



Permanent Sample Plot Database –Administration and Measurement Programme 2011

Summary

This Technical Note describes the administration and measurement of Permanent Sample Plots (PSPs) for Future Forests Research (FFR) in 2011.

The Scion PSP Database stores 2,781 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, but 110 plots under FFR control have been abandoned or felled. Between January and September 2011, 15 experimental trials, with a total of 439 individual plots, were measured and updated onto the database. In-kind help was received from Nelson Forests in the form of plot measurements for two trials in Golden Downs Forest (13 plots) and Hancock Forest Management Ltd provided fieldcrew assistance for one trial in Woodhill Forest (27 plots). A total of 399 measurements were completed by the Scion field crew, without in-kind help. Six growth monitoring plots due for harvest were measured during the year.

ATLAS Technology's data collection program FieldMan has been extended to allow the collection of re-measurement field data for Scion's PSP system. This field computer system has been operational for the 2011 programme for both Scion staff and industry contractors and all FFR plot measurements were captured with the new programme, providing enhanced functionality for both office and field staff. It allows batch processing and better management of data files and now runs in a Windows environment on the field computer, with additional plot descriptors and/or comments available.

Authors: Judy Hayes, Carolyn Andersen, Scion.

PSP Database

Growth data have been captured since the 1920's when the New Zealand Forest Service established permanent sample plots in forests around New Zealand. From the 1970's, when experimental plots were set up by the Forest Research Institute, data have been centralised in a data pool.

The SCION PSP database system manages permanent sample plot data with primary functions being data storage, retrieval, manipulation and presentation. It currently maintains 29,912 permanent sample plots with 11,730 plots having a 'current' status and 61% of plots either felled or abandoned. Plot records exist for 143 different species with *Pinus*

radiata being the dominant species (62% of plots contain this species).

The Scion Permanent Sample Plot (PSP) database system stores 2,781 current *Pinus radiata* plots controlled by the Future Forest Research Radiata Management Theme. These data represent 34% of all *P. radiata* plots on the database.

This year 110 plots under FFR control were abandoned or felled. Trial FR228 (a pruning trial) was extensively damaged by wind in April 2011 and all plots were abandoned (see Figure 1).



The current PSPs have been established widely within experimental trials and growth plots across New Zealand and a Measurement Strategy (FFR-RWP-016 – 3-year PSP measurement programme) is under periodic review to ensure that the matrix of Genetics x Environment x Silviculture is adequately covered in the current and next generation of trials. No growth monitoring plots under FFR control are currently in the measurement programme and at present these only get measured prior to clearfell.

The experimental plots measured by Scion in 2011 (Scenario 2 in FFR-RWP-016) were located in the Silviculture Traits, Special Purpose Breeds and Clonal Trial series (Figure 2). The Clonal Trial in Kawerau, FR 450, was so badly damaged by wind in 2010 that it had to be harvested. The last measurement was taken at age 19 years.

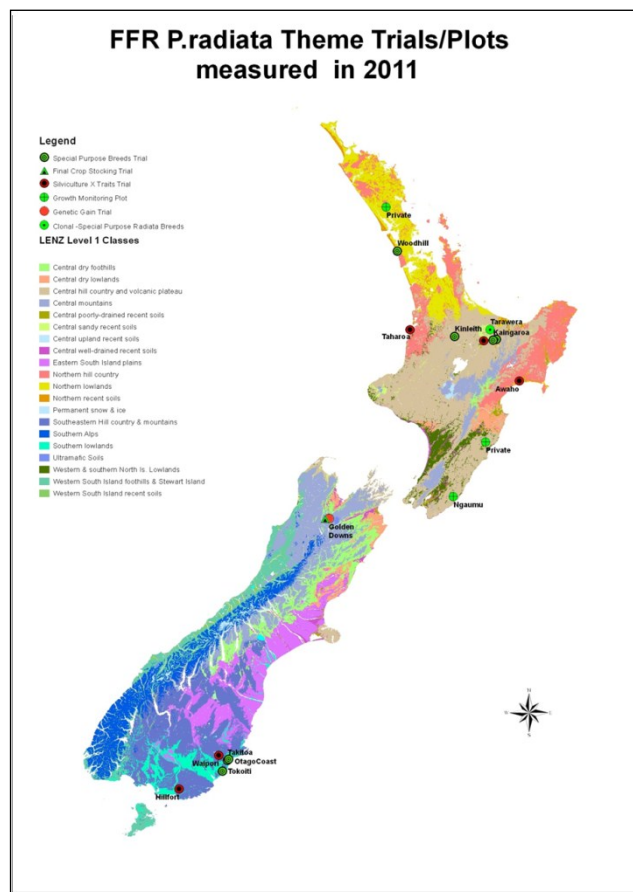


Figure 2. Trial type and Location of PSP's measured during the 2011 year.

Fifty-two percent of the trials measured were in the Central North Island (CNI) growth modelling region whereas only 39% of all FFR plots are in this region. 9% of plots in Hawkes Bay (HBAY) were measured this year although they represent 16% of all plots.

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



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Table 1. Plots measured by Growth Modelling Region compared with total numbers

Growth Model Region/Forest Owner	No. Plots Meas	Total no. current plots
CLAYS	3	214
Private Forest Farm, Dargaville	3	
CNI	229	1091
Private, M. McKee, Kawhia(PFSC)	36	
Taumata Plantations Ltd (HFML)	27	
Tiaki Plantations Company (HFML)	67	
Timberlands Ltd	99	
ECOT	0	45
HBAY	39	451
Juken NZ Ltd, Central Region	37	
Private, Wallingford, Hawkes Bay	2	
SANDS	27	312
Taumata Plantations Ltd (HFML)	27	
NELSON	13	126
Nelson Forests Ltd (GFP)	13	
CANTY	0	96
SOUTH	128	396
City Forests Ltd, Dunedin	85	
Craig Pine Timber Ltd	18	
Wenita Forest Products Ltd	25	
WCOT	0	9
AUST	0	35

PSP Trial Establishment 2011

There were no new trials established in 2011. All trials in the NZ Silviculture x Traits series have now been established. Silviculture and measurements will continue as per the work plan.

PSP Measurement 2011

The Scion field crew re-measured 423 *P. radiata* plots throughout the North and South Island with in-kind help from HFML provided for the FR172/1 trial at Woodhill. A further 16 plots were contributed as in-kind measurements by the land owner (Table 2, trials marked * were in-kind measurements).

There were no silvicultural treatments carried out on any FFR plots this year.

Table 2. Trials/plots measured in 2011

Trial	Forest	No. plots meas.	Month meas.	Meas. age
FR 91	FFarm, Dargaville	3	June	26
FR 95 *	FFarm, Hawkes Bay	2	Jan	29
FR 172/ 1	Woodhill	27	May	19
FR 172/ 3	Kaingaroa	27	May	19
FR 172/ 4	Kinleith	27	May	19
FR 172/ 5	Takitoa, Otago	35	June	19
FR 172/ 6	Otago Coast	25	June	19
FR 215/ 1	Kaingaroa	36	May	17
FR 215/ 3	Tokoiti, Otago	33	June	17
FR 308	Tarawera	67	Aug	16
FR 436	Kaingaroa	36	July	9
FR 437	Waipori, Otago	17	Aug	9
FR 438	Awaho, Hawkes Bay	36	July	8
FR 439	Taharoa, Kawhia	36	Sept	7
FR 440	Hillfort, Southland	18	Aug	7
NN 525*	Golden Downs	4	Aug	28
NN 530*	Golden Downs	9	May	32
WN 369*	Ngaumu	1	April	31

The measurement schedule covered the second half of the 2010/11 financial year and the first half of the 2011/12 financial year. The measurement program took place between January and September 2011. The small numbers of plots measured by in-kind help were all growth monitoring plots providing a final measure before clearfell. All other plots were measured by Scion staff.



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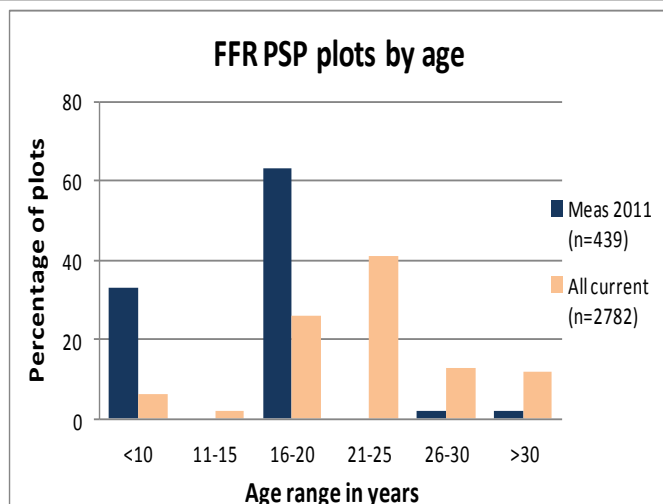


Figure 3. Percentage of plots by age range

Thirty-three percent (143 plots) of the total 439 plot measurements were aged less than 10 years (all plots being in the newly established Silviculture x Traits trial series; FR436 to FR440). Plots measured in 2011 were predominantly in the 16-20 year age range and all plots in the Silviculture/Breed Trial series are in this age range (Figure 3).

Measurement Notes

FR91 - Growth plots with a final measurement before clearfell.

FR172 - The special purpose breeds series trials all have good access within plots with minimal weeds present. The two South Island trials (Takitoa and Otago Coast) have Nectria present.

FR215/1 - This special purpose breeds trial has significant wind damage in some plots

FR215/3 - This South Island special purpose breeds trial has Nectria present (although not severe)

FR308 and FR450 - These clonal trials were scheduled for measurement in 2010 but were deferred until 2011. FR450 was so badly damaged by wind in 2010 that it had to be harvested before measurements were able to be taken. All plots in FR308 were assessed.

FR436 - This trial is the oldest of the series and is ready for its final thin. No in-kind help is currently provided by the forest manager, so the final thinning treatment has been delayed by a lack of funds for

this operation. The thinning (previously scheduled for 2011) is currently being planned for May/June 2012.

FR437 - This trial was established in 2010 and the pruned treatment was carried out by Scion staff at this time. The forest manager indicated they will not be pruning further because of a Nectria risk. Due to this problem with Nectria, only the un-pruned plots were assessed in 2011 and only these plots will continue to be measured and maintained. A second thinning is still due to be carried out.

FR438 - This trial had its final prune lift in 2009 and is due for a final thin in late 2012 (this will match the surrounding stand and is planned to coincide with thinning contractors being on site). Poor drainage in some areas of the trial is causing tree suppression and mortality.

FR439 - 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. In November 2011, a visit to Taharoa Forest was made to carry out an assessment and selection for the pruning operation in February 2012.

FR440 - All treatments have been pruned (even though this was not prescribed in the workplan) so this year only the original pruned treatment plots were measured. The trial has also had snow/wind damage and the trees are generally of poor form. It is likely the pruned trees will suffer from Nectria problems in the future. Thinning treatments are yet to be carried out.

FR95, NN525, NN530 and WN369 were all measured as in-kind help as a final measure before clearfelling.

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.

Over the past years the PSP data has contributed to the development of the 300 Index growth model. A recent study (Report No. FFR-R010) showed that the model performs well over the typical *P. radiata*



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stocking range and rotation length, but suggested that further development over very long rotations and at very high stockings was needed. Data for this have been extracted to improve the 300 Index growth model. With these modifications, the model would cover rotations of up to 100 years across the full range of stockings which is a possible scenario for carbon forestry.

Data from the Special Purpose Breeds trials, including stem description codes, were extracted from the PSP system for a project to determine, primarily, if breeding for wood properties has an impact on stem damage.

And something else.....

Following on further development of the 300 Index growth model during the past year, we are now trying to get funding to upgrade the functionality of the database to include both the 300 and 500 Index. This will give an important new level of output for all users.

ATLAS Technology's data collection program FieldMan has been extended to allow the collection of re-measurement field data for Scion's PSP system.

FieldMan has two components:

1. A PC-based office component for managing the data collection tasks:
 - Allows a PSP batch to be split between multiple dataloggers/crews, for each to collect some of the plots, and the resulting data to be subsequently merged together.
 - Produces reports of batch statistics and status.
2. A field computer component for collecting measurements in the forest:
 - Written for devices running Windows Mobile (and its predecessor Windows CE) and thus is supported by the most-used rugged field computers.
 - Uses a familiar, grid-based style of data entry.
 - Allows data to be selected and entered either via a touch screen, or entirely by keyboard.
 - Invokes extensive in-field checking, allowing immediate correction of errors or omissions.

The PC-based office component allows a better tracking system for management of all data files that come in from various sources.

This field computer system has been operational for the 2011 programme for both Scion staff and industry contractors. As 'bugs' are identified in the software they will be corrected and the updated version will be made available to users.

Another project that the PSP admin team were involved with was the calculation of individual trait breeding values (and subsequent GFPlus ratings) for diameter, wood density, straightness and branching using the 2008 RPBC breeding values and GFPlus ratings by individual ortet (parent). Calculations of individual trait GFPlus values were estimated for known seedlots represented in the list of 'current' FFR trials. In the coming year this data will be updated onto the database.