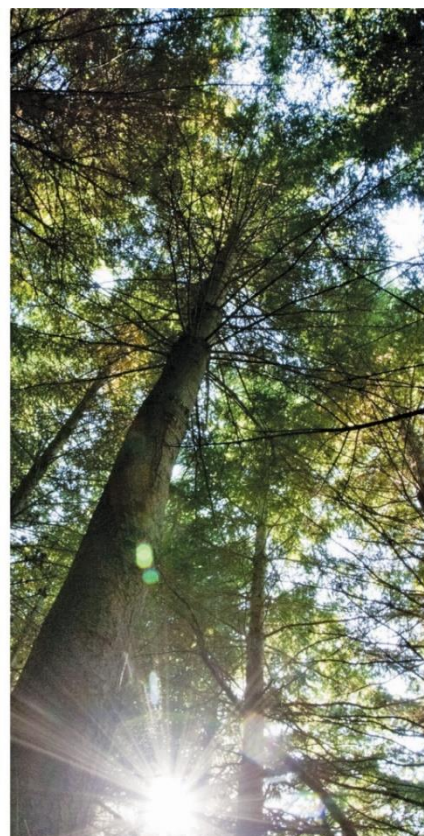
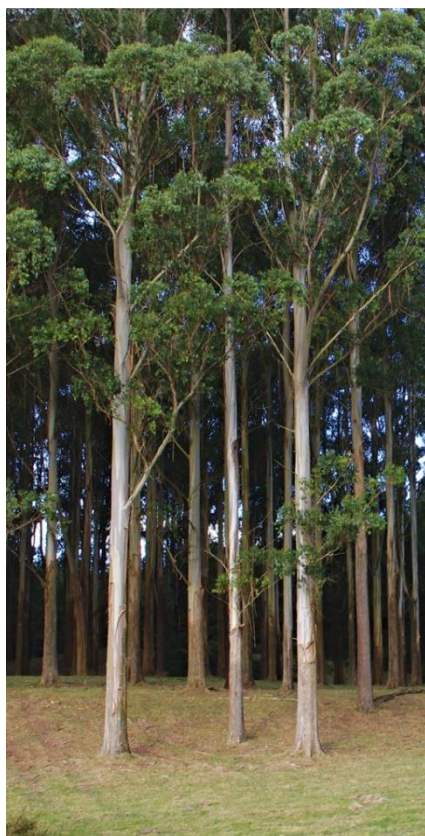


Title: LVL Trial: Pre-Harvest Stand Assessment

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INTRODUCTION

Laminated Veneer Lumber (LVL) producers in New Zealand are looking for an alternative fibre supply to radiata. Eucalypts are well suited to supply wood for structural timber products such as LVL or plywood.

Two trials located in Marlborough have been assessed as a potential source of peeler logs to carry out a peeler study. The trials are:

- *E. bosistoana* trial planted in 2003 by Marlborough Regional Forests in the Pukaka Valley
- *E. quadrangulata* trial planted in 2004 by the Marlborough District Council at the end of Giffords Rd in the Wairau Valley

Both these trials have been assessed and the data analysed to estimate the potential yield of peelers. This data will be used to a) design a planned peeling trial and b) allow some estimation of productivity and yield.

METHODS

Sites

The two trial sites assessed are as follows:

1. A small stand (0.096ha) of *E. bosistoana* planted in 2003 by Marlborough Regional Forests in their Pukaka Valley Forest. The trial site consists of 68 trees. In addition, scattered throughout the stand are a further 10 *C. lusitanica* trees. The stand was thinned about age 6 and all remaining trees were high pruned. A photo example of the stand is shown in Appendix 1.
2. A small stand (0.03ha) of *E. quadrangulata* planted in 2004 by Marlborough District Council on a river reserve beside the Wairau River. The stand was thinned about age 6 leaving 19 trees, all of which were high pruned. A photo example of the stand is shown in Appendix 1.

Tree Assessment

In both stands the following measurement procedure was undertaken:

1. Assess every tree for DBH and tree height and cruise according to industry standard Plotsafe methodology using the RAD05-A template.
2. For the *E. bosistoana* site 50% of the larger trees that were assessed to yield peeler logs were selected for thinning, whilst taking spacing of remaining trees into account.
3. Analyse tree data using YTGGEN to estimate potential peeler log yield, along with other log grades, as per cutting strategy shown in Figure 1. As there are no specific tree volume and taper functions available for either species, the following functions were considered to be the 'best fit' from available functions:
 - Volume: 276 (*E. fastigata* CNI)
 - Taper: 276 (*E. fastigata* CNI)
 - Breakage: 67 (NZ $\frac{2}{3}$ break height)

Note that due to there being 10 *C. lusitanica* trees in the Pukaka stand an adjustment has been applied to the per hectare estimates on the basis that in a pure stand these 10 trees would be all *E. bosistoana*. This is an additional 12.8% volume which has been added to all *E. bosistoana* grades at the Pukaka site (i.e. 10 *C. lusitanica* trees out of a total of 78 trees)

Log Specifications

Log yields are based on the cutting strategy shown in Figure 1. Peeler logs require a minimum SED of 15cm, cut lengths of 1.25m, 2.5m and 3.8m and a maximum sweep of 1/3 SED. Unpruned peeler has a maximum branch size of 7cm. Postwood has a minimum SED of 10cm, cut lengths of 1.9m and 2.5m, a maximum sweep of 1/3 SED and a maximum branch size of 7cm. Firewood has a cut length of 3.8m, and no maximum branch size.

Log Grade	Value (\$)	Min sed (cm)	Max sed (cm)	Max led (cm)	Min mid (cm)	Max mid (cm)	Lengths (m)	Conditions
P7_Peeler	120.00	15.0	1000.0	1000.0	0.0	999.0	1.25,2.5,3.8	BiA=0 Sw3.8LS mvf:%,<> Fl:B10+.C.D.R %SPP:EUSSP
S7_Peeler	90.00	15.0	1000.0	1000.0	0.0	999.0	1.25,2.5,3.8	BiA<=7 Sw3.8LS mvf:%,<> Fl:B10+.C.D.R %SPP:EUSSP
Post	80.00	10.0	1000.0	1000.0	0.0	999.0	1.9,2.5	BiA<=7 Sw3.8LS mvf:%,<> Fl:B10+.C.D.R %SPP:EUSSP
Firewood	50.00	5.0	1000.0	1000.0	0.0	999.0	3.8	SwX F.C.R %SPP:EUSSP
P15_Cumac	120.00	15.0	1000.0	1000.0	0.0	999.0	2.5,3.8	BiA=0 Sw3.8LS mvf:%,<> Fl:B10+.C.D.R %SPP:CUMAC
S15_Cumac	90.00	15.0	1000.0	1000.0	0.0	999.0	2.5,3.8	BiA<=7 Sw3.8LS mvf:%,<> Fl:B10+.C.D.R %SPP:CUMAC
Chip_Cumac	50.00	10.0	1000.0	1000.0	0.0	999.0	3.8	SwX F.C.R %SPP:CUMAC

Figure 1: YTGGEN Cutting Strategy

Area Assessment

Both stands were flown with a UAV and ortho-corrected photos for each produced. From these photos accurate stand areas were able to be calculated. Ground control points were used to improve accuracy. Orthophotos for each site can be found in Appendix 2.

RESULTS

Table 1 summarises stand parameters for each site. Note that the stems per hectare figure for Pukaka Valley includes 104 stems per hectare (10 trees in total) of *C. lusitanica*.

Site	Species	Estab Yr	Total Trees	Stocked Area (ha)	Age (yrs)	Stocking ⁽¹⁾ (Spha)	Mean DBH (cm)	Mean Crop Hgt (m)
Pukaka Vly	<i>E.bosistoana</i>	2003	68	0.096	14.5	813	19.9	16.9
Giffords Rd	<i>E.quadrangulata</i>	2004	19	0.030	13.5	633	23.6	19.9

⁽¹⁾ including *C.lusitanica*

Table 1: Stand Parameters

Table 2 summarises the assessed yields for both sites. For the Pukaka Valley site results are shown for both a clearfell and production thin option. For the production thin, 50% of the total *E. bosistoana* trees were removed. Selection for thinning was based on a 'thinning from the top' approach whereby larger trees assessed to yield peeler logs were removed.

Site	Operation	Type	Total Peeler		Posts		Firewood		Total Volume	
			No. Logs	Vol (m3)	No. Logs	Vol (m3)	No. Logs	Vol (m3)	No. Logs	Vol (m3)
Pukaka Vly	Clearfell ⁽¹⁾	Site	57	3.6	69	2.1	101	4.0	227	9.7
		per ha	670	42.6	811	24.6	1,187	47.3	2,668	114.5
Pukaka Vly	Prod Thin ⁽¹⁾	Site	56	3.6	29	0.9	50	2.3	135	6.8
		per ha	658	42.2	341	11.1	588	27.0	1,587	80.4
Giffords Rd	Clearfell	Site	34	2.6	35	1.1	23	0.9	92	4.6
		per ha	1,133	85.5	1,167	37.9	767	30.7	3,067	154.1

⁽¹⁾ per hectare yields adjusted to assume that all trees are *E.bosistoana* (i.e. 10 trees are actually *C.lusitanica*)

Table 2: Yield Estimates

Table 3 shows the yield by site as a percentage of total recovered volume.

Site	Operation	Peeler	Posts	Firewood	Total
		Vol (m3)	Vol (m3)	Vol (m3)	Vol (m3)
Pukaka Vly	Clearfell	37%	21%	41%	100%
Pukaka Vly	Prod Thin	53%	14%	34%	100%
Giffords Rd	Clearfell	55%	25%	20%	100%

Table 3: Yield by Grade as Percentage of Total Recovered Volume

Both Pukaka (production thin) and Giffords Rd (clearfell) stands will yield approximately 90 logs of peeler grade suitable for the proposed LVL study as shown in Table 4. The "P" in the grade description refers to pruned and "S" to unpruned. Grade cut lengths are also shown in the grade name.

Grade	Gifford			Pukaka		
	No. Logs	Min SED	Max SED	No. Logs	Min SED	Max SED
P7_Peeler1.25	9	15.2	22.5	19	15.0	19.7
P7_Peeler2.5	3	17.6	21.8	16	15.0	21.0
P7_Peeler3.8	10	16.8	24.0	13	15.2	21.0
S7_Peeler1.25	7	15.2	20.2	5	15.1	16.3
S7_Peeler2.5	4	15.0	18.2	3	15.2	17.2
S7_Peeler3.8	1	18.0	18.0			
Grand Total	34	15.0	24.0	56	15.0	21.0

Table 4: Peeler yield by grade and stand

CONCLUSION

While the trials are still of a relatively young age, they can be expected to yield a reasonable quantity of peeler logs suitable for this study, based on the cutting specifications described in the report. The *E. quadrangulata* trial in general exhibited better form and growth rates than the *E. bosistoana*. Some of this could be attributed to the different site type .

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APPENDICES

Appendix 1: Site Photos





E. quadrangulata planted 2004
Giffords Road Jan 2018

Appendix 2: Site Plans



Pukaka Valley Orthophoto



Giffords Rd Orthophoto