

TFL 55
VEGETATION RESOURCES INVENTORY
STATISTICAL ADJUSTMENT

TIMBERLINE FOREST INVENTORY CONSULTANTS LTD.

Prepared for:

Louisiana Pacific

Prepared by:

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Reference: TFL 55 VRI Statistical Adjustment

Please accept this final report for the above-mentioned project.

It has been our pleasure working with you.

Yours truly,
TIMBERLINE FOREST INVENTORY CONSULTANTS LTD.

Kelly Sherman, R.P.F.
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EXECUTIVE SUMMARY

Louisiana Pacific has completed a Vegetation Resources Inventory for Tree Farm Licence 55 (TFL 55). The main objective of the Phase 2 inventory adjustment is to statistically adjust Phase 1 inventory age, height and resulting VDYP generated volume. The Phase 2 adjustment has been completed by Timberline Forest Inventory Consultants and this report details the methodology used.

The Phase 2 adjustment for the TFL 55 VRI was carried out using methods detailed in *VRI Procedures and Standards for Data Analysis, Attribute Adjustment and Implementation of Adjustment in the Corporate database* (MoF 2004).

Table I shows the weighted ratios that have been used to adjust each of the strata. The adjustments have only been applied to stands over the age 40.

Table I Phase 2 Adjustment

Stratum	Height	Age	Volume
Balsam	1.0378	0.7919	1.0456
Cedar	0.9665	0.9918	1.3833
Hemlock	0.9057	1.1997	1.2310
Other (Fd)	0.9665	1.4871	1.3833
Spruce	0.9780	0.8080	0.9905

Table II shows the inventory statistics after the adjustment for stands over age 40.

Table II Adjusted Strata Means

Strata	Area (ha)	Height (m)	Age (yrs)	Site Index (m)	Volume 2003 m ³ /ha
Balsam	3,477	23	150	13	224
Cedar	4,583	35	283	16	680
Hemlock	5,801	29	264	12	489
Other	2,225	27	169	15	387
Spruce	8,972	32	184	16	356
Totals	25,058	30	214	14	430

Table III shows the inventory statistics prior to the adjustment for stands over the age 40.



Table III Unadjusted Strata Means

Strata	Area (ha)	Height (m)	Age (yrs)	Site Index (m)	Volume 2003 m ³ /ha
Balsam	3,477	22	189	10	205
Cedar	4,583	36	285	17	510
Hemlock	5,801	32	220	15	440
Other	2,225	28	116	18	292
Spruce	8,972	33	228	15	373
Totals	25,058	31	221	15	383

Table IV shows the percent change for the adjusted inventory.

Table IV Percent Change for Adjusted Inventory

Strata	Area (ha)	Height (%)	Age (%)	Site Index (m)	Volume 2003 m ³ /ha
Adjusted Area	100%	96%	97%	97%	112 %

Table V reports the sampling error for the height, age and net volume.

Table V Strata Sampling Error

Strata	Height	Age	Volume
Balsam	22.9	27.9	47.5
Cedar	7.4	21.2	26.7
Hemlock	10.4	18.6	22.1
Other	22.3	36.7	48.1
Spruce	6.7	11.3	16.0
All strata	4.4	8.2	10.6



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Appendix 1 Vegetation Resource Inventory Ground Sampling Report



1.0 DESCRIPTION OF THE INVENTORY UNIT

1.1 Introduction

Tree Farm Licence 55 (TFL 55) is located in the Selkirk Mountains between the Revelstoke Reservoir and Kinbasket Lake. The TFL is approximately 93,000 hectares with 45,000 hectares of productive forest and 19,782 hectares of timber harvesting landbase according to Management Plan No. 3 (Sterling Wood Group, June 2000).

The Biogeoclimatic (BEC) zones that exist within TFL55 are listed in Table 1.1 below. All BEC Zones are of Natural Disturbance Type (NDT) 1 except for Parkland (ESSFvvp and ESSFvcp) that is NDT 5 (Forest Practices Code 1995). The most common zones are ICHvk1 and ESSFvc, which together make up just over 90% of the total area

Table 1.1 Area by BEC Zone

BEC	Area (ha)
ICHwk1	1,266
ESSFvv	251
ESSFwc2	488
ESSFvvp	6
ESSFvc	8,819
ICHvk1	14,677
ESSFvcp	209
Total	25,718

A comprehensive vegetation inventory commenced in 2002, based on a Chief Forester's recommendation in the 1996. Atticus Resources Consulting carried out the Phase 1 VRI, which was completed by 2002. Atticus also did the Phase 2 sampling plan and the Phase II ground sampling in the fall and early winter of 2002. This project compiles the ground sampling data and statistically adjusts the vegetation inventory. This project represents one of several projects that are being completed prior to Management Plan No. 4.

1.2 Objectives

The main objective of the Phase 2 inventory adjustment is to statistically adjust Phase 1 inventory age, height and resulting VDYP generated volume. Age and height are estimated using air photos and contain an interpretation bias. Volume generated using VDYP contains a volume bias because, which result from:

1. VDYP estimates decay waste and breakage using FIZ and PSYU which are "averaged" values (note: this bias can be removed by calculating a volume adjust factor from the Net Volume Adjustment Factor sampling collected during the ground portion of Phase 2); and
2. Additional model error associated with taper equations, local fit and the many other variables used to estimate volume (note: these biases can be removed by adjusting the VDYP volume with the ground volumes).

This section details the vegetation resources inventory data set and the ground sample information used to perform the adjustments.

1.3 Vegetation Resources Inventory (VRI) Landbase

TFL 55 encompasses 92,700 hectares of land with 54,444 hectares classified vegetated treed. The remaining 38,000 hectares is broken down between vegetated non-treed and non-vegetated (See Table 1.2).

Table 1.2 TFL 55 Vegetation Netdown

Landbase Description	Area (ha)	Percent
Vegetated Treed	54,444	59%
Vegetated Non-Treed	32,884	35%
Non-Treed	5,372	6%
Total	92,700	100%

The vegetated treed inventory was further broken down into strata for ground sampling based upon species within the operable landbase. Of the 54,444 ha of vegetated treed land only 26,646 ha were within or touching the operability line as shown in Table 1.3.

Table 1.3 Broad Strata Summary

Strata	Area (ha)	Percent
Balsam	3,477	13.4%
Cedar	4,583	19.2%
Hemlock	5,801	23.0%
Other	2,225	8.5%
Spruce	8,972	35.9%
Total/Average	25,058	100.0%

Once the strata were defined, the standards required that each of the strata be further separated in sub-strata, based on volume. However, in this case volume had not yet been assigned to the inventory file (assigned separately by the MSRM). In discussions between Atticus and the Ministry it was decided that the photo interpreted attribute basal area would be used for sub-stratification. The target was less than 15 substrata overall with a maximum of three substrata (low to high basal area) per main species strata (Atticus, 2003). Table 1.4 illustrates the final strata and sub-strata used.

Table 1.4 Final Strata, Sub-Strata Summary

Strata	Sub-strata	Area (ha)	Percent	# Plots
Spruce	Spruce1	2,730	28.5%	9
	Spruce2	3,165	33.0%	10
	Spruce3	3,699	38.5%	12
Total Spruce		9,593	100.0%	31
Balsam	Balsam1	1,755	47.1%	6

Strata	Sub-strata	Area (ha)	Percent	# Plots
	Balsam2	1,969	52.9%	6
Total Balsam		3,725	100.0%	12
Cedar	Cedar1	900	19.0%	3
	Cedar2	1,778	37.5%	6
	Cedar3	2,066	43.5%	6
Total Cedar		4,745	100.0%	15
Hemlock	Hemlock1	1,371	23.1%	4
	Hemlock2	2,108	35.5%	7
	Hemlock3	2,458	41.4%	8
Total Hemlock		5,937	100.0%	19
Other	Other	2,646	100.0%	8
Total Other		2,646	100.0%	8

2.0 DESCRIPTION OF PHASE I AND PHASE II ISSUES

2.1 Unadjusted Inventory

The unadjusted inventory contained an average stand height of 28.7 meters, age of 197.4 years, site index of 14.4 meters, volume at 12.5 cm dbh utilization level of 341.9 m³/ha and volume at 17.5 cm of 330.2 m³/ha. There is a difference in total area of 248 ha between Atticus' summaries and Timberline Forest Inventory Consultants summaries. This is due to recently harvested blocks that were "erased" from the inventory when the depletions were cut in by the Ministry. This will not affect the results of this analysis. The population was obtained by selecting only those vegetated treed stands that were within or touched the operability line and were greater than 40 years old. See Table 2.1.

Table 2.1 Unadjusted Inventory Statistics

Strata	Area (ha)	Height (m)	Age (yrs)	Site Index (m)	Volume 12.5 m ³ /ha	Volume 17.5 m ³ /ha
Balsam	3,477	25.8	194.4	10.5	227.9	214.9
Cedar	4,583	35.4	287.0	16.4	513.0	507.7
Hemlock	5,801	29.2	220.8	15.1	450.0	440.3
Other	2,225	27.4	117.1	18.5	312.6	296.1
Spruce	8,972	32.1	230.4	14.8	387.9	379.8
Total/Average	25,058	28.7	197.4	14.4	341.9	330.2

Note: Averages area area-weighted averages

2.2 Ground Plot Data

Table 2.2 shows a summary of Inventory and ground data for each of the Phase 2 ground plots.

Table 2.2 Phase 2 Ground Plots Summary Table

Phase 2						Phase 1					BFC	Elevation	Adj. applied		
Sample Number	Sub-stratum	Leading Species	Age	Height	Volume	Leading Species	Second Species	Age	Height	Volume			Age	Height	Volume
1	Spruce1	SXW	33	11	17	SX	BL	25	6	0	ICHvk1	1261	N	N	N
2	Spruce1	SXW	28	8	3	SX	CW	24	6	0	ICHvk1	1096	N	N	N
3	Spruce1	SX	25	9	18	SX	BL	156	21	164	ICHvk1	1349	Y	N	Y
4	Spruce1	SE	138	39	465	SE	BL	236	36	150	ICHvk1	.	Y	Y	Y
5	Spruce1	SX	165	31	378	SE	BL	246	35	421	ICHvk1	.	Y	Y	Y
6	Spruce1	SE	154	42	252	SE	BL	271	40	449	ICHvk1	.	Y	Y	Y
7	Spruce1	SXW	194	34	224	SE	BL	246	35	375	ICHvk1	.	Y	Y	Y
8	Spruce1	SXW	173	40	506	SE	BL	266	39	454	ICHvk1	1232	Y	Y	Y
9	Spruce1	SXW	150	36	398	SE	CW	206	33	440	ICHvk1	.	Y	Y	Y
10	Spruce2	BL	182	20	366	SE	BL	146	25	298	ESSFwc2	.	Y	Y	Y
11	Spruce2	HM	325	26	369	SE	BL	246	28	310	ESSFvc-	1641	Y	Y	Y
12	Spruce2	SXW	222	33	441	SE	BL	256	29	316	ESSFvc-	.	Y	Y	Y

Phase 2						Phase 1					BEC	Elevation	Adj. applied		
Sample Number	Sub-stratum	Leading Species	Age	Height	Volume	Leading Species	Second Species	Age	Height	Volume			Age	Height	Volume
13	Spruce2	BL	221	29	379	SE	BL	226	28	340	ESSFvc-	1721	Y	Y	Y
14	Spruce2	HM	196	25	413	SE	BL	246	28	294	ESSFvc-	.	Y	Y	Y
15	Spruce2	BL	145	31	353	SE	BL	156	23	284	ESSFvc-	.	Y	Y	Y
16	Spruce2	SXW	213	41	267	SE	BL	266	35	392	ICHvk1	.	Y	Y	Y
17	Spruce2	SXW	264	35	355	SE	BL	236	34	368	ESSFvc-	1537	Y	Y	Y
18	Spruce2	SE	189	38	368	SE		186	38	470	ICHvk1	.	Y	Y	Y
19	Spruce2	HM	283		384	SE	BL	266	33	380	ESSFvc-	1549	Y	N	Y
20	Spruce3	SE	264	42	440	SE	HW	256	35	508	ESSFvc-	.	Y	Y	Y
21	Spruce3	SX	203	37	602	SE	BL	236	40	411	ICHvk1	.	Y	Y	Y
22	Spruce3	SXW	264		372	SE	BL	306	34	391	ESSFvc-	.	Y	N	Y
23	Spruce3	BL	140	25	313	SE	BL	206	30	385	ICHvk1	1162	Y	Y	Y
25	Spruce3	FDI	106	25	244	SE	PL	106	28	326	ICHvk1	1240	Y	Y	Y
26	Spruce3	FDI	91	30	230	SE	PL	106	28	326	ICHvk1	.	Y	Y	Y
27	Spruce3	SXW	122	34	557	SE	BL	226	36	466	ICHvk1	.	Y	Y	Y
28	Spruce3	SXW	139	28	335	SE	HW	276	35	433	ICHvk1	.	Y	Y	Y
29	Spruce3	SXW	101	28	439	SE	FDI	106	28	320	ESSFvc-	.	Y	Y	Y
30	Spruce3	FDI	107	23	139	SE	HW	156	33	492	ICHvk1	.	Y	Y	Y
31	Spruce3	HW	102	16	95	SE	CW	106	28	382	ESSFvc-	.	Y	Y	Y
32	Balsam1	HM	143	4	0	BL		36	4	0	ESSFvc-	.	N	N	N
33	Balsam1	SXW	21	5	0	SX	BL	146	23	208	ICHvk1	.	N	N	Y
34	Balsam1	BL	87	18	55	BL	SE	96	16	119	ESSFvc-	.	Y	Y	Y
35	Balsam1	BL	86	18	177	BL	SE	106	14	87	ESSFvc-	1875	Y	N	Y
36	Balsam1	BL	133	24	311	BL	SE	226	23	208	ESSFvc-	.	Y	Y	Y
37	Balsam1	BL	164	27	92	BL	SE	186	25	266	ESSFvc-	1878	Y	Y	Y
38	Balsam2	BL	197	20	203	BL	SE	176	25	190	ESSFvc-	1682	Y	Y	Y
39	Balsam2	BL	97	17	78	BL	SE	206	20	181	ESSFvc-	1999	Y	Y	Y
40	Balsam2	BL	168	24	240	BL	SE	236	28	291	ESSFvc-	.	Y	Y	Y
41	Balsam2	SE	62	22	175	BL	HW	116	10	30	ESSFvc-	.	Y	Y	Y
42	Balsam2	BL	160	24	269	BL	SE	156	26	266	ESSFvv-	1823	Y	Y	Y
43	Balsam2	BL	166	25	526	BL	SE	156	26	266	ESSFwc2	1400	Y	Y	Y
44	Cedar1	SE	123	32	280	CW	AC	86	20	152	ICHvk1	.	Y	Y	Y
45	Cedar1	SXW	83	21	52	CW	SE	106	22	232	ICHwk1	722	Y	Y	Y
46	Cedar1	CW			1017	CW	SE	306	35	501	ICHvk1	1115	N	N	Y
47	Cedar2	HW	142	30	247	CW	HW	206	33	385	ICHvk1	960	Y	Y	Y
49	Cedar2	HW	251	30	353	CW	HW	256	33	452	ICHvk1	.	Y	Y	Y
50	Cedar2	CW	354	33	734	CW	HW	306	37	535	ICHvk1	.	Y	Y	Y
51	Cedar2	CW	179	38	1179	CW	HW	306	36	523	ICHvk1	697	Y	Y	Y
52	Cedar2	CW	254	32	603	CW	HW	256	33	504	ICHvk1	910	Y	Y	Y
53	Cedar3	HW	281	37	610	CW	HW	281	38	503	ICHvk1	.	Y	Y	Y
54	Cedar3	HW	198	28	566	CW	SE	256	33	479	ICHvk1	1062	Y	Y	Y
55	Cedar3	CW	213	38	301	CW	HW	256	35	544	ICHvk1	744	Y	Y	Y
56	Cedar3	CW	404	32	801	CW	HW	256	35	530	ICHvk1	1245	Y	Y	Y
57	Cedar3	CW	522		1121	CW	HW	331	39	550	ICHvk1	1146	Y	N	Y

Phase 2						Phase 1					BEC	Elevation	Adj. applied		
Sample Number	Sub-stratum	Leading Species	Age	Height	Volume	Leading Species	Second Species	Age	Height	Volume			Age	Height	Volume
58	Cedar3	CW	252	40	563	CW	HW	381	41	569	ICHvk1	798	Y	Y	Y
59	Hemlock1	FDI	20	5	0	HW	FDI	26	8	1	ICHvk1	756	N	N	N
61	Hemlock1	HM	274	18	477	HM	BL	236	25	331	ESSFvc-	1852	Y	Y	Y
62	Hemlock1	HM	367		407	HW	SE	271	33	473	ESSFvc-	1670	Y	N	Y
63	Hemlock2	HW	200	32	472	HW	CW	126	25	311	ICHvk1	.	Y	Y	Y
64	Hemlock2	HW	298		287	HW	SE	236	32	494	ICHvk1	.	Y	N	Y
65	Hemlock2	FDI	107	28	433	HW	CW	106	29	341	ICHvk1	1109	Y	Y	Y
66	Hemlock2	HM	257	27	439	H	SE	271	35	513	ESSFvc-	.	Y	Y	Y
67	Hemlock2	SXW	63	21	226	HW	CW	136	33	409	ICHvk1	.	Y	Y	Y
68	Hemlock2	CW			810	HW	CW	381	52	581	ICHvk1	.	N	N	Y
69	Hemlock2	CW	301	30	701	HW	CW	206	30	375	ICHvk1	.	Y	Y	Y
70	Hemlock3	CW	134	35	532	HW	CW	256	38	532	ICHvk1	.	Y	Y	Y
71	Hemlock3	CW			386	HW	CW	186	32	466	ICHvk1	856	N	N	Y
72	Hemlock3	HW	240	24	434	HW	CW	146	25	354	ICHvk1	643	Y	Y	Y
73	Hemlock3	CW	584	41	237	HW	CW	306	37	523	ICHvk1	.	Y	Y	Y
74	Hemlock3	HW	381	23	411	HW	CW	281	35	514	ICHvk1	957	Y	Y	Y
75	Hemlock3	HW	281	37	573	HW	CW	236	34	474	ICHvk1	860	Y	Y	Y
76	Hemlock3	HW	309	34	800	HW	CW	256	35	493	ICHvk1	.	Y	Y	Y
77	Hemlock3	HW	186	42	1089	HM	SE	276	37	592	ICHvk1	1326	Y	Y	Y
79	Other	AC	44	22	81	AC		56	18	26	ICHvk1	792	N	N	N
81	Other	FDI	112	27	434	FDI	EP	96	25	189	ICHwk1	947	Y	Y	Y
82	Other	HW	239	29	190	FD	HW	146	30	337	ICHvk1	.	Y	Y	Y
83	Other	BL	90	27	602	FDI	SE	106	28	360	ESSFvc-	1491	Y	Y	Y
84	Other	HW	237	22	516	FD	HW	146	32	369	ICHvk1	.	Y	Y	Y
85	Other	CW	244		669	FDI	SE	126	33	444	ICHwk1	661	Y	N	Y

3.0 DESCRIPTION OF DATA SCREENING PROCESS

The Phase 2 adjustment for the TFL 55 VRI was carried out using methods detailed in *VRI Procedures and Standards for Data Analysis, Attribute Adjustment and Implementation of Adjustment in the Corporate database* (MoF 2004).

3.1 Compilation and Net Volume Adjustment Factors

JS Thrower and Associates compiled the Phase 2 ground data and calculated the net volume adjustment factors (NVAF). There were 63 trees sampled, which were distributed as shown in Table 3.1.

Table 3.1 Sample size for NVAF

Stratum	Sample Size
Dead	4
Immature	10
Mature-C	12
Mature-H	12
Mature-Others	25

Note: The cedar and hemlock were combined for sampling and then post stratified.

3.2 Statistical Adjustment

The adjustment process was carried out following Section 4 of the *VRI Procedures and Standards for Data Analysis, Attribute Adjustment and Implementation of Adjustment in the Corporate Database* (MoF 2004).

The process involves first determining appropriate adjustment ratios for the age and height. Then using VDYP the adjusted volume is calculated. The adjusted volume is then compared to the Phase 2 ground volumes to determine and appropriate volume adjustment ratio.

3.3 Post Stratification

There was a considerable amount of investigating options done to find appropriate post stratification. Variables such as age, biogeoclimatic zones, height and site index were all considered for stratification.

No post stratification was done except that Cedar and Douglas-fir have been combined for the volume and height adjustments. There were only 5 plots in Douglas-fir stands and they were very similar to the cedar stands in terms of volumes and heights. For the age adjustment they have been adjusted separately because they are distinctly different (i.e. age adjustment for cedar is 0.9918 and Douglas-fir is 1.4487. Sam Otukol of the Ministry of Forests stated that it is preferable to use the same strata for age, height and volume adjustments; however he agreed that this was an exception.

In addition sample clusters that have an age below 40 (Phase 1 or Phase 2 age) have been removed from the sample. When the samples below that age 40 were excluded from the analysis the error associated with the adjustment was reduced considerably. This removed plots 1,2,3,32,33, and 59. Plot 79 was removed from other because it was the only 'other' that was not Douglas-fir.

3.4 Calculating Adjustment Factors

The method used for adjustment factors is the ratio of means (ROM) for all three adjustments; age, height and volume. The observations were weighted appropriately because the selection probabilities were unequal amongst the sub strata.

4.0 PRESENTATION OF RESULTS

4.1 Net Volume Adjustment Factors

The NVAF ratios are shown on Table 4.1.

Table 4.1 NVAF Ratios and Sampling Error

Stratum	Sample Size	Avg. NVAF Volume (m3)	Avg. VRI Volume (m3)	NVAF Ratio	95% Sampling Error (Absolute)	SE %
Dead	4	2.9613	2.1418	1.291	0.604	29.4
Immature	10	0.2881	0.2919	0.987	0.063	8.9
Mature-C	12	6.7724	7.6007	0.858	0.138	25.2
Mature-H	12	2.0007	1.9594	1.049	0.111	16.7
Mature-Others	25	3.8241	3.6243	1.021	0.064	15.1

The NVAF factors have been approved by Will Smith. It was suggested that LP Canada consider destructively sampling about eight more tree to bring the sampling error in cedar and hemlock to 10%. Using the original strata, which combined cedar and hemlock, the sampling error was less than 10%. However, the difference in NVAF between cedar and hemlock (6.7724 versus 2.0007) was too large to ignore, so the strata was split.

4.2 Age Adjustment

Table 4.2 shows the weighted ratio of means for the age adjustment for each of the strata.

Table 4.2 Age Adjustment Ratios

Stratum	Age Adjustment Ratio
Balsam	0.7919
Cedar	0.9918
Hemlock	1.1997
Douglas-fir	1.4871
Spruce	0.8080

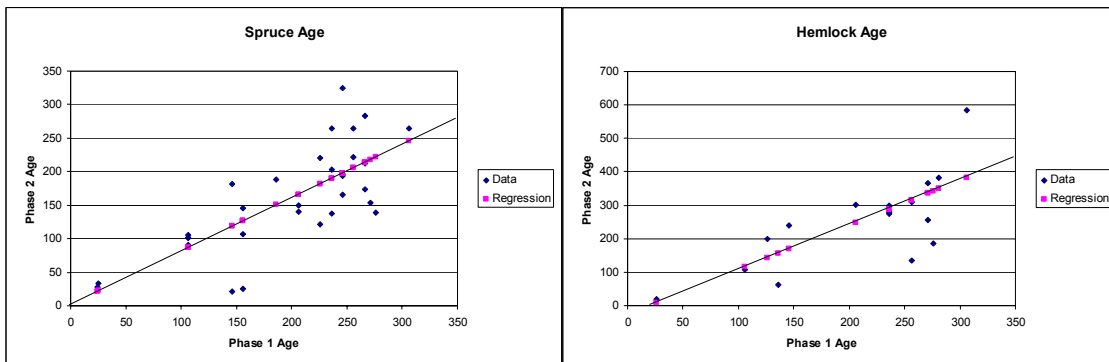
The method used for weighting the adjustment ratios has been shown in Table 4.3.

Table 4.3 Determining Area weighted Adjustment Ratio for Age (Spruce Stratum)

Phase 2 Sample	Substratum		# of Sample Clusters	Weight *	Age	
	Name	Area			Phase 2	Phase 1
9	Spruce1	2730	7	390	150	206
4			7	390	138	236
5			7	390	165	246
7			7	390	194	246
8			7	390	173	266
6			7	390	154	271
3			7	390	25	156
10	Spruce2	3165	10	316	182	146
15			10	316	145	156
18			10	316	189	186
13			10	316	221	226
17			10	316	264	236
11			10	316	325	246
14			10	316	196	246
12			10	316	222	256
19			10	316	283	266
16			10	316	213	266
31	Spruce3	3699	11	336	102	106
25			11	336	106	106
26			11	336	91	106
29			11	336	101	106
30			11	336	107	156
23			11	336	140	206
27			11	336	122	226
21			11	336	203	236
20			11	336	264	256
28			11	336	139	276
22	11	336	264	306		
Weighted Sum- the sum of each weight/age product					1,649,608	2,041,670
Weighted Adjustment Ratio (Phase 2 weighted sum / Phase 1 weighted sum)					0.8080	

Note: Weight is the area in each substratum divided by the number of sample clusters in that substratum.

A regression was used to analyse the relationship between the Phase 1 and Phase 2 inventory age (See Figure 4.1).



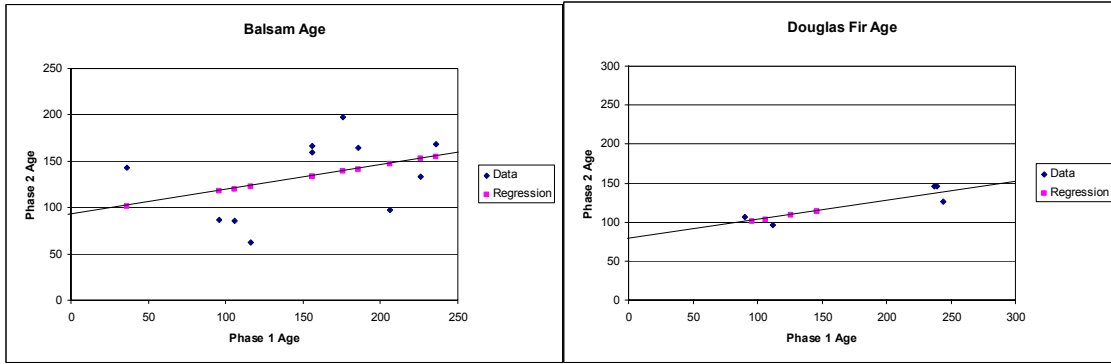


Figure 4.1 Phase 1 versus Phase 2 age

4.3 Height Adjustment

Table 1.1 shows the weighted ratio of means for the height adjustment for each of the strata.

Table 4.4 Height Adjustment Ratios

Stratum	Height Adjustment Ratio
Balsam	1.0378
Cedar	0.9665
Hemlock	0.9057
Douglas-fir	0.9665
Spruce	0.9780

The method used for the weighted adjustment is the same as that used for the age adjustment (See Table 4.3).

A regression was used to analyse the relationship between the Phase 1 and Phase 2 inventory height (See Figure 4.2).

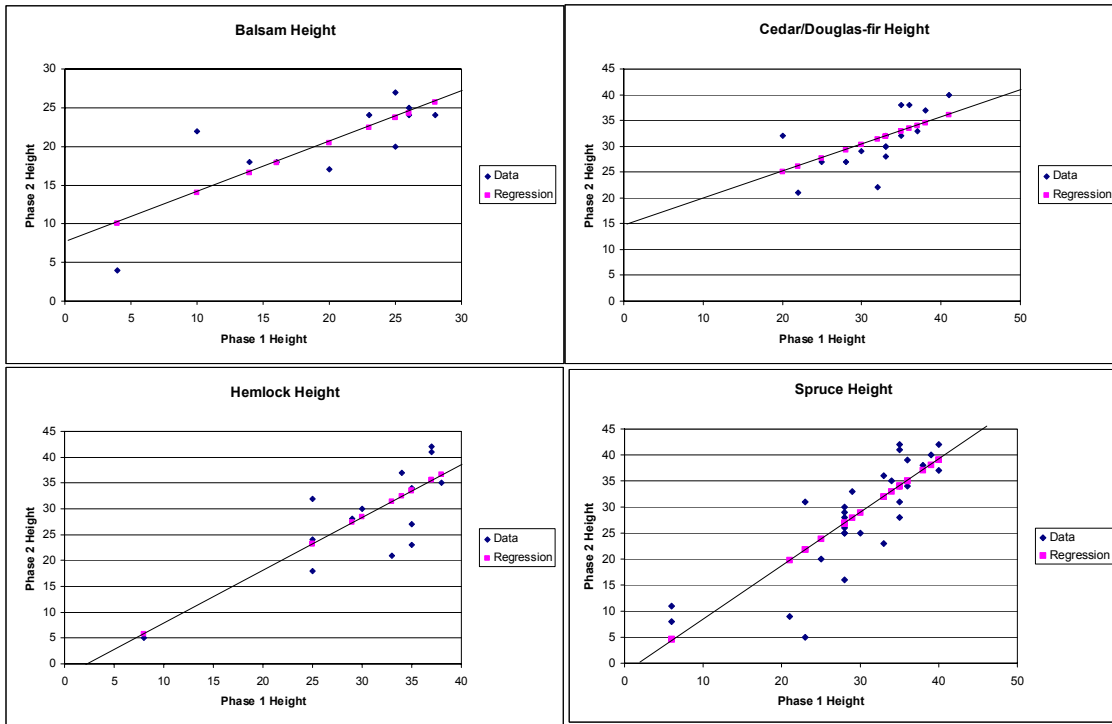


Figure 4.2 Phase 1 versus Phase 2 height

4.4 Volume Adjustment

Using the adjusted age and height as inputs a new volume was calculated with VDYP. This new volume is compared to Phase 2 volume to determine the volume adjustment factor, which is simply a ratio of means between the Phase 2 and adjusted Phase 1 volume (See Table 4.5).

Table 4.5 Volume Adjustment Ratios

Stratum	Volume Adjustment Ratio
Balsam	1.0456
Cedar	1.3833
Hemlock	1.2310
Douglas-fir	1.3833
Spruce	0.9905

5.0 SAMPLING ERROR

5.1 Sampling Error

Table 5.1 shows the sampling error for each of the strata, which were calculated by Sam Otukol of the Ministry of Forests. As per ministry standards, the sampling error was calculated using the weighted ratios for the volume adjustment. The sampling error for height and age was determined without including the weighting.

Table 5.1 Sampling Error

Stratum	Height	Age	Volume
Balsam	22.9	27.9	47.5
Cedar	7.4	21.2	26.7
Hemlock	10.4	18.6	22.1
Other	22.3	36.7	48.1
Spruce	6.7	11.3	16.0
All strata	4.4	8.2	10.6

6.0 SUMMARY AND CONCLUSIONS

6.1 Summary

6.1.1 Adjustment Summary

Table 6.1 shows the weighted adjustments that have been applied to the inventory.

Table 6.1 Phase 2 Weighted Adjustment

Stratum	Height	Age	Volume
Balsam	1.0378	0.7919	1.0456
Cedar	0.9665	0.9918	1.3833
Hemlock	0.9057	1.1997	1.2310
Douglas-fir	0.9665	1.4871	1.3833
Spruce	0.9780	0.8080	0.9905

The adjustments have been applied to all stands in the strata that are over 40 years old.

6.1.2 Adjusted Inventory

Table 6.2 shows the inventory statistics after the adjustment for stands over the age 40.

Table 6.2 Adjusted Inventory Statistics

Strata	Area (ha)	Height (m)	Age (yrs)	Site Index (m)	Volume 2003 m ³ /ha
Balsam	3,477	23	150	13	224
Cedar	4,583	35	283	16	680
Hemlock	5,801	29	264	12	489
Other	2,225	27	169	15	387
Spruce	8,972	32	184	16	356
Totals	25,058	30	214	14	430

Table 6.3 shows the percent change in the inventory statistics after the adjustment.

Table 6.3 Adjusted versus Unadjusted Inventory Statistics

Strata	Area (ha)	Height (%)	Age (%)	Site Index (m)	Volume 2003 m ³ /ha
Adjusted Area	100%	96%	97%	97%	112%

6.2 Conclusions/Discussion

6.2.1 Age, Height, and Site Index

On average the age, height, and site index have decreased slightly but essentially remained almost unchanged. Height decreased 4 %, age decreased 3 % and site index decreased 3 %. The

adjustments applied to specific stratum were much more significant but on average the changes were minimal.

The site index is an indirect adjustment in that it is recalculated using VDYP following the age and height adjustment.

6.2.2 Volume Adjustment

The net increase in the total volume of the inventory is 12 %. There is a slight decrease in the stratum “Other” but a significant increase for the other stratum. The largest volume increase are found in the Cedar/Douglas-fir stratum (38%) and the Hemlock stratum (23%).

6.2.3 Implications

The increase in volume from the Phase 2 VRI adjustment is expected to introduce upward pressure on the short and mid term timber supply of TFL 55.

7.0 SAMPLING PLAN

The original VRI ground sample inventory project implementation plan (VPIP) is appended below.

8.0 REFERENCES

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Appendix 1 - VRI Ground Sampling Report