

**PRESCREENING of GENETIC GAINS TRIALS  
for OUTERWOOD DENSITY and  
VISUAL STEM CHARACTERISTICS**

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**SGMC/WQI Report No. 1a  
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**Stand Growth Modelling Cooperative  
in collaboration with WQI Ltd**

# **RADIATA PINE RESOURCE CHARACTERISATION**

## **WQI Benchmarking Study**

### **Pre-screening of 17 “genetic gains” trials for outerwood density and visual stem characteristics**

**A Report Prepared for WQI Ltd  
Information on trials managed by the Stand Growth Modelling  
Cooperative has been made available in this report**

**WQI REPORT NO. 1a**

**OCTOBER 2003**

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# EXECUTIVE SUMMARY

## RADIATA PINE RESOURCE CHARACTERISATION PART 2: BENCHMARKING

### PART 2A: Prescreening of 17 “genetic gains” trials for outerwood density and visual stem characteristics

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The 1978 Genetic Gains Trials were selected for the major geographic study which will ultimately enable individual stems from throughout New Zealand to be selected for more detailed analyses which will create a new archive of the major wood properties believed to influence the value of radiata pine wood products. Use of a “standard” genotype throughout the study will highlight environmental influences on wood formation and properties. Trees from these trials are now aged 25 years. This report describes the results of a survey of outerwood density, undertaken as a precursor to a more detailed study of site and climatic influences on wood formation and wood properties.

Seedlot WN76/2 (GF 14) was selected as being well represented in the trial and relatively good growth. A contractor (Dean Witehira – Quality Forest Management) visited 20 of the existing trial sites, located across New Zealand, to determine the current state of the plots and, where possible, collect outerwood cores for density determination. Core samples (up to 30 per site; 50 mm radially) were obtained from the best stems in each plot. Individual trees were numbered for later identification and diameter and stem form (including branch characteristics) noted. Wood density was assessed by the “maximum moisture content” method for all individual stems and site averages obtained.

As expected, there was a strong trend for density to decrease southwards. The highest values were found at Aupouri Forest in Northland (494 kg/m<sup>3</sup>), and the lowest at Longwood Forest in Southland (350 kg/m<sup>3</sup>). These are very significant differences between the various sites in this trial and while the overall trend is clear, there are apparent departures due to local site and climate. There is evidence that the wood density values recorded are significantly reduced from those found in the previous national survey of wood properties (1977-82).

Averages for other observed characteristics were:

- Breast height diameters (average 480 cm) ranged from 356 (Eyrewell) to 580 (Longwood and Mohaka).
- Branch index (average 4.3 cm) – 3.4 cm (Golden Downs) to 5.9 cm (Blackmount).
- Visual stem resin score (average 0.9) - from 0.5 (Ruatoria, Longwood) to 2.0 (Aupouri).

# RADIATA PINE RESOURCE CHARACTERISATION

## Part 2: Benchmarking

### Part 2A - Prescreening of 17 “Genetic Gains” trials for outerwood density and visual stem characteristics

The Genetic Gains Trials were established in 1978 with known genotypes (3 open pollinated commercial seedlots), sited on former state-owned production forests at 22 sites selected to encompass a broad range of climates. Two plot designs were used 1) large plots with trees planted at 1111spha and managed under a typical sawlog regime and 2) row plots where trees were planted in single row plots at 833spha and managed as per the surrounding commercial forest, however with changing forest ownership, some variation in silviculture occurred. Several trials have since been abandoned due to excessive grazing or severe storms.

Six of the trials, large block plots under a sawlog regime, were taken under the umbrella of the Stand Growth Modelling Cooperative (SGMC) in 1986, as part of a series of trials designed to model the growth of genetically improved breeds (Table 1). Permanent sample plots were established and growth data has been collected regularly at these sites.

For the current study, Seedlot WN76/2 (GF 14) was chosen as the “fixed” genotype. This seedlot was produced from Gwavas Seed Orchard and is based on open-pollinated seed from 25 clones of the “850” series selected for the central North Island. The pre-screening phase required visiting the 20 remaining trials and assessment of approximately 30 trees/trial following standard non-destructive assessment techniques. This involved outerwood increment core sampling for basic density (Smith, 1954), measuring BHDOB and assessing stems for branch size, internodes, form, resin and ease of felling (Appendix 1). Detailed in Appendix 2 are the individual tree outerwood densities and assessment data for each forest site.

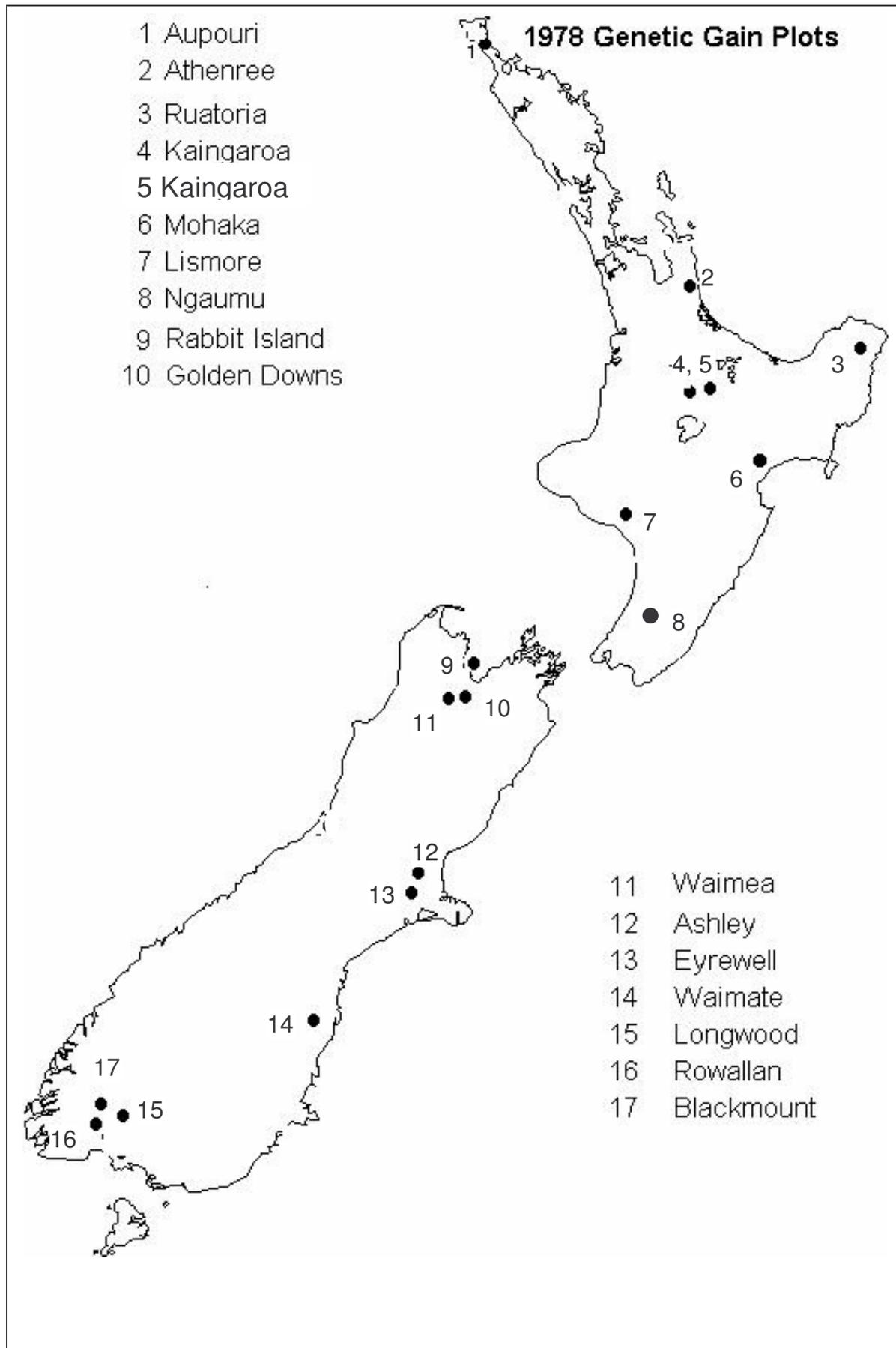
Of the 20 trials identified for the prescreening stage, three have been dropped due to storm damage, lack of tending and poor trial maintenance (Whangapoua, Nemona, and Hochstetter) – Table 1. Figure 1 shows the distribution of sampled sites.

Table 2 provides average values for outerwood density, DBHOB, and the visual estimates for branch size, internodes and resin. The expected trends established in Cown *et al.*'s (1991) earlier survey were apparent where density generally decreased with increasing latitude and elevation. Aupouri in the far North provided the highest outerwood density averaging 494 kg/m<sup>3</sup> with Longwood in Southland averaging the lowest at approximately 350 kg/m<sup>3</sup>. Figure 2 shows average values and 95% confidence intervals for each site sorted by outerwood density and clear site differences are evident. It is not difficult to categorise the 17 sites into three wood density zones as per Cown *et al.* (high >475kg/m<sup>3</sup>, medium 450-475 kg/m<sup>3</sup> and low <450kg/m<sup>3</sup>) except current cut-off points particularly for the medium and low groupings are somewhat reduced (approximately 50 kg/m<sup>3</sup>). Based on the earlier survey (Cown *et al.* 1991), reported outerwood densities for 25-year-old trees from the high, medium and low site density classes were 505kg/m<sup>3</sup>, 465kg/m<sup>3</sup> and 440kg/m<sup>3</sup> respectively. The controlled genetics in the current study would contribute to this difference. Very similar findings were reported in a study of seedlots planted in a Diallel experiment assessed at 22 years of age (Cown and Ball, 2001). Outerwood values from Northland to Southland in that study ranged from 496 kg/m<sup>3</sup> (Woodhill) to 351 kg/m<sup>3</sup> (Taringatura – Southland).

**Table 1 - WQI Pre-screening Genetic Gain Trials**

<b>No.</b>	<b>Forest</b>	<b>Trial ID</b>	<b>Cmpt</b>	<b>Forest Owner</b>	<b>Trial Owner</b>	<b>Trial Design</b>	<b>Comment</b>
<b>1</b>	Aupouri	AK1058	92	Juken Nissho	SGMC	Clearwood	Clean site; easy felling
	<del>Whangapoua</del>	<del>AK773</del>	<del>82</del>	<del>Ernslaw</del>	<del>FRI</del>	<del>Clearwood</del>	<del>Plot identity lost</del>
<b>2</b>	Athenree	AK774	14	Carter Holt Harvey	FRI	Row plot	Good stems; undergrowth
<b>3</b>	Ruatoria	RO1664/4	303	Huaguang Forests	FRI	Row plot	Clean; easy to fell
<b>4</b>	Kaingaroa	RO2103/1	1210	Timber Management	SGMC	Clearwood	Clean
<b>5</b>	Kaingaroa	RO1664/3	222	Timber Management	FRI	Clearwood	Don't know
<b>6</b>	Mohaka	WN377	205	PanPac Forest Products	SGMC	Clearwood	Clean; large stems; comp wood?
<b>7</b>	Lismore	WN306	204	Rayonier NZ	FRI	Row plot	Clean; missing trees
<b>8</b>	Ngaumu	WN306	6	Juken Nissho	FRI	Row plot	Clean; easy to fell
<b>9</b>	Rabbit Island	NN405	1	Tasman District Cncl	FRI	Row plot	Clean; easy to fell
<b>10</b>	Golden Downs	NN530/2	66	Weyerhaeuser	SGMC	Clearwood	Lots of gorse
	<del>Hochstetter</del>	<del>WD267</del>	<del>203</del>	<del>Timberlands WC</del>	<del>FRI</del>	<del>Row plot</del>	<del>Don't know</del>
	<del>Nemona</del>	<del>WD262</del>	<del>26</del>	<del>Timberlands WC</del>	<del>FRI</del>	<del>Row plot</del>	<del>Hopeless</del>
<b>11</b>	Waimea	NN405/3	114	Carter Holt Harvey	FRI	Row plot	Clean; slope; easy to fell?
<b>12</b>	Ashley	CY421	601	Carter Holt Harvey	FRI	Row plot- Expt 3	Good site; difficult access (4x4)
<b>13</b>	Eyrewell	CY421	7	Carter Holt Harvey	FRI	Row plot	Some undergrowth; easy felling
<b>14</b>	Waimate	CY421/1	2	Blakely Pacific	SGMC	Clearwood	Clean
<b>15</b>	Longwood	SD564/1	62	Rayonier NZ	SGMC	Clearwood	Clean; easy to fell
<b>16</b>	Rowallan	SD564	549	Rayonier NZ	FRI	Row plot	Clean; easy to fell
<b>17</b>	Blackmount	SD564	600	Rayonier NZ	FRI	Row plot	Severe damage; poor form

**Figure 1 – Sites Sampled**



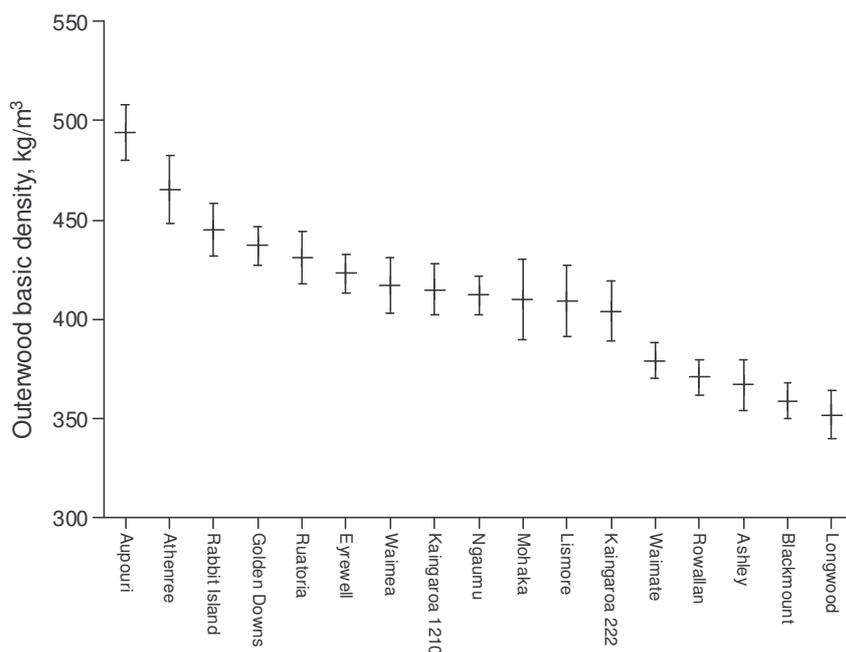
DBHOB values ranged from 356mm at Eyrewell to over 580mm for the Longwood and Mohaka Forests and averaged 480mm for all sites. Visually assessed branch index averages for the whole stem ranged from 3.4cm to 5.9cm for Golden Downs and Blackmount forest sites respectively, and overall averaged 4.3cm. Site averages for visually assessed internodes showed considerable variation, with some of the longer lengths (0.6 and 0.7) coming from the more southern sites ie. Blackmount and Longwood . However, Rowallan, another southern forest site, had an average stem internode score of only 0.1. For visual stem resin assessment, values ranged from 0.5 at Ruatoria and Longwood to 2.0 at Aupouri (which is established on sandy soils), and averaged 0.9 for the 17 sites assessed.

**Table 2 – Average Trial Details Sorted By Latitude**

Forest	GTI Trial no.	Plot No.	O. wood Density. (kg/m <sup>3</sup> )	DBH OB (cm)	Stem BIX* (cm)	Stem Internode score*	Stem Resin Score*	Sample No.
Aupouri	AK1058	1	494	440	4.3	0.1	2.0	24
Athenree	AK774	2	465	489	4.3	0.1	0.6	22
Ruatoria	RO1664/4	3	431	535	5.1	0.1	0.5	25
Kaingaroa 1210	RO2103/1	4	415	511	3.8	0.2	0.9	25
Kaingaroa 222	RO1664/3	5	404	480	4.2	0.1	0.5	25
Mohaka	WN377	6	410	582	4.3	0.0	0.7	15
Ngaumu	WN306/1	8	412	434	4.2	0.3	0.7	29
Lismore	WN306/2	7	409	569	5.7	0.0	1.5	11
Rabbit Island	NN405/2	9	445	430	3.5	0.0	1.3	30
Golden Downs	NN530/2	10	437	455	3.4	0.1	1.5	20
Waimea	NN405/3	11	417	406	3.6	0.1	0.7	30
Eyrewell	CY421/3	13	423	356	3.6	0.0	0.8	30
Ashley	CY421/2	12	367	508	5.8	0.2	0.8	16
Waimate	CY421/1	14	379	465	5.7	0.3	0.8	33
Blackmount	SD564/4	17	359	375	5.9	0.6	0.7	28
Rowallan	SD564/3	16	371	534	4.1	0.1	0.8	25
Longwood	SD564/1	15	352	585	4.6	0.7	0.5	20
All			411	480	4.3	0.2	0.9	408

\* Visually assessed

**Figure 2- Average breast height outerwood basic density**  
(Error bars are the 95% confidence limits of the means)



Now all the information has been collated, identification of suitable stems from trial series sites which cover the main regions can be selected for felling to document actual within-tree patterns in the major fundamental wood properties and log characteristics and provide disc and log samples for further wood product trials. Kaingaroa Compartment 222, one of the more local sites is the first to be felled to establish the Stage 2 protocol to ensure all sample requirements are satisfied.

#### ACKNOWLEDGMENTS

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The laboratory density assessment were performed by Pat Hodgkiss.

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Appendix 1 – Individual Tree Scoring Descriptors

**Branch Index (BIX)**

Assessment made for the 1st 4 logs (5 m)

Score	Average Branch (cm)	Range
0	0	No branches
1	3.0	3 cm or less
2	4.5	3 - 6 cm
3	7.5	6 - 9 cm
4	>9.0	9 cm or greater

**Internode Index (IIX)**

One assesment made for the tree.

Score primarily based on 2nd & 3rd logs but rest of tree also taken into account on marginal calls

IIX = Sum internodes > 0.6m over 5m log length.

Score	Average (IIX)	Description	
0	0.3	No or very few internodes	< 40% of logs made of long internode material
1	0.5	Some internode material	> 40% of logs made of long internode material
2	0.7	Long internode material	> 70% of logs made of long internode material

Appendix 1 – Individual Tree Scoring Descriptors (contd.)

**Resin Assessment**

One assesment made for the tree.

Score	Resin	Description
0	0	No Signs
1	low	low - minimal visual signs
2	medium	Some leisons, bleeding, visually noticeable
3	high	Extensive visual signs, leisons, extensive bleeding

**Acceptable Crop Tree**

Score		Description
Y	Acceptable	Good form, single leader, acceptable crop tree
N	Not acceptable	Some sort of defect, such as multi leader, broken top, large ramicorn, diseased tree - not acceptable as a crop tree

Forest Owner TMC, Trial RO2103/1, Forest Kang Cpt 1210

Plot No.	Plot#	Tree#	O. Wd.	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
			BD		Log 1	Log 2	Log 3	Log 4						
1	10/51	1	351	499	0	2	3	3	1	1	N	N		Top blown out at top 4th log
1	10/51	2	439	411	0	2	2	3	0	0	N	N		Big kink at top 3rd log. May be tricky to fell.
1	10/51	3	445	514	0	1	2	2	0	1	Y	Y		Adjacent to good gap
1	10/51	4	414	573	0	1	2	2	0	2	Y	Y		Good tree other than resin
1	10/51	5	399	523	0	2	3	3	1	1	Y	Y		
1	10/51	6	395	351	0	1	2	2	0	2	N	Y	64	heavy leaner, better trees available
1	10/51	7	377	588	0	2	3	3	0	0	Y	Y	63	
1	10/51	8	360	541	0	2	3	3	0	1	Y	Y	65	Good Tree
1	10/51	9	388	485	0	2	2	2	0	1	Y	Y	62	OK tree
1	10/51	10	396	545	0	2	2	3	1	1	Y	Y		OK tree
1	10/51	11	392	485	0	2	2	3	0	1	N	N	66	Broken top at 18-20m
1	10/51	12	393	541	0	2	2	2	0	0	Y	Y	69	
1	10/51	13	406	508	0	2	3	3	0	1	Y	Y		Good Tree
1	10/51	14	413	466	0	1	2	2	0	1	Y	Y	61	
1	10/51	15	445	483	0	1	2	2	0	0	Y	Y		
1	10/51	16	433	552	0	2	2	2	0	0	Y	Y	59	
1	10/51	17	448	478	0	1	2	2	0	1	Y	Y	75	
1	10/51	18	478	619	0	2	3	3	1	0	Y	Y	73	Nice tree, OK to fell
1	10/51	19	412	574	0	2	2	2	0	2	Y	Y	54	Nice tree. Some resin bleeding. OK to fell.
1	10/51	20	388	493	0	2	2	3	0	1	N	N	57	Top out 18m, Large upper bran(s) around break.
1	10/51	21	418	586	0	1	2	2	0	1	Y	Y		Nice tree
1	10/51	22	447	450	0	2	2	2	0	1	Y	Y	52	
1	10/51	23	481	431	0	1	2	2	0	2	Y	Y	51	Lots of resin, nice tree, ok to fell
1	10/51	24	433	498	0	1	2	3	0	0	Y	Y	55	
1	10/51	25	429	584	0	1	1	2	0	1	Y	Y		Excellent tree. OK to fell

Forest Owner WEYH, Trial NN530/2, Forest Golden Downs Cpt 66

Plot No.	Plot#	Tree#	O. Wd.	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
			BD		Log 1	Log 2	Log 3	Log 4						
2	10/51	1	447	509	0	1	2	2	0	0	y	y	-	
2	10/51	2	462	516	0	1	2	2	0	1	y	y	-	
2	10/51	3	439	498	0	1	1	2	0	1	y	y	3	Nice tree. A little bit of sweep in the butt.
2	10/51	4	438	414	0	1	1	2	0	2	y	y	4	
2	10/51	5	473	437	0	1	2	2	0	1	y	y	-	Comp wood, severe in parts of tree
2	10/51	6	444	372	0	1	1	2	0	2	y	n	6	double leader at top 3rd log
2	10/51	8	467	473	0	2	2	2	1	3	y	y	8	lots of resin
2	10/51	9	451	411	0	1	1	1	0	1	y	y	9	
2	10/51	10	461	378	0	1	2	2	1	2	y	y	-	some resin bleeding
2	10/51	11	445	370	0	1	1	1	0	1	y	y	11	
2	10/51	12	428	460	0	2	2	2	0	0	y	y	12	
2	10/51	14	442	511	0	2	2	2	0	1	y	y	14	
2	10/51	15	378	528	0	2	2	2	0	3	y	y	15	heavy bleeder
2	10/51	17	433	530	2	2	2	2	0	2	y	y	17	prune 2.0m
2	10/51	19	409	432	1	1	2	2	0	2	y	y	19	prune 2.0m, 3 cores, comp wood
2	10/51	21	445	402	0	1	1	2	0	0	y	y	21	3 cores, comp wood
2	10/51	22	401	488	0	2	2	2	0	2	y	y	22	
2	10/51	24	433	549	0	2	2	3	0	2	y	y	24	
2	10/51	25	421	390	0	1	1	2	0	1	y	y	25	traces comp wood
2	10/51	26	431	441	0	1	1	2	0	3	y	y	26	quite a lot of bleeding, some comp wood

Forest Owner Rayonier NZ, Trial SD564/1, Forest Longwood Cpt 62

Plot No.	Plot#	Tree#	O. Wd. BD	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
					Log 1	Log 2	Log 3	Log 4						
5	4/11	1	342	556	0	2	2	3	0	0	y	y	-	
5	4/11	2	363	704	0	2	3	3	1	1	y	y	-	nice big tree, straight
5	4/11	3	340	457	0	2	3	3	1	0	y	y	6	
5	4/11	4	373	528	0	1	2	2	2	0	y	n	-	broken top at 23m, damaged stem at 10m
5	4/11	5	336	511	0	3	3	3	0	1	n	n	-	double leader at 18-20m >150 >200
5	4/11	6	320	459	0	2	2	2	0	1	n	n	8	
5	4/11	7	316	480	3	2	2	2	1	1	n	n	7	P2.0, massive defect at 6m & 12m
5	4/11	8	369	485	0	3	-	-	0	1	n	n	5	top gone at 12m
5	4/11	9	406	526	2	2	3	3	0	0	y	y	4	P4.0, some flutting in butt
5	4/11	10	354	720	0	1	2	2	2	0	y	y	3	very nice tree
5	4/11	11	307	521	0	2	3	3	0	0	n	n	2	broken top at 15m, multi leader
5	4/11	12	331	699	0	3	3	3	2	0	y	y	1	ramicorn at 9m >150mm
5	4/11	13	373	681	0	2	3	3	2	0	y	n	11	broken top at 25m otherwise nice straight tree
5	4/11	14	388	458	0	3	2	2	0	0	y	y	10	deformed stem at whorls 1 and 5, nodal swelling
5	4/11	15	382	767	3	3	3	3	0	0	y	y	-	P4.2, big heavy upper branches, adjacent to gap
5	4/11	16	317	752	0	3	3	3	0	2	y	y	-	edge tree by gap, big heavy branches
5	4/11	17	339	463	0	2	3	3	1	0	n	n	13	broken top at 13m, double leader
5	4/11	18	391	698	0	3	3	3	1	1	y	y	-	edge tree
5	4/11	19	350	606	0	3	3	3	0	0	y	y	14	
5	4/11	20	350	634	0	2	3	3	0	1	n	n	-	triple leader at 18m

Forest Owner Blakely Pacific, Trial CY421/1, Forest Waimate Cpt 2

Plot No.	Plot#	Tree#	O. Wd. BD	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
					Log 1	Log 2	Log 3	Log 4						
8	5/51	1	388	577	3	3	3	3	0	0	y	y	-	p1.8, edge tree
8	5/51	2	347	492	2	2	3	3	0	1	y	y	-	p4.5, edge tree
8	5/51	3	424	659	3	3	3	3	0	0	y	y	-	not pruned, big branching by gap
8	5/51	4	352	596	3	3	3	3	0	2	y	y	-	p1.5, big ramicorn at 4m >300mm, by gap
8	5/51	5	411	606	3	3	3	3	1	0	y	y	-	P1.7
8	5/51	6	415	590	3	3	3	3	2	1	y	y	22	nice tree but big branches
8	5/51	7	408	410	2	2	3	3	0	1	y	y	24	P4.0
8	5/51	8	389	492	0	2	3	-	0	2	n	n	-	broken top at 15m
8	5/51	9	353	480	1	2	2	3	0	1	y	y	-	P4.0
8	5/51	10	385	533	2	3	3	3	1	1	y	y	-	P4.5
8	5/51	11	360	426	2	2	2	-	0	0	n	n	-	P4.0, top blown at 15m
8	5/51	12	375	550	0	3	3	3	1	0	y	y	23	p5.0
8	5/51	13	382	447	2	2	2	2	0	1	y	y	21	p3.5
8	5/51	14	380	438	2	2	2	2	0	1	n	n	19	p1.5, double leader at 3m >300 >350
8	5/51	15	412	559	3	3	3	3	0	1	y	y	20	p1.5, lots of sweep in log/stem
8	5/51	16	375	393	1	1	2	2	0	0	y	y	25	p4.0
8	5/51	17	370	476	3	2	2	2	0	1	n	n	26	p1.5, double leader at 4.0m >300 >400
8	5/51	18	323	504	3	3	2	-	0	1	n	n	2	p1.2, rami at 4m, multi leader at 12m
8	5/51	19		390							n	n	-	dead tree, blown top
8	5/51	20	402	405	3	2	2	2	0	3	n	n	3	p2.0, rami 3m, lots bleeding by ramicorn.
8	5/51	21	350	308							n	n	4	dead, broken top at 6m
8	5/51	22	402	374	3	3	3	3	2	1	y	y	1	p2.0, long internode
8	5/51	23	333	398	2	2	2	2	0	1	y	y	10	p4.0
8	5/51	24	334	498	3	3	3	3	1	1	y	n	14	P2.5, ramicorn at 5m
8	5/51	25		415							n	n	-	dead
8	5/51	26	402	296	2	2	1	1	0	0	y	y	18	P2.0
8	5/51	27	370	450	3	2	2	2	0	0	n	n	17	P2.0, double leader at 4m
8	5/51	28											-	
8	5/51	29	400	342	2	1	1	1	0	0	y	y	13	p1.8
8	5/51	30	379	490	2	2	3	3	0	1	y	y	9	p4.5
8	5/51	31	416	506	2	2	2	3	0	1	y	y	5	p4.5
8	5/51	32	386	501	3	3	3	3	0	1	y	y	6	p4.0
8	5/51	33	369	450	3	3	3	2	1	1	y	y	12	P2.0
8	5/51	34	416	327	1	1	2	2	0	1	y	y	11	P4.0
8	5/51	35	381	488	2	3	2	2	0	1	y	y	8	P4
8	5/51	36	335	419	3	2	2	3	0	0	y	y	7	P2

Forest Owner PFPF, Trial WN377, Forest Mohaka Cpt 205

Plot No.	Plot#	Tree#	O. Wd. BD	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
					Log 1	Log 2	Log 3	Log 4						
12	6/41	1	382	497	0	2	3	-	0	1	n	n	79	double leader at 15m, malformed top
12	6/41	2	424	805	0	3	3	3	0	0	y	y	80	nice big tree
12	6/41	3	468	529	0	3	3	3	0	2	y	y	51	bit of side lean
12	6/41	4	377	754	0	3	3	3	0	1	y	y	52	heavy lean, very big tree
12	6/41	5	374	465	0	2	2	-	0	0	y	y	57	malf top at 14m
12	6/41	6	383	733	0	3	3	3	0	1	y	y	8	nice tree
12	6/41	7	412	533	0	2	2	2	0	1	y	y	61	lot comp wood
12	6/41	8	419	414	0	2	2	-	0	1	n	n	64	malformed top, broken at 15m
12	6/41	9	439	570	0	2	2	2	0	1	y	y	65	
12	6/41	10	349	513	0	1	2	2	0	1	y	y	66	side lean
12	6/41	11	484	528	0	2	2	2	0	0	y	y	68	
12	6/41	12	399	661	0	3	3	2	0	0	y	y	70	
12	6/41	13	469	541	0	2	2	2	0	0	y	y	-	
12	6/41	14	373	532	0	3	3	3	0	1	y	y	-	
12	6/41	15	395	656	0	3	3	3	0	1	y	y	-	OK to fell

Forest Owner JUKN, Trial AK1058, Forest Aupouri Cpt 92

Plot No.	Plot#	Tree#	O. Wd. BD	DBH	BIX				IIX	Resin	Suitable to Fell (Y/N)	Acceptable Crop Tree (Y/N)	PSP #	COMMENTS
					Log 1	Log 2	Log 3	Log 4						
15	10/51	1	455	490	0	3	3	3	0	3	y	y	-	severe resin bleeding
15	10/51	2	508	431	0	2	3	3	2	2	y	y	-	
15	10/51	3	516	319	0	3	3	-	0	1	y	n	-	broken top at 15m, multi-leader basket whorl
15	10/51	4	484	424	0	3	3	3	0	2	y	y	-	
15	10/51	5	552	434	0	3	3	3	0	2	y	y	-	
15	10/51	6	457	385	0	3	3	3	0	2	y	n	11	defect kink at 9m
15	10/51	7	491	443	0	1	2	2	0	2	y	y	18	nice tree
15	10/51	8	499	498	0	2	3	3	0	3	y	y	16	a lot of resin bleeding up high
15	10/51	9	507	446	0	1	2	2	0	2	y	y	-	
15	10/51	10	446	437	0	1	2	2	0	1	y	y	9	marginal 1/2 resin
15	10/51	11	488	447	0	3	2	2	0	2	y	y	12	
15	10/51	12	507	443	0	2	2	3	0	1	y	n	-	stem shift at 13/14m
15	10/51	13	502	500	0	3	3	3	0	3	y	y	20	very very severe resin . Worst resin tree seen.
15	10/51	14	523	418	0	1	2	2	0	3	y	y	19	lots of lesions
15	10/51	15	438	512	0	2	3	3	0	3	y	y	8	very severe resin
15	10/51	16	521	391	0	2	2	2	0	1	y	y	6	resin could be a 2
15	10/51	17	421	498	0	3	3	3	0	3	y	n	-	sev res. bleeding, multi leader at 15m, big br. at ML
15	10/51	18	521	546	0	1	3	3	0	1	y	y	3	
15	10/51	19	566	479	0	2	3	3	0	3	y	y	-	severe bleeding
15	10/51	20	463	460	0	1	3	-	0	3	y	n	-	broken top at 17m and small leader, severe resin
15	10/51	21	481	298	0	2	3	2	0	1	y	n	21	severe stem wobble at 10m
15	10/51	22	515	445	0	2	3	3	0	1	y	y	-	
15	10/51	23	507	412	0	2	3	3	0	2	y	n	-	stem shift at 15m
15	10/51	24	490	398	0	1	3	2	0	1	y	y	-	