



## Permanent Sample Plot Database –Administration and Measurement Programme 2012

### Summary

This Technical Note describes the administration and measurement of Permanent Sample Plots (PSPs) for Future Forests Research (FFR) in 2012.

The Scion PSP Database stores 2,742 current *Pinus radiata* plots controlled by the FFR Radiata Management Theme (34% of all radiata pine plots on the database). There have been no new trials established in the past year, with 39 plots under FFR control having been abandoned or felled. Between January and October 2012, 15 experimental trials, with a total of 393 individual plots, plus 18 growth monitoring plots were measured and updated in the database. In-kind help was received from Hancock Forest Management Ltd in the form of field assistance for two trials in Tungrove and Rakautao Forests (53 plots), PanPac Forest Products Ltd for one trial in Gwavas Forest (22 plots) and Timberlands Ltd in Kaingaroa Forest (1 plot). Silvicultural treatments were carried out with in-kind assistance for thinning operations from Juken New Zealand in Awaho Forest (36 plots) and from Taharoa Inc. in Taharoa forest (36 plots). A total of 335 measurements were completed by the Scion field crew and 9 additional growth monitoring plots due for harvest were measured during the year.

Some growth monitoring plots and two trials were added to the PSP remeasurement program as they are located in the Land Environments of New Zealand (LENZ) level 1 classes that provide the best measure of environmental variables for PSP prioritisation <sup>[1]</sup>.

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### PSP Database

The Scion PSP database system manages permanent sample plot data with primary functions being data storage, retrieval, manipulation and presentation. It currently maintains 30,169 permanent sample plots with 11,322 plots having a 'current' status and 62% of plots either felled or abandoned. Plot records exist for 145 different species with *Pinus radiata* being the dominant species (72% of plots contain this species).

The Scion Permanent Sample Plot (PSP) database system stores 2,742 current *Pinus radiata* plots controlled by the Future Forest Research Radiata Management Theme. These data represent 34% of all current *P. radiata* plots on the database.

Eight growth monitoring plots under FFR control were included in the measurement programme in 2012. Two plots were due for harvest in late 2012, so a final measurement was carried out. The other 6 were growth plots selected because they are located in the Land Environments of New Zealand (LENZ) Level 1 classes, previously not well covered by PSP measurements <sup>[1]</sup>.

Additional trials measured to cover LENZ classes were FR55, Eyrewell Forest (22 plots) and FR 86, Golden Downs (8 plots) (Figure 1).

This year 39 plots under FFR control were abandoned due to wind damage or felled.

In-kind help was provided by Hancock Forest Management Ltd for the measurement of FR121/1, Tungrove Forest (22 plots) and FR 215/2 Rakautao Forest (33 plots); PanPac Forest Products Ltd for measurement of FR 121/3 Gwavas Forest (22 plots); Timberlands limited for the measurement of RO2098 (1 plot); Juken New Zealand Ltd for the thinning of FR 438 (36 plots), and Taharoa Inc. for thinning of FR 439 (36 plots).

Fifty-one percent of the plots measured by Scion were in the Central North Island (CNI) growth modelling region. This year, no plots were measured in the East Coast and Sands growth modelling regions.

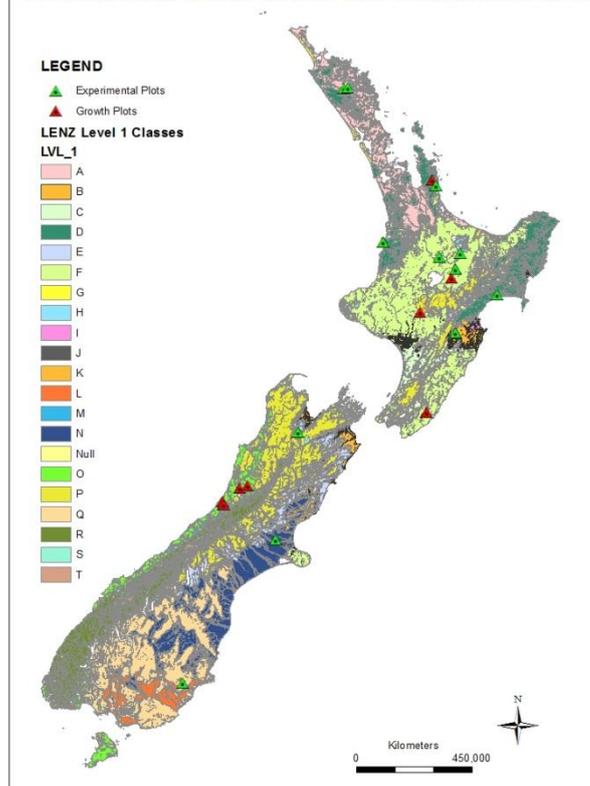
This distribution is shown in Table 1 along with the various forest owners of the trials measured this year.



**Table 1. Plots measured by growth modelling region compared with total numbers**

Growth Model Region/Forest Owner	No. Plots	Total no.
	Meas	plots
<b>CANTY</b>	22	96
Matariki Forests (RAYN)	22	
<b>CLAYS</b>	70	204
Matariki Forests (RAYN)	8	
Private, Hikuai, Tairua	9	
Taumata Plantations Ltd (HFML)	53	
<b>CNI</b>	209	1083
Ernslaw One Ltd, Central Region	1	
Kaingaroa Timberlands	120	
Private, M. McKee, Kawhia(PFSC)	36	
Taumata Plantations Ltd (HFML)	27	
Tiaki Plantations Company (HFML)	25	
<b>ECOT</b>	0	45
<b>HBAY</b>	60	450
Juken NZ Ltd, Central Region	38	
Pan Pac Forest Products Ltd	22	
<b>SANDS</b>	0	303
<b>NELSON</b>	8	126
Nelson Forests Ltd (GFP)	8	
<b>SOUTH</b>	37	392
City Forests Ltd, Dunedin	18	
Craigpine Timber Ltd, Winton	19	
<b>WCOT</b>	5	8
Crown Forestry - MAF (PFOL)	5	
<b>AUST</b>	0	35

**FFR P.radiata Theme Trials/Plots measured in 2012**



**Figure 1. Trial type and Location of PSP's measured during 2012.**

## PSP Trial Establishment 2012

There were no new trials established in 2012.

## PSP Measurement 2012

The measurement schedule covered the second half of the 2011/12 financial year and the first half of the 2012/13 financial year. The measurement program took place between January and October 2012.

Plots measured in 2012 were predominantly in the 21-25 year age range and all these plots are in the Silviculture/Breed Trial series<sup>[2]</sup>. (Figure 2 and Table 2).

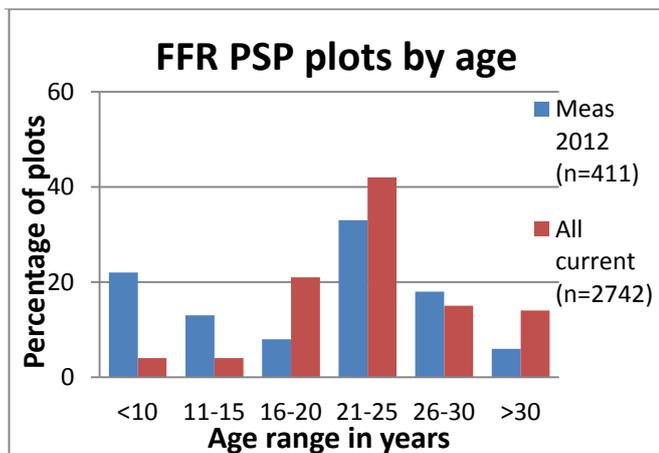
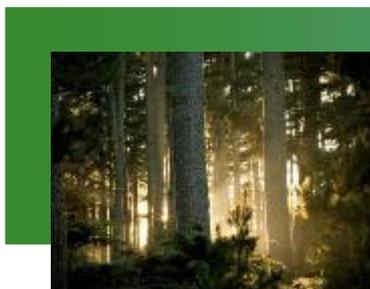


Figure 2. Percentage of plots by age range

The Scion field crew re-measured 410 *P.radiata* plots throughout the North and South Island this year.

Two Silviculture x Traits trials had pruning treatments carried out in 2012. Pruned heights were captured and updated into the PSP system.

Table 2. Trials/plots measured in 2012

Trial	Forest	No.plots meas	Month meas.	Meas. Age
RO1897	Kaingaroo	61	Jan	28
FR55	Eyrewell	22	June	24
FR86	Golden Downs	8	July	23
FR121/1	Tungrove	22	April	22
FR12/12	Kinleith	27	Sept	22
FR121/3	Gwavas	22	May	22
FR121/4	Tairua	8	Sept	22
FR121/6	Tarawera	25	July	22
FR215/2	Rakautao	31	April	18
FR436	Kaingaroo	36	June	10
FR437	Waipori, Otago	18	Aug	10
FR438	Awahou, Hawkes Bay	36	Aug	9
FR439	Taharoa, Kawhia	36	Sept	8
FR440	Hillfort, Southland	19	Aug	8
RO2098	Kaingaroo	22	June	37
FR92	Private, Tairua	9	Feb	28
RO2109 *	Kaingaroo	1	Aug	30
WD417	Kaniere, WC	3	April	26,34
WD417	Hochstetter, WC	1	May	20
WD417	Mawhera, WC	1	May	27
WN363	Karioi	1	Aug	28
WN369	Ngaumu	2	Oct	32

(Trials marked \* were in-kind measurements and growth monitoring plots are highlighted in blue)

## Measurement Notes

**FR92/1 Private Farm/forest**– Small Forest Woodlot growth plots with a final measurement before clearfell.

**RO 1897 Kaingaroo Forest**– This trial was given its final measurement before harvest. Low stocked plots had suffered wind damage and high stocked plots were starting to collapse. Wind damage had blown over one end of the trial area.

**RO 2098 Kaingaroo Forest** – This trial was measured in 2012 as was due for harvest. There had been wind events evident and all plots near stand edge were affected. Some plot trees were difficult to locate and identify, also due to windthrow.

**FR 55 Eyrewell Forest** – This trial is one of four Silviculture/Breed trials planted in 1988. The trial consists of 22 plots with 3 seedlots and 9 treatments. This trial was selected for measurement as it fell within the LENZ level 1 class N (Eastern South Island Plains)<sup>[1]</sup> and is considered a most useful option for growth modelling. A large snowfall had occurred in June 2012 but damage to trees was minimal with only minor branch breakage. Resin bleeding was present on a number of trees.

**FR 86 Golden Downs Forest**– An ex- Stand Growth Modelling Cooperative Silviculture/Breeds trial planted in 1989 and established in 1995. The trial consists of 16 plots with three silviculture treatments across four different seedlots. This trial was included in the remeasurement programme as it falls within the LENZ level 1 class P (Central Mountains) which previous measurement programmes had not covered.

Overall form of the trees at this measurement was found to be good with small branching and relatively straight stems. Only replication 1 was measured as replicate 2 was windblown in 2008.

**FR121/1 Tungrove, FR121/2 Kinleith, FR121/3 Gwavas, FR121/4 Tairua, FR121/6 Tarawera** - These trials are a series of silviculture breeds trials planted in 1990 to quantify genetic gain in growth rate and other traits in major forest growing regions in New Zealand.

All measurements carried out were straight-forward and in-kind help was provided by Hancock Forest Management and PanPac Forest Products. FR121/2,



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FR121/3 and FR121/6 are showing signs of stand collapse especially in the high stocked plots.

**FR215/2 Rakautao Forest-** This trial is one of three trials in a series planted in 1994 to evaluate special-purpose breeds. In-kind help was provided by Hancock Forest Management. This trial is growing well with little sign of wind damage.

**FR436 Waiotapu** - This trial is one of the oldest of the Silviculture X Traits trials series<sup>[3]</sup> and is ready for its final thin. A planned thinning in June 2012 was postponed due to funding arrangements. Thinning is scheduled for June 2013.

**FR437 – Waipori Falls:** This trial was established in 2010 and the pruned treatment was carried out by Scion staff at this time. Only 18 of the 36 plots are being measured now as it was decided that unpruned treatments only will be measured due to Nectria issues in this trial. Nectria is still present and obvious, more so from fluting rather than fruiting bodies. A thinning has been carried out in the surrounding stand and perimeter of the trial. This trial will require thinning, possibly in the next 12 months but depends on funding and in-kind help being available.

**FR438 Awaho Forest**– This trial had a thinning selection carried out in May 2012 in readiness for the thinning contractor. The 500 sph and 370 sph plots only had stems selected for thinning. It is planned that the 250 sph plots will be thinned at the second thinning. In August 2012 the fieldcrew measured the trial and it was noted that the thinning crew had not yet reached the trial area.

**FR439 Taharoa Forest**– In 2011 the intention by the owners was to harvest the forest to make way for a wind farm, but a business case was put forward and accepted to allow a section of the forest, which includes our trial, to remain. The pruning scheduled for 2012 was carried out and measurement of the trial was completed. Thinning is planned for early 2013.

**FR440 Hillfort Forest:** - Eighteen plots have been marked ready for the thinning by a local contractor. Two plots were abandoned due to lack of suitable trees available and replaced by a further two plots. Maintenance of the trial was carried out with boundary pegs being replaced, repainted and new tags applied. The pruned trees in this trial have suffered effects of Nectria. Fruiting bodies were evident on a large

number of pruning wounds at the time of this measurement.

**WD417 - (5 PSP's) - These** growth monitoring plots are located in Kaniere, Mawhera, and Hochstetter forests. They were included in the PSP program so as to cover the LENZ level 1 class O (Western South Island Foothills and Stewart Island). No PSP's had been measured in this area for some time.

**WN363 Karioi, WN369 Ngaumu Forest** – These growth plots were also included as they fell within the LENZ level 1 class are located in Karioi and Ngaumu Forests and cover the LENZ level 1 class K (Central Upland Recent Soils) and LENZ level 1 class F (Central hill country and volcanic plateau) respectively.

**RO 2109 Kaingaroa Forest** – This plot was measured by Timberlands Ltd contractors as in-kind contribution. This plot is a growth monitoring plot and the last current one in its series.

## Administration

The Scion PSP administrators, together with the field crew, continue to plan and carry out the agreed measurement programme efficiently each year. The database administrators are also responsible for ensuring the data are uploaded and checked to a high standard. Error corrections, producing standard reports, on-line interrogation and data retrieval keep the PSP administrators busy throughout the year. In addition to this work other PSP related projects include:

- Recently PSP data has been used to build the updated 300 Index and Site Index productivity layers which have been the most successful attempt at explaining radiata pine productivity from environmental factors to date. Preliminary models explained 70% of 300 index variation and 81% of site index variation across New Zealand<sup>[4]</sup>.
- In 2012, Breeding values were calculated for FFR controlled trials wherever genetic information was available. This information is now stored in the PSP system.
- PSP data from genetic gains trials have been used to develop 300 Index growth model adjustments for seedlots of known GF Plus rating. These can be used for adjusting the



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expected 300 Index of a new crop growing on a site where the 300 Index has been predicted from measurements of an earlier crop of known GF Plus rating. They can also be used to adjust the 300 Index values extracted from the national productivity surface for seedlots of a known GF Plus rating. These functions have been incorporated into FFR Forecaster.

- The Quantitive Silviculture Workshop and Understanding Drivers of Forest Productivity workshop both used FFR PSP data for presentations and workshop exercises.

## References

1. Dowling, L., *Progress Statement: 2012-2013 PSP Remeasurement: FFR IFS Radiata Theme*. (2012).
2. Hayes, J., *PSP Establishment Report for the 1990 Silviculture/Breed Trials: SGMC Report No. 83*. (2000).
3. Dean, M., *Silviculture X Traits Trials – Establishment Report. PMC Report No. 87*. (2005).
4. Kimberley, M., and Harrison, D., *Updated 300 Index and Site Index Surfaces*. In Future Forest Research Intensive Forest Systems Theme quarterly members meeting, August (2012).