VALIDATION OF THE RADIATA PINE SHELTERBELT GROWTH MODEL

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EXECUTIVE SUMMARY

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Some 849 plot measurements in 236 *Pinus radiata* shelterbelt permanent sample plots, were used to validate the growth model developed by Auclair et al (1991). These provided 517 plot increments, none of which had been used in the development of the model. The validation was performed using a library of standardised SAS routines previously developed (Kimberly & Knowles 1993). The analysis showed that the shelterbelt growth model was:

— relatively unbiased in annual height increment prediction (3% error overall) but with a tendency to over-predict height increments for shelterbelts less than 8 years old and at low stockings (< 250 stems/km),

— over-predicting annual basal area increment by an average of 20%. Error was greatest for North Island single-row shelterbelts less than 16 years old and on site indices over-20 m,

— under-predicting mortality by an average of 2.6 trees/km/year. This was particularly noticeable in young (< 16 years) shelterbelts in the North Island. Shelterbelt design does not significantly affect mortality.

Introduction:

Shelterbelts are a common site on New Zealand farms. Historically they have been grown for a variety of reasons but generally more consideration has been given to livestock and crop shelter benefits than to timber production. Consequently few shelterbelts have been actively managed for timber production.

In 1983 the yield and log quality of a 22 year old pruned *Pinus radiata* shelterbelt grown near Rotorua was studied. This showed that shelterbelts, or timber belts as they became known, could be grown to yield a considerable financial return from the wood over-and above there shelter benefit.

It was recognised that in order for growers, managers, or planners to successfully estimate the profitability of farm shelterbelts they needed to have growth and yield models to predict future volumes and log grades. An initial series of permanent sample plots (PSP's) to monitor tree diameter and height growth in Radiata pine were established in 1984 (Wybourne et al. 1984). These resulted in the fitting of a preliminary height growth model for timberbelts grown in the central North Island (Koehler and Tombleson 1988). The development of this height model identified deficiencies in the plot data base resulting in further plots being installed and a rationalisation of the of plots measured. This meant that most effort was placed on the intensively managed one and two row pruned shelterbelts and on a smaller number of unpruned and trimmed radiata pine shelterbelts.

By 1991 a data base of over-360 plots in 115 shelterbelts existed and an intensive study was made of the data from 61 plots from 31 shelterbelts in the central North island and 44 plots from 23 shelterbelts in the South Island (Auclair et al. 1991). Equations were derived to describe;

- Height growth
- Basal Area growth
- Diameter distributions
- Total stem volume
- Mortality

The above equations were incorporated into the STANDPAK Modelling system in the form of two timberbelt growth models; one for the North Island and the other for the South Island.

Given their central nature to many decision making processes, it is important that new and existing growth models are adequately validated, particularly against measurements from permanent sample plots (Goulding, 1979). This report describes the validation of the timberbelt growth model.

Method:

A data base of over 500 shelterbelt permanent sample plots was screened for suitability as validation sets. Ideally validation should be carried out using data

independent to that used in the model development. However, even when a model is compared against the data used to create it, it is not unusual to find regions, particular crop types, or combinations of factors for which it is unsatisfactory. For this reason the data were further sorted into crop types (Table 1) and region (Table 2). Eight crop types were created based on the number of rows of *P.radiata* planted, pruning intensity and the presence or absence of supplementary species. Data not fitting these crop types were not used in the original development of the growth model so were not used in this analysis.

Table 1: List of crop types used

Crop type	Description
1	1 row P radiata unpruned with **no** supplementary species
2	2 row P.radiata unpruned with **no** supplementary species
3	1 row P radiata **pruned** with **no** supplementary species
4	2 row P.radiata **pruned** with **no** supplementary species
5	1 row P radiata unpruned **with** supplementary species
6	2 row P.radiata unpruned **with** supplementary species
7	1 row P radiata **pruned** with supplementary species
8	2 row P.radiata **pruned** with supplementary species

Table 2: Regions tested.

Code	Region
AK	Waikato, Auckland, Northland
RO	Taranaki, South Waikato, Bay of Plenty
WN	Hawkes Bay, Wairarapa, Manawatu
CY	Canterbury, Otago , Southland.

A total of 236 plots with 849 measurement points and 517 increments were used to validate the shelterbelt growth model. A full list of plots screened for use as the validation data set is tabled in Appendix 12. The number of increment sets tested for each crop type is presented in table 3.

Table 3 - Data set used for validation

Crop type	Description	No of Plots	No of Measurements	No of Increments
1	1 row P radiata unpruned with **no** supplementary species	38	67	36
2	2 rows P.radiata unpruned with **no** supplementary species	5	15	11
3	1 row P radiata **pruned** with **no** supplementary species	80	221	119
4	2 rows P.radiata **pruned** with **no** supplementary species	23	69	40
5	1 row P radiata unpruned **with** supplementary species	16	58	58
6	2 rows P.radiata unpruned **with** supplementary species	3	12	6
7	1 row P radiata **pruned** with supplementary species	54	316	202
8	2 rows P.radiata **pruned** with supplementary species	17	91	45
	Total:	236	849	517

The completed data sets were then read into the SAS statistical analysis package where they were submitted to a number of macros developed by Kimberly and Knowles (1993) specifically for this purpose. These macros are designed to input data from the FRI-maintained PSP system (Pilaar & Dunlop, 1990) and can be customised to suit individual sets of data. Several user-defined macros which specify the form of the growth model were created. These were as follows:

SI — to define the site index (mean top height at a standard age)
MTH — to define the mean top height growth function
BA — to define the basal area function
N — to define the mortality function

Using the macro READDAT, data from two files, namely a PSP plot measurement summary file and a file containing region and croptype class numbers for each plot, was read into SAS. Next, the macro GROW, was run repeatedly on subsets of data to test predictions for MTH (mean top height), BA (basal area) and stocking using two different starting ages (4-8 years and 8-16 years).

The macros TABHT, TABBA, and TABN were run to tabulate the mean errors of prediction of MTH, BA, and stocking, respectively. The errors were tabulated against years the model had run, and either CROPTYPE, REGION, Predicted MTH, BA, SI or STOCKING. These give an indication of the total error that can be expected when running the model from a given starting point for a given number of years.

Then the macros TABHTCAI, TABBACAI and TABMORT were then run to tabulate mean errors in prediction of MTH CAI (current annual increment), BA CAI and

mortality, respectively. The errors were tabulated against age, and either CROPTYPE, REGION, SI, meansured BA or the predicted value of the variable (PMTHCAI, PBACAI or PMORT). Means of predicted values and numbers of plots contributing to each mean were also tabulated.

Results and discussion

Results for specific variables tested are presented below.

Mean Top Height (MTH)

The model showed a consistent slight bias toward over-predicting mean top height across all factors tested. Mean top height was over-predicted for all stockings (Appendix 1) but was worse at low stockings. A ten percent over- prediction occurred at stockings less than 150 stems per km, but only four plots were used with this stocking range. When the model was started at a shelterbelt age greater than eight years and run for a period of 8 years the mean error, across all stockings, in final height was an over-prediction of 0.1 metres or 0.7%. When height prediction was begun from a younger age (between four and eight) and run for a similar period the mean error in final height increased to an over-prediction of 0.2 metres (1.9%) .
Regardless of site index, when the simulation was begun from shelterbelt ages between four and eight, MTH was consistently over-predicted by a mean of 2% (Appendix 2). At very low site indices, ie less than 15 metres, MTH was significantly over-predicted (10%). However only two plots were used to test this extreme. When the simulation was begun at an older age, (between 8 and 16 years), it still over-predicted MTH for lower site indices but over-predicted for site indices above 25 metres(Appendix 3).

When simulated from between shelterbelt age four and eight years the model consistently over-predicts MTH irrespective of standing basal area. Increasing basal area does not significantly influence the absolute error in MTH.

MTH is over-predicted for all regions with Canterbury being the poorest at 0.5 metres (5.1%).
The model consistently over-predicted MTH for all crop types except crop type 7 , (single row P.radiata with supplementary species), which was slightly over-predicted (Appendix 4). Crop type 2 , (2 rows unpruned), was over-predicted by the greatest margin (9%).

Basal Area (BA)

The model generally over-predicted basal area at all stockings but at stockings below 150 stems / km, i.e. tree spacing greater than 6.7 metres, the model was found to over-predict by a large margin (56%). As stocking increased the error in basal area prediction reduced. (Appendix 5). The percentage error in predicted BA increased as site index decreased. Initial BA was not a good predictor of total BA as the model over-predicted regardless of start BA (Appendix 6). The model over-predicted for all regions with AK (Northland) providing the largest errors. However there were only four plots used from this region. The model over-predicted BA for all crop types with a mean error of 7-8% depending upon start age and the number of years run.

Mortality

Overall the model strongly underestimated mortality (Appendix 7). Actual mortality was 4.2 stems / km / yr whilst the model predicted only 1.3 stems / km / yr. The model predicted mortality particularly poorly for young shelterbelts (less than 8 years old) and at low stockings (less than 150 stems/km). However, the model overestimated mortality (30 %) in older (>24yr) aged shelterbelts.

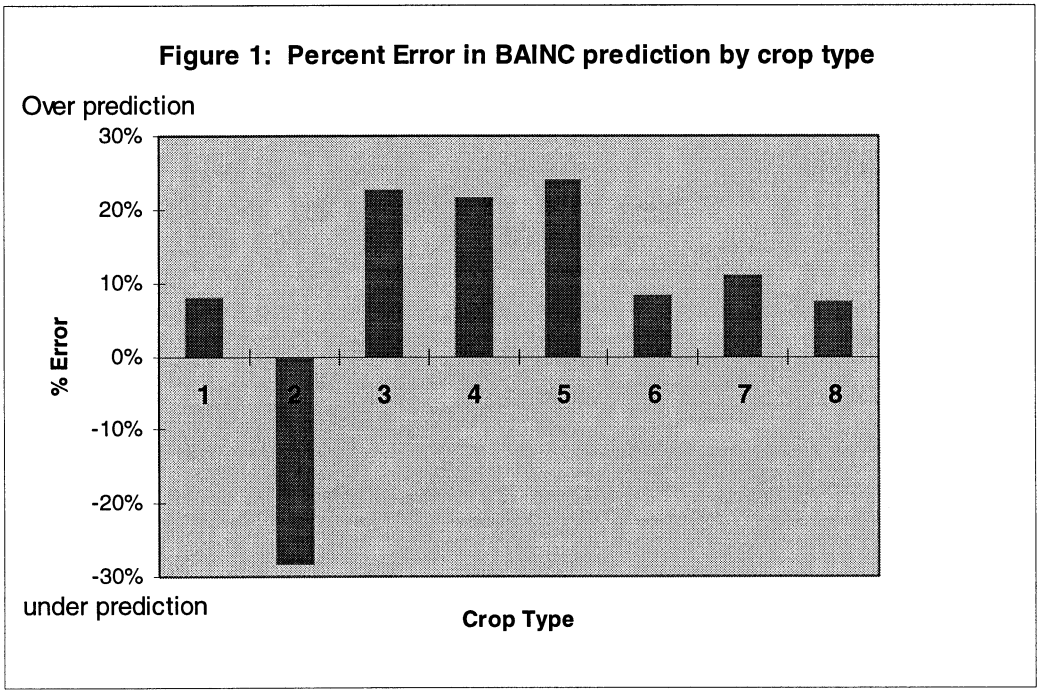
Mean Top Height Increment (MTHINC)

Overall the model over-predicts MTH increment by 2 percent, but overestimates height increment for stockings less than 250 stems/km (ie between tree spacing greater than 4 metres) by 13 %(Appendix 8). The model over-predicts MTHINC in younger (< 8 years) shelterbelts but under-estimates growth of older shelterbelts between 8 and 16 years of age. The model tends to slightly over-estimate the height growth of pruned shelterbelts whilst underestimating unpruned shelterbelts(Appendix 9).

Basal Area Increment (BAINC).

Overall the model over-estimates BAINC by approximately 20 percent. The model over-estimates growth in shelterbelts less than 16 years old and under-estimates growth in shelterbelts over 24 years of age. The model over-estimates for all regions, particularly the central North Island and Hawkes Bay (RO, WN), but predicts better for Canterbury (Appendix 15). The model over-estimates BAINC for all crop types excluding 2 row unpruned shelterbelts which were under-estimated by a large margin (figure 1). However this set had only 6 plots so the result may not be conclusive. The model seriously over-estimates basal area increments of shelterbelts with low basal area starting values (appendix 11). This imprecision appears to be because the model does not account for starting basal area, i.e. shelterbelts on "high" fertility sites grow at the same rate as those on "low" fertility sites.

Figure 1: Percent Error in BAINC prediction by crop type



Conclusions

Although the model predicts height growth to within acceptable limits of error it is shown to be both biased and inaccurate in basal area and mortality prediction. This validation confirms earlier findings, by Auclair (1991) that the model over-estimates basal area for intensively managed shelterbelts. The impact of site differences expressed as different levels of starting basal area is also not adequately predicted by the model. It is therefore concluded that the model requires refitting using the data set originally used to develop the model and plots not previously used together with new data collected since 1991, and that the functions used to predict basal area and mortality require modification.

References

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Koehler A. R. and Tombleson J.D. 1988. Growth of radiata pine shelterbelts in the Central north Island: a preliminary analysis

Pilaar C. & Dunlop J., 1990. Permanent sample plot database system - a vital tool for managing the nations forests. Whats New Series, No 188.

Wybourne et al. 1984. Sample plot system for measuring growth of shelterbelts - stage 1 a pilot study. NZFRI project record No 581 (unpublished).

APPENDIX 1

Starting age between 4 and 8 years, Mean Top Height (m)

12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Stocking (sph)			
		0-150	-0.6	.	-0.6
		150-250	-0.3	.	-0.3
		250-400	-0.1	-1.5	-0.3
		400-650	-0.2	0.1	-0.1
		>650	-0.3	.	-0.3
		ALL	-0.2	-0.2	-0.2
Pred	MEAN	Stocking (sph)			
		0-150	5.4	.	5.4
		150-250	6.8	.	6.8
		250-400	8.5	16.6	9.3
		400-650	10.2	21.8	12.6
		>650	7.6	.	7.6
		ALL	8.7	21.0	10.2
	N	Stocking (sph)			
		0-150	4	.	4
		150-250	28	.	28
		250-400	28	3	31
		400-650	62	16	78
		>650	19	.	19
		ALL	141	19	160

Starting age between 8 and 16 years, Mean Top Height (m)

12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Stocking (sph)			
		150-250	0.1	.	0.1
		250-400	0.3	-1.7	-0.1
		400-650	0.1	-0.1	0.0
		>650	-0.4	-1.3	-0.6
		ALL	0.1	-0.5	-0.1
Pred	MEAN	Stocking (sph)			
		150-250	12.2	.	12.2
		250-400	12.4	16.9	13.2
		400-650	13.3	21.2	15.0
		>650	12.0	20.7	13.6
		ALL	12.9	20.4	14.4
	N	Stocking (sph)			
		150-250	4	.	4
		250-400	21	4	25
		400-650	65	18	83
		>650	13	3	16
		ALL	103	25	128

APPENDIX 2

Starting age between 4 and 8 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	SI			
		10-15	.	-2.2	-2.2
		15-20	-0.3	-1.4	-0.3
		20-25	-0.3	.	-0.3
		25-30	-0.2	0.2	-0.1
		>30	0.5	-1.2	-0.1
		ALL	-0.2	-0.2	-0.2
Pred	MEAN	SI			
		10-15	8.7	14.0	11.3
		15-20	8.7	14.8	9.0
		20-25	6.2	.	6.2
		25-30	9.3	21.6	11.2
		>30	16.2	24.7	18.3
		ALL	8.7	21.0	10.2
	N	SI			
		10-15	1	1	2
		15-20	16	1	17
		20-25	32	.	32
		25-30	89	16	105
		>30	3	1	4
		ALL	141	19	160

Starting age between 8 and 16 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	SI			
		10-15	-1.3	-2.0	-1.8
		15-20	-0.4	-2.2	-0.8
		20-25	-0.0	-0.6	-0.1
		25-30	0.3	0.2	0.3
		>30	1.0	-1.2	0.3
		ALL	0.1	-0.5	-0.1
Pred	MEAN	SI			
		10-15	11.5	15.8	13.7
		15-20	10.1	17.3	11.0
		20-25	12.0	21.7	12.7
		25-30	14.3	21.5	16.0
		>30	17.3	24.7	19.2
		ALL	12.9	20.4	14.4
	N	SI			
		10-15	3	3	6
		15-20	20	3	23
		20-25	24	2	26
		25-30	53	16	69
		>30	3	1	4
		ALL	103	25	128

APPENDIX 3

Starting age between 4 and 8 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	BA (m2/ha)			
		0-5	-0.3	.	-0.3
		5-10	-0.3	.	-0.3
		10-20	-0.1	-2.2	-0.1
		20-30	-0.1	-1.4	-0.2
		30-40	.	.	.
		>40	.	0.1	0.1
		ALL	-0.2	-0.2	-0.2
Pred	MEAN	BA (m2/ha)			
		0-5	5.3	.	5.3
		5-10	7.7	.	7.7
		10-20	9.5	14.0	9.6
		20-30	11.2	14.8	11.4
		30-40	17.0	.	17.0
		>40	18.4	21.8	20.9
		ALL	8.7	21.0	10.2
	N	BA (m2/ha)			
		0-5	36	.	36
		5-10	43	.	43
		10-20	33	1	34
		20-30	19	1	20
		30-40	4	.	4
		>40	6	17	23
		ALL	141	19	160

Starting age between 8 and 16 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	BA (m2/ha)			
		5-10	0.7	.	0.7
		10-20	0.0	-2.2	-0.1
		20-30	0.2	-1.3	0.1
		30-40	0.2	.	0.2
		>40	-0.8	-0.4	-0.5
		ALL	0.1	-0.5	-0.1
Pred	MEAN	BA (m2/ha)			
		5-10	8.5	.	8.5
		10-20	11.2	14.0	11.3
		20-30	13.3	14.7	13.4
		30-40	14.9	.	14.9
		>40	18.0	21.3	20.1
		ALL	12.9	20.4	14.4
	N	BA (m2/ha)			
		5-10	7	.	7
		10-20	39	1	40
		20-30	32	2	34
		30-40	13	.	13
		>40	12	22	34
		ALL	103	25	128

APPENDIX 4

Starting age between 4 and 8 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	REGION			
		AK	0.1	.	0.1
		CY	-0.3	-1.8	-0.5
		RO	-0.2	0.1	-0.1
		WN	-0.2	.	-0.2
		ALL	-0.2	-0.2	-0.2
Pred	MEAN	REGION			
		AK	10.5	.	10.5
		CY	8.7	14.4	9.3
		RO	10.3	21.8	12.5
		WN	6.1	.	6.1
		ALL	8.7	21.0	10.2
	N	REGION			
		AK	4	.	4
		CY	17	2	19
		RO	72	17	89
		WN	48	.	48
		ALL	141	19	160

Starting age between 8 and 16 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	REGION			
		AK	.	.	.
		CY	-0.5	-1.7	-0.9
		RO	0.3	0.1	0.2
		WN	0.2	.	0.2
		ALL	0.1	-0.5	-0.1
Pred	MEAN	REGION			
		AK	11.4	.	11.4
		CY	10.7	17.8	12.4
		RO	15.3	21.7	17.3
		WN	12.3	.	12.3
		ALL	12.9	20.4	14.4
	N	REGION			
		AK	4	.	4
		CY	25	8	33
		RO	37	17	54
		WN	37	.	37
		ALL	103	25	128

APPENDIX 5

Starting age between 4 and 8 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	CROPTY-PE			
		1	0.2	.	0.2
		3	-0.3	-1.8	-0.4
		4	-0.3	.	-0.3
		5	-0.2	-0.8	-0.3
		7	-0.1	0.3	-0.0
		8	-0.4	.	-0.4
		ALL	-0.2	-0.2	-0.2
Pred	MEAN	CROPTY-PE			
		1	6.8	.	6.8
		3	7.0	14.4	7.3
		4	6.2	.	6.2
		5	13.7	24.1	15.5
		7	10.0	21.3	12.5
		8	8.0	.	8.0
		ALL	8.7	21.0	10.2
	N	CROPTY-PE			
		1	4	.	4
		3	43	2	45
		4	17	.	17
		5	14	3	17
		7	49	14	63
		8	14	.	14
		ALL	141	19	160

Starting age between 8 and 16 years, Mean Top Height (m)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	CROPTY-PE			
		1	0.1	-0.6	-0.0
		2	-0.7	-2.2	-1.5
		3	0.1	-2.0	-0.1
		4	-0.4	.	-0.4
		5	0.1	-0.8	-0.2
		7	0.4	0.4	0.4
		8	-0.3	.	-0.3
		ALL	0.1	-0.5	-0.1
Pred	MEAN	CROPTY-PE			
		1	11.7	21.7	13.5
		2	13.3	18.7	15.1
		3	11.9	15.5	12.2
		4	10.1	.	10.1
		5	15.3	24.1	16.7
		7	14.8	21.2	17.3
		8	11.5	.	11.5
		ALL	12.9	20.4	14.4
	N	CROPTY-PE			
		1	9	2	11
		2	4	2	6
		3	44	4	48
		4	7	.	7
		5	16	3	19
		7	21	14	35
		8	2	.	2
		ALL	103	25	128

APPENDIX 6

Starting age between 4 and 8 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Stocking (sph)			
		0-150	-2.6	.	-2.6
		150-250	-1.4	.	-1.4
		250-400	-1.8	-7.0	-2.4
		400-650	-1.2	-1.5	-1.3
		>650	0.1	.	0.1
		ALL	-1.2	-2.4	-1.4
Pred	MEAN	Stocking (sph)			
		0-150	2.1	.	2.1
		150-250	5.4	.	5.4
		250-400	10.5	36.6	13.0
		400-650	17.6	64.7	27.0
		>650	14.3	.	14.3
		ALL	12.7	60.2	18.1
	N	Stocking (sph)			
		0-150	5	.	5
		150-250	31	.	31
		250-400	29	3	32
		400-650	64	16	80
		>650	20	.	20
		ALL	149	19	168

Starting age between 8 and 16 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Stocking (sph)			
		150-250	-2.2	.	-2.2
		250-400	-2.0	-3.6	-2.2
		400-650	-3.2	-0.7	-2.4
		>650	-2.7	-16.9	-6.6
		ALL	-2.8	-3.1	-2.8
Pred	MEAN	Stocking (sph)			
		150-250	12.7	.	12.7
		250-400	20.0	39.9	23.2
		400-650	27.1	61.6	34.6
		>650	32.6	86.9	42.8
		ALL	25.8	61.2	32.7
	N	Stocking (sph)			
		150-250	4	.	4
		250-400	21	4	25
		400-650	65	18	83
		>650	13	3	16
		ALL	103	25	128

APPENDIX 7

Starting age between 4 and 8 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	SI			
		10-15	.	-5.9	-5.9
		15-20	-0.6	-3.6	-0.8
		20-25	-1.1	.	-1.1
		25-30	-1.3	-2.2	-1.4
		>30	-4.1	-0.8	-3.0
		ALL	-1.2	-2.4	-1.4
Pred	MEAN	SI			
		10-15	9.8	25.0	17.4
		15-20	13.2	25.9	13.9
		20-25	5.7	.	5.7
		25-30	14.3	63.0	21.4
		>30	38.7	85.6	50.4
		ALL	12.7	60.2	18.1
	N	SI			
		10-15	1	1	2
		15-20	16	1	17
		20-25	34	.	34
		25-30	95	16	111
		>30	3	1	4
		ALL	149	19	168

Starting age between 8 and 16 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	SI			
		10-15	-1.3	-6.1	-4.9
		15-20	-2.9	-3.9	-3.1
		20-25	-2.8	-20.2	-4.2
		25-30	-2.8	-0.4	-2.0
		>30	-1.7	-0.8	-1.4
		ALL	-2.8	-3.1	-2.8
Pred	MEAN	SI			
		10-15	24.7	42.6	33.6
		15-20	20.3	50.1	24.2
		20-25	23.8	93.4	29.1
		25-30	28.0	61.2	35.7
		>30	40.7	85.6	51.9
		ALL	25.8	61.2	32.7
	N	SI			
		10-15	3	3	6
		15-20	20	3	23
		20-25	24	2	26
		25-30	53	16	69
		>30	3	1	4
		ALL	103	25	128

APPENDIX 8

Starting age between 4 and 8 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Predicted BA			
		0-5	-1.1	.	-1.1
		5-10	-0.8	.	-0.8
		10-20	-1.2	.	-1.2
		20-30	-2.2	-4.8	-2.5
		30-40	.	.	.
		>40	.	-2.1	-2.1
		ALL	-1.2	-2.4	-1.4
Pred	MEAN	Predicted BA			
		0-5	2.9	.	2.9
		5-10	7.3	.	7.3
		10-20	13.8	.	13.8
		20-30	23.7	25.5	23.9
		30-40	35.1	.	35.1
		>40	51.1	64.3	60.9
		ALL	12.7	60.2	18.1
	N	Predicted BA			
		0-5	38	.	38
		5-10	41	.	41
		10-20	39	.	39
		20-30	21	2	23
		30-40	4	.	4
		>40	6	17	23
		ALL	149	19	168

Starting age between 8 and 16 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	Predicted BA			
		5-10	-2.5	.	-2.5
		10-20	-1.4	.	-1.4
		20-30	-2.7	-3.9	-2.8
		30-40	-5.1	.	-5.1
		>40	-3.2	-3.0	-3.0
		ALL	-2.8	-3.1	-2.8
Pred	MEAN	Predicted BA			
		5-10	8.8	.	8.8
		10-20	14.7	.	14.7
		20-30	24.8	26.6	24.9
		30-40	33.5	.	33.5
		>40	53.2	65.9	61.2
		ALL	25.8	61.2	32.7
	N	Predicted BA			
		5-10	5	.	5
		10-20	34	.	34
		20-30	33	3	36
		30-40	18	.	18
		>40	13	22	35
		ALL	103	25	128

APPENDIX 9

Starting age between 4 and 8 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	REGION			
		AK	-1.6	.	-1.6
		CY	-0.6	-4.8	-1.1
		RO	-1.2	-2.1	-1.4
		WN	-1.4	.	-1.4
		ALL	-1.2	-2.4	-1.4
Pred	MEAN	REGION			
		AK	19.0	.	19.0
		CY	13.0	25.5	14.3
		RO	18.0	64.3	26.8
		WN	5.4	.	5.4
		ALL	12.7	60.2	18.1
	N	REGION			
		AK	4	.	4
		CY	17	2	19
		RO	72	17	89
		WN	56	.	56
		ALL	149	19	168

Starting age between 8 and 16 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	REGION			
		AK	.	.	.
		CY	-3.2	-8.8	-5.1
		RO	-1.8	-0.4	-1.2
		WN	-3.3	.	-3.3
		ALL	-2.8	-3.1	-2.8
Pred	MEAN	REGION			
		AK	20.5	.	20.5
		CY	23.4	58.1	31.8
		RO	31.6	62.6	41.4
		WN	22.0	.	22.0
		ALL	25.8	61.2	32.7
	N	REGION			
		AK	4	.	4
		CY	25	8	33
		RO	37	17	54
		WN	37	.	37
		ALL	103	25	128

APPENDIX 10

Starting age between 4 and 8 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	CROPTYPE			
		1	-0.2	.	-0.2
		3	-1.4	-4.8	-1.5
		4	-0.8	.	-0.8
		5	-3.4	-5.0	-3.8
		7	-1.3	-1.5	-1.4
		8	0.2	.	0.2
		ALL	-1.2	-2.4	-1.4
Pred	MEAN	CROPTYPE			
		1	8.3	.	8.3
		3	8.0	25.5	8.8
		4	7.8	.	7.8
		5	28.4	86.1	38.6
		7	14.9	59.7	24.1
		8	10.5	.	10.5
		ALL	12.7	60.2	18.1
	N	CROPTYPE			
		1	4	.	4
		3	43	2	45
		4	17	.	17
		5	14	3	17
		7	54	14	68
		8	17	.	17
		ALL	149	19	168

Starting age between 8 and 16 years, Basal Area (m2/ha)
12:09 Sunday, November 2

			TIMERUN		
			0-8	8-16	ALL
Res	MEAN	CROPTYPE			
		1	-2.9	-20.2	-6.7
		2	-1.7	-8.5	-5.1
		3	-3.7	-3.2	-3.6
		4	-2.0	.	-2.0
		5	-2.6	-5.0	-3.2
		7	-0.8	0.6	-0.0
		8	-1.3	.	-1.3
		ALL	-2.8	-3.1	-2.8
Pred	MEAN	CROPTYPE			
		1	22.8	93.4	35.7
		2	38.7	70.2	49.2
		3	21.9	34.4	22.9
		4	20.4	.	20.4
		5	34.8	86.1	42.9
		7	28.4	57.6	40.1
		8	16.8	.	16.8
		ALL	25.8	61.2	32.7
	N	CROPTYPE			
		1	9	2	11
		2	4	2	6
		3	44	4	48
		4	7	.	7
		5	16	3	19
		7	21	14	35
		8	2	.	2
		ALL	103	25	128

APPENDIX 11

Mortality (stems/ha/yr) 12:09 Sunday, November 20, 1

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	Stocking (sph)					
		0-150	17.31	.	-0.36	1.27	10.56
		150-250	4.44	-0.56	-0.46	-0.46	3.59
		250-400	6.69	3.91	1.52	5.97	5.14
		400-650	3.74	1.91	3.13	-1.49	2.62
		>650	-4.08	-1.11	5.02	-4.49	-1.93
		ALL	4.10	1.79	2.84	-0.63	2.89
Pred	MEAN	Stocking (sph)					
		0-150	0.34	.	0.36	0.36	0.35
		150-250	0.60	0.56	0.46	0.46	0.59
		250-400	0.87	1.00	1.02	1.11	0.95
		400-650	1.34	1.34	1.44	1.49	1.35
		>650	2.68	2.45	2.23	2.41	2.53
		ALL	1.21	1.37	1.42	1.46	1.30
	N	Stocking (sph)					
		0-150	6	.	2	2	10
		150-250	34	5	1	1	41
		250-400	21	19	3	2	45
		400-650	43	58	10	2	113
		>650	19	12	5	4	40
		ALL	123	94	21	11	249

APPENDIX 12

Mean top height CAI (m/yr)

12:09 Sunday, November 2

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	Stocking (sph)					
		0-150	-0.27	.	0.04	-0.31	-0.22
		150-250	-0.14	-0.17	-0.40	-0.03	-0.14
		250-400	-0.12	0.22	-0.25	0.19	0.02
		400-650	-0.11	0.10	0.06	-0.46	-0.00
		>650	-0.09	0.12	-0.08	0.20	0.01
		ALL	-0.12	0.11	-0.04	-0.03	-0.03
Pred	MEAN	Stocking (sph)					
		0-150	1.24	.	0.71	0.60	1.01
		150-250	1.37	1.44	0.55	0.43	1.33
		250-400	1.45	1.45	0.85	0.46	1.37
		400-650	1.44	1.39	1.05	0.86	1.37
		>650	1.47	1.11	0.69	0.20	1.14
		ALL	1.42	1.37	0.88	0.46	1.31
	N	Stocking (sph)					
		0-150	6	.	2	2	10
		150-250	34	5	1	1	41
		250-400	21	19	3	2	45
		400-650	43	57	10	2	112
		>650	19	12	5	4	40
		ALL	123	93	21	11	248

APPENDIX 13

Mean top height CAI (m/yr)

12:09 Sunday, November 2

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	CROPTY-PE					
		1	0.40	0.07	0.13	-0.13	0.07
		2	.	0.00	-0.44	0.34	-0.03
		3	-0.09	0.17	-0.26	0.09	0.02
		4	-0.11	0.36	-0.40	-0.03	0.02
		5	-0.01	-0.12	.	.	-0.10
		6	.	.	-0.39	-0.46	-0.42
		7	-0.17	0.14	0.44	.	-0.04
		8	-0.15	-0.11	.	.	-0.15
		ALL	-0.12	0.11	-0.04	-0.03	-0.03
Pred	MEAN	CROPTY-PE					
		1	0.97	1.28	0.72	0.52	0.96
		2	.	0.85	0.74	0.01	0.53
		3	1.29	1.31	0.77	0.44	1.24
		4	1.25	1.22	0.55	0.43	1.19
		5	1.61	1.50	.	.	1.52
		6	.	.	0.97	0.86	0.93
		7	1.55	1.52	1.22	.	1.52
		8	1.50	1.44	.	.	1.49
		ALL	1.42	1.37	0.88	0.46	1.31
	N	CROPTY-PE					
		1	2	8	5	3	18
		2	.	2	2	2	6
		3	35	41	5	3	84
		4	18	7	1	1	27
		5	3	12	.	.	15
		6	.	.	3	2	5
		7	48	21	5	.	74
		8	17	2	.	.	19
		ALL	123	93	21	11	248

APPENDIX 14

Basal Area CAI (m2/ha/yr)

12:09 Sunday, November 2

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	Stocking (sph)					
		0-150	-1.31	.	0.52	-0.28	-0.74
		150-250	-0.98	-1.50	1.21	0.86	-0.94
		250-400	-1.01	-1.64	-0.41	0.37	-1.18
		400-650	-0.59	-1.45	-0.40	-0.24	-1.01
		>650	0.26	-1.13	0.47	2.45	0.08
		ALL	-0.70	-1.45	-0.03	0.94	-0.85
Pred	MEAN	Stocking (sph)					
		0-150	1.80	.	2.59	2.34	2.07
		150-250	2.53	3.95	1.23	0.98	2.63
		250-400	3.36	5.40	2.60	1.81	4.10
		400-650	3.61	6.03	6.23	5.55	5.11
		>650	4.82	5.68	4.43	1.32	4.68
		ALL	3.37	5.74	4.70	2.33	4.32
	N	Stocking (sph)					
		0-150	6	.	2	2	10
		150-250	34	5	1	1	41
		250-400	21	19	3	2	45
		400-650	43	57	10	2	112
		>650	19	12	5	4	40
		ALL	123	93	21	11	248

APPENDIX 15

Basal Area CAI (m2/ha/yr)

12:09 Sunday, November 2

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	REGION					
		AK	-0.95	-1.14	.	.	-1.05
		CY	-0.03	-0.20	0.19	1.47	0.24
		RO	-0.43	-1.06	-0.11	-0.88	-0.64
		SD	.	.	-0.74	-0.24	-0.54
		WN	-1.00	-2.38	.	.	-1.58
		ALL	-0.70	-1.45	-0.03	0.94	-0.85
Pred	MEAN	REGION					
		AK	4.63	5.33	.	.	4.98
		CY	2.24	3.83	3.23	1.34	3.03
		RO	3.71	6.00	6.91	3.86	4.71
		SD	.	.	6.13	5.55	5.90
		WN	3.08	6.43	.	.	4.39
		ALL	3.37	5.74	4.70	2.33	4.32
	N	REGION					
		AK	2	2	.	.	4
		CY	4	18	12	8	42
		RO	56	34	6	1	97
		SD	.	.	3	2	5
		WN	61	39	.	.	100
		ALL	123	93	21	11	248

APPENDIX 16

Basal Area CAI (m2/ha/yr)

12:09 Sunday, November 2

			Age				
			0-8	8-16	16-24	>24	ALL
Res	MEAN	BA (m2/ha)					
		0-5	-0.86	.	.	.	-0.86
		5-10	-0.79	-1.92	.	.	-0.94
		10-20	-0.10	-1.71	-1.00	.	-1.11
		20-30	.	-1.74	0.36	.	-1.43
		30-40	.	-0.77	.	0.59	-0.60
		>40	.	-0.73	-0.07	1.02	-0.04
		ALL	-0.70	-1.45	-0.03	0.94	-0.85
Pred	MEAN	BA (m2/ha)					
		0-5	2.50	.	.	.	2.50
		5-10	3.95	4.29	.	.	3.99
		10-20	4.77	4.91	2.59	.	4.82
		20-30	.	6.26	1.91	.	5.62
		30-40	.	6.33	.	0.90	5.65
		>40	.	7.20	5.52	2.65	5.42
		ALL	3.37	5.74	4.70	2.33	4.32
	N	BA (m2/ha)					
		0-5	63	.	.	.	63
		5-10	36	5	.	.	41
		10-20	24	38	1	.	63
		20-30	.	23	4	.	27
		30-40	.	14	.	2	16
		>40	.	13	16	9	38
		ALL	123	93	21	11	248

APPENDIX 17

Timberbelt growth model validation dataset

Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
1	CY	467	32	1	1	E. Richards	Darfield	1	P.RAD	-	1967	27	20	5	C
1	CY	467	33	1	1	E. Richards	Darfield	1	P.RAD	-	1965	29	16	5	C
1	CY	467	55	1	1	J. Letham	Rakaia	1	P.RAD	-	1977	17	26	3	A
1	CY	467	55	2	1	J. Letham	Rakaia	1	P.RAD	-	1977	17	24	3	A
1	RO	2007	1	1	1	R. Annett	Rerewhakaaitu	1	P.RAD	-	1964	30	20	6	F
1	RO	2007	1	2	1	R. Annett	Rerewhakaaitu	1	P.RAD	-	1964	30	20	6	F
1	RO	2007	1	3	1	R. Annett	Rerewhakaaitu	1	P.RAD	-	1964	30	22	6	F
2	CY	467	5	1	1	C. Scott	Oxford	1	P.RAD	-	1978	16	25	3	A
2	CY	467	5	2	1	C. Scott	Oxford	1	P.RAD	-	1978	16	27	3	A
2	CY	467	17	1	1	J. Brownlee	Rakaia	2	P.RAD	CEDEO	1970	24	24	5	C
2	CY	467	17	2	1	J. Brownlee	Rakaia	2	P.RAD	CEDEO	1970	24	26	5	C
2	CY	467	3	1	1	R. Leech		2	P.RAD	-	1955	39	30	2	F
2	CY	467	3	2	1	R. Leech		2	P.RAD	-	1955	39	31	2	F
3	CY	467	49	1	1	A. Harris	Ashburton	1	P.RAD	CUARZ	1977	17	23	5	C
3	CY	467	49	2	1	A. Harris	Ashburton	1	P.RAD	CUARZ	1977	17	21	5	C
3	CY	467	15	1	1	B. Harris	Darfield	1	P.RAD	CULUS	1969	25	25	5	C
3	CY	467	73	1	1	B. Redfern	Darfield	1	P.RAD	-	1979	15	24	3	C
3	CY	467	36	1	1	D. Hutton	Darfield	1	P.RAD	PSMEN	1959	35	22	2	F
5	RO	2007	8	1	1	B. Giles	Maketu	1	P.RAD	-	1979	15	13	7	C
5	RO	2007	8	2	1	B. Giles	Maketu	1	P.RAD	-	1979	15	15	7	C
5	RO	2007	8	3	1	B. Giles	Maketu	1	P.RAD	-	1979	15	15	7	C
5	CY	467	47	1	1	C. Lill	Rakaia	1	P.RAD	-	1974	20	23	4	C
5	CY	467	47	2	1	C. Lill	Rakaia	1	P.RAD	-	1974	20	24	4	C
5	RO	2007	13	1	1	D. Taylor	Rerewhakaaitu	1	P.RAD	-	1974	20	11	6	F
5	RO	2007	13	2	1	D. Taylor	Rerewhakaaitu	1	P.RAD	-	1974	20	10	6	F
5	RO	2007	26	1	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	15	7	C
5	RO	2007	26	2	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	15	7	C
5	RO	2007	26	3	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	15	7	C
5	RO	2007	27	1	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	9	7	C
5	RO	2007	27	2	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	10	7	C
5	RO	2007	27	3	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	10	7	C
5	RO	2007	28	1	1	I. Moore	Kaharoa	1	P.RAD	-	1984	10	10	7	C
5	RO	2007	28	2	1	I. Moore	Kaharoa	1	P.RAD	-	1984	10	10	7	C
5	RO	2007	28	3	1	I. Moore	Kaharoa	1	P.RAD	-	1984	10	10	7	C
5	RO	2007	29	1	1	I. Moore	Kaharoa	1	EUREG	-	1983	11	13	4	C
5	RO	2007	29	2	1	I. Moore	Kaharoa	1	EUREG	-	1983	11	13	4	C
5	RO	2007	44	1	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	10	3	C
5	RO	2007	44	2	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	10	3	C
5	RO	2007	44	3	1	I. Moore	Kaharoa	1	P.RAD	-	1983	11	10	3	C
5	RO	2007	4	1	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	20	6	F
5	RO	2007	4	2	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	19	6	F
5	RO	2007	4	3	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	20	6	F
5	RO	2007	5	1	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	16	6	F
5	RO	2007	7	1	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	20	6	F
5	RO	2007	7	2	1	J. Dunn	Rerewhakaaitu	1	P.RAD	-	1963	31	19	6	F
5	AK	1008	12	1	1	D. McNeil	Te Poi	1	P.RAD	-	1979	15	15	4	C
5	AK	1008	12	2	1	D. McNeil	Te Poi	1	P.RAD	-	1979	15	15	4	C
5	AK	1008	12	1	1	D. McNeil	Te Poi	1	P.RAD	-	1979	15	15	5	C
5	RO	2007	41	1	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	10	1	C
5	RO	2007	41	2	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	41	3	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	41	4	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	41	5	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	13	1	C
5	RO	2007	41	6	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C

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Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
5	RO	2007	41	7	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	41	8	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	13	1	C
5	RO	2007	42	1	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	42	2	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	14	1	C
5	RO	2007	42	3	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	42	4	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	14	1	C
5	RO	2007	42	5	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	12	1	C
5	RO	2007	42	6	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	15	1	C
5	RO	2007	43	1	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	13	1	C
5	RO	2007	43	2	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	13	1	C
5	RO	2007	43	3	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	13	1	C
5	RO	2007	43	4	1	Te Wharenui	Rotorua	1	P.RAD	-	1990	4	10	1	C
6	RO	2007	6	1	2	J. Dunn	Rerewhakaaitu	2	P.RAD	-	1963	31	33	6	F
6	FR	108	1	1	1	B. Pearce	Clifden	2	P.RAD	-	1970	24	30	3	C
6	FR	108	1	2	1	B. Pearce	Clifden	2	P.RAD	-	1970	24	29	3	C
6	FR	108	1	3	1	B. Pearce	Clifden	2	P.RAD	-	1972	22	30	3	C
7	CY	467	68	1	1	A. Midgley	Timaru	1	P.RAD	CEDEO	1965	29	10	5	C
7	CY	467	68	2	1	A. Midgley	Timaru	2	P.RAD	-	1965	29	30	5	C
7	RO	2007	31	1	1	Agrodome	Ngongotaha	1	P.RAD	CRJAP	1984	10	20	7	C
7	RO	2007	32	1	1	Agrodome	Ngongotaha	1	P.RAD	CRJAP	1984	10	18	7	C
7	RO	2007	33	1	1	Agrodome	Ngongotaha	1	P.RAD	CRJAP	1984	10	18	7	C
7	RO	2007	34	1	1	Agrodome	Ngongotaha	1	P.RAD	CRJAP	1984	10	18	7	C
7	FR	31	1	1	1	Alexander Trust	Waitara	1	P.RAD	CRJAP	1988	6	13	4	C
7	FR	31	1	2	1	Alexander Trust	Waitara	1	P.RAD	CRJAP	1988	6	12	4	C
7	FR	31	1	3	1	Alexander Trust	Waitara	1	P.RAD	CRJAP	1988	6	14	4	C
7	FR	31	1	4	1	Alexander Trust	Waitara	1	P.RAD	CRJAP	1988	6	12	4	C
7	FR	31	1	5	1	Alexander Trust	Waitara	1	P.RAD	CRJAP	1988	6	12	4	C
7	FR	32	3	1	1	B. Morison	Masterton	1	P.RAD	CCLEY	1985	9	20	2	C
7	FR	32	3	2	1	B. Morison	Masterton	1	P.RAD	CCLEY	1985	9	19	2	C
7	FR	32	3	3	1	B. Morison	Masterton	1	P.RAD	CCLEY	1985	9	20	2	C
7	CY	467	73	2	1	B. Redfern	Darfield	1	P.RAD	-	1979	15	25	3	C
7	CY	467	73	3	1	B. Redfern	Darfield	1	P.RAD	-	1979	15	25	3	C
7	FR	34	1	1	1	C. Dawkins	Waihopai	1	P.RAD	CCLEY	1991	3	10	0	C
7	FR	34	1	2	1	C. Dawkins	Waihopai	1	P.RAD	CCLEY	1991	3	10	0	C
7	FR	34	1	3	1	C. Dawkins	Waihopai	1	P.RAD	CCLEY	1991	3	10	0	C
7	FR	34	1	4	1	C. Dawkins	Waihopai	1	P.RAD	CCLEY	1991	3	10	0	C
7	FR	34	1	5	1	C. Dawkins	Waihopai	1	P.RAD	CCLEY	1991	3	10	0	C
7	FR	32	2	3	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1984	10	20	2	C
7	FR	32	2	4	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1984	10	19	2	C
7	FR	32	2	5	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1984	10	19	2	C
7	FR	32	2	6	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1986	8	20	2	C
7	FR	32	2	7	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1986	8	20	2	C
7	FR	32	2	8	1	E. Gawith	Masterton	1	P.RAD	CCLEY	1986	8	20	2	C
7	CY	467	7	1	1	E. Sanders	Rangiora	1	P.RAD	CUMAC	1975	19	21	6	C
7	FR	30	3	1	1	G. Cheer	Norsewood	1	P.RAD	CUMAC	1989	5	15	2	C
7	FR	30	3	2	1	G. Cheer	Norsewood	1	P.RAD	CUMAC	1989	5	15	2	C
7	FR	30	3	3	1	G. Cheer	Norsewood	1	P.RAD	CUMAC	1989	5	14	2	C
7	FR	30	3	4	1	G. Cheer	Norsewood	1	P.RAD	CUMAC	1989	5	14	2	C
7	FR	30	3	5	1	G. Cheer	Norsewood	1	P.RAD	CUMAC	1989	5	15	2	C
7	FR	33	2	1	1	J. Cousins	Fielding	1	P.RAD	CUMAC	1990	4	16	2	C
7	FR	33	2	2	1	J. Cousins	Fielding	1	P.RAD	CUMAC	1990	4	14	2	C
7	FR	33	2	3	1	J. Cousins	Fielding	1	P.RAD	CUMAC	1990	4	14	2	C
7	FR	33	2	4	1	J. Cousins	Fielding	1	P.RAD	CUMAC	1990	4	13	2	C

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Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
7	FR	33	2	5	1	J. Cousins	Fielding	1	P.RAD	CUMAC	1990	4	14	2	C
7	RO	2007	19	1	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	5	C
7	RO	2007	19	10	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	2	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	3	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	4	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	9	10	C
7	RO	2007	19	5	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	9	10	C
7	RO	2007	19	6	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	7	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	8	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	10	10	C
7	RO	2007	19	9	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	8	10	C
7	RO	2007	20	1	1	J. Insch	Kaharoa	1	P.RAD	CRJAP	1978	16	10	10	C
7	RO	2007	20	2	1	J. Insch	Kaharoa	1	P.RAD	CRJAP	1978	16	10	10	C
7	RO	2007	20	3	1	J. Insch	Kaharoa	1	P.RAD	CRJAP	1978	16	9	10	C
7	RO	2007	20	4	1	J. Insch	Kaharoa	1	P.RAD	CRJAP	1978	16	10	10	C
7	RO	2007	20	5	1	J. Insch	Kaharoa	1	P.RAD	CRJAP	1978	16	10	10	C
7	RO	2007	21	1	1	J. Insch	Kaharoa	1	P.RAD	L. KAE	1979	15	15	5	C
7	CY	467	78	1	1	J. Nicholls	Rangiora	1	P.RAD	-	1979	15	25	8	C
7	CY	467	78	2	1	J. Nicholls	Rangiora	1	P.RAD	-	1979	15	24	8	C
7	CY	467	79	1	1	J. Nicholls	Rangiora	1	P.RAD	CCLHG	1982	12	25	5	C
7	CY	467	79	2	1	J. Nicholls	Rangiora	1	P.RAD	CCLNB	1982	12	25	5	C
7	FR	30	17	1	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	8	3	C
7	FR	30	17	2	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	10	3	C
7	FR	30	17	3	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	10	3	C
7	FR	30	17	4	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	10	3	C
7	FR	30	17	5	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	10	3	C
7	FR	30	17	6	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	10	3	C
7	FR	30	17	7	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	9	3	C
7	FR	30	17	8	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	5	3	C
7	FR	30	18	1	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	10	3	C
7	FR	30	18	2	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	9	3	C
7	FR	30	18	3	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	8	3	C
7	FR	30	18	4	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	9	3	C
7	FR	30	18	5	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	10	3	C
7	FR	30	18	6	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	9	3	C
7	FR	30	18	7	1	J. Renton	Taradale	1	P.RAD	CEATL	1981	13	8	3	C
7	FR	30	18	8	1	J. Renton	Taradale	1	P.RAD	CEDEO	1981	13	7	3	C
7	FR	30	19	1	1	J. Renton	Taradale	1	P.RAD	-	1981	13	15	3	C
7	FR	30	19	1	2	J. Renton	Taradale	1	P.RAD	-	1981	13	15	3	C
7	FR	30	19	1	3	J. Renton	Taradale	1	P.RAD	-	1981	13	15	3	C
7	FR	30	20	1	1	J. Renton	Taradale	1	P.RAD	-	1981	13	13	3	C
7	FR	30	20	1	2	J. Renton	Taradale	1	P.RAD	-	1981	13	14	3	C
7	FR	30	21	1	1	J. Renton	Taradale	1	P.RAD	-	1981	13	10	3	C
7	FR	30	21	1	2	J. Renton	Taradale	1	P.RAD	-	1981	13	14	3	C
7	CY	467	38	1	1	K. Cookson	Darfield	1	P.RAD	CEDEO	1979	15	26	4	C
7	CY	467	38	2	1	K. Cookson	Darfield	1	P.RAD	CEDEO	1979	15	24	4	C
7	CY	467	64	1	1	K. Eaves		1	P.RAD	CUARZ	1965	29	25	5	F
7	CY	467	64	2	1	K. Eaves		1	P.RAD	CUARZ	1965	29	22	5	F
7	FR	32	1	1	1	K. Waiker	Masterton	1	P.RAD	CCLEY	1989	5	15	2	C
7	FR	32	1	2	1	K. Waiker	Masterton	1	P.RAD	CCLEY	1989	5	15	2	C
7	FR	32	1	3	1	K. Waiker	Masterton	1	P.RAD	CCLEY	1989	5	15	2	C
7	FR	32	1	4	1	K. Waiker	Masterton	1	P.RAD	CCLEY	1989	5	15	2	C
7	FR	32	1	5	1	K. Waiker	Masterton	1	P.RAD	CCLEY	1989	5	15	2	C

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Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
7	FR	28	1	1	1	L. McLean	Waipu	1	P.RAD	AMENITY	1986	8	20	2	C
7	FR	28	1	1	2	L. McLean	Waipu	1	P.RAD	AMENITY	1986	8	20	2	C
7	FR	28	3	1	1	N. Hearn	Dargaville	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	28	3	2	1	N. Hearn	Dargaville	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	28	3	3	1	N. Hearn	Dargaville	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	28	3	4	1	N. Hearn	Dargaville	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	28	3	5	1	N. Hearn	Dargaville	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	2	1	1	1	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	1	1	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	1	3	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	12	5	C
7	FR	2	1	1	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	1	5	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	1	2	1	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	2	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	2	3	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	1	2	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	13	5	C
7	FR	2	1	2	5	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	3	1	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	10	5	C
7	FR	2	1	3	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	11	5	C
7	FR	2	1	3	3	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	2	1	3	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	13	5	C
7	FR	2	1	3	5	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	13	5	C
7	FR	2	1	4	1	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	1	4	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	1	4	3	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	9	5	C
7	FR	2	1	4	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	3	4	C
7	FR	2	1	4	5	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	15	5	C
7	FR	2	2	1	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	8	5	C
7	FR	2	2	1	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	11	5	C
7	FR	2	2	2	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	13	5	C
7	FR	2	2	2	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	12	5	C
7	FR	2	2	3	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	13	5	C
7	FR	2	2	3	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	10	5	C
7	FR	2	2	4	2	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	12	5	C
7	FR	2	2	4	4	Ngati Whakaue	Rotorua	1	P.RAD	CRJAP	1987	7	14	5	C
7	FR	30	1	1	1	P. Harris	Taradale	1	P.RAD	CUMAC	1988	6	15	3	C
7	FR	30	1	2	1	P. Harris	Taradale	1	P.RAD	CUMAC	1988	6	14	3	C
7	FR	30	1	3	1	P. Harris	Taradale	1	P.RAD	CUMAC	1988	6	15	3	C
7	FR	30	1	4	1	P. Harris	Taradale	1	P.RAD	CUMAC	1988	6	15	3	C
7	FR	30	1	5	1	P. Harris	Taradale	1	P.RAD	CUMAC	1988	6	15	3	C
7	FR	28	2	1	1	S. Mooney	Maungaturoto	1	P.RAD	AMENITY	1992	2	10	0	C
7	FR	28	2	2	1	S. Mooney	Maungaturoto	1	P.RAD	AMENITY	1992	2	10	0	C
7	FR	28	2	3	1	S. Mooney	Maungaturoto	1	P.RAD	AMENITY	1992	2	10	0	C
7	FR	28	2	4	1	S. Mooney	Maungaturoto	1	P.RAD	AMENITY	1992	2	10	0	C
7	FR	28	2	5	1	S. Mooney	Maungaturoto	1	P.RAD	AMENITY	1992	2	10	0	C
7	FR	30	2	1	1	T. Hartree	Taradale	1	P.RAD	CEDEO	1988	6	15	3	C
7	FR	30	2	2	1	T. Hartree	Taradale	1	P.RAD	CEDEO	1988	6	15	3	C
7	FR	30	2	3	1	T. Hartree	Taradale	1	P.RAD	CEDEO	1988	6	15	3	C
7	FR	30	2	4	1	T. Hartree	Taradale	1	P.RAD	CEDEO	1988	6	13	3	C
7	FR	30	2	5	1	T. Hartree	Taradale	1	P.RAD	CEDEO	1988	6	15	3	C
7	FR	102	6	1	1	T. Watt	Dipton	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	102	6	2	1	T. Watt	Dipton	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	102	6	3	1	T. Watt	Dipton	1	P.RAD	CUMAC	1992	2	10	0	C

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Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
7	FR	102	6	4	1	T. Watt	Dipton	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	102	6	5	1	T. Watt	Dipton	1	P.RAD	CUMAC	1992	2	10	0	C
7	FR	31	3	1	1	Waimate Demo	Hawera	1	P.RAD	Boxthorn	1988	6	15	3	C
7	FR	31	3	2	1	Waimate Demo	Hawera	1	P.RAD	CRJAP	1988	6	14	3	C
7	FR	31	3	3	1	Waimate Demo	Hawera	1	P.RAD	Boxthorn	1988	6	14	3	C
7	FR	31	3	4	1	Waimate Demo	Hawera	1	P.RAD	Boxthorn	1988	6	14	3	C
7	FR	31	3	5	1	Waimate Demo	Hawera	1	P.RAD	CRJAP	1988	6	14	3	C
8	FR	31	1	2	2	Alexander Trust	Waitara	2	P.RAD	CRJAP	1988	6	19	4	C
8	FR	31	1	4	2	Alexander Trust	Waitara	2	P.RAD	CRJAP	1988	6	18	4	C
8	FR	31	1	8	2	Alexander Trust	Waitara	2	P.RAD	CRJAP	1988	6	20	4	C
8	FR	34	1	2	2	C. Dawkins	Waihopai	2	P.RAD	CCLEY	1991	3	20	0	C
8	FR	34	1	4	2	C. Dawkins	Waihopai	2	P.RAD	CCLEY	1991	3	20	0	C
8	FR	34	1	8	2	C. Dawkins	Waihopai	2	P.RAD	CCLEY	1991	3	20	0	C
8	FR	32	2	1	2	E. Gawith	Masterton	2	P.RAD	CCLEY	1984	10	18	2	C
8	FR	32	2	2	2	E. Gawith	Masterton	2	P.RAD	CCLEY	1984	10	17	2	C
8	FR	30	3	2	2	G. Cheer	Norsewood	2	P.RAD	CUMAC	1989	5	20	2	C
8	FR	30	3	4	2	G. Cheer	Norsewood	2	P.RAD	CUMAC	1989	5	20	2	C
8	FR	30	3	8	2	G. Cheer	Norsewood	2	P.RAD	CUMAC	1989	5	19	2	C
8	FR	33	2	2	2	J. Cousins	Fielding	2	P.RAD	CUMAC	1990	4	18	2	C
8	FR	33	2	4	2	J. Cousins	Fielding	2	P.RAD	CUMAC	1990	4	19	2	C
8	FR	33	2	8	2	J. Cousins	Fielding	2	P.RAD	CUMAC	1990	4	20	2	C
8	CY	467	77	1	1	J. Nicholls	Rangiora	2	P.RAD	-	1979	15	29	8	C
8	CY	467	77	2	1	J. Nicholls	Rangiora	2	P.RAD	-	1979	15	30	8	C
8	FR	32	1	1	2	K. Waiker	Masterton	2	P.RAD	CCLEY	1984	10	15	4	C
8	FR	32	1	2	2	K. Waiker	Masterton	2	P.RAD	CCLEY	1984	10	15	4	C
8	FR	28	3	2	2	N. Hearn	Dargaville	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	28	3	4	2	N. Hearn	Dargaville	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	28	3	6	2	N. Hearn	Dargaville	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	28	3	8	2	N. Hearn	Dargaville	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	2	3	1	2	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	20	5	C
8	FR	2	3	1	4	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	17	5	C
8	FR	2	3	1	8	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	19	5	C
8	FR	2	3	2	2	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	19	5	C
8	FR	2	3	2	4	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	18	5	C
8	FR	2	3	2	8	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	17	5	C
8	FR	2	3	3	2	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	19	5	C
8	FR	2	3	3	4	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	18	5	C
8	FR	2	3	3	8	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	20	5	C
8	FR	2	3	4	2	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	19	5	C
8	FR	2	3	4	4	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	18	5	C
8	FR	2	3	4	8	Ngati Whakaue	Rotorua	2	P.RAD	CRJAP	1987	7	17	5	C
8	FR	30	1	2	2	P. Harris	Taradale	2	P.RAD	CUMAC	1988	6	20	3	C
8	FR	30	1	4	2	P. Harris	Taradale	2	P.RAD	CUMAC	1988	6	20	3	C
8	FR	30	1	8	2	P. Harris	Taradale	2	P.RAD	CUMAC	1988	6	18	3	C
8	FR	28	2	2	2	S. Mooney	Maungaturoto	2	P.RAD	AMENITY	1992	2	20	0	C
8	FR	28	2	4	2	S. Mooney	Maungaturoto	2	P.RAD	AMENITY	1992	2	20	0	C
8	FR	28	2	6	2	S. Mooney	Maungaturoto	2	P.RAD	AMENITY	1992	2	20	0	C
8	FR	28	2	8	2	S. Mooney	Maungaturoto	2	P.RAD	AMENITY	1992	2	20	0	C
8	FR	30	2	2	2	T. Hartree	Taradale	2	P.RAD	CEDEO	1988	6	19	3	C
8	FR	30	2	4	2	T. Hartree	Taradale	2	P.RAD	CEDEO	1988	6	20	3	C
8	FR	30	2	8	2	T. Hartree	Taradale	2	P.RAD	CEDEO	1988	6	20	3	C
8	FR	32	4	1	2	T. Jaspers	Masterton	2	P.RAD	CCLEY	1986	8	20	2	C
8	FR	32	4	2	2	T. Jaspers	Masterton	2	P.RAD	CCLEY	1986	8	20	2	C

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Code	Plot	Number				Owner	Location	No of Rows	Primary Species	Supp Species	Year Plant	Tree Age	No of Trees	No of Meas	Plot Status
8	FR	32	4	3	2	T. Jaspers	Masterton	2	P.RAD	CCLEY	1986	8	20	2	C
8	FR	102	6	2	2	T. Watt	Dipton	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	102	6	4	2	T. Watt	Dipton	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	102	6	8	2	T. Watt	Dipton	2	P.RAD	CUMAC	1992	2	20	0	C
8	FR	31	3	2	2	Waimate Demo	Hawera	2	P.RAD	Akeake	1988	6	19	3	C
8	FR	31	3	4	2	Waimate Demo	Hawera	2	P.RAD	Akeake	1988	6	20	3	C
8	FR	31	3	8	2	Waimate Demo	Hawera	2	P.RAD	Akeake	1988	6	20	3	C
9	CY	467	1	1	1	A. Graydon	Oxford	1	P.RAD	None	1973	21	24	6	C
9	CY	467	1	2	1	A. Graydon	Oxford	1	P.RAD	None	1973	21	24	6	C
9	CY	467	2	1	1	A. Graydon	Oxford	1	P.RAD	None	1976	18	23	6	C
9	CY	467	2	2	1	A. Graydon	Oxford	1	P.RAD	None	1976	18	24	6	C
9	CY	467	44	1	1	D. Anderson	Ashburton	1	P.RAD	-	1975	19	24	3	C
9	CY	467	44	2	1	D. Anderson	Ashburton	1	P.RAD	-	1975	19	25	4	C
9	CY	467	44	3	1	D. Anderson	Ashburton	1	P.RAD	-	1975	19	25	4	C
9	CY	467	65	1	1	D. Anderson	Ashburton	1	P.RAD	-	1977	17	24	4	C
9	CY	467	65	2	1	D. Anderson	Ashburton	1	P.RAD	-	1977	17	25	4	C
9	CY	467	35	1	1	G. Hunt	Dunsandel	1	P.RAD	CEDEO	1977	17	23	5	C
9	CY	467	24	1	1	R. Abbott	Darfield	1	P.RAD	-	1966	28	26	2	A
9	CY	467	24	2	1	R. Abbott	Darfield	1	P.RAD	-	1966	28	26	2	A
9	CY	467	25	1	1	R. Abbott	Darfield	1	P.RAD	-	1970	24	24	3	A
9	CY	467	25	2	1	R. Abbott	Darfield	1	P.RAD	-	1970	24	22	3	A
9	CY	467	29	1	1	R. Oakley	Darfield	1	P.RAD	-	1976	18	25	5	C
9	CY	467	29	2	1	R. Oakley	Darfield	1	P.RAD	-	1976	18	23	5	C
9	RO	2007	10	1	1	R. Palmer	Aongatete	1	P.RAD	-	1979	15	15	7	C
9	RO	2007	10	2	1	R. Palmer	Aongatete	1	P.RAD	-	1979	15	15	7	C
9	RO	2007	10	3	1	R. Palmer	Aongatete	1	P.RAD	-	1979	15	15	7	C
9	CY	467	69	1	1	S. Bruce	Darfield	1	P.RAD	-	1969	25	24	3	C
9	CY	467	69	2	1	S. Bruce	Darfield	1	P.RAD	-	1969	25	26	3	C
9	RO	2007	3	1	1	P. Cram	Paengaroa	1	P.RAD	-	1977	17	17	5	A
9	RO	2007	3	2	1	P. Cram	Paengaroa	1	P.RAD	-	1977	17	16	5	A
9	RO	2007	3	3	1	P. Cram	Paengaroa	1	P.RAD	-	1977	17	15	5	A
10	CY	467	74	1	1	C. Watson	Burnham	1	P.RAD	-	1970	24	26	2	C
10	CY	467	74	2	1	C. Watson	Burnham	1	P.RAD	-	1970	24	26	2	C
10	CY	467	75	1	1	C. Watson	Burnham	1	P.RAD	-	1965	29	29	2	C
10	CY	467	75	2	1	C. Watson	Burnham	1	P.RAD	-	1965	29	28	2	C
10	RO	2007	17	1	2	J. Pearson	Katikati	2	P.RAD	-	1978	16	13	3	C
10	RO	2007	17	2	2	J. Pearson	Katikati	2	P.RAD	-	1978	16	11	3	C
10	RO	2007	17	3	2	J. Pearson	Katikati	2	P.RAD	-	1978	16	13	3	C
10	CY	467	30	1	1	R. Bryant	Darfield	2	P.RAD	-	1932	62	33	3	F
10	CY	467	30	2	1	R. Bryant	Darfield	2	P.RAD	-	1932	62	32	3	F
10	CY	467	31	1	1	R. Bryant	Darfield	2	P.RAD	-	1969	25	29	4	F
10	CY	467	26	1	1	R. Oakley	Darfield	1	P.RAD	-	1980	14	27	5	C
10	CY	467	28	1	1	R. Oakley	Darfield	1	P.RAD	-	1975	19	27	5	C
10	CY	467	28	2	1	R. Oakley	Darfield	1	P.RAD	-	1975	19	29	5	C
10	CY	467	26	2	1	R. Oakley	Darfield	2	P.RAD	-	1980	14	30	5	C
11	CY	467	39	1	1	B. Harris	Darfield	1	P.RAD	CULUS	1978	16	14	5	C
11	CY	467	39	2	1	B. Harris	Darfield	1	P.RAD	CULUS	1978	16	12	5	C
11	CY	467	45	1	1	G. Coppard	Rakaia	1	P.RAD	-	1971	23	22	3	A
11	CY	467	45	2	1	G. Coppard	Rakaia	1	P.RAD	-	1971	23	25	3	A
11	CY	467	10	1	1	I. Bruce	Darfield	1	P.RAD	-	1971	23	25	5	C
11	CY	467	10	2	1	I. Bruce	Darfield	1	P.RAD	-	1971	23	24	5	C
11	CY	467	8	1	1	I. Bruce	Darfield	1	P.RAD	-	1975	19	24	5	C
11	CY	467	8	2	1	I. Bruce	Darfield	1	P.RAD	-	1975	19	25	5	C

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11	CY	467	9	1	1	I. Bruce	Darfield	1	P.RAD	-	1970	24	26	5	C
11	CY	467	9	2	1	I. Bruce	Darfield	1	P.RAD	-	1970	24	25	5	C
11	CY	467	11	1	1	S. Bruce	Darfield	1	P.RAD	CUARZ	1971	23	25	5	C
11	CY	467	11	2	1	S. Bruce	Darfield	1	P.RAD	CUARZ	1971	23	25	5	C
11	CY	467	12	1	1	S. Bruce	Darfield	1	P.RAD	CUARZ	1965	29	25	5	C
11	CY	467	12	2	1	S. Bruce	Darfield	1	P.RAD	CUARZ	1965	29	22	5	C
11	CY	467	50	1	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1967	27	20	4	C
11	CY	467	50	2	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1967	27	22	4	C
11	CY	467	51	1	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1968	26	22	4	C
11	CY	467	52	1	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1967	27	23	4	C
11	CY	467	52	2	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1967	27	13	4	C
11	CY	467	53	1	1	T. McKeown	Ashburton	1	P.RAD	CUARZ	1972	22	18	4	C
12	CY	467	14	1	3	I. Bruce	Darfield	1	PSMEN	-	1966	28	13	1	A
12	CY	467	14	2	3	I. Bruce	Darfield	1	PSMEN	-	1966	28	13	1	A
12	CY	467	14	1	1	I. Bruce	Darfield	2	P.RAD	PSMEN	1966	28	30	4	F
12	CY	467	14	2	1	I. Bruce	Darfield	2	P.RAD	PSMEN	1966	28	27	4	F
13	CY	467	48	1	1	A. Harris	Ashburton	2	P.RAD	CUARZ	1975	19	29	5	C
13	CY	467	48	2	1	A. Harris	Ashburton	2	P.RAD	CUARZ	1975	19	31	5	C
13	CY	467	40	1	2	C. MacDonald	Rangiora	1	CEDEO	-	1964	30	16	2	A
13	CY	467	40	2	2	C. MacDonald	Rangiora	1	CEDEO	-	1964	30	15	2	A
13	CY	467	41	1	2	C. MacDonald	Rangiora	1	CEDEO	-	1969	25	15	2	A
13	CY	467	40	1	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1964	30	30	7	C
13	CY	467	40	2	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1964	30	30	7	C
13	CY	467	41	1	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	26	7	C
13	CY	467	41	2	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	30	7	C
13	CY	467	42	1	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	31	7	C
13	CY	467	42	2	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	33	7	C
13	CY	467	43	1	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	30	7	C
13	CY	467	43	2	1	C. MacDonald	Rangiora	2	P.RAD	CEDEO	1969	25	26	7	C
13	CY	467	34	1	1	G. Hunt	Dunsandel	2	P.RAD	CEDEO	1972	22	27	5	C
13	CY	467	34	2	1	G. Hunt	Dunsandel	2	P.RAD	CEDEO	1972	22	30	5	C
13	CY	467	63	1	1	J. Zino	Hawarden	2	P.RAD	CUARZ	1972	22	30	7	C
13	CY	467	63	2	1	J. Zino	Hawarden	2	P.RAD	CUARZ	1972	22	30	7	C
13	CY	467	20	1	1	M. Spencer-Bowe	Eyrewell	2	P.RAD	-	1978	16	31	5	C
13	CY	467	20	2	1	M. Spencer-Bowe	Eyrewell	2	P.RAD	-	1978	16	32	5	C
14	CY	467	46	1	1	A. Lill	Rakaia	1	P.RAD	-	1968	26	26	4	C
14	CY	467	46	2	1	A. Lill	Rakaia	1	P.RAD	-	1968	26	24	4	C
14	CY	467	58	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1962	32	11	3	C
14	CY	467	58	2	1	P. Smail	Hororata	1	P.RAD	CEDEO	1962	32	10	3	C
14	CY	467	59	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1965	29	10	4	C
14	CY	467	59	2	1	P. Smail	Hororata	1	P.RAD	CEDEO	1965	29	10	4	C
14	CY	467	59	3	1	P. Smail	Hororata	1	P.RAD	CEDEO	1965	29	10	4	C
14	CY	467	59	4	1	P. Smail	Hororata	1	P.RAD	-	1965	29	28	1	C
14	CY	467	60	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1961	33	12	3	C
14	CY	467	60	2	1	P. Smail	Hororata	1	P.RAD	CULUS	1961	33	13	3	C
14	CY	467	61	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1959	35	11	3	C
14	CY	467	61	2	1	P. Smail	Hororata	1	P.RAD	CEDEO	1959	35	16	3	C
14	CY	467	62	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1960	34	12	3	C
14	CY	467	62	2	1	P. Smail	Hororata	1	P.RAD	CEDEO	1960	34	13	3	C
14	CY	467	62	3	1	P. Smail	Hororata	1	P.RAD	CEDEO	1960	34	11	3	C
14	CY	467	56	1	1	P. Smail	Hororata	1	P.RAD	CEDEO	1955	39	13	2	F
14	CY	467	56	2	1	P. Smail	Hororata	1	P.RAD	CEDEO	1955	39	10	2	F
14	CY	467	57	1	1	P. Smail	Hororata	1	P.RAD	CUARZ	1958	36	13	3	F

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14	CY	467	57	2	1	P. Smail	Hororata	1	P.RAD	CUARZ	1958	36	9	3	F