



TFL 52 Change Monitoring Inventory Plot Analysis – Final Report

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Executive Summary

Twenty four Inventory Monitoring plots were established randomly in West Fraser's Mills Ltd TFL 52 second growth stands in 2001 and remeasured in 2006. The growth and yield monitoring program's goals were to: "to provide a high level-of-comfort that growth and yield (GY) estimates used in timber supply analyses adequately reflect the actual GY of trees and post-harvest regenerated (PHR) stands on the TFL. The GYM program is designed to detect practically significant differences¹ between actual and predicted changes in key attributes; it does not explain why potential difference may exist. Thus, the GYM program functions as an early warning system to detect differences that may impact forest management on the TFL." (West Frazer Mill Ltd TFL 52 Growth and Yield Monitoring Sample Plan Third Year, May 29, 2003, J.S. Thrower and Associates.) Primary interest was in net volume growth compared to management plan growth projections. Secondary interest was second growth stand site index compared to expected values.

Data were compiled to VRI standards and MoFR site index equations were used to estimate site index.

Three plots showed a decrease in volume, all pine stands (two due to beetle infestation, one due to harvesting of residuals).

Site index was calculated for the primary species by basal area per plot. Total age was based on site tree dbh age and a years to breast height correction factor. For the SBS zone SI=22, age=31 years; for ESSF SI=21, age= 28 years. Yearly net volume growth averaged over the 5 years for stems 12.5 cm dbh+ was: ongrowth: 3.5 m³/ha/year; ingrowth: 0 m³/ha/year; mortality-standing: 1.1 m³/ha/year; mortality-down: 0.1 m³/ha/year. (Ongrowth is growth over the measurement period of live trees tallied at the starting measurement).

Growth on the plots was compared to yield table current (VDYP) and future (TIPSY) yield projections. Three plots apparently used residual trees for site index resulting in an older age. An attempt was made to correct these data. After this correction net volume growth (12.5 cm dbh) was insignificantly different to both management plan current and future yield tables. Future improvements would be to use establishment date to attach the yield tables rather than site index derived stand age. Overall site index measured was 2.3 m higher than expected from assigned yield table site indices than expected (21.2 m measured and 18.9 m expected): this general trend was consistent across all species although the small size of the data set is suggestive only and needs to be confirmed with a larger data set.

Some field measurement suggestions are made in the Appendix.

¹ Practically significant differences (as opposed to statistically significant differences) are defined as ones large enough to impact management decisions. Timber supply sensitivity analyses can be used to determine practically significant differences.

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Objective

To present analysis of West Fraser Mills Ltd Change Monitoring Inventory plots, to examine aspects relating to stand growth, implications for timber supply analysis and practical technical aspects.

The West Fraser Mills Ltd. growth and yield monitoring program's goals are: "to provide a high level-of-comfort that growth and yield (GY) estimates used in timber supply analyses adequately reflect the actual GY of trees and post-harvest regenerated (PHR) stands on the TFL. The GYM program is designed to detect practically significant differences² between actual and predicted changes in key attributes; it does not explain why potential difference may exist. Thus, the GYM program functions as an early warning system to detect differences that may impact forest management on the TFL." (West Fraser Mill Ltd TFL 52 Growth and Yield Monitoring Sample Plan Third Year, May 29, 2003, J.S. Thrower and Associates.) Primary interest was in net volume growth compared to management plan growth projections. Secondary interest was second growth stand site index compared to expected values.

Methods

Twenty-four random fixed area plots were established within managed portions of TFL 52 in 2001 and remeasured in 2006. The plots were part of the BC Vegetation Resource Inventory change monitoring program for which standards are still in development. There were some departures from CMI field standards for this study, notably in putting nails at breast height and in not using the 5.64 m radius plots to collect site index data. All standing stems ≥ 9 cm were measured in 11.28 m radius plots (0.04ha or 1/25th ha) while all standing stems ≥ 4 cm and < 9 cm were measured on 5.64 m radius plots (0.01 or 1/100th ha). Smaller stems and stumps are collected in 2.5 m radius plots and are not analysed here. Volume was compiled using Kozak V5. Total volume was compiled including tips and stumps. Merchantable volume was calculated as total volume minus 30 cm stump and 10 cm top. Cruiser call net factors (decay) were used to reduce merchantable volume to give net volume. Site index was calculated based on the major species for live stems > 12.5 cm dbh. Standard MoF curves were used based on Site Tools. BEC variant was determined using a BEC/plot overlay. Site index was based on the 11.48 m radius plot 'quadrant' site trees.

Note that cruise data was checked for any errors prior to any analysis, anomalies are noted and the corrections used can be found in the Appendix 1.

² Practically significant differences (as opposed to statistically significant differences) are defined as ones large enough to impact management decisions. Timber supply sensitivity analyses can be used to determine practically significant differences.

Results

Figure 1 shows site index versus age (mean 22 m at 50 years bh age, and mean age 30.5 years total age in 2006). For the SBS zone SI=22 m, age=31 years; for ESSF SI=21 m, age= 28 years. Figure 2 shows the distribution by species and biogeoclimatic zone. Figure 3 shows site index by species and biogeoclimatic variant while Figure 4 shows site index against both species and variant. Three plots (see Figure 1) were close to or older than 50 years- this will be discussed in later in relation to the timber supply yield tables. Figure 5 shows annual live tree merchantable growth by age. There were 3 plots with a net loss of volume, plots 1002, 1006 and 1012 (all leading pine at 4 cm dbh+). There were no field notes for plot 1002 suggesting any beetle kill; plot 1006 notes suggested 20% 'red attack', while plot 1012 had several trees cut due to adjacent logging. Plot 1012 data is shown in the site index graphs but is not included in any further volume analyses. Four plots were noted for beetle attack: 1006, 1007, 1009 and 1012. Table 1 shows site index data while Table 2 shows volume summary data.

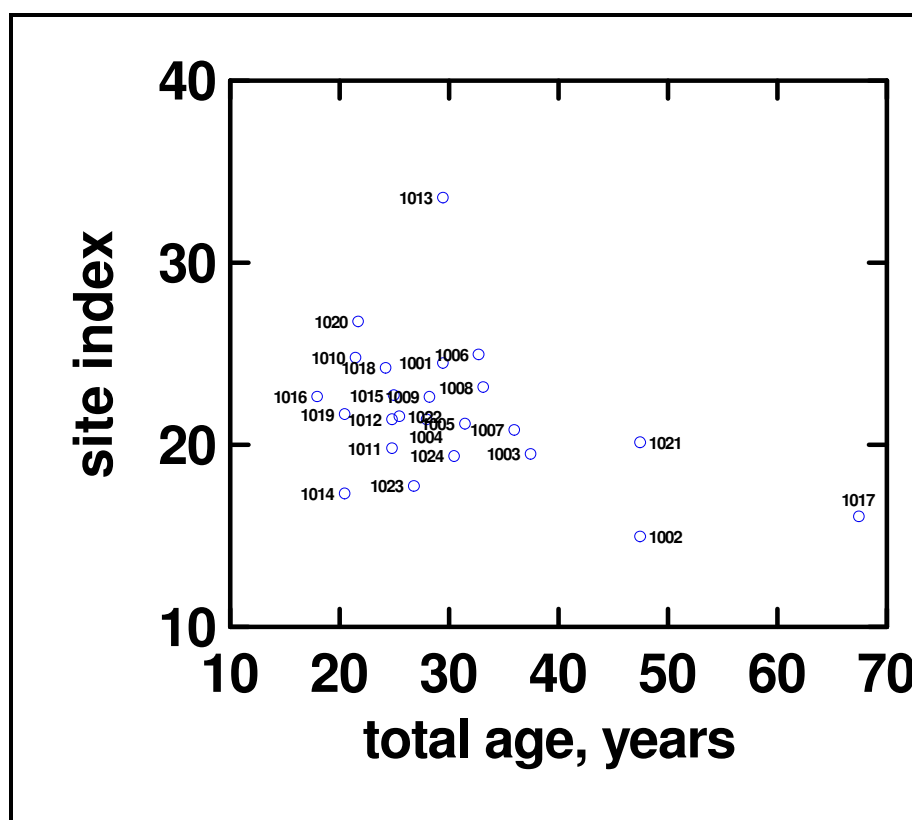


Figure 1: Plot site index versus total age (from site index and bh age corrections)

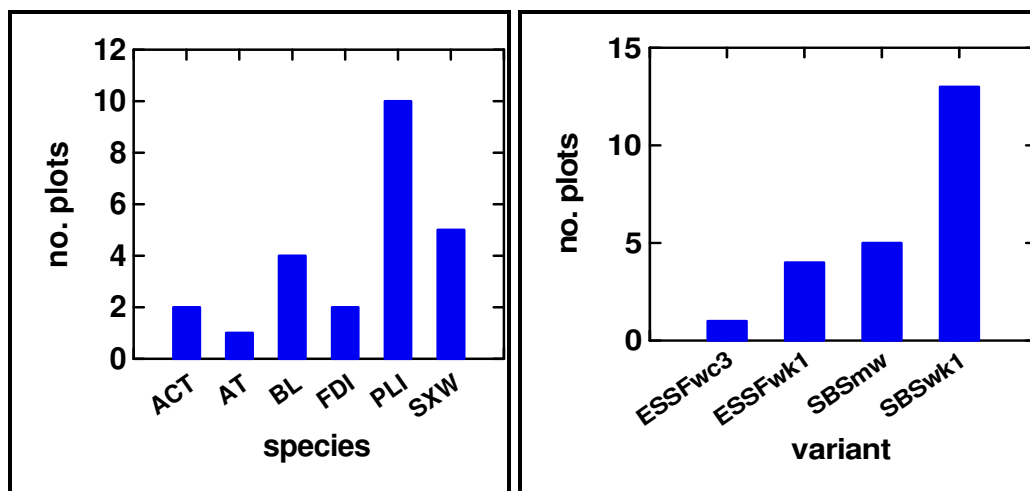


Figure 2: Leading species trees 12.5 cm dbh+ in 2006 and plots per BEC zone.

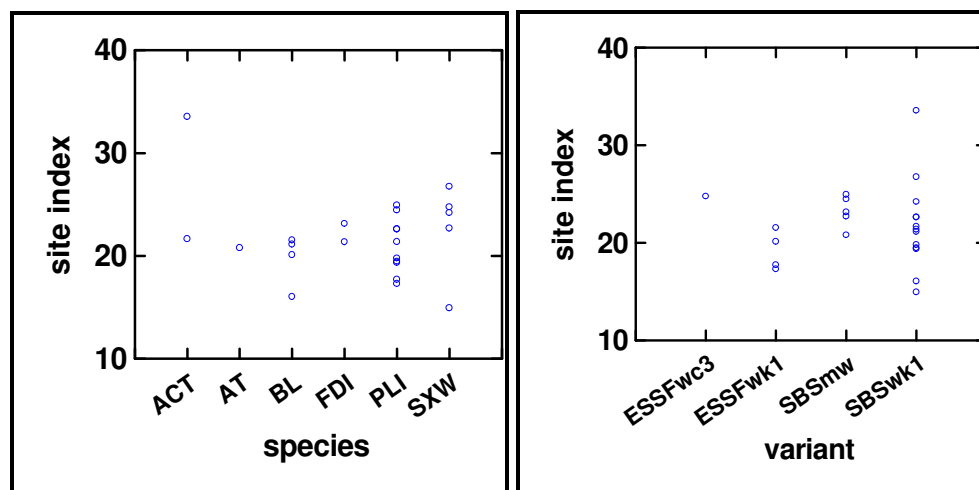


Figure 3: Site index by leading species (trees 12.5 cm dbh+) and biogeoclimatic variant in 2006.

Table 1. Site index data		
	2001	2006
height, m	9.9	11.3
site index	21.9	21.8
age, bh	18.1	23.1
age, total	25.5	30.5

height is top height, m

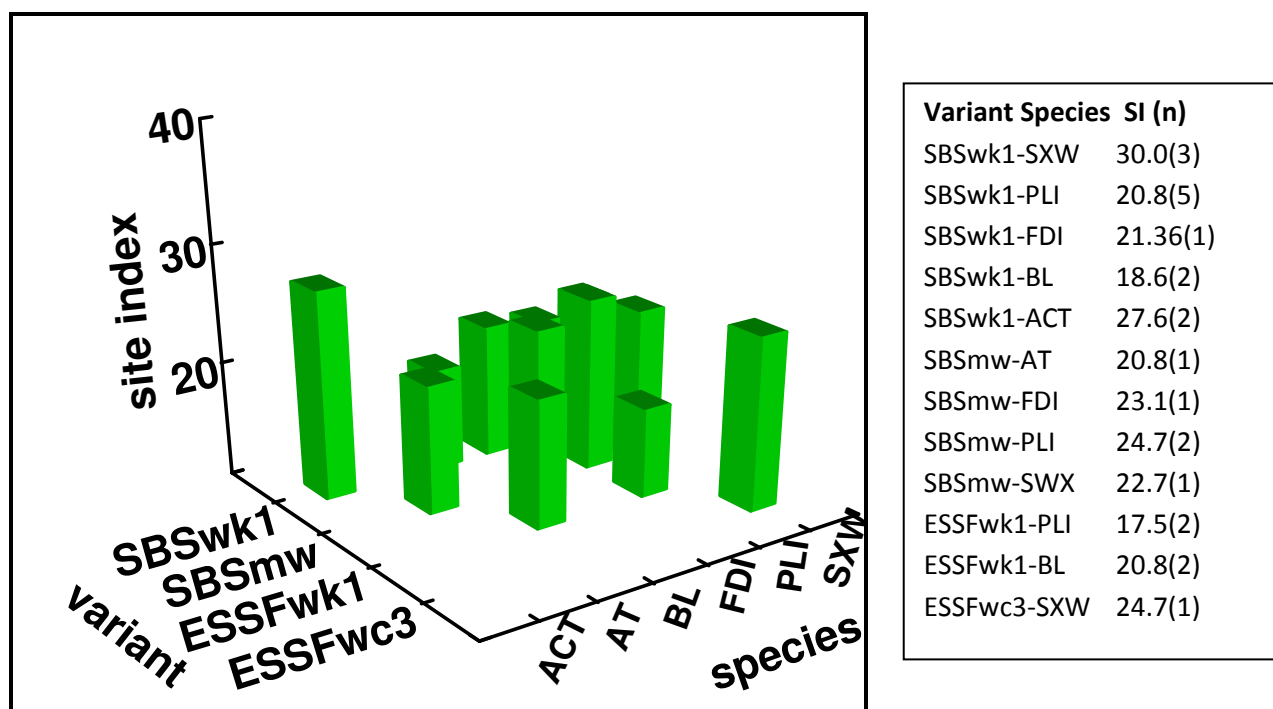


Figure 4: Site index by variant and species

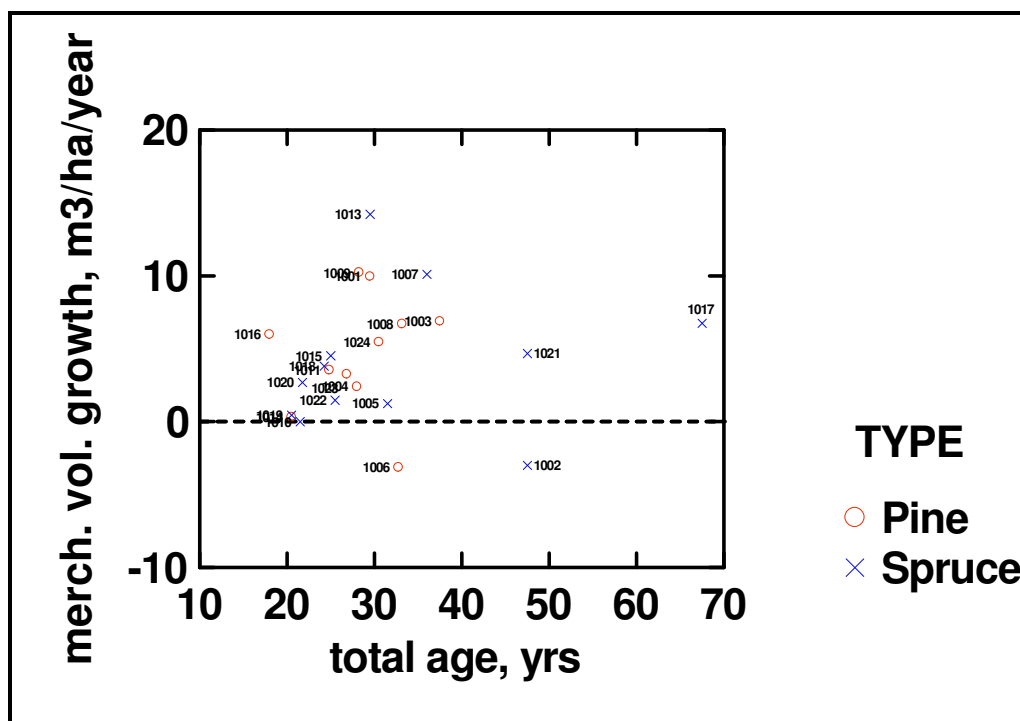


Figure 5: Annual live stem growth versus stand age. Pine includes pine and Douglas-fir, Spruce includes other species. Excludes plot 1012.

Table 2: Summary Volume Data (excludes plot 1012)									
	4cm dbh+			12cm dbh+			17.5cm dbh+		
variable	2001	2006	yearly	2001	2006	yearly	2001	2006	yearly
			change			change			change
basal area, m ² /ha	11.2	16.4	1.0	6.8	11.6	1.0	3.4	6.5	0.6
stems/ha	1295	1644	69.8	293	461	33.6	96	164	13.6
Quadratic diameter, cm	10.5	11.3	0.1	17.2	17.9	0.2	21.2	22.5	0.5
Tot Vol., m ³ /ha	48.8	75.1	5.3	35.2	61.1	5.2	18.6	37.4	3.8
Merch Vol., m ³ /ha	28.7	47.6	3.8	27.4	48.8	4.3	16.2	33.1	3.4
Net Vol., m ³ /ha	28.5	46	3.5	27.1	44.6	3.5	15.3	29.7	2.9
Ingrowth, m ³ /ha		2.5	0.5		0	0.0		0	0.0
*Dead standing, m ³ /ha		5.6	1.1		5.5	1.1		3.5	0.7
Dead down, m ³ /ha		0.8	0.2		0.7	0.1		0.65	0.1

Note Total, Merchantable and Net volume are for live stems and includes ingrowth volume. All comparisons between 2001 and 2006 were significantly different (paired t-tests, $p < 0.05$) volume. Total volume incl tips and stumps, merchantable volume excludes 10cm top and 30cm stump. Net volume is merchantable volume less cruiser-call net factor. Ingrowth and dead standing are net factored based on 2006 data while dead down is net factored based on 2001 data.

*Dead standing volume is almost exclusively due to mortality in two plots, 1002 and 1006.

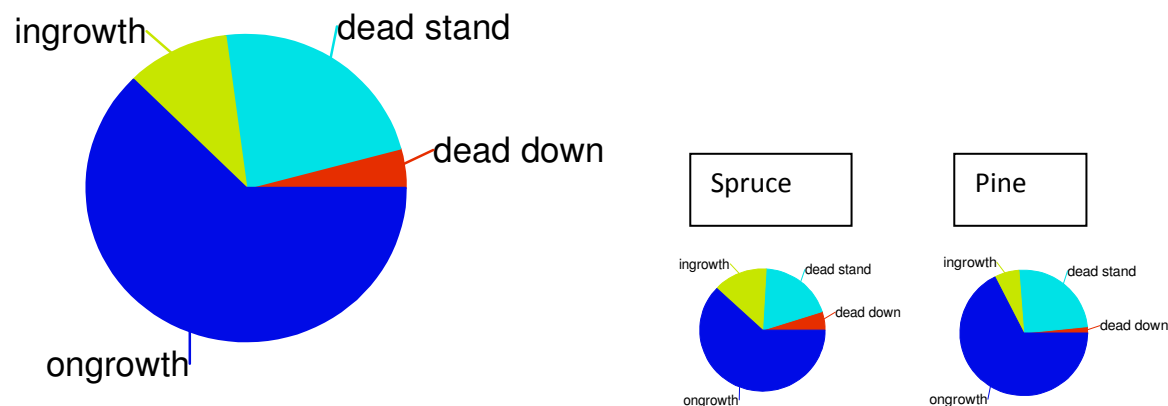


Figure 6: Component of growth for net volume, 4 cm dbh+ over the 5 year period, Numbers sum to 4.3 m³/ha/year (from Table 2, 4 cm dbh+). (All species is the larger pie chart) Ongrowth is the change in volume for trees alive in 2001, ingrowth is the volume of trees exceeding 4 cm after 2001, dead stand is the volume of trees alive in 2001 but dead standing in 2006 and dead down are trees alive in 2001 but dead and down in 2006. Pine types include pine and Douglas-fir, spruce types includes the remaining species. Dead standing volume is almost exclusively due to mortality in two plots, 1002 (spruce type) and 1006 (pine type).

Means volumes (12.5 cm +, m³/ha, see Table 2) at second measurement were total: 61, merchantable: 49 and net: 45. At 4 cm dbh+ net live stem growth for all plots was 3.5 m³/ha/year; net ingrowth was 0.5 m³/ha/year; standing merchantable mortality was 1.1 m³/ha/year and down mortality was 0.2 m³/ha/year (excluding plot 1012). There was more ingrowth in the spruce types and more dead down in the pine types. This was likely due to higher mountain pine beetle mortality.

Trees that were down on the second measurement were not measured so it was assumed they were dead down. It would be useful to actually record all tagged trees that are down to avoid any confusion. Similarly the ingrowth trees can usually be distinguished by tagging numbers: a code in the hand held program and one to record any 'missed' trees would ensure quality data.

Stems per ha 4 cm dbh+ increased from 1295 in 2001 to 1644 in 2007 (significant $p < 0.01$); basal area 4 cm dbh+ increased from 11.2 in 2001 to 16.4 m²/ha in 2006 (significant $p < 0.05$); at 12.5 cm dbh+ net volume increased from 27.1 m³/ha in 2001 to 44.6 m³/ha in 2006, over the same 5 years merchantable volume increased from 29 to 49 m³/ha and total volume increased from 49 to 75 m³/ha (Table 2).

The mean annual increment for total volume 4 cm dbh+ was 1.6 m³/ha/year at the first measurement and 2.1 m³/ha/year; for net volume the numbers were 0.9 m³/ha/year and 1.3 m³/ha/year, respectively. To examine current growth projections the management plan yield tables (current volume based on VDYP and future volumes based on TIPSy) were compared to the actual growth by matching the plot to the yield table used for that stand. See Figure 7.

Table 3. Comparing CMI and Yield Table Projections				
	Year	CMI Plot	Yield Table-Current	Yield Table-Future
Net Volume m ³ /ha	2001	27.1	31.3 ^{ns}	47.9 ^{ns}
	2006	44.5	45.6 ^{ns}	76.2*
Net Volume "adjusted" m ³ /ha	2001	27.1	11.78 ^{ns}	28.7 ^{ns}
	2006	44.5	24.5 ^{ns}	52.4 ^{ns}

Excludes 1012. 'adjusted ' are refits of site index to 1002,1017 and 1021 (older plots).

* indicates significantly different from CMI plots data. t-test, $p < 0.05$ compared to CMI data.

^{ns} indicates no significant difference, t-test $p < 0.05$ compared to CMI data.

Table 3 shows the average results of the CMI data and the associated yield tables. It appears that the field sampling procedure may have resulted in the selection of some residual trees for 3 of the plots, 1002, 1017 and 1021 (Figure 7). When fitted to the yield tables an apparent over prediction of yields, compared to actual CMI plot yields, resulted. Refitting the 3 plots (see Appendix 4) that may contain residual (veteran) trees gave a closer agreement between CMI plot and yield table yields and projections. See Table4 (Appendix 4), Figure 7, Figure 9 and Figure 10 (Appendix 4).

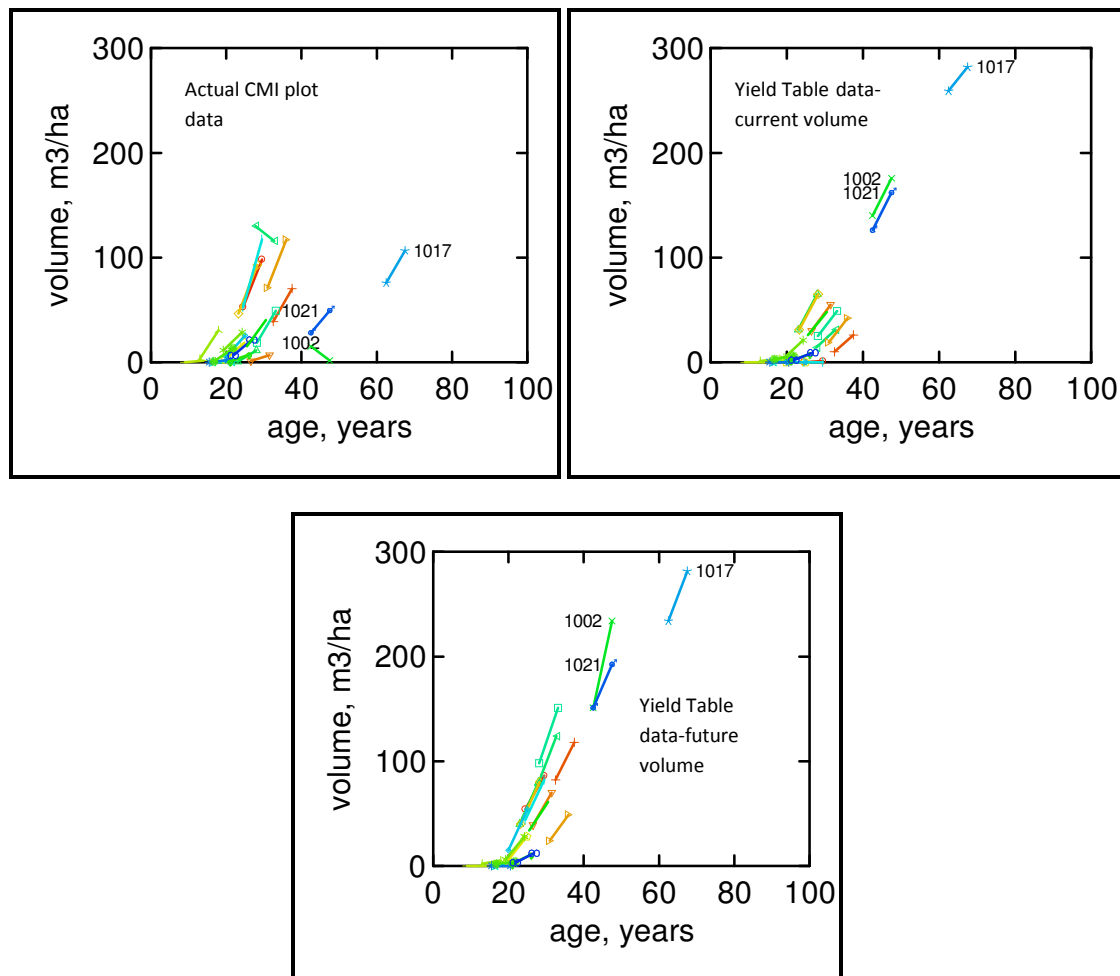


Figure 7: Projections using actual plot data (top left) and Management Plan 3 current growth projections (top right) using VDYP and Management Plan 3 future growth (bottom left) using TIPSy for the stand that the plot was in (ages were matched). Excludes plot 1012. Uses net volume.

The unadjusted CMI plot data are mid-way between the current and future yield table in 2001 and close to the current yields in 2006: statistically they are not significantly different from the current yield tables (VDYP) but were significantly different to the future volumes (TIPSy) in 2006 only. The “adjusted” CMI data (Appendix 4) was insignificantly different from both the current and future yield tables, although the data were closer to the future yield tables. A more conclusive test would be to obtain date of establishment from silvicultural records to determine stand age.

Site index estimates for the stands for attaching yield tables were provided by Timberline, called the “SIBEC” approach. Figure 8 shows a comparison. The mean estimated site index (“SIBEC”) was 18.9 m while the actual measured site index was 21.2 m, a difference of 2.3 m. The data were significantly different ($P < 0.01$, $t = 3.6$, $n = 21$). There were 21 observations (3 estimated site index values were missing for 1007, 1013 and 1019). There were not enough data to undertake a meaningful species comparison. However, the measured site index was higher compared to expected for BL and SXW than it was for PLI

(see Figure 8)³. For SBS actual site index was 21.6 m and estimated site index ("SIBEC") was 20.1 m, a difference of 1.5m, n=15; for the ESSF actual was 20.5 m and estimated was 15.8 m a difference of 4.7 m, n=6. Both these differences were significant at the 95% confidence level though both data sets are extremely small so that caution is advised in trying to extrapolate these findings.

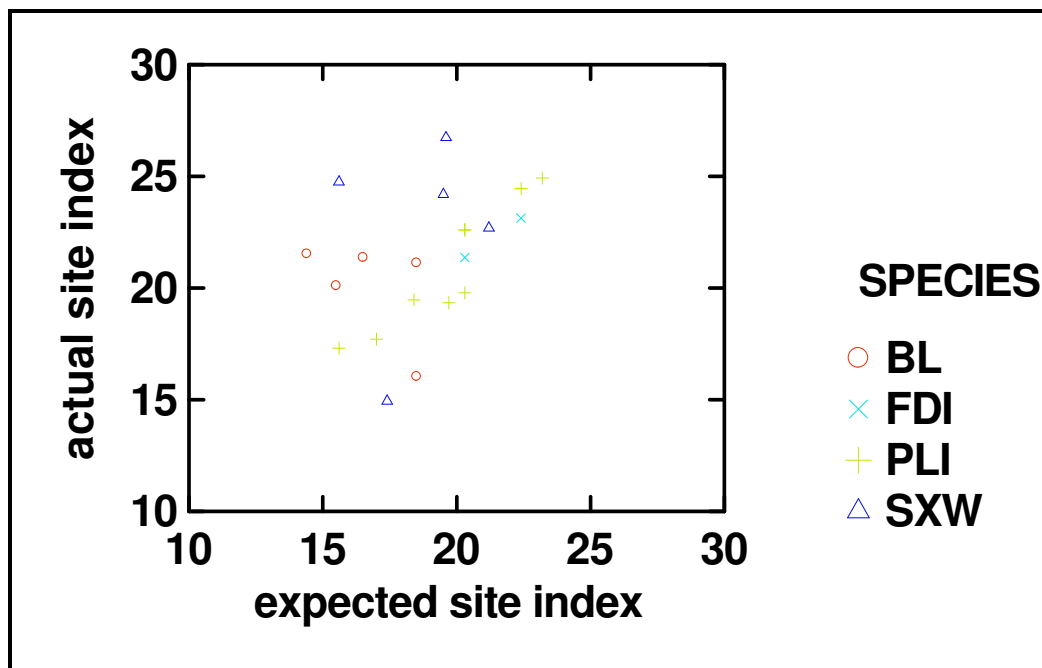


Figure 8: Comparison of actual site index versus expected site index ("SIBEC").

Some field sampling suggestions are in Appendix 4.3.

³ PLI actual 20.9, estimated 19.7, difference 1.2, n=9; SXW actual 22.7, estimated 18.7, difference 4, n=5; FDI actual 22.2, estimated 21.3, difference 0.9, n=2 and BL actual 20.0, estimated 16.7, difference 3.3, n=5.

Conclusions

This is the first remeasurement analysis of the Inventory Monitoring plots for West Fraser: as such some of the analyses are investigative rather than confirmatory. The stand composition was quite variable with several site species. Two stands had a significant net loss of volume while one was partly harvested. These data are highly variable and net merchantable volume is only just starting to be recorded. The sample size is also on the small side to enable conclusive tests to be undertaken. Several plots have zero volume assigned by the current or future yield model allocation. This high level of variability and small sample size made it difficult to discriminate statistically significant differences. It also serves as a caution not to expect to reach strong unequivocal conclusions on this first remeasurement. Nevertheless certain trends are evident. Plot growth appeared to partly confirm the allocated managed (TIPSY) yields (after adjustment for 3 plots with residual trees) although the data were not significantly different from the current (VDYP) yields either. In summary the early results from the growth data do not indicate any unexpected discrepancies with current allocation of yield tables for timber supply analysis. Note that this comparison is very sensitive to the assigned stand age: in this analysis stand age was based on site index trees rather than date of establishment which was not available. Overall site index measured was 2.3 m higher than expected from assigned yield table site indices than expected (21.2 m measured and 18.9 m expected): this general trend was consistent across all species although the small size of the data set is suggestive only and needs to be confirmed with a larger data set.

For a technical aspect it would be useful to examine the choice of site trees: generally a 5.64 m radius plot was not used instead trees were taken in multiple "quartered" sectors in a 0.04 ha plot. Choosing the largest trees in a sector quadrant may have meant that some residual trees were chosen. Similarly if a tree died and was down at second measurement then it was not recorded: it was assumed to be dead and down but may have been missed. A confirmation of ingrowth tag numbers in the comments file would ensure that no mistake are made when tallying ingrowth trees.

Appendices

Appendix 1 CMI Field Data Review Results

PLOT #	DATA YR	DATA YR	2001 CALL	2006 CALL	PROBLEM	COMMENTS	PROPOSED CHANGE
1001	2001	2006				NO POSITIVE INCREASES IN NET FACTORS,	N/A
1001	2001	2006	#105 DBH 4.4 HGT 8.6	#105 DBH 4.3 HGT 8.3		TREE IS NOT DEAD AND HAS NO BTP LISTED	LEAVE AS IS
1001	2001	2006	TREE 106 LISTED	NO TREE 106 LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	SHOULD HAVE A FIELD COMMENT OF DEAD FALLEN
1002	2001	2006				NO POSITIVE INCREASES IN NET FACTORS,	N/A
1002	2001	2006	385 SPECIES PLI	385 SPECIES BL			CHANGE TO 06 SPECIES
1002	2001	2006	401 DBH 5.0 HGT 3.6	401 DBH 4.7 HGT 3.1		TREE IS DEAD NOW BUT NO BTP LISTED	LEAVE AS IS
1002	2001	2006	414 LISTED	414 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	SHOULD HAVE A FIELD COMMENT OF DEAD FALLEN
1002	2001	2006	431 DBH 4.7 HGT 5.2	431 DBH 4.6 HGT 4.7		TREE IS DEAD NOW BUT NO BTP LISTED	LEAVE AS IS
1002	2001	2006	304 NOT LISTED	304 LISTED		COULD BE INGROWTH BUT IS MISSING INFORMATION, OFFICE ADDED DATA IS ESTIMATED AND IS E FOR DBH CODE, -- FOR BARK %, E FOR HEIGHT CODE, P99-- FOR GRADE, 11110-- FOR WILDLIFE, 0 FOR DAMAGE , STEM MAP ?	CHANGE DATA AS ESTIMATED IN OFFICE TO REFLECT
1003	2001	2006				NO POSITIVE INCREASES IN NET FACTORS,	N/A
1003	2001	2006	494 DBH 4.8	494 DBH 4.7		LIVE TREE STILL DBH SHRUNK?	LEAVE AS IS
1003	2001	2006	540 DBH 14.7 HGT 9.9	540 DBH 9.3 HGT 9.7		LIVE TREE STILL, APPEARS DATA HAS BEEN DUPLICATED FROM TREE BEFORE THIS ONE #828 INGROWTH.	CHANGE DATA AS ESTIMATED IN OFFICE TO REFLECT
1004	2001	2006				NO POSITIVE INCREASES IN NET FACTORS,	N/A
	2001	2006	357 DBH 49.0	357 DBH 38.7		DEAD TREE DBH SHRUNK	LEAVE AS IS



PLOT #	DATA YR	DATA YR	2001 CALL	2006 CALL	PROBLEM	COMMENTS	PROPOSED CHANGE
	2001	2006	358 SPECIES BL	358 SPECIES FDI			CHANG TO 06 SPECIES
	2001	2006	359 SPECIES BL	359 SPECIES FDI			CHANGE TO 06 SPECIES
	2001	2006	356 LISTED	356 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
	2001	2006	363 SPECIES BL	363 SPECIES FDI			CHANGE TO 06 SPECIES
	2001	2006	365 LISTED	365 LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1005	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1006	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1007	2001	2006				NO NEGATIVE INCREASES IN NET FACTORS	N/A
	2001	2006	814 HGT 5.8	814 HGT 5.4		NOT BROKEN BUT IS AN ASPEN STAND	LEAVE AS IS
	2001	2006	817 HGT 13.7	817 HGT 13.6		NOT BROKEN BUT IS AN ASPEN STAND	LEAVE AS IS
	2001	2006	828 HGT 17.1	828 HGT 15.5		NOT BROKEN BUT IS AN ASPEN STAND	LEAVE AS IS
	2001	2006	836 DBH 13.3 HGT 15.1	836 DBH HGT 13.0		NOT BROKEN BUT IS AN ASPEN STAND	LEAVE AS IS
	2001	2006	837 HGT 15.7	837 HGT 15.1		NOT BROKEN BUT IS AN ASPEN STAND	LEAVE AS IS
	2001	2006	839		GRADE NOT RIGHT	CHANGE IN OFFICE TO R05-- N9900	CHANGE DATA AS ESTIMATED IN OFFICE TO REFLECT
	2001	2006	840 LISTED	840 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1008	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	989 DBH 18.9	989 DBH 18.7		POSSIBLY OVER A STUB THE FIRST TIME?	CHANGE DATA AS ESTIMATED IN OFFICE TO REFLECT
1009	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A

PLOT #	DATA YR	DATA YR	2001 CALL	2006 CALL	PROBLEM	COMMENTS	PROPOSED CHANGE
1010	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1011	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1012	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	292 HGT 9.6	292 HGT 8.5		?	LEAVE AS IS
	2001	2006	293 TO 297	TREES NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
	2001	2006	300 TO 303	TREES NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
	2001	2006	305 TO 308	TREES NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1013	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	270 SPECIES ACT	270 SPECIES AT		?	CHANGE TO 06 SPECIES
	2001	2006	282 TREE LISTED	282 TREE NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1014	2001	2006	322 NF% 84	322 NF%94		TREE IS 2.2M TALLER NOW- DON'T CHANGE	LEAVE AS IS
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1015	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	765,757,763,765,783 LISTED	765757763765783 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1016	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	37 LISTED	37 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	

PLOT #	DATA YR	DATA YR	2001 CALL	2006 CALL	PROBLEM	COMMENTS	PROPOSED CHANGE
1017	2001	2006	874 NF% 67	874 NF%91		LOG LENGTH WENT FROM 13 TO 5 , FROST CRACK LISTED WORKS OUT TO 91% SHOULD LEAVE AT 91%	LEAVE AS IS
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	
1018	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1019	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006				NO NEGATIVE CHANGES IN DBH OR HEIGHTS	N/A
1020	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	352 LISTED	352 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
	2001	2006	355 LISTED	355 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1021	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	450 HGT 6.0	450 HGT 5.6		BL NO BTP LISTED?	LEAVE AS IS
1022	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	488 LISTED	488 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	
1023	2001	2006	595 NF%98	595 NF%--		PATH HAS BEEN REMOVED	LEAVE AS IS
	2001	2006	599 NF%94	599 NF% --		PATH HAS BEEN REMOVED	LEAVE AS IS
1024	2001	2006				NO POSITIVE INCREASES IN NET FACTORS	N/A
	2001	2006	544,555,560 LISTED	544,555,560 NOT LISTED		ALL DEAD STANDING OVER 4CM SHOULD BE MEASURED, MAY BE DEAD DOWN	

Appendix 2 Compilation Summary Results

Plot No.	Measurement Date	2001 4.0cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2001JUL24	1400.7	19.39	97.6	61.82	61.78	0	0	0	0	0	0	0	0	0	0	0	0
1002	2001AUG07	3025.9	21.07	76.96	20.73	20.02	0	0	0	0	0	0	0	0	0	0	0	0
1003	2001AUG16	3550.8	25.93	117.05	47.56	47.53	0	0	0	0	0	0	0	0	0	0	0	0
1004	2001AUG06	450.1	2.22	4.68	0.53	0.53	0	0	0	0	25	4.72	1.7	0.98	0	0	0	0
1005	2001AUG17	950.1	3.99	10.84	1.88	1.88	0	0	0	0	25	3.55	1.51	0.92	0	0	0	0
1006	2001JUL17	1451	28.57	190.73	146.07	145.98	0	0	0	0	275.1	3.96	5.81	2.97	0	0	0	0
1007	2001JUL20	975.6	17.75	107.93	79.43	79.38	0	0	0	0	0	0	0	0	0	0	0	0
1008	2001JUL18	725.4	10.32	37.92	20.82	20.81	0	0	0	0	0	0	0	0	0	0	0	0
1009	2001JUL31	1400.5	17.98	80.94	53.34	53.30	0	0	0	0	0	0	0	0	0	0	0	0
1010	2001AUG05	1900	3.86	6.89	0	0.00	0	0	0	0	50	4.37	2.03	1.18	0	0	0	0
1011	2001JUL22	1200.3	6.94	17.13	3.29	3.29	0	0	0	0	0	0	0	0	0	0	0	0
1012	2001AUG02	575.3	12.23	70.81	59.87	59.83	0	0	0	0	75.1	9.87	20.35	17.74	0	0	0	0
1013	2001AUG02	900.3	14.52	75.15	58.33	58.28	0	0	0	0	0	0	0	0	0	0	0	0
1014	2001AUG04	600	1.65	3.11	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1015	2001JUL19	2225.4	9.72	27.06	6.41	6.41	0	0	0	0	675.2	7.84	15.13	4.41	0	0	0	0
1016	2001JUL23	1275.5	9.83	28.76	5.44	5.43	0	0	0	0	0	0	0	0	0	0	0	0
1017	2001JUL21	1950.5	23.12	112.42	84.56	82.24	0	0	0	0	0	0	0	0	0	0	0	0
1018	2001AUG03	250.2	5.12	18.46	13.01	13.00	0	0	0	0	0	0	0	0	0	0	0	0
1019	2001AUG01	1200	2.62	4.63	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1020	2001AUG05	475.1	1.82	3.33	0.9	0.89	0	0	0	0	0	0	0	0	0	0	0	0
1021	2001AUG14	1100.3	11.5	46.62	30.91	30.75	0	0	0	0	25	4.3	1.78	1.07	0	0	0	0
1022	2001AUG19	750.1	3.05	6.69	0.5	0.50	0	0	0	0	0	0	0	0	0	0	0	0
1023	2001AUG18	1250.3	8.18	20.41	7.24	7.24	0	0	0	0	0	0	0	0	0	0	0	0
1024	2001AUG17	775.3	8.28	26.23	17.24	17.23	0	0	0	0	25	0.19	0.38	0	0	0	0	0

Plot No.	Measurement Date	2001 12.5cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2001JUL24	675.5	14.72	76.45	57.65	57.61	0	0	0	0	0	0	0	0	0	0	0	0
1002	2001AUG07	475.3	7.65	28.13	16.59	16.02	0	0	0	0	0	0	0	0	0	0	0	0
1003	2001AUG16	600.4	11.93	58.17	42.53	42.50	0	0	0	0	0	0	0	0	0	0	0	0
1004	2001AUG06	50	0.66	1.59	0.36	0.53	0	0	0	0	25	4.72	1.7	0.98	0	0	0	0
1005	2001AUG17	25	0.44	1.62	1.13	1.13	0	0	0	0	25	3.55	1.51	0.92	0	0	0	0
1006	2001JUL17	1275.9	26.84	180.34	142.63	142.54	0	0	0	0	50	2.93	3.69	2.93	0	0	0	0
1007	2001JUL20	675.5	15.56	99.1	77.78	77.72	0	0	0	0	0	0	0	0	0	0	0	0
1008	2001JUL18	325.2	7.35	29.18	20.36	20.35	0	0	0	0	0	0	0	0	0	0	0	0
1009	2001JUL31	575.4	13.54	65.04	50.74	47.64	0	0	0	0	0	0	0	0	0	0	0	0
1010	2001AUG05	0	0	0	0	0.00	0	0	0	0	50	4.37	2.03	1.18	0	0	0	0
1011	2001JUL22	100.1	1.63	5.03	2.81	2.81	0	0	0	0	0	0	0	0	0	0	0	0
1012	2001AUG02	250.2	10.54	66.8	59.48	59.44	0	0	0	0	75.1	9.87	20.35	17.74	0	0	0	0
1013	2001AUG02	325.2	11.39	66.49	57.58	57.55	0	0	0	0	0	0	0	0	0	0	0	0
1014	2001AUG04	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1015	2001JUL19	50	1.53	6.88	5.58	5.57	0	0	0	0	75.1	4.48	4.77	2.92	0	0	0	0
1016	2001JUL23	175.1	2.43	7.68	3.49	3.49	0	0	0	0	0	0	0	0	0	0	0	0
1017	2001JUL21	500.3	17.34	95.96	83	80.68	0	0	0	0	0	0	0	0	0	0	0	0
1018	2001AUG03	150.1	4.14	15.66	12.41	12.40	0	0	0	0	0	0	0	0	0	0	0	0
1019	2001AUG01	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1020	2001AUG05	25	0.59	1.32	0.9	0.89	0	0	0	0	0	0	0	0	0	0	0	0
1021	2001AUG14	250.2	7.94	36.78	30.69	30.52	0	0	0	0	25	4.3	1.78	1.07	0	0	0	0
1022	2001AUG19	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1023	2001AUG18	225.2	4.2	11.3	6.98	6.98	0	0	0	0	0	0	0	0	0	0	0	0
1024	2001AUG17	275.2	6.56	22.24	16.79	16.77	0	0	0	0	0	0	0	0	0	0	0	0

Plot No.	Measurement Date	2001 17.5cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2001JUL24	225.2	6.97	36.73	31.45	31.43	0	0	0	0	0	0	0	0	0	0	0	0
1002	2001AUG07	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1003	2001AUG16	150.1	4.41	22.41	18.94	18.93	0	0	0	0	0	0	0	0	0	0	0	0
1004	2001AUG06	0	0	0	0	0.00	0	0	0	0	25	4.72	1.7	0.98	0	0	0	0
1005	2001AUG17	0	0	0	0	0.00	0	0	0	0	25	3.55	1.51	0.92	0	0	0	0
1006	2001JUL17	400.3	11.15	75.95	65.35	56.24	0	0	0	0	50	2.93	3.69	2.93	0	0	0	0
1007	2001JUL20	75.1	4.55	31.11	28.55	28.53	0	0	0	0	0	0	0	0	0	0	0	0
1008	2001JUL18	125.1	3.7	15.32	12.29	9.64	0	0	0	0	0	0	0	0	0	0	0	0
1009	2001JUL31	325.2	9.48	46.38	38.96	35.87	0	0	0	0	0	0	0	0	0	0	0	0
1010	2001AUG05	0	0	0	0	0.00	0	0	0	0	25	3.98	1.85	1.14	0	0	0	0
1011	2001JUL22	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1012	2001AUG02	200.1	9.65	63.76	57.62	57.59	0	0	0	0	75.1	9.87	20.35	17.74	0	0	0	0
1013	2001AUG02	225.2	9.67	59.68	53.27	51.54	0	0	0	0	0	0	0	0	0	0	0	0
1014	2001AUG04	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1015	2001JUL19	25	1.17	5.52	4.91	4.91	0	0	0	0	25	3.65	1.78	1.21	0	0	0	0
1016	2001JUL23	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1017	2001JUL21	300.2	14.18	83.35	74.88	72.59	0	0	0	0	0	0	0	0	0	0	0	0
1018	2001AUG03	100.1	3.14	11.78	9.62	9.61	0	0	0	0	0	0	0	0	0	0	0	0
1019	2001AUG01	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1020	2001AUG05	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1021	2001AUG14	100.1	5.25	26.07	23.24	23.08	0	0	0	0	25	4.3	1.78	1.07	0	0	0	0
1022	2001AUG19	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1023	2001AUG18	25	0.7	1.84	1.34	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1024	2001AUG17	125.1	3.57	12.51	10.07	10.06	0	0	0	0	0	0	0	0	0	0	0	0

Plot No.	Measurement Date	2006 4.0cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2006OCT21	1650.8	25.86	152.43	110.73	110.6543	0	0	0	0	0	0	0	0	350	1.42	5.43	0
1002	2006OCT22	1125.1	5.52	22.53	2.2	2.201525	1575.9	19.46	90.44	49.06	0	0	0	0	100	0.53	2.71	0
1003	2006OCT01	3801	30.67	160.91	80.16	80.10635	0	0	0	0	0	0	0	0	475.1	2.07	8.65	2.41
1004	2006OCT16	1550.2	9.53	23.17	9.21	9.203075	0	0	0	0	25	2.94	1.09	0.62	1225.2	5.72	12.61	3.42
1005	2006OCT19	1400.3	7.82	26.17	8.97	8.959875	0	0	0	0	25	3.63	1.03	0.58	750.2	3.11	9.6	1.32
1006	2006OCT20	950.6	20.31	156.53	126.96	92.94573	425.3	12.12	92.03	79.84	0	0	0	0	0	0	0	0
1007	2006OCT16	1125.6	22.04	142.98	112.79	112.7105	25	0.41	0.67	0.29	0	0	0	0	200.1	3.04	19.7	15.99
1008	2006OCT24	875.5	16.63	75.63	53.65	53.61655	0	0	0	0	0	0	0	0	150	0.7	2.7	0.78
1009	2006OCT17	1475.6	24.62	136.51	102.79	102.7218	0	0	0	0	0	0	0	0	150	0.63	1.79	0
1010	2006OCT17	3750.4	15.13	40.24	0.74	0.737875	0	0	0	0	50	4.42	2.05	1.19	2375.3	7.71	20.35	0.64
1011	2006OCT19	1600.7	15.93	48.21	20.64	20.62385	0	0	0	0	0	0	0	0	775.3	5.97	15.63	3
1012	2006OCT21	350.2	4.34	12.03	6.17	6.164875	0	0	0	0	0	0	0	0	200.1	2.15	3.9	1.01
1013	2006OCT20	925.4	21.62	136.17	116.33	116.0423	0	0	0	0	0	0	0	0	425.2	4.99	19.06	12.61
1014	2006OCT30	1475.3	7.33	17.48	2.13	2.1246	0	0	0	0	0	0	0	0	1250.2	5.86	13.48	1.54
1015	2006OCT22	2475.7	20.16	71.03	28.74	28.71648	0	0	0	0	0	0	0	0	625.3	4.56	16.88	5.05
1016	2006OCT17	1250.8	16.47	64.41	34.64	34.61958	0	0	0	0	0	0	0	0	375.2	2.55	8.93	0.96
1017	2006OCT18	2275.7	30.99	158.39	117.98	116.3835	0	0	0	0	0	0	0	0	475.1	2.37	7.12	1.21
1018	2006OCT17	725.2	9.74	40.26	31.04	29.82383	25	0.31	1.07	0.4	0	0	0	0	500.1	1.77	4.11	0.44
1019	2006OCT20	2125.2	8.06	18.1	1.66	1.65765	0	0	0	0	0	0	0	0	1225.2	3.66	8.08	0.76
1020	2006OCT18	1600.3	10.5	25.93	8.57	8.568275	0	0	0	0	0	0	0	0	1400.3	8.39	20.55	6.71
1021	2006OCT21	1325.4	17.34	77.56	55.74	55.08055	0	0	0	0	25	4.41	1.96	1.21	450.1	1.72	5.49	0.73
1022	2006OCT21	1175.5	9.72	29.45	8.53	8.52065	0	0	0	0	0	0	0	0	775.4	5.79	17.44	3.9
1023	2006OCT20	1775.5	15.92	48.73	24.2	24.1851	0	0	0	0	0	0	0	0	675.1	2.56	6.24	1.07
1024	2006OCT19	1375.3	14.1	55.2	37.37	37.00355	0	0	0	0	25	0.19	0.4	0	750.1	4.1	15.36	7.27

Plot No.	Measurement Date	2006 12.5cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2006OCT21	900.6	21.93	133.91	107.45	107.37	0	0	0	0	0	0	0	0	0	0	0	0
1002	2006OCT22	50	0.69	2.9	1.63	0.62	775.5	14.13	65.62	45.12	0	0	0	0	0	0	0	0
1003	2006OCT01	875.6	17.93	101.69	76.97	75.01	0	0	0	0	0	0	0	0	0	0	0	0
1004	2006OCT16	250.2	5.96	17.64	12.34	8.98	0	0	0	0	25	2.94	1.09	0.62	0	0	0	0
1005	2006OCT19	175.1	2.89	11.83	7.31	6.89	0	0	0	0	25	3.63	1.03	0.58	0	0	0	0
1006	2006OCT20	925.6	20.14	155.42	126.96	92.95	400.3	11.95	91.05	79.84	0	0	0	0	0	0	0	0
1007	2006OCT16	825.6	22.76	153.95	128.27	109.48	25	0.41	0.67	0.29	0	0	0	0	0	0	0	0
1008	2006OCT24	575.4	14.97	70.31	53.87	53.06	0	0	0	0	0	0	0	0	0	0	0	0
1009	2006OCT17	750.5	20.92	121.88	101.86	101.79	0	0	0	0	0	0	0	0	0	0	0	0
1010	2006OCT17	0	0	0	0	0.00	0	0	0	0	50	4.42	2.05	1.19	0	0	0	0
1011	2006OCT19	625.4	10.37	34.77	20.51	18.58	0	0	0	0	0	0	0	0	0	0	0	0
1012	2006OCT21	75.1	2.15	6.26	4.93	4.93	0	0	0	0	0	0	0	0	25	1.08	0.67	0.4
1013	2006OCT20	500.3	22.51	143.34	128.65	115.85	0	0	0	0	0	0	0	0	0	0	0	0
1014	2006OCT30	100.1	1.62	3.42	1.53	0.76	0	0	0	0	0	0	0	0	0	0	0	0
1015	2006OCT22	500.3	9.8	42.03	28.18	28.72	0	0	0	0	0	0	0	0	0	0	0	0
1016	2006OCT17	750.5	12.95	51.57	33.39	33.00	0	0	0	0	0	0	0	0	0	0	0	0
1017	2006OCT18	700.5	24.04	135.13	116.76	114.20	0	0	0	0	0	0	0	0	0	0	0	0
1018	2006OCT17	275.2	8.58	38.27	31.41	29.79	25	0.31	1.07	0.4	0	0	0	0	0	0	0	0
1019	2006OCT20	125.1	1.78	5.13	2.24	1.45	0	0	0	0	0	0	0	0	0	0	0	0
1020	2006OCT18	275.2	6.9	19.97	14.37	7.43	0	0	0	0	0	0	0	0	0	0	0	0
1021	2006OCT21	350.2	12.67	63.15	54.08	53.43	0	0	0	0	25	4.41	1.96	1.21	0	0	0	0
1022	2006OCT21	175.1	3.32	10.73	7.36	5.84	0	0	0	0	0	0	0	0	0	0	0	0
1023	2006OCT20	475.3	10.48	33.69	23.25	22.86	0	0	0	0	0	0	0	0	0	0	0	0
1024	2006OCT19	425.3	12.69	53.96	44.08	36.52	0	0	0	0	0	0	0	0	0	0	0	0

Plot No.	Measurement Date	2006 17.5cm dbh+																
		Live					Mortality				Dead				Ingrowth			
		Stems	Basal Area	Tot Vol.	Merch Vol.	Net Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2006OCT21	400.3	13.68	84.46	73.99	70.78	0	0	0	0	0	0	0	0	0	0	0	0
1002	2006OCT22	0	0	0	0	0.00	100.1	2.62	11.86	9.64	0	0	0	0	0	0	0	0
1003	2006OCT01	175.1	5.76	34.58	30.17	26.43	0	0	0	0	0	0	0	0	0	0	0	0
1004	2006OCT16	100.1	3.07	9.4	7.32	3.47	0	0	0	0	25	2.94	1.09	0.62	0	0	0	0
1005	2006OCT19	25	0.64	2.91	2.37	2.37	0	0	0	0	25	3.63	1.03	0.58	0	0	0	0
1006	2006OCT20	350.2	9.88	78.21	68.31	54.59	325.2	10.42	79.63	70.64	0	0	0	0	0	0	0	0
1007	2006OCT16	250.2	12.11	86.35	78.32	58.44	0	0	0	0	0	0	0	0	0	0	0	0
1008	2006OCT24	275.2	9.89	49.02	41.93	38.60	0	0	0	0	0	0	0	0	0	0	0	0
1009	2006OCT17	425.3	15.27	89.69	79	78.95	0	0	0	0	0	0	0	0	0	0	0	0
1010	2006OCT17	0	0	0	0	0.00	0	0	0	0	25	4.07	1.89	1.17	0	0	0	0
1011	2006OCT19	50	1.59	6.05	5.04	5.04	0	0	0	0	0	0	0	0	0	0	0	0
1012	2006OCT21	50	1.67	5.7	4.64	4.64	0	0	0	0	0	0	0	0	25	1.08	0.67	0.4
1013	2006OCT20	350.2	19.7	130.67	119.78	108.57	0	0	0	0	0	0	0	0	0	0	0	0
1014	2006OCT30	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1015	2006OCT22	50	2.25	10.95	9.65	9.64	0	0	0	0	0	0	0	0	0	0	0	0
1016	2006OCT17	25	0.64	2.89	2.34	2.34	0	0	0	0	0	0	0	0	0	0	0	0
1017	2006OCT18	375.3	18.59	115.24	104.07	102.62	0	0	0	0	0	0	0	0	0	0	0	0
1018	2006OCT17	150.1	6.79	31.91	28.05	26.83	0	0	0	0	0	0	0	0	0	0	0	0
1019	2006OCT20	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1020	2006OCT18	125.1	4.22	12.84	10.2	5.96	0	0	0	0	0	0	0	0	0	0	0	0
1021	2006OCT21	200.1	9.93	51.81	46.08	45.43	0	0	0	0	25	4.41	1.96	1.21	0	0	0	0
1022	2006OCT21	25	0.7	2.05	1.58	1.58	0	0	0	0	0	0	0	0	0	0	0	0
1023	2006OCT20	175.1	5.79	18.54	14.85	14.84	0	0	0	0	0	0	0	0	0	0	0	0
1024	2006OCT19	250.2	9.66	42.77	37.04	27.13	0	0	0	0	0	0	0	0	0	0	0	0

Plot No.	Measurement Date	4.0 cm+				% live->dead	12.5 cm+				17.5cm+			
		Stems	Basal Area	Tot Vol.	Merch Vol.		Stems	Basal Area	Tot Vol.	Merch Vol.	Stems	Basal Area	Tot Vol.	Merch Vol.
1001	2006OCT21	100	0.13	0.3	0	100	0	0	0	0	0	0	0	0
1002	2006OCT22	125	0.4	1.57	0.35	100	0	0	0	0	0	0	0	0
1003	2006OCT01	0	0	0	0	100	0	0	0	0	0	0	0	0
1004	2006OCT16	50	0.49	1.13	0.17	100	0	0	0	0	0	0	0	0
1005	2006OCT19	0	0	0	0	100	0	0	0	0	0	0	0	0
1006	2006OCT20	75.1	0.8	4.76	1.58	79	0	0	0	0	0	0	0	0
1007	2006OCT16	25	1.83	12.67	11.77	100	25	1.83	12.67	11.77	25	1.83	12.67	11.77
1008	2006OCT24	0	0	0	0	100	0	0	0	0	0	0	0	0
1009	2006OCT17	0	0	0	0	100	0	0	0	0	0	0	0	0
1010	2006OCT17	0	0	0	0	100	0	0	0	0	0	0	0	0
1011	2006OCT19	0	0	0	0	100	0	0	0	0	0	0	0	0
1012	2006OCT21	250.2	9.73	64	56.6	75	200.1	9.34	62.81	56.53	175.1	9.02	61.31	55.7
1013	2006OCT20	325.1	3.34	10.64	5.54	100	75.1	2.03	6.67	5.04	50	1.51	4.78	3.72
1014	2006OCT30	0	0	0	0	100	0	0	0	0	0	0	0	0
1015	2006OCT22	0	0	0	0	0	0	0	0	0	0	0	0	0
1016	2006OCT17	25	0.22	0.6	0.02	100	0	0	0	0	0	0	0	0
1017	2006OCT18	0	0	0	0	100	0	0	0	0	0	0	0	0
1018	2006OCT17	0	0	0	0	100	0	0	0	0	0	0	0	0
1019	2006OCT20	0	0	0	0	100	0	0	0	0	0	0	0	0
1020	2006OCT18	50	0.81	1.78	0.9	100	25	0.59	1.32	0.9	0	0	0	0
1021	2006OCT21	0	0	0	0	100	0	0	0	0	0	0	0	0
1022	2006OCT21	125	0.43	0.97	0	100	0	0	0	0	0	0	0	0
1023	2006OCT20	0	0	0	0	100	0	0	0	0	0	0	0	0
1024	2006OCT19	75.1	1.32	4.79	3.31	100	25	0.87	3.81	3.26	25	0.87	3.81	3.26

Down at second measurement (tree not recorded at second measurement).

Plot No.	Measurement Date	species composition 4cm+												
		Meas no. 1							Meas. No. 2					
		Pri. Species	Pri. Sp. %	Sec. Species	Sec. Sp. %	Ter. Sp. Code	Ter. Species	Ter. Sp. %	Pri. Species	Pri. Sp. %	Sec. Species	Sec. Sp. %	Ter. Species	Ter. Sp. %
1001	2006OCT21	Pl	76	Ac	14	15	S	10	Pl	74.186	Ac	16	S	10
1002	2006OCT22	Pl	95	B	3	15	S	2	Pl	55.525	B	28	S	17
1003	2006OCT01	Pl	89	S	10	3	B	1	Pl	87.988	S	11	B	1
1004	2006OCT16	F	51	S	49	0		0	F	64.881	S	35		0
1005	2006OCT19	B	75	S	17	12	Pl	9	B	69.253	S	21	Pl	10
1006	2006OCT20	Pl	97	At	3	0		0	Pl	94.3	At	6		0
1007	2006OCT16	At	50	B	39	15	S	10	At	50.448	B	37	S	11
1008	2006OCT24	F	75	Ac	25	0		0	F	77.114	Ac	23		0
1009	2006OCT17	Pl	93	B	4	15	S	3	Pl	91.904	B	4	S	4
1010	2006OCT17	S	95	B	5	0		0	S	94.738	B	5		0
1011	2006OCT19	Pl	69	S	23	7	F	4	Pl	63.33	S	28	F	5
1012	2006OCT21	B	81	S	12	12	Pl	7	Pl	34.961	B	33	S	24
1013	2006OCT20	Ac	61	S	30	12	Pl	6	Ac	77.801	S	16	At	3
1014	2006OCT30	S	73	B	27	0		0	S	76.93	B	23		0
1015	2006OCT22	S	55	At	39	1	Ac	4	S	59.18	At	35	Ac	3
1016	2006OCT17	Pl	75	S	15	3	B	7	Pl	70.963	S	19	B	7
1017	2006OCT18	B	85	S	13	1	Ac	2	B	83	S	15	Ac	2
1018	2006OCT17	S	37	Pl	31	1	Ac	18	S	40.351	Pl	26	Ac	21
1019	2006OCT20	Ac	46	S	36	2	At	18	Ac	55.361	S	30	At	15
1020	2006OCT18	S	100		0	0		0	S	100		0		0
1021	2006OCT21	B	72	S	28	0		0	B	63.512	S	36		0
1022	2006OCT21	B	59	S	41	0		0	B	59.042	S	41		0
1023	2006OCT20	Pl	60	B	39	15	S	1	Pl	59.778	B	38	S	2
1024	2006OCT19	Pl	74	S	24	3	B	1.845	Pl	69.344	S	28	B	3

Plot No.	Measurement Date	species composition 12.5cm+										
		Meas no. 1					Meas. No. 2					
		Sec. Spec ies	Sec. Sp. %	Ter. Sp. Code	Ter. Species	Ter. Sp. %	Pri. Species	Pri. Sp. %	Sec. Species	Sec. Sp. %	Ter. Species	Ter. Sp. %
1001	2006OCT21	Ac	14	15	S	10	PLI	75.285	AC	16.104	SXW	8.611
1002	2006OCT22	B	3	15	S	2	SXW	55.642	BL	44.358		0
1003	2006OCT01	S	10	3	B	1	PLI	95.509	SXW	4.491		0
1004	2006OCT16	S	49	0		0	FDI	78.909	SXW	21.091		0
1005	2006OCT19	S	17	12	PI	9	BL	83.287	PLO	16.713		0
1006	2006OCT20	At	3	0		0	PLI	94.251	AT	5.749		0
1007	2006OCT16	B	39	15	S	10	AT	49.534	BL	37.37	SXW	11.057
1008	2006OCT24	Ac	25	0		0	FDI	75.179	ACT	24.821		0
1009	2006OCT17	B	4	15	S	3	PLI	93.841	BL	4.422	SXW	1.737
1010	2006OCT17	B	5	0		0	SXW	72.7229	BL	27.2771		0
1011	2006OCT19	S	23	7	F	4	PLI	72.059	SXW	16.797		6.752
1012	2006OCT21	S	12	12	PI	7	PLI	40.254	BL	37.246	SXW	22.5
1013	2006OCT20	S	30	12	PI	6	ACT	82.634	SXW	13.869	AT	3.497
1014	2006OCT30	B	27	0		0	PLI	55.6369	SXW	34.9926	BL	9.3705
1015	2006OCT22	At	39	1	Ac	4	SXW	51.602	AT	43.396	ACT	5.002
1016	2006OCT17	S	15	3	B	7	PLI	73.706	SXW	14.664	BL	7.799
1017	2006OCT18	S	13	1	Ac	2	BL	81.52	SXW	15.762	ACT	2.718
1018	2006OCT17	PI	31	1	Ac	18	SXW	40.351	PLO	25.864	ACT	20.739
1019	2006OCT20	S	36	2	At	18	ACT	100		0		0
1020	2006OCT18		0	0		0	SXW	100		0		0
1021	2006OCT21	S	28	0		0	BL	67.69	SXW	32.31		0
1022	2006OCT21	S	41	0		0	BL	68.036	SXW	31.964		0
1023	2006OCT20	B	39	15	S	1	PLI	61.241	BL	38.759		0
1024	2006OCT19	S	24	3	B	1.845	PLI	71.788	SXW	28.212		0

Plot No.	Measurement Date	Site Index Meas No. 2				
		based on major species 12.5cm dbh+				
		species	top height	bh age, yrs	site index	total age
1001	2006OCT21	PLI	15	24	24	30
1002	2006OCT22	SXW	11	36	15	48
1003	2006OCT01	PLI	14	31	19	38
1004	2006OCT16	FDI	10	19	21	28
1005	2006OCT19	BL	10	22	21	32
1006	2006OCT20	PLI	17	27	25	33
1007	2006OCT16	AT	16	33	21	36
1008	2006OCT24	FDI	14	25	23	33
1009	2006OCT17	PLI	13	23	23	28
1010	2006OCT17	SXW	7	13	25	22
1011	2006OCT19	PLI	10	19	20	25
1012	2006OCT21	BL*	7	15	21	25
1013	2006OCT20	ACT	23	27	34	30
1014	2006OCT30	PLI	6	9	12	14
1015	2006OCT22	SXW	8	16	23	25
1016	2006OCT17	PLI	8	13	23	18
1017	2006OCT18	BL	16	55	16	68
1018	2006OCT17	SXW	8	15	24	24
1019	2006OCT20	ACT	9	18	22	21
1020	2006OCT18	SXW	8	14	27	22
1021	2006OCT21	BL	16	37	20	48
1022	2006OCT21	BL	7	16	22	26
1023	2006OCT20	PLI	9	20	18	27
1024	2006OCT19	PLI	12	24	19	31

Plot No.	Measurement Date	Site Index Meas No. 2		
		BEC	sub-zone	variant
1001	2006OCT21	SBS	mw	0
1002	2006OCT22	SBS	wk	1
1003	2006OCT01	SBS	wk	1
1004	2006OCT16	SBS	wk	1
1005	2006OCT19	SBS	wk	1
1006	2006OCT20	SBS	mw	0
1007	2006OCT16	SBS	mw	0
1008	2006OCT24	SBS	mw	0
1009	2006OCT17	SBS	wk	1
1010	2006OCT17	ESSF	wc	3
1011	2006OCT19	SBS	wk	1
1012	2006OCT21	ESSF	wk	1
1013	2006OCT20	SBS	wk	1
1014	2006OCT30	ESSF	wk	1
1015	2006OCT22	SBS	mw	0
1016	2006OCT17	SBS	wk	1
1017	2006OCT18	SBS	wk	1
1018	2006OCT17	SBS	wk	1
1019	2006OCT20	SBS	wk	1
1020	2006OCT18	SBS	wk	1
1021	2006OCT21	ESSF	wk	1
1022	2006OCT21	ESSF	wk	1
1023	2006OCT20	ESSF	wk	1
1024	2006OCT19	SBS	wk	1

Based on major species 12.5cm dbh+

*no PL I measured for site index



Appendix 3 Issues encountered while checking the CMI data for TFL 52.

WHILE CHECKING THE CMI DATA I FOUND A NUMBER OF DISCREPANCIES BETWEEN THE PREVIOUS AND CURRENT MEASUREMENTS. SOME OF THE COMMON DIFFERENCES ENCOUNTERED ARE:

- DBH MEASUREMENT IN 2006 SMALLER THAN 2001
- HEIGHTS IN 2006 SMALLER THAN 2001
- TREES THAT DO NOT EXIST IN DATA SET IN 2006 BUT ARE PRESENT IN 2001
- SPECIES CHANGE FROM 2001 TO 2006
- MISSING OR INVALID GRADES FOR SIZE OF STEMS.
- LOSS INDICATORS THAT EXISTED IN 2001 WITH NET FACTORING HAVE BEEN REMOVED IN SOME CASES IN 2006.

SOME OF THESE DIFFERENCES COULD NOT BE CORRECTED AS THERE WAS NOT ANYWAY OF KNOWING WHICH WAS THE CORRECT DATA (SUCH AS DBH OR HEIGHT, ETC) IN THE OFFICE. I THINK A LOT OF THE DIFFERENCES AND INCOMPLETE DATA COULD HAVE BEEN TAKEN CARE OF WITH A COUPLE OF CHANGES TO THE DATA ENTRY PROGRAM.

- USING A HANDHELD VERSION OF GY HOST (GROWTH AND YIELD) WITH A COUPLE OF MODIFICATIONS, OR MODIFYING TIMVEG TO ACCEPT OTHER DATA AND EDITS / VALIDATIONS SIMILAR TO THE GROWTH AND YIELD PROGRAM. ASSUMING THAT THE CMI DATA CAN BE INCORPORATED INTO THE GY HOST \ HAND PROGRAM MOST OF THESE EDITS \ VALIDATIONS, ALREADY EXIST. OR THE TIMVEG PROGRAM COULD BE ALTERED TO FUNCTION IN A SIMILAR WAY.

HAVING THE PROGRAM ABLE TO ACCOMMODATE THE PREVIOUS MEASUREMENTS LOADED INTO IT SO DIFFERENCES CAN BE CONFIRMED ON VALIDATIONS SIMILAR TO THE GROWTH AND YIELD PROGRAM. THIS WOULD ALLOW YOU TO CONFIRM DIFFERENCES AND DATA IS CORRECT IN THE FIELD RATHER THAN BACK AT THE OFFICE WHERE YOU CANNOT SEE THE TREE.

- ✚ WHEN A DBH MEASUREMENT OR HEIGHT IS SMALLER THAN THE PREVIOUS MEASURE THE HANDHELD PROGRAM WILL BEEP TO WARN YOU, AND YOU CAN VERIFY THE DATA WHILE ON SITE AND PLACE A COMMENT LIKE DBH CHECK (CANNED NOTES) SO THAT AN OFFICE CHECK WOULD KNOW WHICH DATA IS CORRECT.

- ✚ SIMILAR TO ABOVE VALIDATIONS COULD BE USED FOR SPECIES CHANGES, PATH CHANGES OR MISSING LOSS INDICATORS, DAMAGE AGENTS AND MISSING OR INVALID GRADES (SIMILAR TO SOME OF THE CRUISE PROGRAMS AVAILABLE), IF THE HEIGHT IS SHORTER THAN PREVIOUS, IS THERE A BROKEN TOP? EXCESSIVE NET FACTOR DIFFERENCES COULD PROMPT YOU TO VERIFY CORRECT.
- ✚ BY HAVING THESE VALIDATIONS IN THE FIELD, IT WOULD HELP TO DRASTICALLY REDUCE KEYPUNCHING ERRORS.
- THERE WERE SOME TREES MISSING FROM THE CURRENT DATA SET THAT ARE ASSUMED TO HAVE DIED AND FALLEN SINCE PREVIOUS MEASUREMENT, BECAUSE OF THIS THERE ARE NO INDICATIONS WHETHER THE TREE WAS MISSED OR IS DEAD AND FALLEN. WITH THE PREVIOUS DATA IN THE HANDHELD, A NOTE COULD BE PLACED FROM A CANNED LIST, (SUCH AS TREE IS NOW DEAD AND FALLEN) THAT WOULD ALLOW QUICK AND EASY VERIFICATION, THAT THE VALIDATION WARNING HAD BEEN RECOGNIZED (THESE COULD ALL BE CANNED NOTES, BUT THE AVAILABILITY TO TYPE IN YOUR OWN COMMENTS FOR SOME CIRCUMSTANCES WOULD ALSO BE HELPFUL).

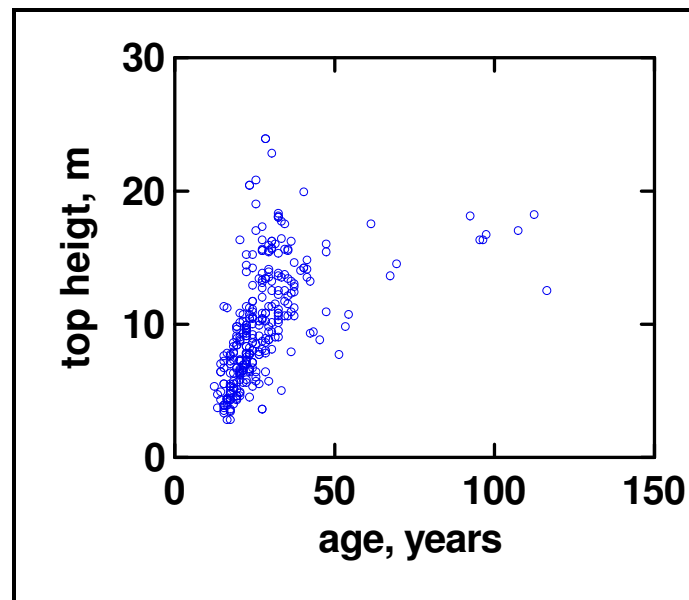
Appendix 4 Analysis of possible residual or veteran trees.

Figure 9: All site trees for the 24 plots (309 trees) showing that some residual (veteran) trees may have been selected. Total age is derived from breast height age and a correction factor.

Table 4. Examining possible non-residuals (veteran) for site index (primary species 12.5cm dbh+) based on 2006 data.						
	Primary species	% species	Substitute species	% species	old age	new age
1002	SXW	56%	PL*	56%	47.5	23.5
1017	BL	81%	ACT**	15%	67.5	16
1021	BL	68%	SXW**	36%	42.5	38
*PL major species 4cm+; **ACT/SXW secondary species 12.5cm+						

Note there were difficulties in fitting a new site index to 1017: the ACT site trees chosen only represented 15% of the stand volume.

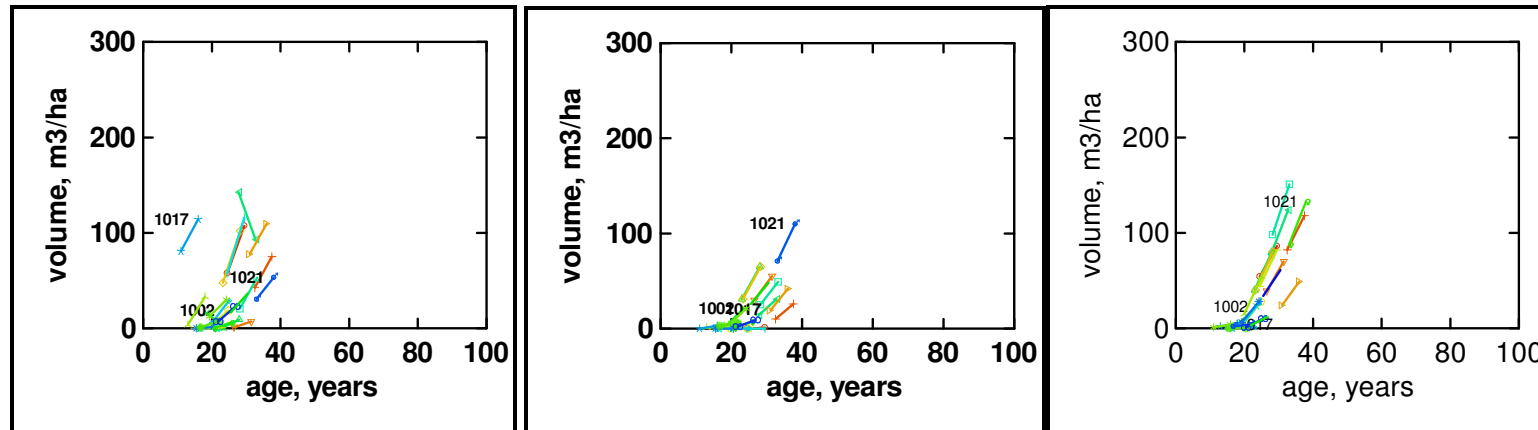


Figure 10: Refits of actual (CMI plots left) current (MP3 Yield Tables VDYP yields, middle) and future volumes (MP3 Yield Tables TIPSYS yields, right) to plots 1002, 1017 and 1021. Uses data from Table 4. A closer relationship is observed but note that these data are 'adjusted': this may not be fully justified and is shown for illustrative reasons. Note that there were problems fitting a new site index to 1017.