_mat	804.5	909.5	0.8846
BL_all	1,476.5	895.4	1.6490
OTHER_all	1,500.2	1,493.9	1.0042
PL_good	1,383.2	1,168.2	1.1840
PL_poor	1,728.5	1,354.5	1.2761
SX_all	659.0	876.8	0.7516
Overall	**1,173.0**	**1,114.1**	**1.0529**

Lorey height is another attribute that is not directly photo interpreted but is derived by VDYP 7 based on other attributes. In this analysis, lorey height, as measured through the Phase II samples is approximately 3% higher than the values derived through VDYP based on Phase I adjusted attributes (Table 11).

Table 11: Lorey Height Adjustment Ratio

Stratum	Phase II Ground Measured Lorey Height (m)	Phase I Interpreted Lorey Height (m)	Ratio of Averages
ATAC_imm	13.5	14.9	0.9103
ATAC_mat	19.3	19.5	0.9908
BL_all	11.7	10.9	1.0762
OTHER_all	9.9	10.1	0.9778
PL_good	15.5	16.4	0.9476
PL_poor	14.7	14.5	1.0122
SX_all	14.6	15.3	0.9526
Overall	**14.3**	**14.7**	**0.9747**

On average, the Phase I attribute adjusted net volumes are underestimated by approximately 8% in comparison with Phase II net volume measurements (Table 12). With the exception of the PL_good and SX_all strata, all other strata show an increase in net volume with the largest increase in the BL_all stratum.

Table 12: Net Volume per Hectare Adjustment Ratio

Stratum	Phase II Ground Measured Attribute Adjusted Net Volume (m3/ha)	Phase I Interpreted Attribute Adjusted Net Volume (m3/ha)	Ratio of Averages
ATAC_imm	106.0	87.7	1.2098
ATAC_mat	183.2	153.6	1.1922
BL_all	164.0	133.4	1.2295
OTHER_all	70.2	63.1	1.1120
PL_good	180.3	181.4	0.9937
PL_poor	184.9	177.4	1.0425
SX_all	151.8	155.2	0.9780
Overall	**150.4**	**139.3**	**1.0792**

5.2 Leading Species Comparison

The accuracy of the Phase I leading species was assessed relative to the Phase II observed leading species. Table 13 shows that on average, Phase I leading species is correct approximately 60% of the time. SX_all has the lowest accuracy for leading species. However, if differences between S, SE and SW are ignored the accuracy of this stratum increases to 52% and the overall accuracy increased to 63%.

Table 13: Leading Species Comparison

Phase 1 Leading Species	Phase II Leading Species											Total	% Correct
	AC	AT	BL	LT	PL	S	SB	SE	SW	SX	(blank)		
AC	2	2										**4**	50%
AT	16	36			5				2			**59**	61%
BL			19			1		4				**24**	79%
PLI	1	3	1		23	1	3	3	2	1		**38**	61%
SB		1		3	1		5		1			**11**	45%
SE		1	3		1			6			1	**12**	50%
SW	3		2		1	1		3	3	1	3	**17**	18%
Total	**22**	**43**	**25**	**3**	**31**	**3**	**8**	**16**	**8**	**2**	**4**	**165**	57%

5.3 Sampling Error

Sampling error with 95% probability is calculated for the entire population as well as for each individual stratum using the calculations described in the procedures manual. Table 14 demonstrates that the target of achieving a 10% sampling error (95% probability) on overall net volume has not been achieved.

Table 14: Standard Error and Sampling Error

Strata	ATAC_imm	ATAC_mat	BL_all	OTHER_all	PL_good	PL_poor	SX_all	Overall
Strata Sample Size	26	37	24	11	16	22	29	165
Total Area	189,623	173,788	178,972	141,511	177,097	204,111	317,741	1,382,841
Stand Age	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.0544	0.0416	0.0493	0.1845	0.0914	0.0787	0.1000	0.0358
VRI Sampling Error Pct(%)	11.4	10.0	9.1	29.4	18.2	15.2	19.7	7.0
Stand Height	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.0511	0.0439	0.0494	0.1807	0.0918	0.0789	0.0463	0.0291
VRI Sampling Error Pct(%)	10.8	10.1	9.7	31.3	19.0	14.5	9.4	5.8
Lorey Height	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.0613	0.0530	0.0630	0.1580	0.0819	0.0600	0.0679	0.0296
VRI Sampling Error Pct(%)	13.2	10.5	11.5	31.7	16.9	11.6	14.0	5.9
Basal Area	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.0815	0.0693	0.2079	0.2352	0.0849	0.1073	0.0706	0.0462
VRI Sampling Error Pct(%)	19.9	16.5	27.2	37.2	16.7	17.7	16.1	8.7
Stems per Hectare	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.0825	0.1422	0.3118	0.1581	0.2015	0.1526	0.0804	0.0621
VRI Sampling Error Pct(%)	20.3	31.5	37.1	30.9	33.3	23.4	21.0	11.6
Unadjusted Net Volume	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.1230	0.0896	0.2414	0.8428	0.1302	0.1654	0.0911	0.1007
VRI Sampling Error Pct(%)	26.8	20.7	27.6	91.9	27.9	25.2	21.3	17.4
Attribute Adjusted Net Volume	0	0	0	0	0	0	0	0
VRI Standard Error of Ratio	0.1686	0.1232	0.1705	0.5047	0.1475	0.1356	0.1057	0.0717
VRI Sampling Error Pct(%)	27.3	20.2	27.2	89.0	29.1	25.5	21.2	12.8

6 DISCUSSION

Inventory adjustment ratios have been applied by stratum to the Dawson Creek TSA inventory file provided by the MFLNRO. The following shows the impacts of the inventory adjustment at the TSA level.

Overall the average volume per hectare across the entire TSA increases by 1.7 m^3/ha (1.2%). Total volume across the land base increases by the same percentages. Figure 3 shows the volume per hectare and total net volume changes by stratum. The BL_all, OTHER_all and PL_poor strata all showed a positive volume increase with the largest volume per hectare increase observed in the BL_all and PL_poor strata. The ATAC_imm, ATAC_mat, PL_good and SX_all strata all showed reductions in net merchantable volume with the largest decrease in the in the ATAC_mat and SX_all strata. In terms of overall volume on the land base, the adjustment increased the total net merchantable volume by approximately 2.5 million m^3.

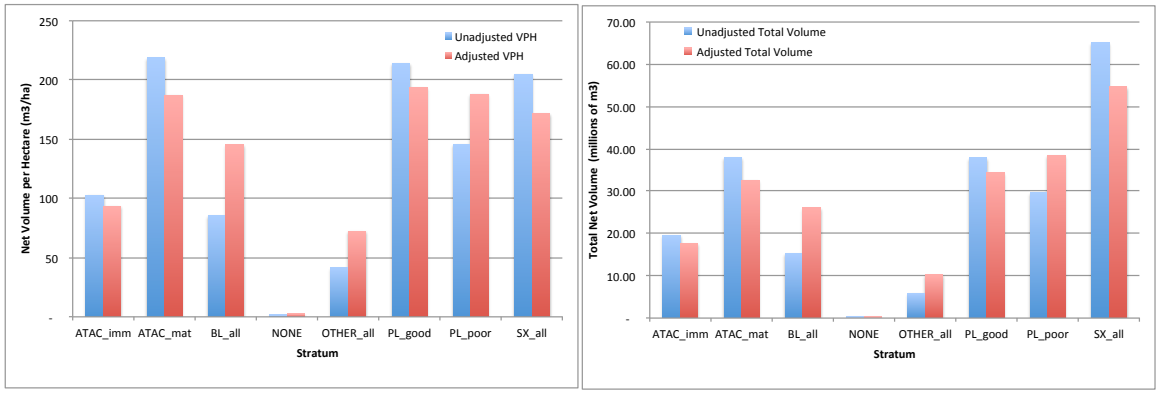

Figure 3: Adjusted and Unadjusted Total Net Volume and Net Volume Per Hectare By Stratum

Figure 4 compares net volume per hectare and total volume by ageclass for the adjusted land base. These figures show the combined effects of the age and volume adjustments and provide a general assessment of the overall impact of the adjustment on inventory volume and potentially timber supply.

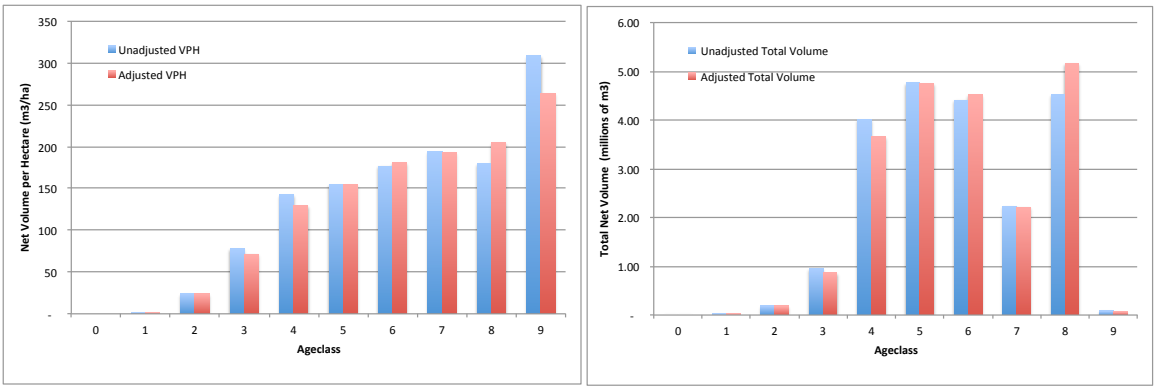

Figure 4: Adjusted and Unadjusted Area, Total Volume and Total Volume Per Hectare By Ageclass (adjusted portion of the TSA only)

The OTHER_all stratum, due to its inherrent complexity and diversity, coupled with the low number of plots, has a large sampling error. While this stratum represents predominantly black spurce and larch-leading stands which may be of marginal economic value, it represents approximately 10% of the adjusted land base and therefore increases the overall sampling error for the analysis. Removing uneconomic species from the adjusted land base and re-assessing the adjustment ratios would provide a more localized reflection of the timber harvesting land base and may reduce the overall sampling error.

The results of this analysis suggest that overall volume in the existing Phase I inventory may be underestimated by approximately 1.2% with sampling error of +/- 17.4% (95% probability). The Forest Analysis and Inventory Branch supports the application of Phase II VRI adjustments as an improvement in the overall inventory. However, given the size of the adjustment relative to the sampling error, care should be taken in assessing the implications of this adjustment on the timber supply of the TSA. In understanding the potential implications of the adjustment it is important to understand the impacts of both the positive and negative ranges of the sampling error on existing stand volumes. Furthermore, the adjustment has the potential to affect both the size of the timber harvesting land base as well as the yield curves associated with natural stands; the implications of which should also be considered in assessing the timber supply.

7 REFERENCES

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APPENDIX I – ADJUSTMENT DATA

Table 15: Adjustment Data

Stratum	Cluster ID	Phase II Measured Data							Phase I Interpreted Data (Projected to 2002)									Comment
		SPP1	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	SPP1	SPP2	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	Net Vol AA	
ATAC_imm	DDCX-0048-O 1	AT	56.3	15.1	9.8	776	13.8	24.2	AT	AC	78.0	19.7	34.4	1,386	16.6	149.8	110.1	
ATAC_imm	DDCX-0055-OO1	SW	39.6	12.8	19.3	1,322		80.1	AT	SW	38.0	6.7	3.0	580		-	-	set to zero vol; lht dropped no vdyp lht_aa; lht dropped no p2 lht
ATAC_imm	DDCX-0129-OO1	PL	39.7	9.3	9.0	1,296	8.2	10.1	AT	SW	53.0	16.7	26.5	1,558	14.6	93.8	73.5	
ATAC_imm	DDCX-0196-OO1	AT	62.5	14.4	15.0	984	12.4	44.3	AT		33.0	13.8	16.6	1,506	11.3	24.5	17.6	
ATAC_imm	DDCX-0502-OO1	PL	59.8	17.9	10.0	127	18.6	69.1	AT	SW	68.0	15.7	19.4	895	14.1	69.9	53.1	
ATAC_imm	DDCX-0531-OO1	AT	69.9	24.0	23.8	448	21.5	159.5	AC	AT	71.0	16.6	42.6	1,294	14.9	147.1	117.9	
ATAC_imm	DDCX-0554-OO1	AT	68.3	10.8	23.3	863	12.7	89.9	AT	PLI	48.0	12.6	18.7	1,636	11.3	33.2	27.1	
ATAC_imm	DDCX-0569-OO1	AT	113.5	26.3	48.6	844	22.7	340.6	AT	PLI	73.0	22.0	42.6	1,345	18.5	255.0	184.3	
ATAC_imm	DDCY-0032-Q 1	AT	58.5	18.2	10.8	333	12.8	63.7	AT	AC	78.0	18.7	29.5	1,080	15.6	115.2	86.7	
ATAC_imm	DDCY-0070-Q 1	SW	66.3	16.6	12.5	360	15.1	61.1	AT	SW	68.0	20.7	39.2	1,336	17.4	202.3	156.2	
ATAC_imm	DDCY-0104-QO1	AC	60.2	14.5	14.8	781	6.9	56.1	AT	SE	73.0	16.1	13.9	576	14.5	44.8	34.8	
ATAC_imm	DDCY-0180-QO1	AT	64.0	14.8	33.0	1,930	10.6	126.3	AT	SW	63.0	16.9	27.2	1,592	14.0	87.7	64.2	
ATAC_imm	DDCY-0218-QO1	AC	54.8	17.8	36.4	1,709	12.3	154.7	AT	AC	68.0	17.7	29.3	1,381	15.3	104.6	78.6	
ATAC_imm	DDCY-0309-QO1	AC	78.4	17.9	28.0	1,174	15.8	141.6	AT	PLI	73.0	22.0	33.2	985	18.5	197.6	144.2	
ATAC_imm	DDCY-0361-QO1	AT	78.0	21.5	42.0	847	20.2	262.8	AT	SW	68.0	16.7	29.2	1,628	14.1	94.8	68.8	
ATAC_imm	DDCY-0509-QO1	AT	67.3	25.5	39.7	986	16.7	209.5	AT	AC	63.0	20.8	37.0	1,402	17.8	197.4	143.7	
ATAC_imm	DDCY-0514-QO1	AT	68.8	22.5	28.8	694	21.7	192.4	AT		63.0	19.8	36.7	1,464	16.2	175.6	123.0	
ATAC_imm	DDCY-0518-QO1	AC	43.7	12.5	24.0	1,925	13.2	59.4	AC	AT	43.0	16.0	16.3	891	15.0	49.3	41.9	
ATAC_imm	DDCY-0529-QO1	AT	69.8	13.3	21.0	1,261	12.9	74.8	AT	AC	78.0	17.7	29.4	1,529	15.0	99.9	73.3	
ATAC_imm	DDCY-0534-QO1	AC	41.0	15.9	27.5	1,301	15.6	112.3	AT		68.0	17.7	29.2	1,532	14.5	102.1	73.3	
ATAC_imm	DDCY-0536-QO1	AT	48.8	6.2	5.8	600	6.8	15.6	AT	AC	63.0	21.7	32.6	995	19.2	184.7	140.3	
ATAC_imm	DDCY-0538-QO1	AC	75.3	19.2	39.2	971	21.0	232.4	AT	AC	63.0	21.7	41.8	1,362	18.5	239.1	174.9	
ATAC_imm	DDCY-0548-QO1	AT	52.5		3.0	250	7.7	9.1	AT	SW	78.0	19.7	29.5	1,279	17.0	134.3	99.4	height excluded - no p2 ht
ATAC_imm	DDCY-0568-QO1	AC	25.8	13.1	25.7	1,735	13.6	68.6	AT	AC	43.0	17.2	28.7	1,539	14.7	102.8	75.1	
ATAC_imm	DDCY-0570-QO1	AT	56.7	13.5	25.2	2,620	9.0	42.3	AT		53.0	16.7	26.1	1,946	13.4	67.2	46.3	
ATAC_imm	DDCY-0575-QO1	AT	61.0	14.8	18.3	1,099	10.1	56.6	AT	AC	58.0	16.6	29.0	1,430	14.6	91.8	70.7	
ATAC_mat	DDCX-0024-OO1	AT	92.3	27.2	45.5	466	27.6	432.7	AT	SW	124.0	28.6	19.8	196	24.0	157.6	114.3	
ATAC_mat	DDCX-0049-O 1	AT	77.2	23.8	37.8	738	21.9	255.0	AT	AC	93.0	29.2	49.0	954	24.0	406.0	291.3	
ATAC_mat	DDCX-0057-O 1	AT	77.0	20.1	22.8	1,054	20.7	123.3	AT	AC	103.0	24.3	24.4	365	19.5	149.3	105.8	
ATAC_mat	DDCX-0087-OO1	AT	82.8	20.9	42.8	1,107	20.9	264.7	AT	AC	98.0	23.8	44.6	1,181	19.3	264.0	189.1	
ATAC_mat	DDCX-0088-OO1	AC	41.9	15.1	20.0	2,322	10.4	28.3	AT	AC	88.0	21.8	5.9	145	19.3	34.0	24.8	
ATAC_mat	DDCX-0135-OO1	AT	100.9	24.9	37.0	1,508	18.9	217.3	AT		83.0	21.2	14.4	320	16.6	77.5	52.8	
ATAC_mat	DDCX-0166-OO1	AT	104.6	24.5	60.8	1,746	22.5	380.5	AT	SW	123.0	26.5	44.4	1,023	20.8	296.5	207.8	
ATAC_mat	DDCX-0195-OO1	AT	83.8	27.5	49.5	746	26.0	412.2	AT	AC	88.0	23.8	39.6	1,085	18.7	237.9	164.3	
ATAC_mat	DDCX-0230-OO1	AT	87.8	21.6	14.0	320	15.5	83.8	AT	PLI	93.0	20.3	33.9	1,027	16.3	180.6	134.3	
ATAC_mat	DDCX-0299-OO1	AC	126.5	21.1	16.8	129	18.5	138.0	AT	SW	103.0	23.3	34.2	934	18.2	195.8	134.1	
ATAC_mat	DDCX-0510-OO1	AT	104.5		21.0	304	23.1	158.0	AT	PLI	98.0	22.8	44.7	1,227	18.3	275.3	199.6	height excluded - no p2 ht
ATAC_mat	DDCX-0528-OO1	AC	113.8	25.7	34.2	652	24.7	233.2	AC	AT	83.0	26.0	43.5	1,078	20.7	280.1	200.1	
ATAC_mat	DDCX-0541-OO1	AC	59.8	17.4	27.5	811	13.1	136.0	AT	AC	103.0	22.4	39.0	1,197	18.6	193.7	144.1	
ATAC_mat	DDCX-0547-OO1	PL	82.6	16.8	29.8	904	16.5	173.5	AT	PLI	113.0	22.4	29.5	746	18.8	195.2	145.9	
ATAC_mat	DDCX-0549-OO1	AT	83.0		23.3	832	18.4	135.5	AT	AC	93.0	23.3	38.8	1,159	18.4	225.6	154.0	height excluded - no p2 ht
ATAC_mat	DDCX-0556-OO1	AT	54.5	10.5	4.0	96	26.4	27.1	AT	AC	91.0	23.5	31.0	2,349	17.1	112.7	69.0	
ATAC_mat	DDCX-0567-OO1	AT	86.8	20.7	17.0	195	22.2	124.7	AC	AT	98.0	23.8	24.8	693	19.9	133.7	101.4	
ATAC_mat	DDCX-0578-OO1	AT	102.8	26.7	51.8	858	19.3	350.3	AT	PLI	98.0	24.8	39.7	1,026	19.9	276.7	199.0	
ATAC_mat	DDCY-0071-Q 1	AT	37.7	11.7	15.0	1,472	12.3	37.1	AT	SW	123.0	27.5	39.6	809	22.0	278.9	207.2	
ATAC_mat	DDCY-0072-Q 1	AT	90.8	21.0	40.5	902	20.0	272.7	AT	PLI	98.0	23.8	39.7	1,073	19.7	282.5	210.0	
ATAC_mat	DDCY-0075-Q 1	AT	63.3	14.6	23.0	1,953	12.3	58.6	AT	AC	103.0	27.3	44.2	999	22.3	339.7	242.3	
ATAC_mat	DDCY-0076-Q 1	AC	120.3	24.9	35.0	315	25.7	281.6	AT	AC	104.0	24.4	39.3	887	20.1	238.2	177.1	
ATAC_mat	DDCY-0156-QO1	AC	74.6	8.4	27.9	300	9.6	237.7	AT	AC	138.0	31.9	30.0	190	26.8	262.9	187.5	
ATAC_mat	DDCY-0214-QO1	AT	92.3	24.6	21.0	279	20.4	150.2	AT		113.0	25.4	44.2	1,101	19.3	275.7	185.3	
ATAC_mat	DDCY-0216-QO1	AC	93.4	23.8	60.2	618	27.2	462.6	AT	SW	113.0	23.4	34.4	911	21.1	228.7	178.0	
ATAC_mat	DDCY-0253-QO1	AT	102.3	25.3	22.4	378	19.6	150.6	AT		83.0	26.1	48.3	1,117	19.7	352.4	229.6	
ATAC_mat	DDCY-0267-QO1	AT	108.6	25.3	42.0	439	24.2	334.9	AT	SW	108.0	24.8	39.8	844	21.3	274.4	207.6	
ATAC_mat	DDCY-0525-OO1	AC	115.0	29.1	21.0	172	23.8	166.4	AT		113.0	23.4	34.3	931	17.7	186.0	125.4	
ATAC_mat	DDCY-0526-QO1	AC	94.9	23.7	15.8	89	24.6	130.1	AT		93.0	21.3	33.8	999	16.0	168.8	111.3	
ATAC_mat	DDCY-0532-QO1	AT	36.5	16.3	26.6	2,304	10.5	80.6	AT	SW	83.0	22.1	33.6	970	18.5	203.0	145.7	
ATAC_mat	DDCY-0544-QO1	PL	75.6		23.8	1,449	9.6	73.0	AT	PLI	88.0	19.8	24.7	795	15.6	120.2	84.3	height excluded - no p2 ht
ATAC_mat	DDCY-0545-OO1	PL	101.5	22.2	5.8	65	21.1	44.5	AT	SW	108.0	23.8	34.8	872	18.8	209.1	146.0	
ATAC_mat	DDCY-0546-QO1	AT	69.0	16.8	32.4	715	16.2	199.1	AT	AC	88.0	19.8	29.6	1,277	15.3	128.4	86.5	
ATAC_mat	DDCY-0553-QO1	AC	100.2	29.8	27.0	233	27.0	241.3	AT	PLI	123.0	25.5	39.2	1,006	21.5	266.7	211.3	
ATAC_mat	DDCY-0562-QO1	AT	49.9	11.1	23.3	1,994	8.2	46.3	AT	SW	88.0	19.8	29.6	1,278	15.3	127.9	86.3	manual edit to feature_id (WS 07mar12)
ATAC_mat	DDCY-0566-QO1	AT	80.7	19.5	17.5	172	27.3	102.3	AT	SB	128.0	24.9	14.9	226	20.1	94.9	69.0	
ATAC_mat	DDCY-0577-QO1	AC	23.5	10.5	11.0	1,130	7.5	32.3	AT	AC	104.0	26.4	34.4	661	20.7	234.1	161.9	
BL_all	DDCX-0007-OO1	BL	209.5	16.6	52.2	2,312	12.2	214.1	BL	SE	173.0	17.4	29.6	840	15.2	145.3	199.7	

Stratum	Cluster ID	Phase II Measured Data							Phase I Interpreted Data (Projected to 2002)								Comment
		SPP1	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	SPP1	SPP2	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	Net Vol AA	
BL_all	DDCX-0043-O 1	SE	130.5	17.3	45.6	1,024	13.4	258.9	BL	SE	63.0	15.0	48.6	1,222	14.1	211.0	311.2	
BL_all	DDCX-0045-O 1	BL	147.5	16.2	21.0	366	10.0	124.1	BL		174.0	15.5	34.3	1,215	10.7	112.5	151.6	
BL_all	DDCX-0127-OO1	SE	69.7	10.0	23.8	1,464	7.7	55.2	BL		64.0	7.9	5.0	560	6.0	-	5.5	set to zero vol
BL_all	DDCX-0132-OO1	SE	109.0	8.5	13.3	628	7.0	53.2	BL	SE	74.0	11.0	12.1	708	9.4	29.2	42.0	
BL_all	DDCY-0031-QO1	S	55.9	7.9	19.0	1,278	6.4	58.1	BL		74.0	9.0	5.7	560	6.7	5.8	8.3	manual edit to feature_id (WS 07mar12)
BL_all	DDCY-0038-Q 1	BL	211.5	16.1	23.4	932	14.1	104.0	BL	SE	214.0	19.6	39.9	1,003	14.1	181.5	248.1	
BL_all	DDCZ-0003-QO1	BL	194.5	18.4	35.0	198	17.4	227.7	BL	SE	154.0	17.4	24.5	517	15.6	124.5	174.5	
BL_all	DDCZ-0004-QO1	BL	187.3	16.6	33.3	1,141	16.2	170.7	BL	SE	143.0	17.3	24.1	526	15.6	120.6	170.4	
BL_all	DDCZ-0006-QO1	BL	173.9	26.5	45.0	739	24.4	314.9	BL	SE	213.0	21.6	45.0	904	17.8	270.1	368.0	
BL_all	DDCZ-0007-QO1	BL	160.8	13.3	63.0	4,018	10.8	160.7	BL		144.0	9.5	2.3	208	7.3	3.0	4.1	
BL_all	DDCZ-0009-QO1	BL	147.5	10.7	15.0	210	11.5	43.5	BL		143.0	17.3	14.5	377	12.4	57.3	77.9	
BL_all	DDCZ-0010-QO1	BL	180.8	21.6	33.8	484	14.6	216.7	BL	SE	194.0	17.6	34.7	1,109	12.5	137.8	187.2	
BL_all	DDCZ-0026-QO1	BL	167.5	20.0	33.6	432	16.7	211.9	BL	SE	193.0	20.5	44.8	886	17.4	258.7	354.7	
BL_all	DDCZ-0029-QO1	BL	122.2	10.8	40.0	1,610	10.0	171.9	BL	SE	114.0	13.3	22.6	981	9.9	64.2	89.3	
BL_all	DDCZ-0032-QO1	BL	215.2	22.2	33.8	747	21.1	216.6	BL	SE	133.0	14.3	32.2	1,525	11.8	109.5	153.5	
BL_all	DDCZ-0034-QO1	BL	79.9	11.3	22.0	772	13.0	107.6	BL	PLI	93.0	8.2	15.0	1,200	7.6	-	34.7	set to zero vol
BL_all	DDCZ-0036-QO1	BL	122.5	12.7	100.0	3,602	12.0	426.1	BL		154.0	12.5	28.2	1,399	8.6	67.7	89.9	
BL_all	DDCZ-0037-QO1	SE	145.1	9.4	44.3	2,093	7.7	145.7	BL		154.0	14.4	33.6	1,272	9.9	101.9	135.9	
BL_all	DDCZ-0041-QO1	BL	88.3	9.7	35.0	3,928	7.5	40.2	BL		93.0	9.1	8.9	840	6.7	9.6	13.6	
BL_all	DDCZ-0042-QO1	BL	202.2	17.7	51.8	1,868	12.5	243.1	BL		154.0	17.4	34.2	1,125	12.1	133.7	177.6	
BL_all	DDCZ-0044-QO1	BL	113.1	5.8	38.0	3,493		69.7	BL		93.0	4.5	1.0	600		-	-	set to zero vol; lht dropped no vdyp lht_aa; lht dropped no p2 lht
BL_all	DDCZ-0048-QO1	BL	112.3	7.7	15.4	780	2.3	56.8	BL		114.0	13.3	18.1	637	9.4	51.1	70.1	
BL_all	DDCZ-0050-QO1	BL	231.5	16.3	49.0	1,317	12.2	244.8	BL		153.0	14.4	33.4	1,275	9.9	101.0	133.7	
OTHER_all	DDCX-0044-O 1	SB	123.0	12.2	21.6	2,287	9.5	27.4	SB	SW	88.0	6.8	9.0	1,400	6.1	-	5.5	set to zero vol
OTHER_all	DDCX-0085-OO1	SB	115.1	11.9	16.0	969	9.0	60.7	SB	SW	88.0	9.8	17.4	1,918	9.0	15.3	29.7	
OTHER_all	DDCX-0125-OO1	SB	102.5	12.7	29.4	1,681	12.0	108.6	SB	SW	123.0	13.3	14.1	980	12.4	35.7	57.8	
OTHER_all	DDCX-0131-OO1	SW	74.7	13.1	26.0	1,591	10.4	84.7	SB	PLI	88.0	13.7	24.3	1,610	14.2	87.4	127.6	
OTHER_all	DDCX-0133-OO1	AT			11.7	881	14.8	29.1	SB	SW	68.0	7.8	9.0	1,300	7.2	-	7.7	set to zero vol age / height excluded - spp match
OTHER_all	DDCX-0139-OO1	SB	91.8	11.6	33.8	2,993	11.9	72.9	SB	SW	94.0	14.2	23.2	1,304	12.8	69.0	107.0	
OTHER_all	DDCX-0576-OO1	LT	144.0	17.6	8.8	356		35.6	SB	LT	43.0	4.2	4.0	1,000		-	-	set to zero vol; lht dropped no vdyp lht_aa; lht dropped no p2 lht
OTHER_all	DDCY-0034-Q 1	LT	71.3	10.2	14.0	1,542	6.9	11.9	SB	SW	108.0	15.8	29.5	1,718	14.3	99.5	152.4	
OTHER_all	DDCY-0036-Q 1	PL	56.0	8.9	14.0	1,396	5.9	12.0	SB	PLI	63.0	11.7	20.0	1,848	12.0	38.5	65.5	
OTHER_all	DDCY-0069-QO1	SB	166.5	19.7	49.0	1,463	19.7	319.4	SB	SW	78.0	11.7	18.9	1,494	10.4	33.0	56.5	
OTHER_all	DDCY-0073-Q 1	LT	96.5	11.6	12.3	1,343	8.7	10.0	SB	PLI	73.0	12.9	21.8	1,860	13.0	51.5	84.9	
PL_good	DDCX-0002-OO1	PL	35.5	9.0	18.7	757	6.8	118.8	PLI	SW	103.0	20.5	24.7	802	17.8	179.2	165.6	
PL_good	DDCX-0003-OO1	PL	85.8	19.5	37.8	1,383	17.4	202.9	PLI	SW	103.0	19.5	29.5	1,055	17.0	191.0	177.0	
PL_good	DDCX-0091-OO1	PL	94.4	17.7	26.6	1,215	12.5	121.5	PLI	AT	103.0	20.5	39.4	1,266	17.9	269.8	249.3	
PL_good	DDCX-0122-OO1	PL	104.1	14.7	45.0	3,112	11.8	176.5	PLI		93.0	16.4	33.4	1,468	13.1	142.1	121.9	
PL_good	DDCX-0128-OO1	BL	139.2	15.1	45.0	1,828	14.8	193.8	PLI	SE	74.0	15.3	32.8	1,510	13.5	135.7	123.9	
PL_good	DDCX-0513-OO1	PL	53.1	15.6	15.0	639	13.9	63.8	PLI	AT	53.0	13.7	29.6	1,821	11.7	94.5	79.8	
PL_good	DDCX-0574-OO1	AT	105.5	14.6	40.5	621	20.3	283.5	PLI	AT	104.0	25.5	44.9	460	24.9	406.5	395.5	
PL_good	DDCY-0060-QO1	PL	96.0	19.3	46.8	2,071	16.4	242.4	PLI	AT	93.0	16.4	33.9	1,695	13.3	158.9	135.4	
PL_good	DDCY-0067-Q 1	AC	74.5	10.4	9.0	917	10.0	3.4	PLI	AT	78.0	20.8	34.6	969	18.7	242.5	227.1	
PL_good	DDCY-0068-Q 1	PL	96.9	23.6	43.2	784	20.7	314.6	PLI	AT	138.0	23.9	40.0	861	21.0	317.0	299.8	
PL_good	DDCY-0109-QO1	SW	133.5	32.8	43.2	386	22.6	395.8	PLI	AT	108.0	19.9	34.8	1,267	17.5	224.5	204.1	
PL_good	DDCY-0110-QO1	PL	90.5	20.0	34.2	1,275	16.6	207.6	PLI	SW	118.0	21.9	39.9	1,167	18.2	287.2	270.4	
PL_good	DDCY-0111-QO1	SB	45.1	7.7	13.0	1,498	8.3	11.9	PLI	AT	74.0	15.3	14.3	591	12.9	64.6	58.0	
PL_good	DDCY-0113-QO1	SX	147.5	28.7	33.0	860	25.6	240.7	PLI	SW	74.0	18.2	33.6	1,491	15.5	192.2	173.5	
PL_good	DDCY-0148-QO1	PL	94.1	21.7	39.6	1,312	18.9	281.6	PLI		103.0	17.5	33.8	1,406	13.9	161.3	139.1	
PL_good	DDCY-0579-QO1	AT	65.5	16.3	27.5	3,474	11.4	25.2	PLI	AT	78.0	16.8	19.7	863	14.7	90.9	82.2	
PL_poor	DDCX-0004-OO1	SE	79.3	11.3	22.4	635	10.2	110.5	PLI	BL	93.0	13.4	9.5	466	12.2	30.5	38.0	
PL_poor	DDCX-0005-OO1	PL	71.3	13.1	15.0	1,779	9.3	32.5	PLI	SB	118.0	20.9	39.9	1,219	18.6	272.9	335.7	
PL_poor	DDCX-0010-O 1	SW	151.5	17.0	38.3	1,698	15.1	183.4	PLI	SB	138.0	19.9	35.0	1,366	17.8	218.2	270.6	
PL_poor	DDCX-0011-OO1	PL	168.0	19.0	47.3	1,100	18.3	306.1	PLI	SB	108.0	20.9	44.8	1,321	16.7	266.6	323.3	
PL_poor	DDCX-0012-O 1	PL	164.5	14.1	45.6	3,795	11.0	138.1	PLI	SB	93.0	9.5	16.6	1,947	8.9	13.1	15.6	
PL_poor	DDCX-0081-OO1	PL	88.5	14.8	24.8	717	14.6	162.0	PLI	SE	113.0	20.5	39.0	1,243	18.9	257.7	325.2	
PL_poor	DDCX-0082-OO1	PL	49.9	11.7	28.0	3,750	10.3	22.8	PLI	SB	78.0	14.8	34.3	1,536	13.0	143.8	179.3	
PL_poor	DDCY-0029-QO1	PL	46.0	11.1	19.3	2,269	7.8	28.0	PLI	SB	48.0	11.6	18.6	1,494	10.2	30.3	36.6	
PL_poor	DDCY-0033-QO1	PL	140.8		45.0	1,870	16.5	278.9	PLI	SB	88.0	18.8	34.6	1,419	15.5	170.3	208.9	height excluded - no p2 ht
PL_poor	DDCY-0058-QO1	PL	69.8	17.9	24.8	1,046	13.4	151.8	PLI	SE	83.0	11.4	13.6	1,062	10.2	24.5	29.6	
PL_poor	DDCY-0059-QO1	S	74.0	11.5	29.8	831	11.0	148.8	PLI	SW	103.0	14.5	28.5	1,287	13.4	107.2	132.7	
PL_poor	DDCY-0065-Q 1	SB	167.5	17.9	74.3	3,826	13.6	327.1	PLI	SB	133.0	14.8	34.5	1,474	13.3	144.1	163.9	
PL_poor	DDCY-0066-QO1	PL	88.8	17.9	53.7	2,437	12.0	247.3	PLI	SW	138.0	18.9	34.9	1,315	17.3	212.7	258.5	
PL_poor	DDCY-0077-QO1	SE	84.0	23.0	28.0	303	23.3	215.8	PLI	SE	104.0	18.6	34.1	1,336	17.2	192.5	240.7	
PL_poor	DDCY-0078-Q 1	PL	43.2	11.8	20.0	1,853	9.2	69.9	PLI	SB	53.0	11.8	24.0	1,796	10.9	56.3	68.8	
PL_poor	DDCY-0100-QO1	PL	198.5	14.4	60.0	3,610	12.4	286.5	PLI	BL	103.0	15.5	33.4	1,506	13.9	130.9	163.4	
PL_poor	DDCY-0102-QO1	PL	95.0	18.1	50.4	1,999	15.9	287.2	PLI	SB	103.0	16.5	34.0	1,478	13.7	153.0	186.7	

Stratum	Cluster ID	Phase II Measured Data							Phase I Interpreted Data (Projected to 2002)								Comment
		SPP1	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	SPP1	SPP2	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	Net Vol AA	
PL_poor	DDCY-0103-QO1	SB	147.5	12.8	28.8	1,820	14.2	101.5	PLI	SB	123.0	13.6	28.9	1,923	12.2	74.6	91.1	
PL_poor	DDCY-0105-QO1	PL	94.1	17.3	25.2	762	17.8	159.4	PLI	SB	93.0	14.4	26.4	1,624	10.9	72.5	95.2	
PL_poor	DDCY-0106-QO1	SE	81.8	23.5	28.0	566	19.1	188.4	PLI	SB	113.0	20.5	24.4	773	17.7	137.4	174.3	
PL_poor	DDCY-0120-QO1	PL	92.5		36.0	702	22.1	321.3	PLI	SW	94.0	19.5	29.4	1,049	18.5	191.4	236.5	height excluded - no p2 ht
PL_poor	DDCY-0535-OO1	AT	117.2	26.7	39.6	659	26.8	300.8	PLI	AT	128.0	21.9	39.9	1,164	19.1	260.5	328.0	
SX_all	DDCX-0001-OO1				-	-		-	SE	BL	193.0	19.6	8.0	162		38.7	33.3	age / height excluded; ba/sph/vph=0 lht dropped no p2 lht
SX_all	DDCX-0008-O 1	SE	219.3	21.5	42.0	707	17.5	269.7	SW	BL	113.0	23.0	39.0	912	18.9	251.0	207.2	
SX_all	DDCX-0015-OO1	AC	95.9	27.2	42.0	475	27.1	292.6	SW	AC	123.0	27.1	49.1	983	24.1	360.6	309.4	
SX_all	DDCX-0026-O 1				-	-	-	-	SW	BL	214.0	29.6	35.2	530	25.0	287.2	241.4	manual edit to feature_id (WS 07mar12)age / height excluded; ba/sph/vph=0
SX_all	DDCX-0042-OO1	S	48.9	14.8	23.8	752	14.0	131.5	SW	PLI	113.0	18.9	33.4	1,334	16.0	171.0	150.5	
SX_all	DDCX-0083-OO1	BL	234.0	25.3	25.2	629	26.6	152.7	SE	BL	234.0	26.8	45.1	778	22.0	319.7	276.7	
SX_all	DDCX-0124-OO1	AT	54.5	12.9	5.9	434	5.9	22.4	SE	AT	73.0	9.8	12.5	1,272	9.7	14.3	16.9	
SX_all	DDCX-0126-OO1	BL	211.9		42.0	845	18.3	244.6	SW	PLI	158.0	21.8	39.8	1,260	18.1	246.6	211.7	height excluded - no p2 ht
SX_all	DDCX-0130-OO1	BL	126.1		32.2	374	21.7	219.1	SE	BL	233.0	29.8	45.1	703	23.6	340.5	294.7	height excluded - no p2 ht
SX_all	DDCY-0074-Q 1	AC	99.0	21.3	37.8	1,106	20.8	209.0	SW	AT	53.0	17.5	29.5	1,373	15.0	122.8	111.7	
SX_all	DDCY-0116-QO1	SE	119.0	27.5	43.2	381	22.2	301.2	SW	PLI	123.0	24.1	39.2	888	20.2	283.8	237.8	
SX_all	DDCY-0147-QO1	SE	111.5	19.7	30.0	938	15.9	148.2	SE	BL	203.0	18.7	30.1	1,056	14.7	137.7	119.9	
SX_all	DDCY-0149-QO1	BL	128.5	17.8	38.3	1,197	18.1	209.6	SW	BL	203.0	24.4	40.4	836	19.9	266.8	222.8	
SX_all	DDCY-0150-QO1	SE	73.1	9.8	7.2	200	6.7	21.9	SE	BL	63.0	9.6	9.0	926	8.5	10.3	12.0	
SX_all	DDCY-0153-QO1	SE	146.0	25.2	29.3	728	20.8	174.1	SE	PLI	124.0	23.3	44.0	1,094	18.4	280.8	236.5	
SX_all	DDCY-0219-QO1	SW	97.5	20.8	63.0	1,898	18.0	408.9	SW	AC	113.0	27.0	49.2	982	22.6	384.4	314.7	
SX_all	DDCY-0249-QO1				-	-		-	SW	PLI	113.0	25.0	9.8	110		77.5	65.1	age / height excluded; ba/sph/vph=0 lht dropped no p2 lht
SX_all	DDCY-0287-QO1	AC			33.3	773	22.3	201.6	SW	SB	98.0	22.6	39.6	898	18.5	241.6	202.5	age / height excluded - spp match
SX_all	DDCY-0516-QO1				-	-		-	SW	SB	78.0	18.5	7.8	178		41.9	35.4	age / height excluded; ba/sph/vph=0 lht dropped no p2 lht
SX_all	DDCY-0533-OO1	SW	76.5	19.2	26.3	677	22.9	163.2	SW	AT	128.0	27.8	49.8	970	24.2	382.7	324.5	
SX_all	DDCY-0542-QO1	SW	135.5		39.6	513	27.7	320.0	SW	AT	93.0	22.7	38.1	942	21.1	258.2	230.1	height excluded - no p2 ht
SX_all	DDCY-0573-QO1	PL	72.5	16.1	17.5	677	12.8	76.2	SW	PLI	78.0	20.5	34.2	979	18.2	216.6	186.9	
SX_all	DDCZ-0002-QO1	SE	33.5	3.9	8.0	332	10.0	28.9	SE	BL	63.0	10.5	8.2	709	9.0	13.1	13.9	
SX_all	DDCZ-0005-QO1	BL	138.4	12.3	23.8	1,816	8.8	61.1	SE	BL	144.0	17.5	29.3	1,126	13.6	118.3	105.9	
SX_all	DDCZ-0021-QO1	SX	251.7	27.2	46.7	695	19.8	320.9	SW	BL	94.0	20.9	38.6	1,232	16.7	209.1	175.3	
SX_all	DDCZ-0022-QO1	SE	72.1	13.3	15.0	530	9.1	63.0	SE	BL	143.0	14.4	19.1	921	11.9	64.1	58.0	
SX_all	DDCZ-0023-QO1	PL	61.8	12.3	14.0	553	9.6	62.7	SE	PLI	73.0	11.7	8.9	680	10.6	18.0	18.0	
SX_all	DDCZ-0024-QO1	SE	103.5	20.5	39.2	1,117	15.3	224.2	SW	BL	93.0	13.8	17.7	947	11.4	54.1	50.6	
SX_all	DDCZ-0046-QO1	SE	72.2	11.6	19.0	766	10.2	75.7	SE	BL	73.0	13.5	13.1	642	11.5	41.9	38.7	
drop age LT 30	DDCX-0013-OO1		22.3	9.6	15.0	1,957	9.0	-	PL	S	18.0	5.0		2,275				
drop age LT 30	DDCX-0014-O 1	AC	94.8	25.4	49.5	688	21.3	337.2	PL	S	19.0	3.2		1,572				
drop age LT 30	DDCX-0089-OO1		44.3	7.3	1.4	175	8.6	-	AT	AC	23.0	6.3	15.0	2,750				
drop age LT 30	DDCX-0517-OO1		16.0	6.3	4.0	720	5.3	-	AT	AC								
drop age LT 30	DDCY-0061-Q 1	PL	29.7	5.3	10.8	1,038	5.2	12.6	SE	EP	23.0	5.7	15.0	1,700				
drop age LT 30	DDCY-0063-Q 1	PL			0.3	20	8.3	0.5	PLI									
drop age LT 30	DDCY-0511-QO1	AC	56.2	22.3	3.4	100	17.8	18.6	AT	PLI	3.0	1.0	1.0	3,100				
drop age LT 30	DDCY-0560-QO1		25.5		-	-	4.5	-	AT		4.0	0.3	1.0	3,374				
drop age LT 30	DDCY-0571-OO1	SW	49.2	19.4	39.7	2,692	18.8	163.0	AT	SW	23.0	10.3	3.6	416		2.5		
drop duplicate	DDCX-0006-Q 1	SE	107.5	6.5	2.5	147	6.5	3.4	BL	SE	213.0	21.6	45.0	904	17.8	270.1	368.0	same feature id as DDCZ-0006-QO1
drop monitoring	DDCX-0022-MO1	BL	157.3	20.8	28.6	500	12.4	177.7	SE	BL	143.0	14.4	19.1	921	11.9	64.1	58.0	monitoring plot
drop non-tsa	DDCX-0028-FO1	AC	28.5	12.3	12.0	675	9.8	32.7	PLI	SB	48.0	11.6	18.6	1,494	10.2	30.3	36.6	WS 07mar2012
drop non-tsa	DDCX-0028-O 1		22.0	12.4	-	-	2.4	-	PLI	SB	48.0	11.6	18.6	1,494	10.2	30.3	36.6	WS 07mar2012
drop not VT	DDCX-0009-OO1	PL	134.3	21.3	21.3	671	15.2	134.7										
drop not VT	DDCX-0016-O 1	AT	77.7	22.9	49.0	1,167	22.7	358.6	AT									
drop not VT	DDCX-0018-MO1	SX	115.9	27.3	24.3	801	11.8	160.0										
drop not VT	DDCX-0018-OO1	BL	117.0		36.0	1,673	18.4	188.6										
drop not VT	DDCX-0020-MO1	PL	128.3	21.3	41.7	1,551	16.7	302.2										
drop not VT	DDCX-0020-OO1	PL	124.3	21.0	37.8	1,376	18.1	229.2										
drop not VT	DDCX-0022-OO1	BL	144.8	19.6	39.0	1,455	11.6	209.0										
drop not VT	DDCX-0046-O 1																	
drop not VT	DDCX-0047-O 1	SX			12.5	548	14.9	54.2										

Stratum	Cluster ID	Phase II Measured Data							Phase I Interpreted Data (Projected to 2002)								Comment
		SPP1	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	SPP1	SPP2	Age	Height	Basal Area	SPH	Lorey Height	Net Vol.	Net Vol AA	
drop not VT	DDCX-0050-MO1	PL	32.8	10.7	15.4	1,026	9.3	39.2										
drop not VT	DDCX-0050-OO1	PL	29.8	10.7	7.7	600	8.2	17.7										
drop not VT	DDCX-0051-MO1	BL	109.5	12.2	24.8	901	9.0	83.6										
drop not VT	DDCX-0051-OO1	BL	97.5	13.4	20.3	463	11.9	100.0										
drop not VT	DDCX-0052-O 1	AT	45.5	12.9	11.7	1,304	10.7	28.5										
drop not VT	DDCX-0053-MO1	S	189.5	14.6	47.2	1,826	10.7	202.4										
drop not VT	DDCX-0053-OO1	SE	277.1	19.7	31.5	1,434	10.9	130.1										
drop not VT	DDCX-0054-OO1	S	104.8	21.4	50.4	1,209	17.4	284.7										
drop not VT	DDCX-0056-O 1	BL	80.5	13.9	2.9	100	9.1	12.7										
drop not VT	DDCX-0086-OO1				-	-	-	-										
drop not VT	DDCX-0123-OO1	BL	101.0	13.8	24.5	1,412	8.9	75.1										
drop not VT	DDCX-0300-OO1				-	-	-	-	AT									
drop not VT	DDCX-0515-OO1	AT	76.0	19.3	35.0	1,833	20.7	159.0	AT									
drop not VT	DDCX-0543-OO1								AT									
drop not VT	DDCY-0030-Q 1	PL	79.8	18.3	19.3	228	22.6	158.1										
drop not VT	DDCY-0035-QO1	AT	68.0	21.3	39.2	1,135	19.2	227.5										
drop not VT	DDCY-0040-Q 1	SW	122.8	26.8	36.0	443	25.8	282.1										
drop not VT	DDCY-0062-Q 1	SE	187.5	19.4	36.0	847	14.0	200.3										
drop not VT	DDCY-0064-FO1	BL	194.6	17.8	42.2	1,601	10.7	199.7										
drop not VT	DDCY-0064-Q 1	SE	282.5	21.5	32.4	759	14.4	194.4										
drop not VT	DDCY-0079-Q 1	PL	31.0	8.1	12.0	887	8.0	15.2										
drop not VT	DDCY-0080-Q 1	SE	262.3	17.8	45.6	857	18.1	264.4										
drop not VT	DDCY-0107-QO1	PL	118.5	13.7	57.0	2,039	14.6	325.9	BL	SX								
drop not VT	DDCY-0154-QO1	PL	99.3	24.6	28.0	545	23.2	213.0										
drop not VT	DDCY-0189-QO1	AC	96.7	24.2	37.8	531	22.8	245.4	AT	AC								
drop not VT	DDCY-0550-QO1	SW	74.8	21.1	42.0	1,437	22.4	245.5										
drop not VT	DDCY-0555-QO1	AT	87.3	29.7	32.4	471	28.0	248.3	AT									
drop wrong poly	DDCX-0041-OO1	SE	130.0	22.2	47.3	886	20.7	335.1	BL		93.0	9.1	8.9	840	6.7	9.6	13.6	WS 07mar2012

APPENDIX II – ADJUSTMENT SUMMARIES

Table 16: Adjustment Summary Statistics

Strata	ATAC_imm	ATAC_mat	BL_all	OTHER_all	PL_good	PL_poor	SX_all	Overall
Strata Sample Size	26	37	24	11	16	22	29	165
Total Area	189,623	173,788	178,972	141,511	177,097	204,111	317,741	1,382,841
Stand Age (at_m_tls)								
Average: at_m_tls (Ground Age)	60.8	83.6	149.1	94.7	91.3	105.2	96.0	97.1
Average: age_match (Photo Age)	64.8	102.2	140.3	76.9	92.9	103.5	96.2	97.1
Ratio of Averages	0.9373	0.8177	1.0630	1.2310	0.9826	1.0156	0.9970	1.0003
VRI Standard Error of Ratio	0.0544	0.0416	0.0493	0.1845	0.0914	0.0787	0.1000	0.0358
VRI Sampling Error Pct(%)	11.4	10.0	9.1	29.4	18.2	15.2	19.7	7.0
Stand Height (ht_m_tls)								
Average: ht_m_tls (Ground Height)	15.7	19.0	14.3	11.8	17.9	14.8	13.1	15.1
Average: ht_match (Photo Height)	16.9	22.4	14.3	10.4	18.9	13.9	13.5	15.6
Ratio of Averages	0.9269	0.8493	0.9994	1.1308	0.9477	1.0652	0.9697	0.9653
VRI Standard Error of Ratio	0.0511	0.0439	0.0494	0.1807	0.0918	0.0789	0.0463	0.0291
VRI Sampling Error Pct(%)	10.8	10.1	9.7	31.3	19.0	14.5	9.4	5.8
Lorey Height (ht_mean1)								
Average: ht_mean175 (Ground Height)	13.5	19.3	11.7	9.9	15.5	14.7	14.6	14.3
Average: lht_aa (Photo Height)	14.9	19.5	10.9	10.1	16.4	14.5	15.3	14.7
Ratio of Averages	0.9103	0.9908	1.0762	0.9778	0.9476	1.0122	0.9526	0.9747
VRI Standard Error of Ratio	0.0613	0.0530	0.0630	0.1580	0.0819	0.0600	0.0679	0.0296
VRI Sampling Error Pct(%)	13.2	10.5	11.5	31.7	16.9	11.6	14.0	5.9
Basal Area (ba_ha)								
Average: ba_ha (Ground Basal Area)	22.9	28.3	36.9	21.5	32.4	35.6	25.7	29.0
Average: ba1999 (Photo Basal Area)	28.5	34.3	24.7	17.4	32.4	29.9	29.8	28.6
Ratio of Averages	0.8016	0.8243	1.4959	1.2376	0.9987	1.1905	0.8622	1.0128
VRI Standard Error of Ratio	0.0815	0.0693	0.2079	0.2352	0.0849	0.1073	0.0706	0.0462
VRI Sampling Error Pct(%)	19.9	16.5	27.2	37.2	16.7	17.7	16.1	8.7
Stems per Hectare (stems_ha)								
Average: stems_ha (Ground SPH)	1,047.5	804.5	1,476.5	1,500.2	1,383.2	1,728.5	659.0	1,173.0
Average: sph1999 (Photo SPH	1,313.3	909.5	895.4	1,493.9	1,168.2	1,354.5	876.8	1,114.1
Ratio of Averages	0.7976	0.8846	1.6490	1.0042	1.1840	1.2761	0.7516	1.0529
VRI Standard Error of Ratio	0.0825	0.1422	0.3118	0.1581	0.2015	0.1526	0.0804	0.0621
VRI Sampling Error Pct(%)	20.3	31.5	37.1	30.9	33.3	23.4	21.0	11.6
Net Unadjusted Volume (vht_nwb)								
Average: vht_nwb (Ground Net Volume)	106.0	183.2	164.0	70.2	180.3	184.9	151.8	151.2
Average: vol_dbw1999 (Unadjusted) Photo Net Volume	117.9	215.3	95.7	39.1	197.4	143.7	181.1	147.7
Ratio of Averages	0.8997	0.8508	1.7144	1.7966	0.9134	1.2870	0.8382	1.0239
VRI Standard Error of Ratio	0.1230	0.0896	0.2414	0.8428	0.1302	0.1654	0.0911	0.1007
VRI Sampling Error Pct(%)	26.8	20.7	27.6	91.9	27.9	25.2	21.3	17.4
Net Attribute Adjusted Volume (vht_nwb)								
Average: vht_nwb (Ground Net Volume)	106.0	183.2	164.0	70.2	180.3	184.9	151.8	150.4
Average: vol_aa (Attribute Adjusted) Photo Net Volume	87.7	153.6	133.4	63.1	181.4	177.4	155.2	139.3
Ratio of Averages	1.2098	1.1922	1.2295	1.1120	0.9937	1.0425	0.9780	1.0792
VRI Standard Error of Ratio	0.1686	0.1232	0.1705	0.5047	0.1475	0.1356	0.1057	0.0717
VRI Sampling Error Pct(%)	27.3	20.2	27.2	89.0	29.1	25.5	21.2	12.8

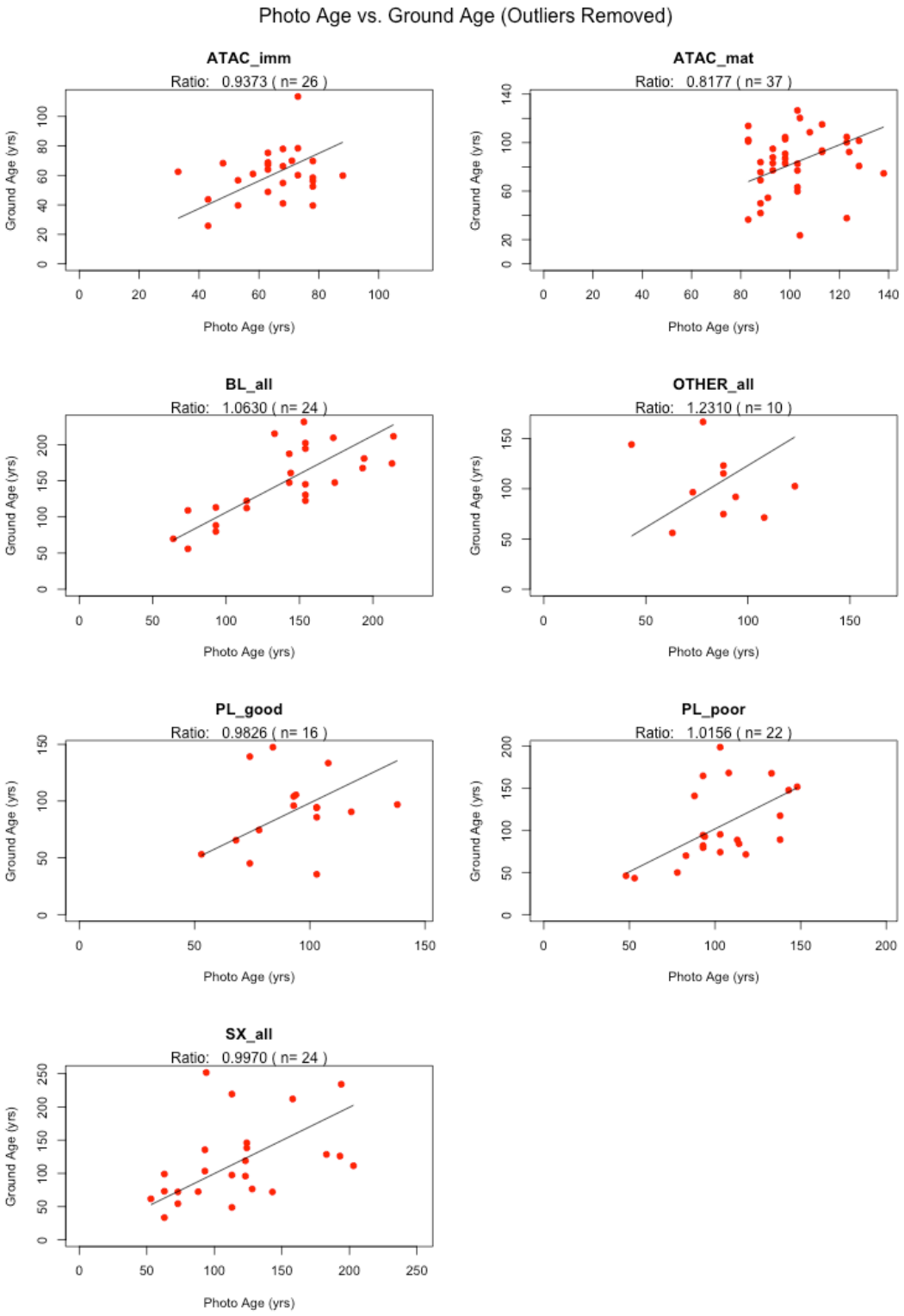

Figure 5: Ground Age vs. Photo Age

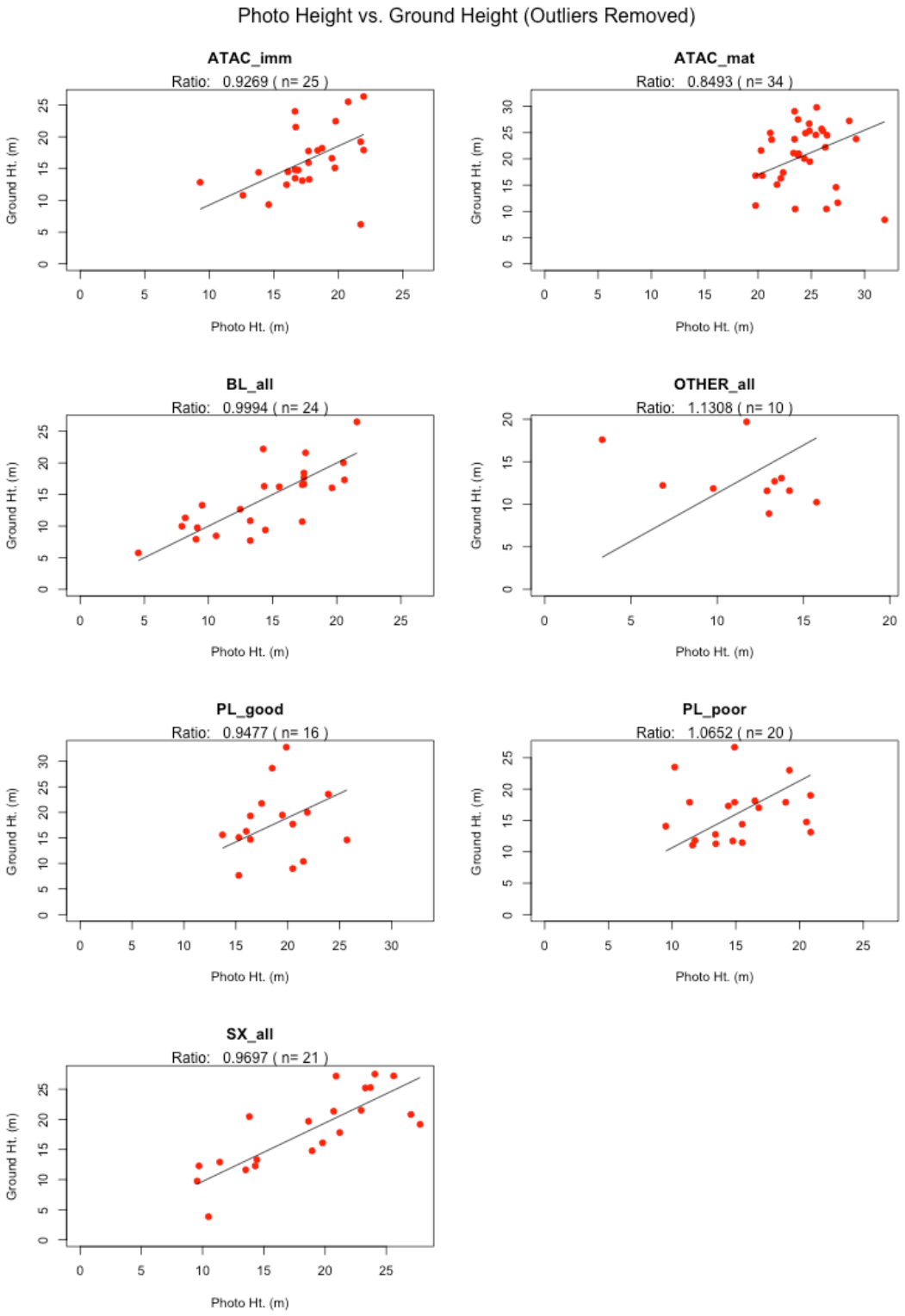

Figure 6: Ground Height vs. Photo Height

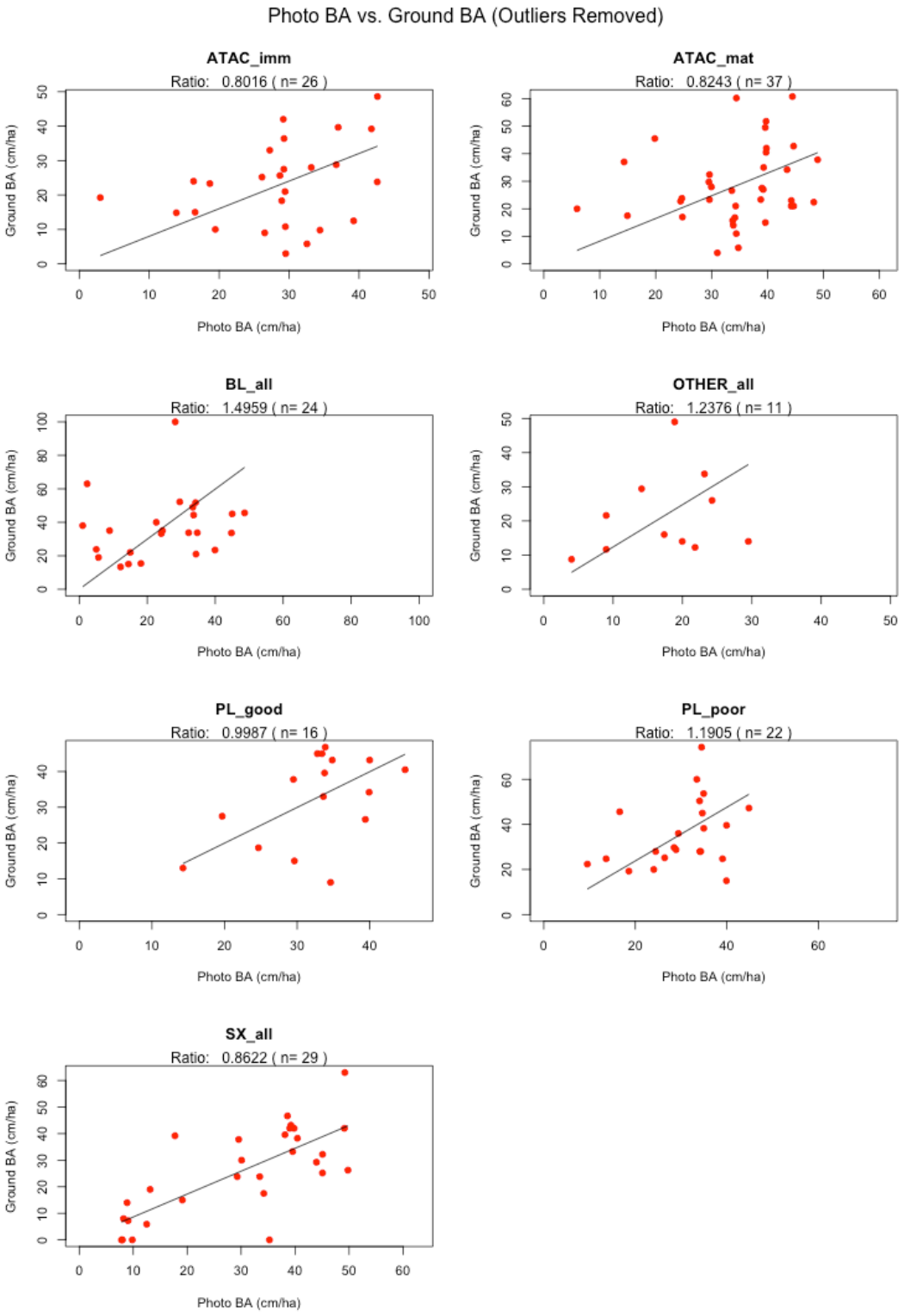

Figure 7: Ground BA vs. Photo BA

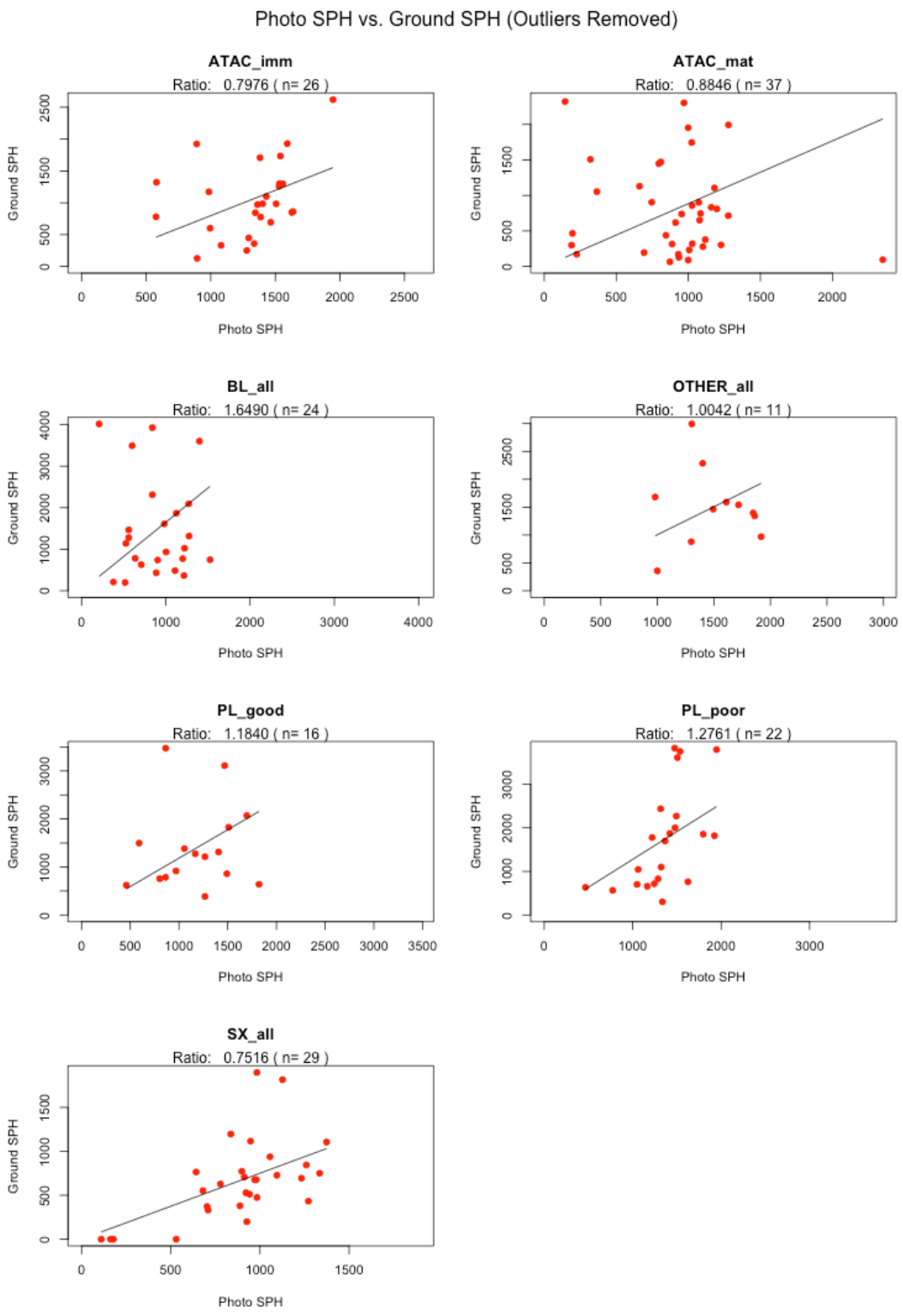

Figure 8: Ground Stems per Hectare vs. Photo Stems per Hectare

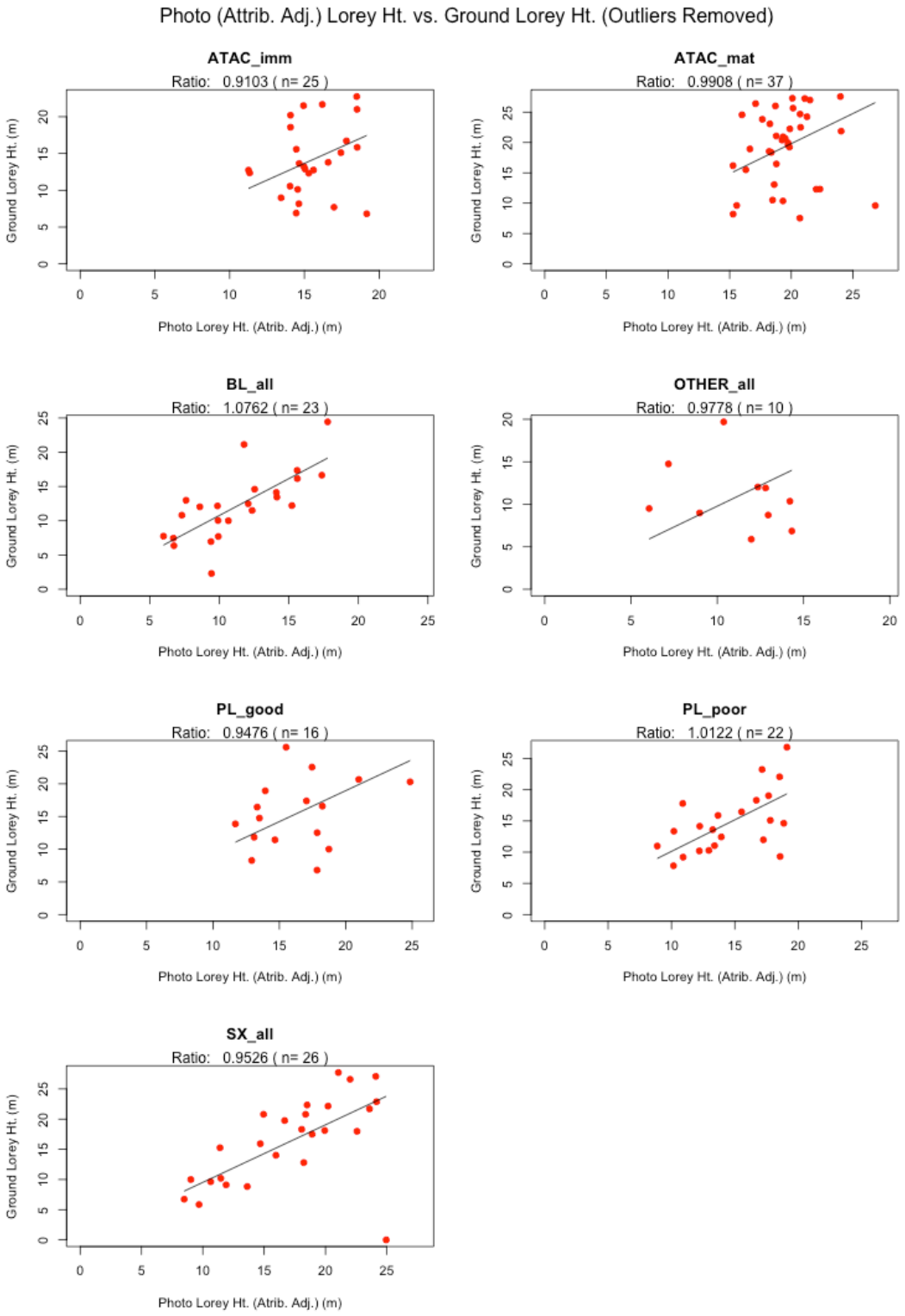

Figure 9: Ground Lorey Height vs. Photo (VDYP 7) Lorey Height Using Adjusted Attributes

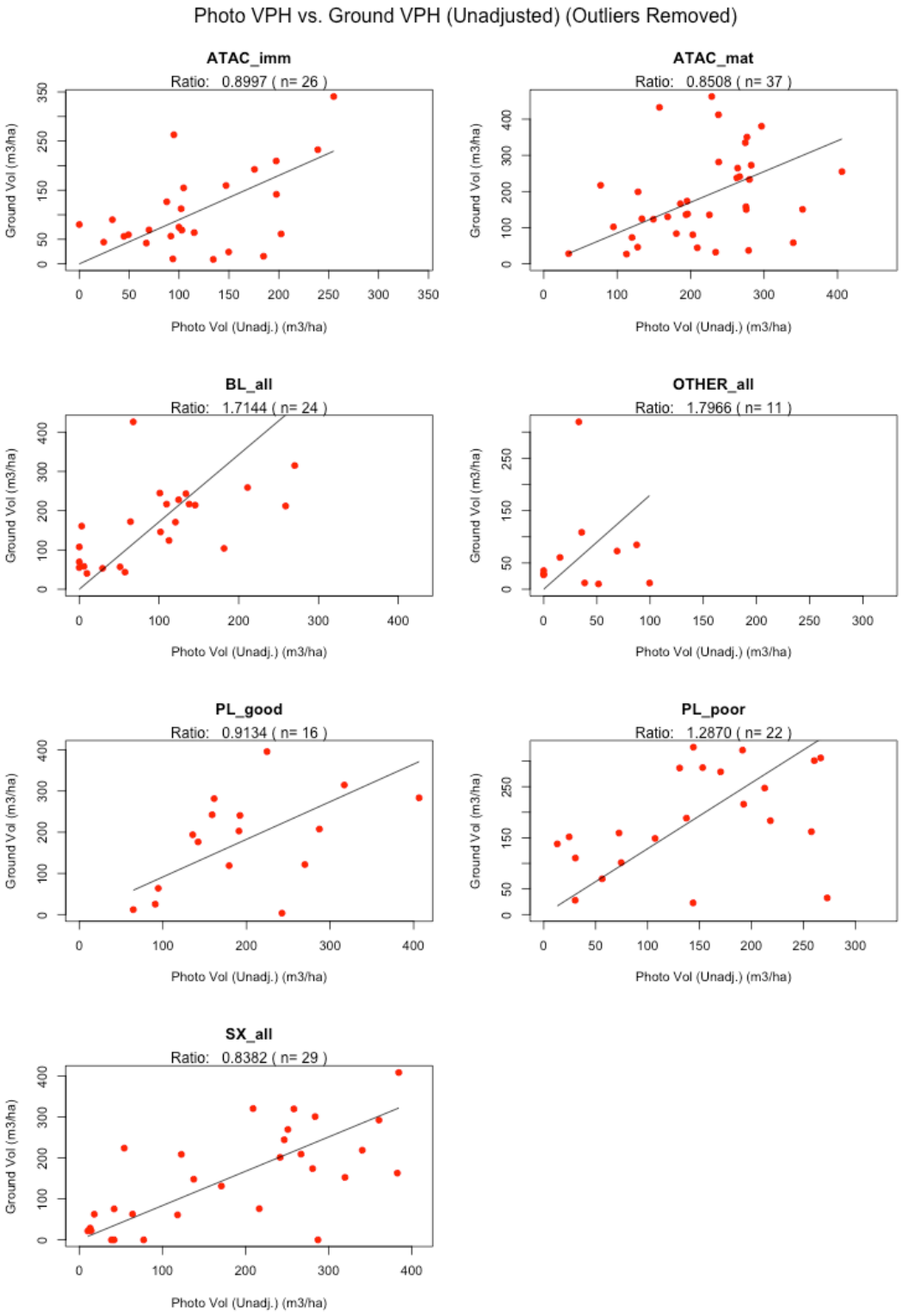

Figure 10: Ground Net Volume vs. Unadjusted Photo (VDYP 7) Volume

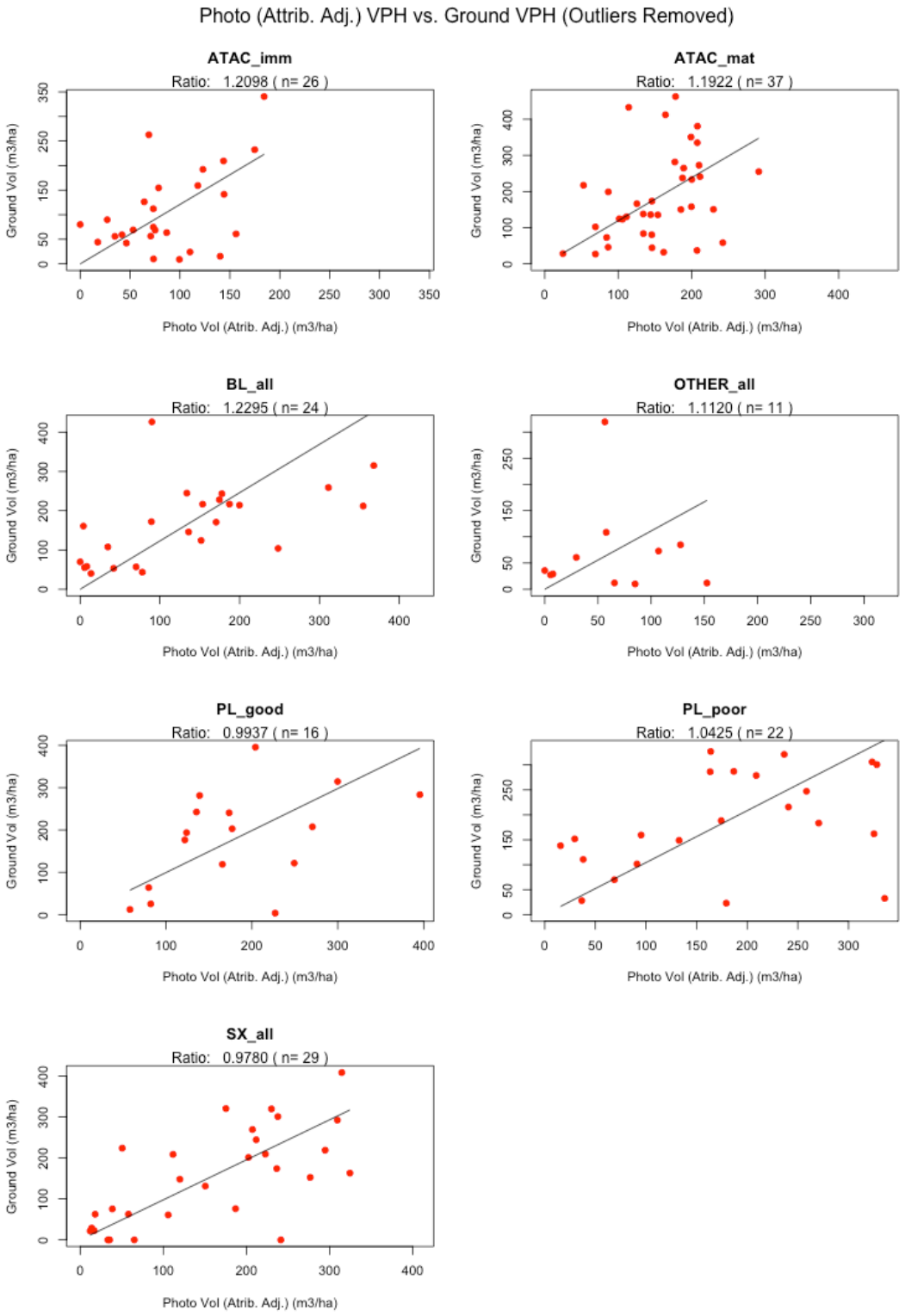

Figure 11: Ground Net Volume vs. Photo (VDYP 7) Volume Using Adjusted Attributes

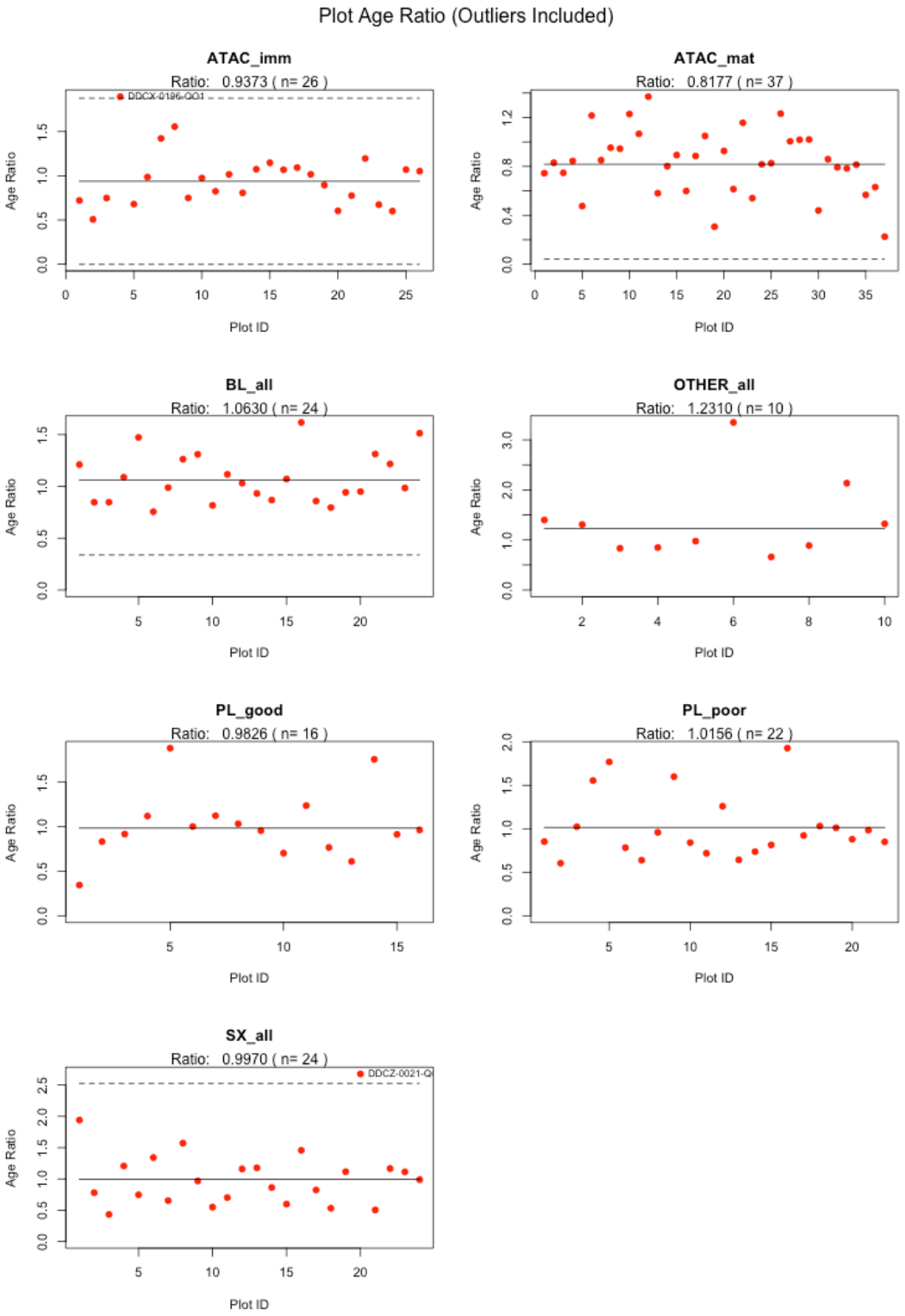

Figure 12: Age Outliers

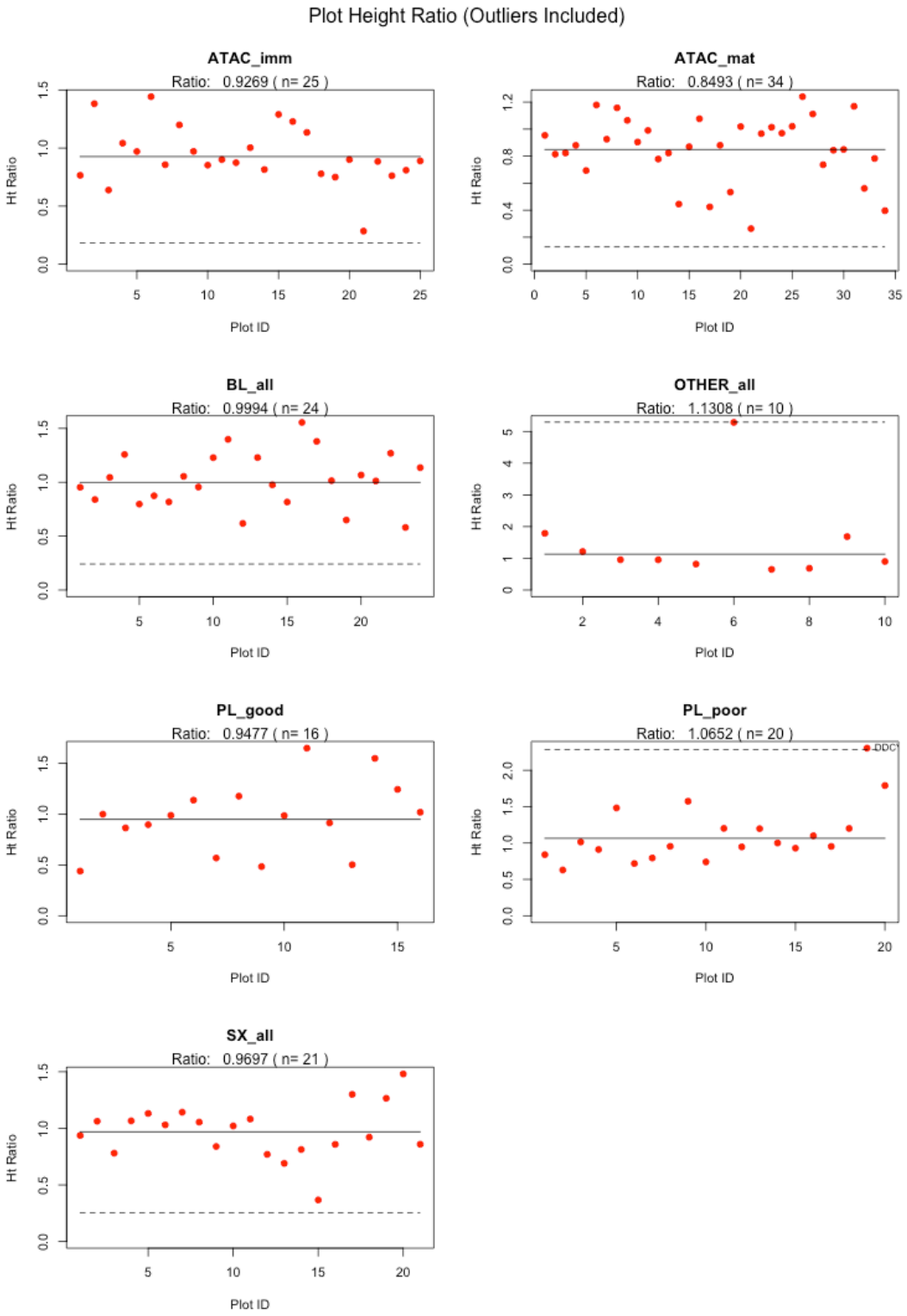

Figure 13: Height Outliers

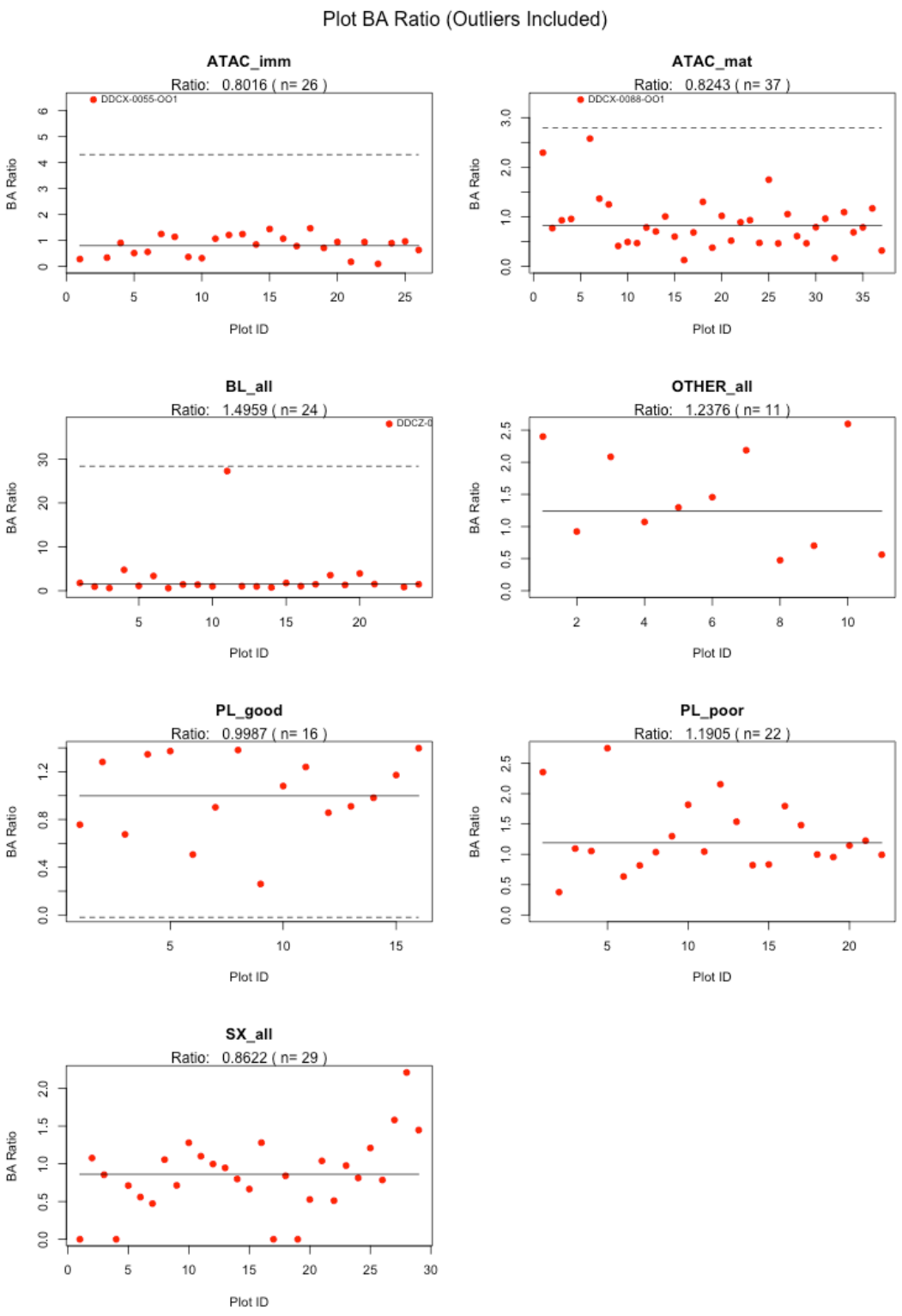

Figure 14: BA Outliers

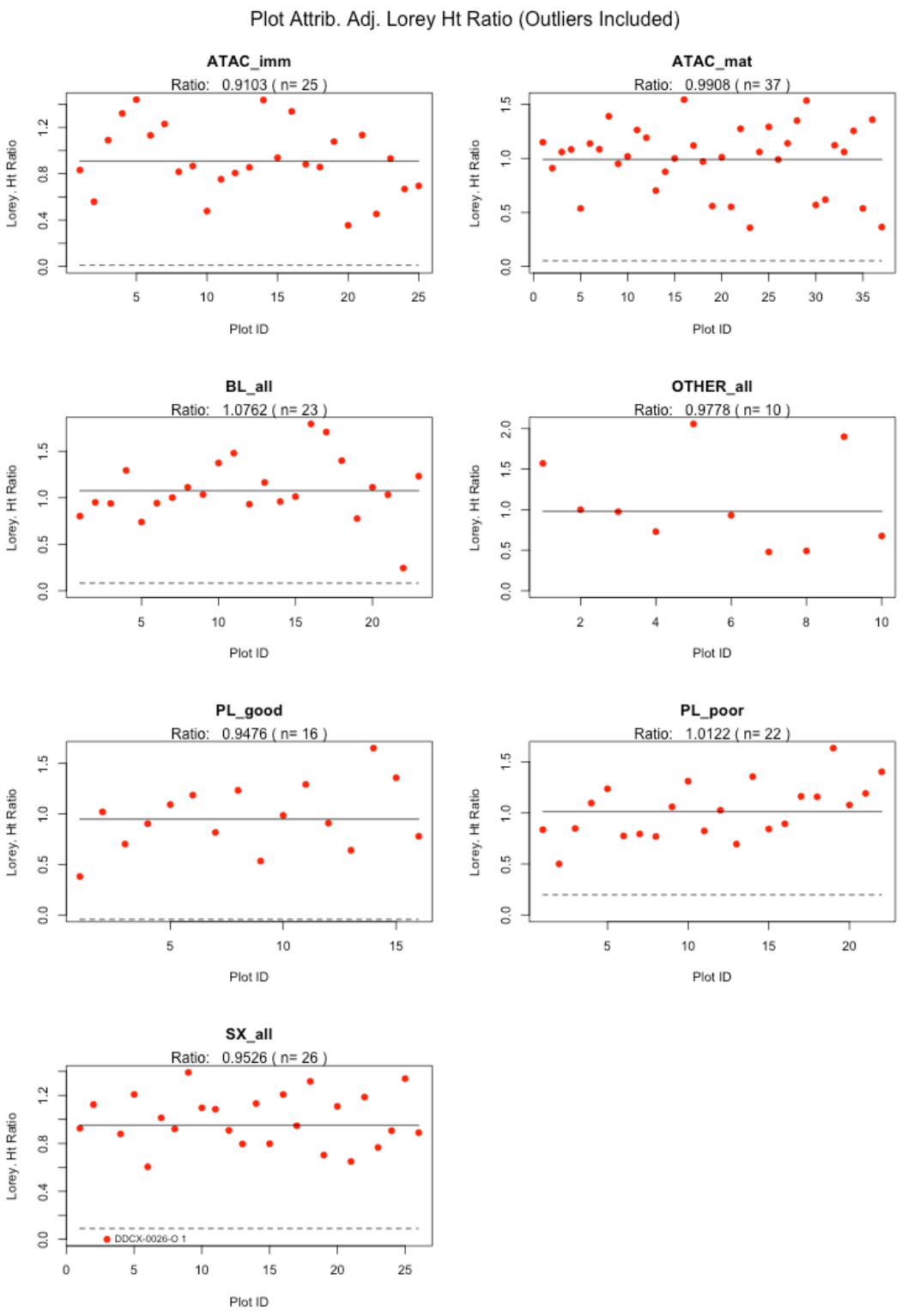

Figure 15: Lorey Height Outliers

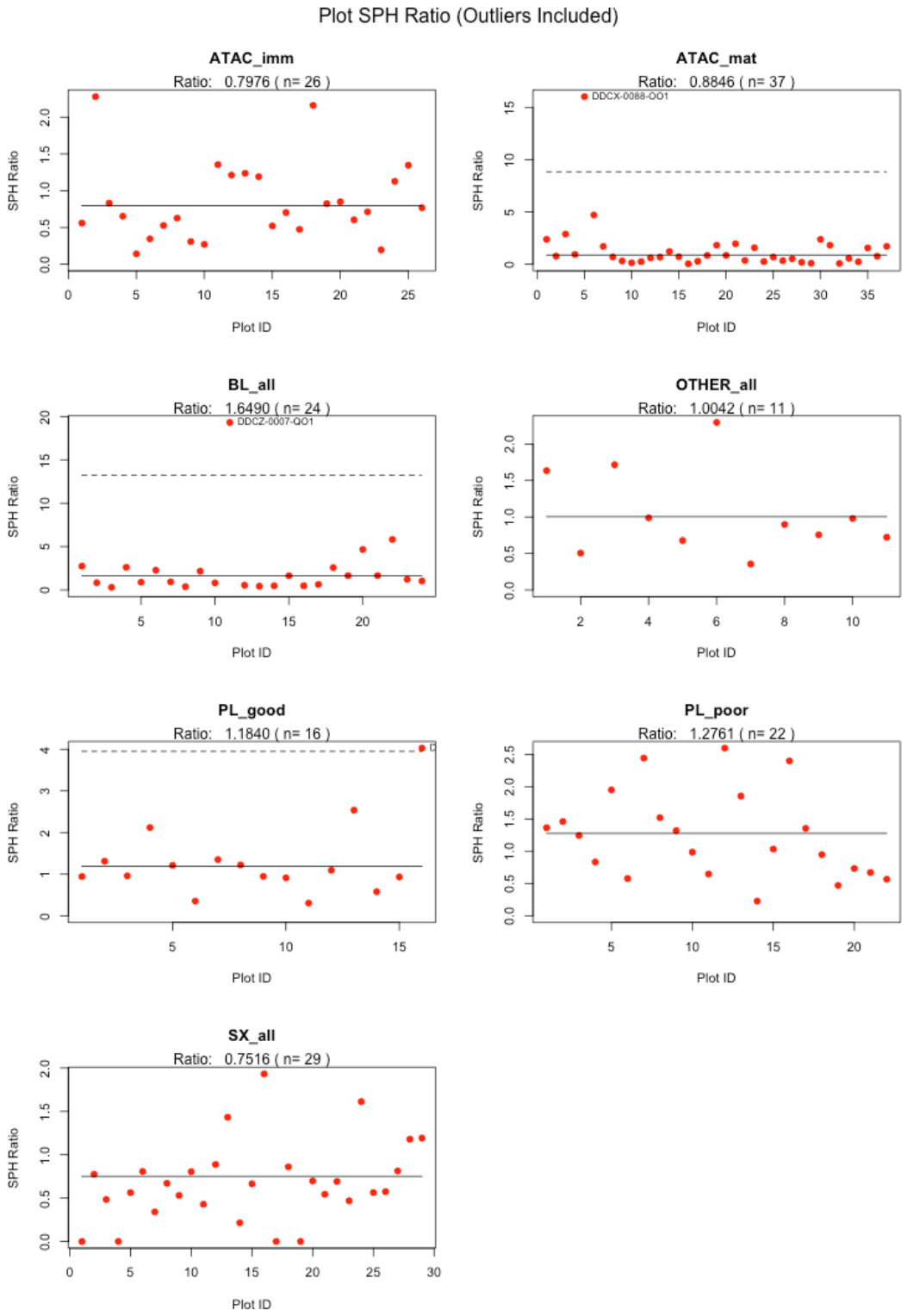

Figure 16: Stems per Hectare Outliers

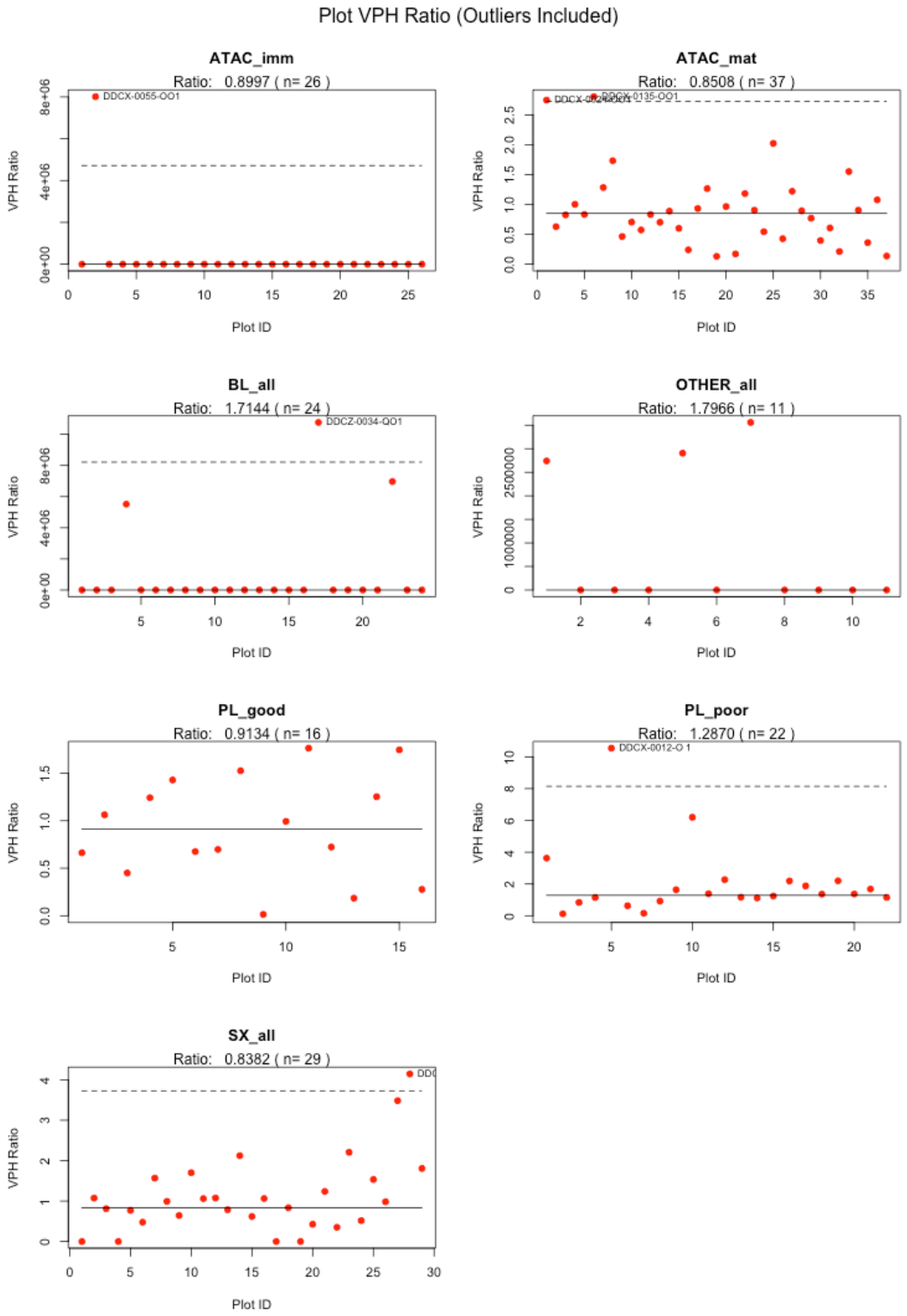

Figure 17: Unadjusted Volume Outliers.

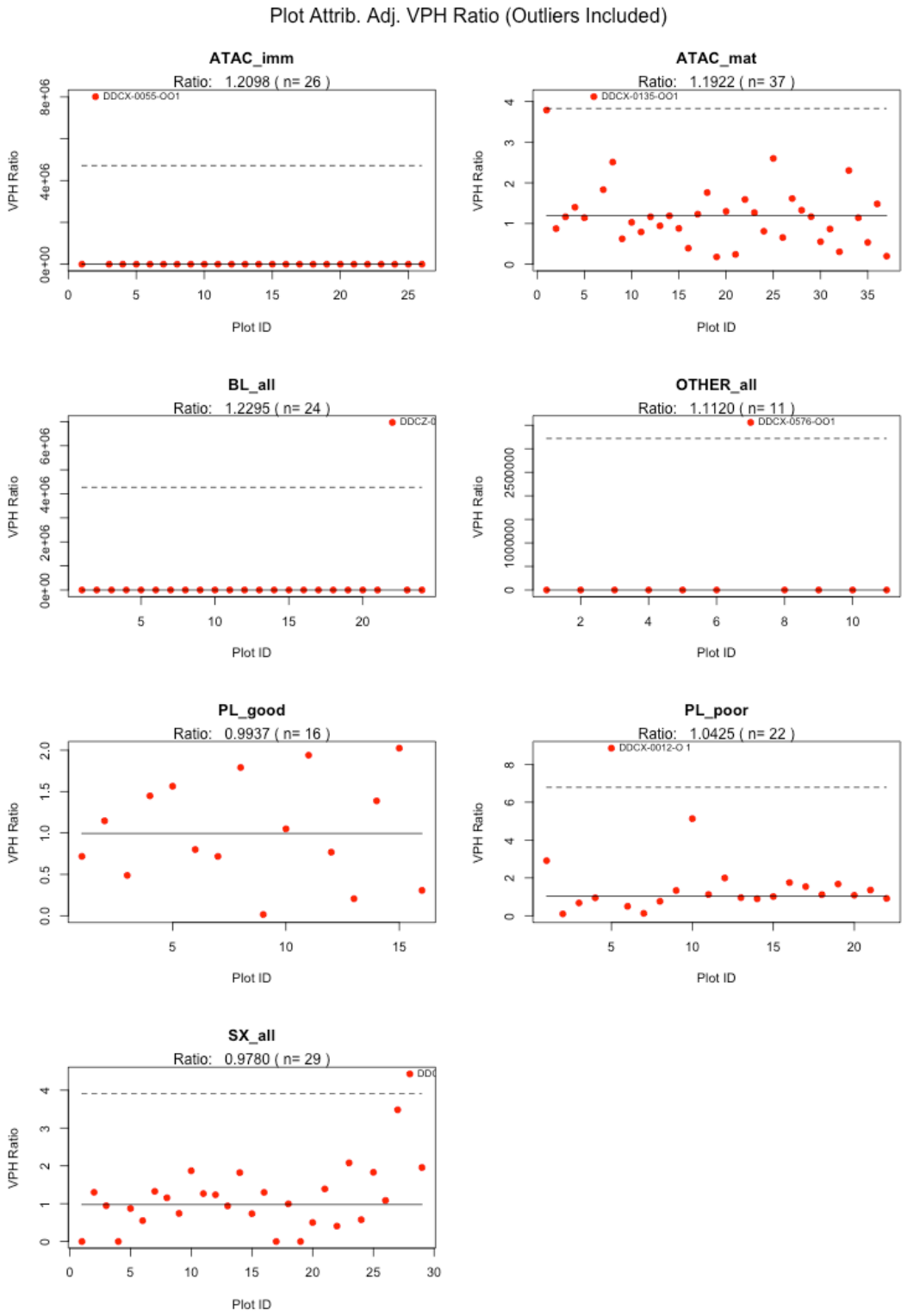

Figure 18: Attribute Adjusted Net Volume Outliers

APPENDIX III – SAMPLING PLAN

The following VPIP report can be accessed from the MFLNRO website using the links provided:

- J.S. Thrower & Associates. 1997. *Dawson Creek Forest District Vegetation Resources Inventory Ground Sampling Plan Revised Final Report. 8 October 1997.* 44pp. *http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vpips/dawsoncrkfd_vrigs_vpip.pdf*