ESTIMATION OF FUEL WEIGHT AND PREDICTION OF FIRE BEHAVIOUR IN SLASH PINE PLANTATIONS

by

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INTRODUCTION

Low intensity burning has been used to modify the fuel complex in Slash Pine (*Pinus elliottii*) plantations to provide fire protection. This type of burning is also being considered as a means of managing the fuel complex to minimise the chances of outbreaks of *Ips grandicollis.*

In this study the fuel complex following thinning in a 34-year-old stand, was surveyed and the data were used to prescribe guidelines for low intensity burning. Following the burn the fuel complex was surveyed to indicate the changes caused by the fire.

STUDY AREA AND FUEL COMPLEX

The study was undertaken in compartment 234 of Barcoongere plantation (Figure 1). This plantation has an area of about 2000 ha and is located in Barcoongere and Newfoundland State Forests, on the coastal plain about 55 km south of Grafton on the north coast of New South Wales (Forestry Commission of New South Wales, 1981). The main species planted is *P. elliottii* and Compartment 234 was planted with that species in 1954. The site was prepared for planting by felling all the eucalypt forest overstorey, extracting the sawlogs, and then burning the debris (broadcast burning).

The stand was thinned at age 22 (1976) by removing every third planting row. At age 34 years (1988) the stand was selectively thinned, retaining a basal area of 20 m^2 ha^{-1}. Between 1976 and 1988, regular fuel reduction burns had been carried out on a cycle of five years or less. The fuel complex following the 1988 thinning consisted of the harvesting slash from the thinning, fuel that had accumulated since the previous burn and residual large fuel that had not been consumed by the previous fires. This large fuel was primarily large diameter hardwood logs remaining after the broadcast burn and the fuel reduction burns. This fuel complex was typical of that occurring after second thinning in Barcoongere plantation.

In 1988 the stand had a mean height of 21.8 m and the height to dead crown was 15.2 m. The understorey was dominated by lantana with an average height of about 1.5 m.

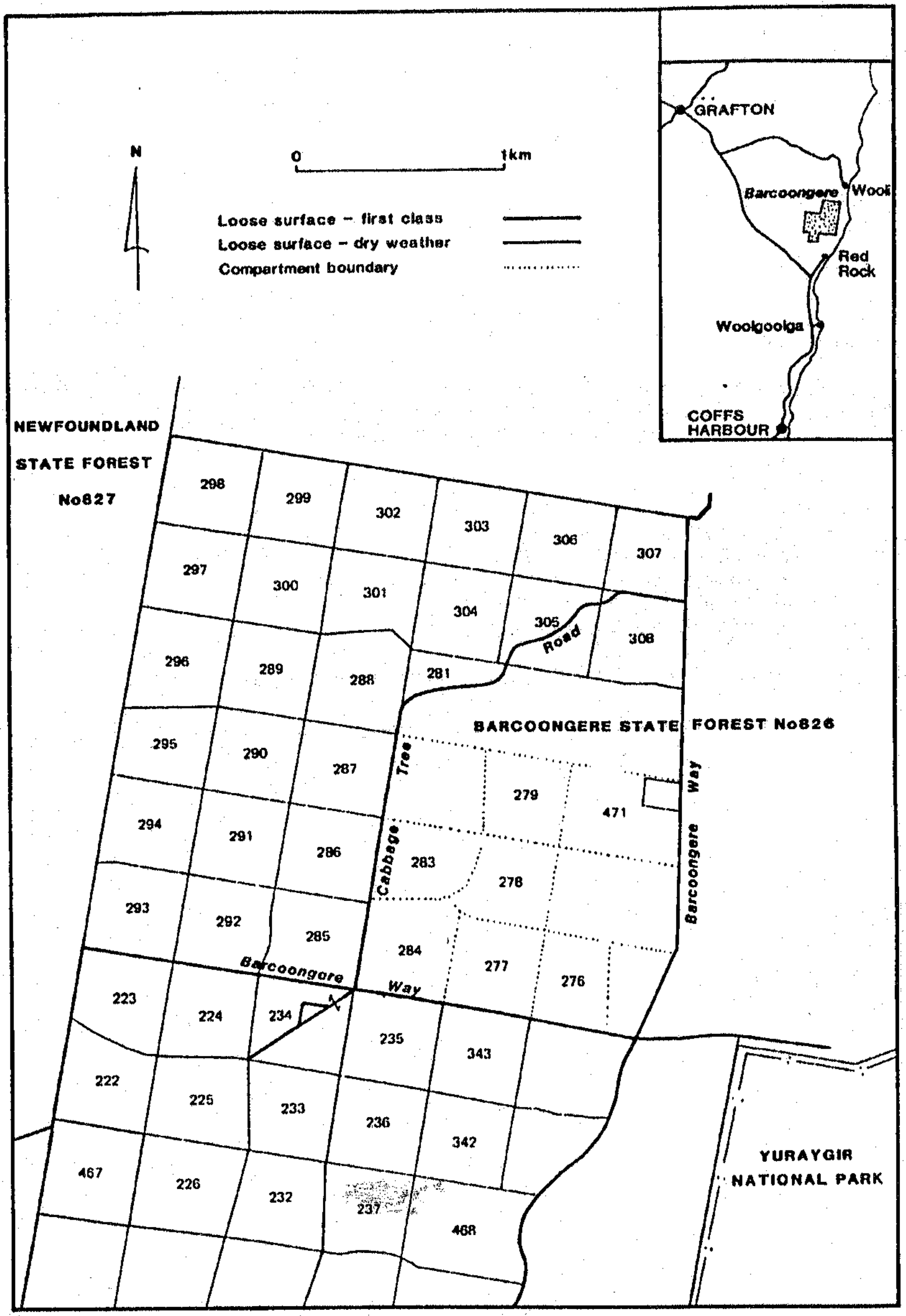

Figure 1. Locality sketch and map showing location of study site in Barcoongere plantation.

STUDY METHODS

1. Fine Fuel

Fine fuel was defined as all organic matter, up to 25 mm diameter, which was attached to or deposited on the ground surface. All such material from within a 0.1 m^2 circular area up to a height of 0.9 m was sampled.

Twenty sample sites were located at 30 m intervals along a transect line, which was oriented diagonally across the planting rows in a north-east - south-west direction. At each sample site, five 0.1 m^2 fuel samples were collected using the pattern shown in Figure 2.

In the post-burn survey, samples were collected in the same way except that the first sample site was located 15 m further along the transect, to avoid the areas disturbed in the pre-burn survey. An additional five sites were also sampled by extending the transect line by 150 m.

Samples were weighed, dried in a forced-draught oven at 105°C for 48 hours and then re-weighed. One sample from each sample site was randomly selected and sorted into eight fractions.

(i) Cones
(ii) Bark
(iii) Needles
(iv) Twigs 0-6 mm diameter
(v) Twigs 6-25 mm diameter
(vi) Green vegetation
(vii) Cured vegetation
(viii) Miscellaneous decomposing matter.

Samples were collected in May, 1988 (pre-burn survey) and in November, 1988 (post-burn survey).

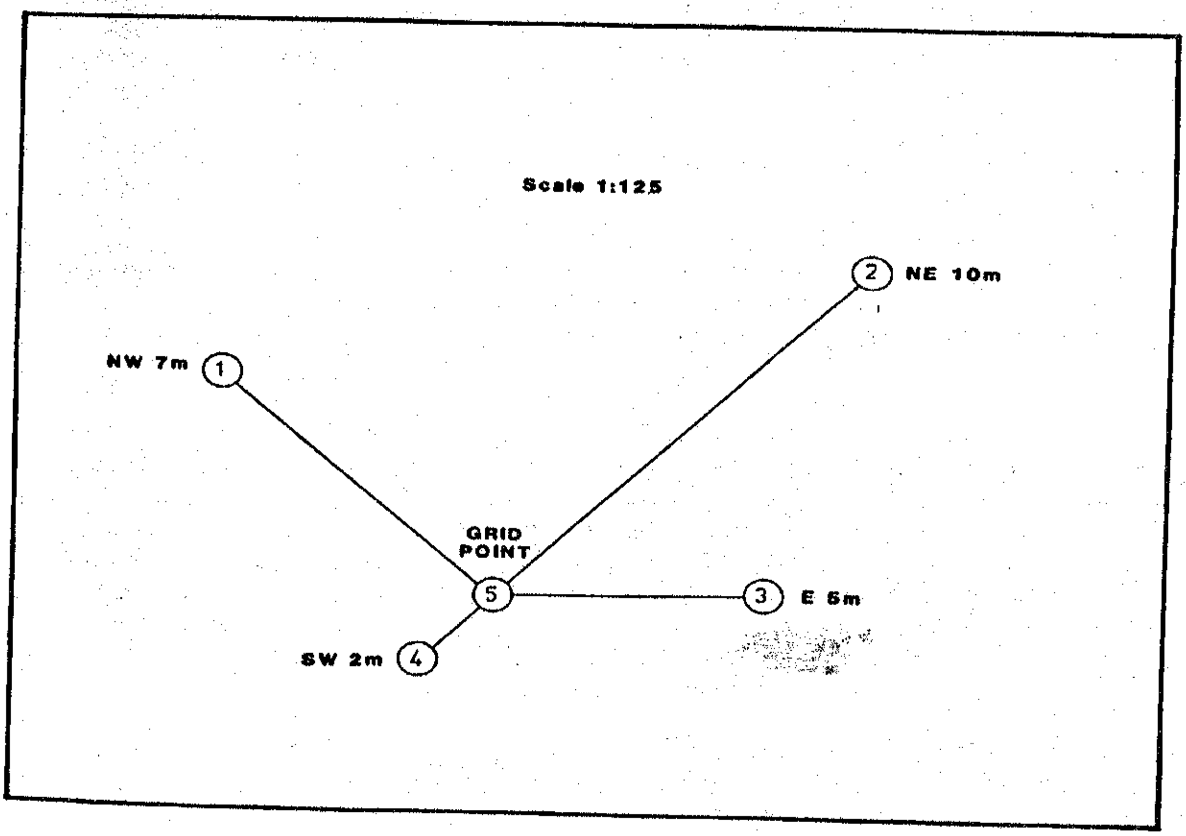

Figure 2. Fine fuel sampling pattern.

2. *Large Fuel*

Large fuel was defined as all dead woody material with a diameter larger than 25 mm. It consisted of large twigs, branches and logs.

The large fuel was surveyed using the line intersect method (van Wagner, 1968). This line intersect method has been thoroughly tested in field applications (Kirby and Hall, 1979) and is commonly used for assessing large fuels or harvesting residues.

Three 250 m transect lines were located to form an equilateral triangle so that any orientation bias would be minimised (van Wagner, 1982). Along each transect the diameter and type of every large fuel component intersecting the vertical plane of the transect was recorded. Three type classes were recognised: pine, hardwood and lantana. At the pre-burn survey each piece was classified into two condition classes (solid; decayed) and at the post-burn survey each was classified into three classes (solid; decayed; charred).

The total volume of large fuel was calculated using the equation:

$$V = \frac{\pi^2 \sum d^2}{8 L}$$

where V = Volume of large fuel in m^3 ha^{-1}
d = Piece diameter in cm
L = Length of transect line in m.
(van Wagner, 1982).

A density factor was derived for each type of large fuel from air dry density values quoted by Bootle (1983). These factors allowed weights (tonne ha^{-1}) of large fuel to be derived.

Transect lines were surveyed in May, 1988 (pre-burn survey) and in November, 1988 (post-burn survey).

RESULTS AND DISCUSSION

1. *Fine Fuel (Pre-burn)*

The fine fuel weights for all samples are detailed in Appendix 1 and summary statistics are presented in Table 1. The weights ranged from 0.79 tonne ha^{-1} to 83.15 tonne ha^{-1} with a mean of 25.66 tonne ha^{-1} (95% confidence limit: ± 3.4 tonne ha^{-1}).

The high fine fuel weight results from the recent deposition of fine fuel by the thinning. The size of this deposition is indicated by data obtained from *P. elliottii* plantation at Whiporie State Forest near Casino. In this plantation first thinning at age 21 years increased fine fuel weights by 8.5 tonne ha^{-1}, producing post-thinning fine fuel weights of 18 tonne ha^{-1} in regularly burnt plots and 28 tonne ha^{-1} in unburnt plots. The annual litterfall in the Barcoongere plantation would be similar to the 3 tonne ha^{-1}, which was recorded over a 15 year period in the Whiporie State Forest plantations. In the absence of burning this litterfall has produced an increasing fine fuel weight over time, achieving an apparent dynamic equilibrium weight of about 20 tonne ha^{-1} after about 20 years. Regular low intensity burning, commencing at age eight years, has restricted fine fuel weight to a maximum of about 10 tonne ha^{-1} (Forestry Commission New South Wales, *unpubl. data*).

The mean fine fuel weight has a high standard deviation (68% of the mean), which indicates the variability in fine fuel weight produced by the uneven deposition of the thinning debris over the site. In the absence of deposition from thinning, fine fuels in conifer plantations tend to become more uniform with time as indicated by sampling in Whiporie plantation. From age eight years to age 21 years, the standard deviation of the mean fine fuel weight showed a general downward trend from 45-50% of the mean to 30% of the mean.

Table 1. Pre-burn fine fuel weight and moisture content.

	Number samples	Min. wt.	Max. wt.	Mean wt.	Std. dev. of mean wt.	Std. err. of mean wt.	Moisture content (%)
Green weight (g)	100	15.2	1404.8	368.9	264.9	26.5	
Dry weight (g)	100	7.9	831.5	256.6	174.8	17.5	43.8
Fine fuel weight (tonne ha^{-1})	100	0.8	83.2	25.7	17.5	1.7	

The composition of the fine fuel is summarised in Table 2 and more detailed data are provided in Appendix 2. The main fractions were Needles (33% of fine fuel weight) and Twigs 6-25 mm (25%). The large amount of Twigs present is due to the recent deposition of tree crowns in the thinning operation. Green and Cured Vegetation makes up only 5% of the fuel. Cones, Bark and Miscellaneous fractions, in particular, have standard deviations greater than mean weight. This indicates an uneven distribution of these fractions over the site.

2. *Fine Fuel Moisture Content (Pre-burn)*

The moisture content of the samples was 44%. This moisture content would be too high for prescribed burning. Van Loon and Love (1973) have suggested that a moisture content of 13-20% promoted satisfactory fuel reduction burns but recognised that this range needed to be confirmed by further experimental burning.

The high fine fuel moisture content is partly due to the large proportion of fine fuel that was live vegetation when deposited by the thinning. This contrasts with the deposition of dead vegetation by the normal litterfall process. The prevailing climatic conditions have also contributed to maintaining high moisture contents in the plantation. Drought indices measured at Coffs Harbour on the day of sampling were:

Byram-Keetch Drought Index (BKDI)	:	27
Soil Dryness Index (SDI)	:	47
Fine Fuel Flammability Index (FFFI)	:	7

The Byram-Keetch Drought Index and Soil Dryness Index are relatively low indicating that large fuels and soils have high moisture levels, which would contribute to damp conditions under the plantation canopy. The Fine Fuel Flammability Index is lower than expected for the fuel moisture levels recorded. However this index is very responsive to daily climatic conditions and has been derived using climatic data measured in Coffs Harbour. The temperature would have been higher and the humidity lower than in the plantation, producing the lower than expected Fine Fuel Flammability Index.

Moisture contents were derived for the fine fuel fractions from the data in Appendix 2 and are summarised in Table 2. The moisture contents ranged from 22% for Cured Vegetation to 68% for Green Vegetation.

Table 2. Pre-burn fine fuel composition and moisture content.

Fuel fraction	Number samples	Mean wt. (tonne ha^{-1})	Std. dev. of mean wt.	Std. err. of mean wt.	Proportion of total fine fuel (%)	Moisture content (%)
Cones	20	1.79	2.33	0.52	8	66
Bark	20	2.40	3.67	0.82	10	39
Needles	20	7.53	7.34	1.64	33	27
Twigs 0-6	20	1.93	1.87	0.42	8	25
Twigs 6-25	20	5.77	5.92	2.32	25	34
Green Vegetation	20	0.71	0.84	0.19	3	68
Cured Vegetation	20	0.52	0.52	0.12	2	22
Miscellaneous	20	2.59	3.12	0.70	11	30

3. *Fine Fuel (Post-burn)*

The fine fuel weights for all samples are detailed in Appendix 3 and summary statistics are presented in Table 3. The weights ranged from 0.40 tonne ha^{-1} to 83.22 tonne ha^{-1} with a mean of 11.68 tonne ha^{-1} (95% confidence limit: ± 2.0 tonne ha^{-1}). The mean fine fuel weight has a high standard deviation (95% of the mean). The fuel weight has a high degree of variability due to the uneven deposition of the thinning debris, and this is further compounded by the typical mosaic of burnt, part burnt and unburnt areas produced by prescribed burning.

The fine fuel composition is summarised in Table 4 and more detailed data are provided in Appendix 4. The main fractions were Bark (41% of fine fuel weight), Needles (17%) and Twigs 6-25 mm (14%).

Table 3. Post-burn fine fuel weight and moisture content.

	Number samples	Min. wt.	Max. wt.	Mean wt.	Std. dev. of mean wt.	Std. err. of mean wt.	Moisture content (%)
Green weight (g)	125	4.0	945.0	147.3	140.5	12.6	
Dry weight (g)	125	4.0	832.2	116.8	111.4	10.0	26.1
Fine fuel weight (tonne ha^{-1})	125	0.4	83.2	11.7	11.1	1.0	

4. *Fine Fuel Moisture Content (Post-burn)*

The moisture content of the fine fuel samples was 26%, which is considerably lower than that derived prior to burning. This lower moisture content reflects the fact that the fuels have been on the forest floor for a longer period, have been dried by the burn and that the prevailing climatic conditions are drier. Drought indices measured at Coffs Harbour on the day of sampling were:

Byram-Keetch Drought Index	:	71
Soil Dryness Index	:	112
Fine Fuel Flammability Index	:	3

The Byram-Keetch Drought Index and the Soil Dryness Index indicate drying conditions in which the moisture content of the large fuel and soil is becoming low. The Fine Fuel Flammability Index is again lower than expected given the fuel moisture content measured. Once more the use of climatic data collected from outside the forest is the likely reason for this difference.

The moisture content of the various fine fuel fractions has been derived from the data in Appendix 4 and is summarised in Table 4. The moisture contents ranged from 8% for the Miscellaneous fraction to 29% for Green Vegetation. During the sorting process these samples have dried out and this has reduced the green weights of the fractions. As a result the moisture contents derived are lower than their actual values.

Table 4. Post-burn fine fuel composition and moisture content.

Fuel fraction	Number samples	Mean wt. (tonne ha^{-1})	Std. dev. of mean wt.	Std. err. of mean wt.	Proportion total fine fuel (%)	Moisture content (%)
Cones	25	0.72	0.94	0.19	5	10
Bark	25	5.61	10.70	2.14	41	9
Needles	25	2.28	4.61	0.92	17	13
Twigs 0-6	25	0.85	0.86	0.17	6	9
Twigs 6-25	25	1.97	2.67	0.53	14	11
Green Vegetation	25	0.55	0.98	0.20	4	29
Cured Vegetation	25	0.89	0.97	0.19	7	9
Miscellaneous	25	0.80	0.76	0.15	6	8

5. *Fine Fuel: Changes Caused by the Burn*

The burn reduced the fine fuel weight from 25.66 tonne ha^{-1} to 11.68 tonne ha^{-1}; a reduction of 13.98 tonne ha^{-1} (54%).

Table 5 compares the weights of the fuel fractions before and after burning providing an indication of fire effects. The weights of most fractions were reduced by the burn with percent reductions ranging from 23% for Green Vegetation to 70% for Needles. The largest reductions were Needles (70%), Miscellaneous (69%), Twigs 6-25 mm (66%), and Cones (60%).

For two fractions, Bark and Cured Vegetation, mean sample weight increased following the burn. The apparent increase in Bark weight was an artefact of sampling. The Bark fraction is unevenly distributed over the site and plots established after burning have sampled a number of bark accumulations. In the pre-burn sample the four heaviest Bark weights averaged 8 tonne ha^{-1}, while in the post-burn sample they averaged 29 tonne ha^{-1}. However the fact that these Bark accumulations are still present following burning also indicates that it is not as readily burnt as some other fractions or that it is accumulated in areas that remain unburnt. The Cured Vegetation weight has increased by 71%. This fraction could be expected to increase due to burning, as a result of Green Vegetation being scorched and killed by the fire.

Burning has increased the variability in the fine fuel weight (the standard deviation has increased from 68% to 95% of the mean). However for the fuel fractions the changes in variability have not been consistent. For some the variability increased (Bark, Needles, Twigs 6-25 mm, Green Vegetation), for others there was little change (Cones, Twigs 0-6 mm, Cured Vegetation), while the Miscellaneous fraction became less variable.

Before burning 45% of the samples were less than 20 tonne ha^{-1}, 45% were 20-50 tonne ha^{-1} and 10% were greater than 50 tonne ha^{-1}. After burning 85% of the samples were less than 20 tonne ha^{-1}, 14% were 20-50 tonne ha^{-1} and 1% were greater than 50 tonne ha^{-1}.

Table 5. Changes in fine fuel composition due to burning.

Fuel fraction	Pre-burn weight (tonne ha^{-1})	Post-burn weight (tonne ha^{-1})	Change in weight (tonne ha^{-1})	Percent change in weight
Cones	1.79	0.72	-1.07	-60
Bark	2.40	5.61	+3.21	+134
Needles	7.53	2.28	-5.25	-70
Twigs 0-6	1.93	0.85	-1.08	-56
Twigs 6-25	5.77	1.97	-3.80	-66
Green Vegetation	0.71	0.55	-0.16	-23
Cured Vegetation	0.52	0.89	+0.37	+71
Miscellaneous	2.59	0.80	-1.79	-69

6. *Large Fuel (Pre-burn)*

The weight of large fuel prior to burning was 91.0 tonne ha^{-1}. This was made up of 68.3 tonne ha^{-1} of hardwood (75%), 22.2 tonne ha^{-1} of pine (24%), and 0.5 tonne ha^{-1} of lantana (1%).
A summary of the data are presented in Table 6 with more detailed data in Appendix 5.

A total of 409 large fuel pieces were measured with a mean piece diameter of 9.67 cm. There were 300 pieces (73%) of pine with a mean diameter of 7.5 cm, 79 pieces (19%) of hardwood with a mean diameter of 20.0 cm, and 30 pieces (7%) of lantana with a mean diameter of 4.0 cm.

The condition classification estimated that 1% of the pine, 3% of the lantana, and 24% of the hardwood was decayed. These proportions are in accord with the relative ages of the fuel types and the period each has been lying on the forest floor. The hardwood is old material that has been on the forest floor at least since plantation establishment, while most of the pine and lantana is young material that has only been on the forest floor since the recent thinning.

The pine fuel type was examined in more detail by breaking it into three diameter classes:

(i) the 2.5 - 5.0 cm diameter class contained 148 pieces with a mean diameter of 3.3 cm, and a weight of 1.4 tonne ha^{-1};

(ii) the 5.0 - 15.0 cm diameter class contained 129 pieces with a mean diameter of 10.2 cm, and a weight of 12.4 tonne ha^{-1};

(iii) the greater than 15.0 cm diameter class contained 23 pieces with a mean diameter of 19.9 cm, and a weight of 8.4 tonne ha^{-1}.

The 2.5 - 5.0 cm diameter class consisted mainly of woody material from the crowns of the thinned trees.

The greater than 15 cm diameter class consisted mainly of bole material from trees that had been "felled to waste". Although the pieces in this class exceed the minimum diameter for sawlogs, diameter is only one of the parameters used to define a sawlog. Important parameters which were not assessed in this study are the length and straightness of each piece. While it is likely that most of these pieces are unsuitable for sawlogs, they are a potential source of pulpwood, as are the pieces in the 5-15 cm class. These sources contain a potential volume of 20 tonne ha^{-1}. However there would be a "cost" in utilising this material and this includes:

- increased machinery activity associated with the collection, extraction and processing of the material. This would promote greater soil disturbance and compaction;
- a loss of woody biomass from the forest floor;
- a reduction in the physical barriers to soil and water movement on the site.

Table 6. Pre-burn large fuel composition.

Fuel fraction	Number of pieces	Mean piece diameter (cm)	Large fuel weight (tonne ha^{-1})
Lantana	30	4.0	0.5
Hardwood	79	20.0	68.3
Pine 2.5 - 5 cm	148	3.3	1.4
Pine 5 - 15 cm	129	10.2	12.4
Pine 15+ cm	23	19.9	8.4
Total pine	300	7.5	22.2
Total	409	9.7	91.0

7. *Large Fuel (Post-burn)*

The weight of large fuel after burning was 99.4 tonne ha^{-1}. This was made up of 72.6 tonne ha^{-1} of hardwood (73%), 26.7 tonne ha^{-1} of pine (27%), and 0.1 tonne ha^{-1} of lantana (0.1%).

A summary of the data is presented in Table 7 with more detailed data in Appendix 6.

A total of 558 large fuel pieces was measured with a mean piece diameter of 8.6 cm. There were 427 pieces (77%) of pine with a mean diameter of 6.9 cm, 116 pieces (21%) of hardwood with a mean diameter of 15.4 cm, and 15 pieces (3%) of lantana with a mean diameter of 3.3 cm.

The pine component was examined in more detail by breaking it into three diameter classes:

(i) the 2.5 - 5.0 cm diameter class contained 238 pieces with a mean diameter of 3.3 cm, and a weight of 2.4 tonne ha^{-1};

(ii) the 5.0 - 15.0 cm diameter class contained 159 pieces with a mean diameter of 10.3 cm, and a weight of 15.7 tonne ha^{-1};

(iii) the greater than 15.0 cm diameter class contained 30 pieces with a mean diameter of 17.4 cm, and a weight of 8.6 tonne ha^{-1}.

Table 7. Post-burn large fuel composition.

Fuel fraction	Number of pieces	Mean piece diameter (cm)	Large fuel weight (tonne ha^{-1})
Lantana	15	3.3	0.1
Hardwood	116	15.4	72.6
Pine 2.5 - 5 cm	238	3.3	2.4
Pine 5 - 15 cm	159	10.3	15.7
Pine15+ cm	30	17.4	8.6
Total pine	427	6.9	26.7
Total	558	8.6	99.4

8. *Large Fuel: Changes Caused by the Burn*

The total number of pieces and the weight of large fuel following burning were greater than those measured before burning. These increases are due to variations in the relocating the sample transects for the post-burn measure. This result also shows that a fire of the intensity prescribed is ineffective in reducing large fuel weight.

Although the fire failed to reduce the large fuel weight, it did char 79% of the pine and 32% of the hardwood. This shows that much of the large fuel was exposed to the fire, but that conditions were unsuitable for combustion to be sustained. It is likely that this charring has reduced the flammability of the large fuels.

FUELS AND FIRE BEHAVIOUR

Burgan and Rothermel (1984) state that fire behaviour is influenced by a number of fuel complex parameters. The main ones are:

(i) fuel loadings within specified size classes;

(ii) surface area-to-volume ratios for specified size classes (a measure of the bulk density of the fuel);

(iii) fuel bed depth;

(iv) heat content of fuel;

(v) moisture content of the fuel.

These parameters are directly and indirectly incorporated in the fire intensity equation derived by Byram (1959).

$$I = hwr$$

where I = fire intensity (kW m^{-1})
h = heat of combustion (kJ kg^{-1})
w = fuel weight (kg m^{-2})
r = rate of spread (m sec^{-1})

McArthur (1967) developed this equation for Australian conditions and suggested that a heat of combustion value of 8 000 Btu lb^{-1} (18 595 kJ kg^{-1}) was appropriate for forest fuels.

As rate of spread is directly proportional to fuel quantity, it follows from the formula that as fuel quantity doubles, the fire intensity will increase fourfold.

Distinction must also be made between total fuel and available fuel. Van Loon and Love (1973) define available fuel as the quantity of fuel that actually burns in a fire, i.e. the difference in fuel weight before and after burning. While it is accepted that this definition is theoretically correct and should be used when deriving the intensity of a completed burn, it is not a definition that can be applied when predicting fire behaviour prior to burning. For such predictions, it is necessary to estimate the amount of fuel that could potentially be burnt by the fire.

Burgan and Rothermel (1984) relate available fuel to surface area/volume (s/v) ratios and bulk density. As the size of individual fuel particles increases the s/v ratio gets smaller, and the particles must be packed more tightly to maximise reaction intensity for efficient combustion. As particle size decreases a greater portion of the fuel particle is heated to ignition. Bulk density (the weight of fuel per cubic metre of fuel bed) affects rate of spread with increases in bulk density decreasing the rate of spread.

Burgan and Rothermel have classified fuels as follows:

Fuel type	Diameter class	Typical s/v ratio
1 hr	0-6 mm	2000
10 hr	6-25 mm	109
100 hr	greater than 25 mm	30

Available fuels are those in the 1 hour and 10 hour classes, so in the present study all the fine fuel is considered to be available fuel. This gives an available fuel weight of 25.66 tonnes ha^{-1} (2.57 kg m^{-2}).

It is assumed that the large fuel would not contribute to fire behaviour but, depending on conditions, may ignite and burn following the passage of the flame front.

Burrows (1984) discusses appropriate intensities for prescribed burns and concludes that the intensity should be less than 350 kW m^{-1}. Van Loon and Love (1973) adopted the intensity range of 45-173 kW m^{-1}, as defined by McArthur (1962), for prescribed burning in slash pine plantations. The limits of this range are used in the following section to derive burning guidelines for the Barcoongere plantation.

DERIVATION OF BURNING PRESCRIPTIONS

The equation I = HWR, has been simplified by Burrows (1984) to

$$I \approx \frac{RW}{2}$$

where R = ROS (m hr^{-1})
W = fuel (tonnes ha^{-1})
I = intensity (KW m^{-1})

therefore $R \approx \frac{2I}{W}$ m hr^{-1}

Inserting known values into this equation provides the upper and lower limits for rates of spread, for fires of prescribed intensities.

1) $R = \frac{2x45}{25.7}$

$= 3.5 \text{ m hr}^{-1}$

$= 0.06 \text{ m min}^{-1}$

2) $R = \frac{2x173}{25.7}$

$= 13.5 \text{ m hr}^{-1}$

$= 0.22 \text{ m min}^{-1}$

These rates of spread, a minimum of 0.06 m min^{-1} and a maximum of 0.22 m min^{-1}, were used as the guidelines for prescribed burning on post-thinning sites in Barcoongere plantation. Test fires should be used to confirm that the target rates of spread are being achieved.

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Appendix 1. Pre-burn data for fine fuel samples.

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
A1	308.51	212.42	21.24	
A2	242.57	196.63	19.66	
A3	323.95	242.63	24.26	
A4	496.02	404.82	40.48	
A5	449.02	345.96	34.59	28.05
B1	92.46	65.52	6.55	
B2	273.09	199.18	19.92	
B3	134.64	111.38	11.14	
B4	249.75	191.87	19.18	
B5	889.62	600.39	60.03	23.36
C1	757.39	525.50	52.55	
C2	155.30	129.37	12.93	
C3	279.77	206.53	20.65	
C4	426.78	310.65	31.06	
C5	185.89	150.70	15.07	26.45
D1	1074.55	715.52	71.55	
D2	86.92	74.29	7.42	
D3	373.05	185.76	18.57	
D4	566.82	441.89	44.19	
D5	167.02	125.38	12.53	30.85
E1	1243.69	831.51	83.15	
E2	76.27	59.31	5.93	
E3	330.18	273.95	27.39	
E4	312.32	260.02	26.00	
E5	345.63	256.61	25.66	33.63
F1	123.14	103.87	10.38	
F2	221.36	170.17	17.02	
F3	646.95	560.80	56.08	
F4	116.43	92.83	9.28	
F5	39.71	33.64	3.36	19.22
G1	71.76	59.02	5.90	
G2	15.24	7.87	0.79	
G3	160.67	130.48	13.05	
G4	64.48	46.64	4.66	
G5	493.13	348.58	34.86	11.85
H1	319.80	205.55	20.56	
H2	548.18	405.01	40.50	
H3	461.34	335.22	33.52	
H4	490.73	365.08	36.51	
H5	294.76	226.75	22.68	30.75

Appendix 1. (cont.)

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
I1	366.38	262.98	26.30	
I2	86.09	66.68	6.67	
I3	525.67	330.69	33.07	
I4	35.69	18.67	1.87	
I5	258.27	179.61	17.96	17.17
J1	237.47	174.49	17.45	
J2	539.91	425.46	42.55	
J3	1404.77	774.12	77.41	
J4	242.53	161.26	16.13	
J5	242.23	161.07	16.11	33.93
K1	485.17	316.55	31.66	
K2	324.70	251.10	25.11	
K3	329.65	236.90	23.69	
K4	477.53	360.10	36.01	
K5	413.27	285.60	28.56	29.01
L1	311.61	224.40	22.44	
L2	698.93	516.40	51.64	
L3	379.51	264.65	26.47	
L4	293.86	224.20	22.42	
L5	299.39	199.00	19.90	28.57
M1	340.33	207.30	20.73	
M2	264.32	162.60	16.26	
M3	331.66	260.97	26.10	
M4	502.67	361.90	36.19	
M5	244.94	172.20	17.22	23.30
N1	120.39	80.19	8.02	
N2	537.63	381.70	38.17	
N3	1177.85	784.40	78.44	
N4	568.40	334.80	33.48	
N5	407.97	281.80	28.18	37.26
O1	261.53	200.90	20.09	
O2	111.09	89.60	8.96	
O3	404.98	281.25	28.13	
O4	155.25	127.10	12.71	
O5	240.96	192.80	19.28	17.83
P1	530.85	363.10	36.31	
P2	287.66	227.44	22.74	
P3	171.82	149.50	14.95	
P4	644.98	450.50	45.05	
P5	264.33	163.60	16.30	27.07

Appendix 1. (cont.)

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
Q1	169.84	103.20	10.32	
Q2	674.21	484.00	48.40	
Q3	617.29	460.75	46.08	
Q4	824.49	517.20	51.72	
Q5	978.12	616.10	61.61	43.63
R1	232.86	99.30	9.93	
R2	350.15	235.30	23.53	
R3	567.52	323.30	32.33	
R4	262.78	139.70	13.97	
R5	137.27	106.75	10.68	18.09
S1	111.76	68.60	6.86	
S2	178.98	120.90	12.09	
S3	150.22	84.00	8.40	
S4	423.87	305.08	30.51	
S5	472.16	209.20	20.92	15.76
T1	251.42	142.40	14.24	
T2	232.09	119.20	11.92	
T3	152.19	95.60	9.56	
T4	56.97	40.00	4.00	
T5	617.97	474.67	47.47	17.44
Mean weight all samples	368.93	256.62	25.66	

Appendix 2. Pre-burn weight and moisture content of fine fuel fractions.

Sample No.	Cones			Bark			Needles			Twigs 0-6mm			Twigs 6-25mm			Green Vegetation			Cured Vegetation			Miscellaneous		
	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.	Green wt (g)	Oven dry wt (g)	Pct m.c.
A5	62.38	55.52	12.4	20.62	18.11	13.9	51.58	45.02	14.6	1.99	1.82	9.3	130.83	107.99	21.2	1.40	0.60	133.3	4.68	4.02	16.4	64.14	54.37	18.0
B4	1.07	1.00	7.0	176.52	127.61	38.3	37.84	33.88	11.7	3.58	3.18	12.6	0.0	0.0	0.0	9.62	6.90	39.4	5.24	4.82	8.7	15.88	14.48	9.7
C1	90.46	38.81	133.1	7.13	5.27	35.3	420.37	303.89	38.3	12.94	9.88	31.0	199.13	146.47	36.0	5.91	2.34	152.6	3.55	3.07	15.6	17.90	15.77	13.5
D4	48.18	34.47	39.8	11.80	10.23	15.4	218.17	178.02	22.6	18.10	15.76	14.9	262.02	196.49	33.4	2.22	1.49	49.0	1.00	0.91	9.9	5.33	4.52	17.9
E2	0.0	0.0	0.0	1.36	1.11	22.5	24.69	19.73	25.1	6.77	5.50	23.1	27.30	20.10	35.8	6.90	4.94	39.7	4.34	3.68	17.9	4.91	4.25	15.5
F1	0.0	0.0	0.0	4.19	3.40	23.2	55.08	47.40	16.2	11.10	9.33	19.0	34.40	28.63	20.2	3.89	2.76	40.9	2.02	1.72	17.4	12.46	10.63	17.2
G1	0.0	0.0	0.0	18.84	15.33	22.9	34.98	28.40	23.2	5.03	4.22	19.2	0.0	0.0	0.0	0.0	0.0	0.0	5.39	4.47	20.6	7.52	6.60	13.9
H5	11.28	7.68	46.9	8.58	6.78	26.6	49.97	39.64	26.1	24.73	20.11	23.0	73.43	52.87	38.9	6.02	3.60	67.2	5.17	4.06	27.3	11.68	9.68	20.7
I2	12.61	9.03	39.7	2.25	1.89	19.1	20.14	15.71	28.2	20.81	16.55	25.7	0.0	0.0	0.0	4.72	3.04	55.3	3.29	2.68	22.8	22.27	17.78	25.3
J2	0.0	0.0	0.0	41.92	33.33	25.8	157.43	127.99	23.0	82.39	67.46	22.1	216.68	163.79	32.3	1.85	1.45	27.6	0.65	0.54	20.4	38.99	30.90	26.2
K1	0.0	0.0	0.0	186.42	118.71	57.0	59.42	44.03	35.0	42.02	30.42	38.1	77.24	40.37	91.3	26.00	13.52	92.3	10.12	7.79	29.9	83.95	61.71	36.0
L3	121.38	64.87	87.1	13.55	9.59	41.3	106.12	83.35	27.3	34.26	25.91	32.2	82.72	65.78	25.8	12.67	7.79	62.6	2.37	1.95	21.5	6.44	5.41	19.0
M3	0.0	0.0	0.0	29.53	23.99	23.1	33.10	26.11	26.8	14.89	11.87	25.4	55.51	44.56	24.6	42.10	26.36	59.7	2.40	1.98	21.2	27.00	20.70	30.4
N1	9.82	7.58	29.6	0.0	0.0	0.0	13.47	10.89	23.7	12.99	10.68	21.6	0.0	0.0	0.0	62.13	32.60	90.6	14.72	12.22	20.5	7.26	6.22	16.7
O3	90.72	52.16	73.9	2.08	1.76	18.2	46.31	38.27	21.0	39.87	29.92	33.3	130.98	91.22	43.6	11.16	5.89	89.5	1.04	0.83	25.3	14.29	11.71	22.0
P2	0.0	0.0	0.0	14.71	11.92	23.4	198.51	160.62	23.6	2.19	1.89	15.9	51.90	36.37	42.7	6.22	4.62	34.6	9.31	7.83	18.9	4.82	4.19	15.0
Q3	0.0	0.0	0.0	28.03	21.99	27.5	102.38	79.98	28.0	49.12	39.18	25.4	54.97	43.68	25.9	6.09	4.24	43.6	2.08	1.70	22.4	177.55	132.03	34.5
R5	0.0	0.0	0.0	4.80	3.87	24.0	69.24	54.91	26.1	12.81	9.71	31.9	12.70	9.82	29.3	16.60	10.78	54.0	7.42	6.13	21.0	13.70	11.53	18.8
S4	74.69	38.73	92.9	8.85	6.87	28.8	35.17	28.28	24.4	11.98	9.50	26.1	0.0	0.0	0.0	8.66	6.12	41.5	12.98	10.07	28.9	89.71	61.64	45.5
T5	70.12	48.15	45.6	85.67	59.03	45.1	174.17	140.56	23.9	73.68	62.41	18.1	137.63	104.91	31.2	2.94	2.13	38.0	28.32	22.87	23.8	45.44	34.61	31.3
Percent moisture content all samples	65.6			38.7			26.7			24.9			34.2			68.0			21.9			29.5		

Appendix 3. Post-burn data for fine fuel samples.

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
A1	89.0	74.0	7.40	
A2	493.0	430.0	43.00	
A3	135.0	116.8	11.68	
A4	90.0	72.8	7.28	
A5	76.0	62.5	6.25	15.12
B1	114.0	99.1	9.91	
B2	70.0	62.4	6.24	
B3	59.0	56.2	5.62	
B4	65.0	58.6	5.86	
B5	61.0	56.0	5.60	6.65
C1	82.0	75.5	7.55	
C2	58.0	55.9	5.59	
C3	119.0	102.4	10.24	
C4	157.0	135.6	13.56	
C5	292.0	249.0	24.90	12.37
D1	81.0	76.9	7.69	
D2	100.0	87.5	8.75	
D3	287.0	251.3	25.13	
D4	467.0	425.8	42.58	
D5	80.0	66.0	6.60	18.15
E1	4.0	4.0	0.40	
E2	396.0	349.3	34.93	
E3	25.0	25.1	2.51	
E4	219.0	193.8	19.38	
E5	32.0	31.1	3.11	12.07
F1	350.0	289.1	28.91	
F2	75.0	49.3	4.93	
F3	89.0	87.3	8:73	
F4	945.0	832.2	83.22	
F5	71.0	68.9	6.89	26.54
G1	324.0	292.1	29.21	
G2	34.0	34.0	3.40	
G3	26.0	25.9	2.59	
G4	71.0	64.6	6.46	
G5	183.0	163.7	16.37	11.61
H1	158.0	144.3	14.43	
H2	109.0	95.3	9.53	
H3	142.0	139.6	13.96	
H4	40.0	37.0	3.70	
H5	464.0	174.0	17.40	11.80

Appendix 3. (cont.)

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
I1	38.0	37.4	3.74	
I2	48.0	37.3	3.73	
I3	183.0	174.3	17.43	
I4	80.0	77.8	7.78	
I5	255.0	248.5	24.85	11.51
J1	142.0	115.9	11.59	
J2	219.0	145.9	14.59	
J3	298.0	281.0	28.10	
J4	113.0	107.8	10.78	
J5	317.0	290.2	29.02	18.82
K1	229.0	128.3	12.83	
K2	116.0	103.5	10.35	
K3	53.0	47.6	4.76	
K4	57.0	47.3	4.73	
K5	41.0	37.7	3.77	7.29
L1	48.0	36.8	3.68	
L2	182.0	160.0	16.00	
L3	122.0	54.5	5.45	
L4	153.0	123.6	12.36	
L5	124.0	106.5	10.65	9.63
M1	49.0	43.7	4.37	
M2	146.0	115.4	11.54	
M3	142.0	124.6	12.46	
M4	149.0	47.7	4.77	
M5	24.0	20.5	2.05	7.04
N1	14.0	10.7	1.07	
N2	53.0	45.8	4.58	
N3	108.0	87.7	8.77	
N4	166.0	145.4	14.54	
N5	299.0	258.2	25.82	10.96
O1	159.0	78.2	7.82	
O2	155.0	103.6	10.36	
O3	230.0	213.8	21.38	
O4	104.0	84.3	8.43	
O5	129.0	109.0	10.90	11.78
P1	85.0	59.9	5.99	
P2	78.0	51.5	5.15	
P3	281.0	235.8	23.58	
P4	148.0	117.9	11.79	
P5	166.0	141.5	14.15	12.13
Q1	62.0	56.9	5.69	
Q2	85.0	76.9	7.69	
Q3	803.0	474.6	47.46	
Q4	139.0	100.9	10.09	
Q5	37.0	33.1	3.31	14.85

Appendix 3. (cont.)

Sample number	Green weight (g)	Oven dry weight (g)	Fine fuel weight (tonne ha^{-1})	Mean fine fuel weight for site (tonne ha^{-1})
R1	60.0	41.1	4.11	
R2	253.0	230.9	23.09	
R3	122.0	100.8	10.08	
R4	61.0	51.4	5.14	
R5	72.0	59.6	5.96	9.68
S1	90.0	58.9	5.89	
S2	98.0	82.7	8.27	
S3	82.0	79.5	7.95	
S4	154.0	84.4	8.44	
S5	139.0	92.1	9.21	7.95
T1	300.0	174.2	17.42	
T2	113.0	71.4	7.14	
T3	159.0	125.1	12.51	
T4	254.0	205.5	20.55	
T5	363.0	180.9	18.09	15.14
U1	64.0	52.3	5.23	
U2	142.0	62.3	6.23	
U3	133.0	102.5	10.25	
U4	150.0	33.3	3.33	
U5	339.0	236.0	23.60	9.73
V1	100.0	80.6	8.06	
V2	487.0	379.9	37.99	
V3	47.0	40.4	4.04	
V4	97.0	82.2	8.22	
V5	132.0	61.2	6.12	12.89
W1	221.0	167.2	16.72	
W2	52.0	46.3	4.63	
W3	45.0	40.3	4.03	
W4	65.0	54.4	5.44	
W5	73.0	62.0	6.20	7.40
X1	31.0	24.6	2.46	
X2	106.0	90.6	9.06	
X3	29.0	27.3	2.73	
X4	66.0	61.6	6.16	
X5	70.0	68.1	6.81	5.44
Y1	76.0	75.5	7.55	
Y2	32.0	26.6	2.66	
Y3	80.0	78.2	7.82	
Y4	32.0	30.7	3.07	
Y5	61.0	61.2	6.12	5.44
Mean weight all samples	147.29	116.79	11.68	

Appendix 4. Post-burn weight and moisture content of fine fuel fractions.

Sample No.	Cones Green wt (g)	Cones Oven dry wt (g)	Cones Pct m.c.	Bark Green wt (g)	Bark Oven dry wt (g)	Bark Pct m.c.	Needles Green wt (g)	Needles Oven dry wt (g)	Needles Pct m.c.	Twigs 0-6mm Green wt (g)	Twigs 0-6mm Oven dry wt (g)	Twigs 0-6mm Pct m.c.	Twigs 6-25mm Green wt (g)	Twigs 6-25mm Oven dry wt (g)	Twigs 6-25mm Pct m.c.	Green Vegetation Green wt (g)	Green Vegetation Oven dry wt (g)	Green Vegetation Pct m.c.	Cured Vegetation Green wt (g)	Cured Vegetation Oven dry wt (g)	Cured Vegetation Pct m.c.	Miscellaneous Green wt (g)	Miscellaneous Oven dry wt (g)	Miscellaneous Pct m.c.
A5	0.0	0.0	0.0	13.08	12.19	7.3	19.65	18.33	7.2	12.5	11.84	9.3	0.0	0.0	0.0	9.42	8.35	12.8	9.32	8.75	6.5	3.32	3.05	8.9
B4	21.86	20.68	5.7	10.58	9.92	6.7	3.68	3.41	7.9	2.4	2.23	7.6	14.42	13.58	6.2	0.65	0.47	38.3	6.32	6.14	2.9	2.49	2.24	11.2
C1	19.16	18.2	5.3	4.58	4.33	5.8	7.16	6.61	8.3	8.13	7.67	6.0	27.82	25.91	7.4	1.28	1.08	18.5	5.0	4.96	0.8	6.95	6.75	3.0
D4	2.55	2.43	4.9	394.43	366.29	7.7	22.58	21.22	6.4	10.05	9.43	6.6	0.0	0.0	0.0	0.11	0.09	22.2	4.01	3.78	6.1	23.74	22.6	5.0
E2	0.0	0.0	0.0	327.81	298.19	9.9	5.33	4.93	8.1	7.22	6.69	7.9	2.09	1.94	7.7	4.45	4.15	7.2	9.22	8.66	6.5	26.32	24.72	6.5
F1	0.0	0.0	0.0	274.31	251.84	8.9	12.93	12.34	4.8	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.67	6.3	6.23	5.82	7.0	16.38	15.42	6.2
G1	0.0	0.0	0.0	246.88	229.94	7.4	23.16	21.96	5.5	0.12	0.1	20.0	27.53	25.83	6.6	0.22	0.21	4.8	4.06	3.91	3.8	10.79	10.19	5.9
H5	18.13	17.11	6.0	11.94	11.42	4.6	31.69	30.14	5.1	0.62	0.56	10.7	91.4	85.2	7.3	0.16	0.13	23.1	10.81	10.09	7.1	19.81	19.39	2.2
I2	0.0	0.0	0.0	0.71	0.63	12.7	3.28	3.1	5.8	5.98	5.52	8.3	23.54	21.17	11.2	4.75	2.76	72.1	0.69	0.61	13.1	3.55	3.5	1.4
J2	24.56	21.55	14.0	7.98	7.26	9.9	6.41	5.85	9.6	33.48	30.13	11.1	67.74	59.45	13.9	1.09	0.92	18.5	7.27	6.56	10.8	15.5	14.15	9.5
K1	10.89	9.11	19.5	3.52	3.28	7.3	26.32	24.45	7.7	9.54	8.29	15.1	0.0	0.0	0.0	51.43	34.58	48.7	40.97	32.58	25.8	17.42	16.04	8.6
L3	1.79	1.71	4.7	4.56	4.47	2.0	21.81	19.26	13.2	0.87	0.79	10.1	12.07	10.74	12.4	0.09	0.08	12.5	7.29	6.67	9.3	11.61	10.75	8.0
M3	3.37	3.27	3.1	0.5	0.5	0.0	3.7	3.27	13.2	0.99	0.79	25.3	30.85	27.7	11.4	0.0	0.0	0.0	0.0	0.0	0.0	1.17	1.13	3.5
N1	0.0	0.0	0.0	1.34	1.31	2.3	1.52	1.49	2.0	0.25	0.25	0.0	0.0	0.0	0.0	1.63	1.57	3.8	4.63	4.52	2.4	1.62	1.6	1.3
O3	0.0	0.0	0.0	80.52	73.94	8.8	19.09	17.85	7.0	18.76	17.64	6.4	57.07	53.4	6.9	14.19	13.2	7.5	24.83	23.59	5.3	15.24	14.17	7.6
P2	0.0	0.0	0.0	2.57	2.28	12.7	17.4	15.69	10.9	4.03	3.58	12.6	24.18	21.4	13.0	4.65	4.21	10.5	1.91	1.7	12.4	2.97	2.7	10.0
Q3	0.0	0.0	0.0	104.12	89.38	16.5	283.12	238.36	18.8	36.03	31.04	16.1	103.7	90.1	15.1	12.22	9.93	23.1	0.0	0.0	0.0	18.09	15.83	14.3
R5	17.86	15.4	16.0	1.87	1.62	15.4	28.94	25.86	11.9	9.32	8.09	15.2	0.0	0.0	0.0	1.19	0.88	35.2	7.13	6.53	9.2	1.49	1.27	17.3
S4	2.92	2.44	19.7	0.0	0.0	0.0	46.68	40.81	14.4	1.18	0.99	19.2	4.0	3.33	20.1	14.17	10.55	34.3	28.0	25.32	10.6	1.17	0.92	27.2
T5	21.89	19.83	10.4	1.87	1.75	6.9	29.83	27.78	7.4	21.4	19.75	8.4	42.15	38.4	9.8	48.21	36.49	32.1	37.49	34.96	7.2	2.12	1.9	11.6
U5	0.0	0.0	0.0	10.18	9.56	6.5	7.44	6.89	8.0	15.53	14.84	4.7	0.0	0.0	0.0	1.22	0.62	96.8	1.83	1.44	27.1	0.0	0.0	0.0
V4	24.61	22.98	7.1	10.98	10.46	5.0	4.8	4.6	4.4	12.8	12.19	5.0	15.81	15.18	4.2	0.08	0.08	0.0	11.4	10.83	5.3	6.66	5.87	13.5
W2	26.8	24.82	8.0	4.51	4.01	12.5	4.25	3.81	11.6	7.29	6.7	8.8	0.0	0.0	0.0	0.53	0.49	8.2	3.87	3.68	5.2	3.08	2.74	12.4
X1	0.0	0.0	0.0	5.38	5.03	7.0	10.7	9.95	7.5	5.48	5.22	5.0	0.0	0.0	0.0	1.09	1.02	6.7	1.0	1.0	0.0	2.51	2.41	4.2
Y2	0.0	0.0	0.0	3.22	3.02	6.6	2.38	2.33	2.2	9.48	9.08	4.4	0.0	0.0	0.0	1.12	1.12	0.0	10.26	9.8	4.7	1.28	1.28	0.0
Percent moisture content all samples		9.7			8.9			13.2			9.4			10.7			29.1			9.0			7.5	

Appendix 5. Pre-burn data from large fuel transects.

Transect 1
0 - 250 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	7	135.5	27.4	3.9	0.450	0.3
Hardwood	33	16184.3	600.4	18.2	0.900	71.9
Pine 2.5-5 cm	34	388.6	113.4	3.3	0.530	1.0
Pine 5-15 cm	43	4765.0	441.1	10.3	0.530	12.5
Pine 15+ cm	9	3983.9	184.1	20.5	0.530	10.4
Pine total	86	9137.5	738.6	8.6	0.530	23.9
Total	126	25457.3	1366.4	10.9		96.1

Transect 2
250 - 500 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	17	437.6	70.9	4.2	0.450	0.9
Hardwood	12	8423.2	251.9	21.0	0.900	37.4
Pine 2.5-5 cm	60	707.8	202.5	3.4	0.530	1.8
Pine 5-15 cm	31	3660.9	323.8	10.5	0.530	9.6
Pine 15+ cm	8	3320.9	159.5	19.9	0.530	8.7
Pine total	99	7689.5	685.8	6.9	0.530	20.1
Total	128	16550.3	1008.6	7.9		58.4

Appendix 5. (cont.)

Transect 3
500 - 750 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	6	93.8	22.3	3.7	0.450	0.2
Hardwood	34	21503.5	726.2	21.4	0.900	95.2
Pine 2.5-5 cm	54	577.3	173.9	3.2	0.530	1.5
Pine 5-15 cm	55	5801.9	545.3	9.9	0.530	15.2
Pine 15+ cm	6	2283.0	113.9	19.0	0.530	5.9
Pine total	115	8662.1	833.1	7.2	0.530	22.6
Total	155	30259.3	1581.6	10.2		118.0

Total Transect
750 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	30	666.8	120.6	4.0	0.450	0.5
Hardwood	79	46111.0	1578.5	20.0	0.900	68.3
Pine 2.5-5 cm	148	1673.7	489.8	3.3	0.530	1.4
Pine 5-15 cm	129	14227.7	1310.2	10.2	0.530	12.4
Pine 15+ cm	23	9587.7	457.5	19.9	0.530	8.4
Pine total	300	25489.1	2257.5	7.5	0.530	22.2
Total	409	72266.9	3956.6	9.7		91.0

Appendix 6. Post-burn data from large fuel transects.

Transect 1
0 - 250 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	7	24.7	91.7	3.5	0.450	0.2
Hardwood	31	494.6	18686.2	17.1	0.900	83.0
Pine 2.5-5 cm	82	260.3	884.1	3.3	0.530	2.3
Pine 5-15 cm	53	546.6	6097.2	10.3	0.530	15.9
Pine 15+ cm	13	218.0	4137.7	18.2	0.530	10.8
Pine total	148	1024.9	11118.9	7.1	0.530	29.1
Total	186	1544.2	29896.8	8.3		112.3

Transect 2
250 - 500 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	7	22.2	71.1	3.2	0.450	0.2
Hardwood	40	509.0	10183.4	12.7	0.900	45.2
Pine 2.5-5 cm	81	275.9	969.9	3.4	0.530	2.5
Pine 5-15 cm	43	448.5	4960.6	10.4	0.530	13.0
Pine 15+ cm	12	209.6	3800.7	17.4	0.530	9.9
Pine total	136	934.0	9731.2	6.8	0.530	25.5
Total	183	1465.2	19985.7	8.0		70.8

Appendix 6. (cont.)

Transect 3
500 - 750 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	1	3.0	9.0	3.0	0.450	0.02
Hardwood	45	781.7	20216.3	17.4	0.900	89.80
Pine 2.5-5 cm	75	258.3	921.4	3.4	0.530	2.40
Pine 5-15 cm	63	640.2	7001.0	10.2	0.530	18.31
Pine 15+ cm	5	96.3	1891.2	19.3	0.530	4.94
Pine total	143	994.8	9813.5	7.0	0.530	25.66
Total	189	1779.5	30038.8	9.4		115.48

Total Transect
750 m

Fuel fraction	Number of pieces	ΣD^2	ΣD	Mean diam. (cm)	Density of fraction (tonne m^{-3})	Large fuel weight (tonne ha^{-1})
Lantana	15	49.9	171.9	3.3	0.450	0.1
Hardwood	116	1785.3	49085.9	15.4	0.900	72.6
Pine 2.5-5 cm	238	794.5	2775.3	3.3	0.530	2.4
Pine 5-15 cm	159	1635.3	18058.8	10.3	0.530	15.7
Pine 15+ cm	30	523.9	9829.6	17.4	0.530	8.6
Pine total	427	2953.7	30663.6	6.9	0.530	26.7
Total	558	4788.9	79921.3	8.6		99.4