Fire Management Branch
Department of Conservation & Environment

CHANGES IN UNDERSTOREY VEGETATION IN SHERBROOKE FOREST FOLLOWING BURNING OR SLASHING

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Ackowledgements: This trial was initiated by Mr A Hodgson when he was Fire Research Officer, and maintained by Mr B D Dexter while he occupied the same office.

SUMMARY

In 1968 a study was established, within the tall-open forest of Sherbrooke Forest, to examine the separate effects of low intensity burning and slashing of understorey vegetation on the cover of *Tetrarrhena juncea* (forest wiregrass).

The results from measurements in five years, up to and including 1980, show that low intensity burning has had a significant long-term effect and reduced the cover of *T. juncea*. Slashing proved to be ineffective.

Burning has created a more diverse understorey vegetation. The major reason for the increased diversity appears to be a more even distribution of the total amount of vegetation between species.

INTRODUCTION

During 1968 a trial was established in Sherbrooke Forest to examine separately the burning and slashing of understorey vegetation as methods of reducing the cover of *Tetrarrhena juncea* (forest wiregrass). The study was initiated because the *Menura novaehollandiae* (lyrebird) population in Sherbrooke Forest was thought to be decreasing due to the extensive cover of *T. juncea* restricting the ability of the species to scratch in the ground litter and obtain food.

This report examines the influence of each method on the composition of the understorey vegetation during the period up to 1980.

STUDY AREA

The tall open-forest (Specht, 1970) of the study area (Figure 1) is dominated by *Eucalyptus regnans* (mountain ash) thought to have originated following wildfire in 1902 or 1906. Apart from *T. juncea* the major understorey species include *Pomaderris aspera* (hazel pomaderris), *Olearia argophylla* (musk daisy-bush), *Cyathea australis* (rough tree-fern) and *Prosthanthera lasianthos* (Christmas bush).

METHOD

1 Plot Establishment

Nine plots ranging in area from 0.12 - 0.23 ha were located as shown in Appendix 1. Although quantitative data were not obtained prior to treatment, all plots were assessed visually to have similar vegetation.

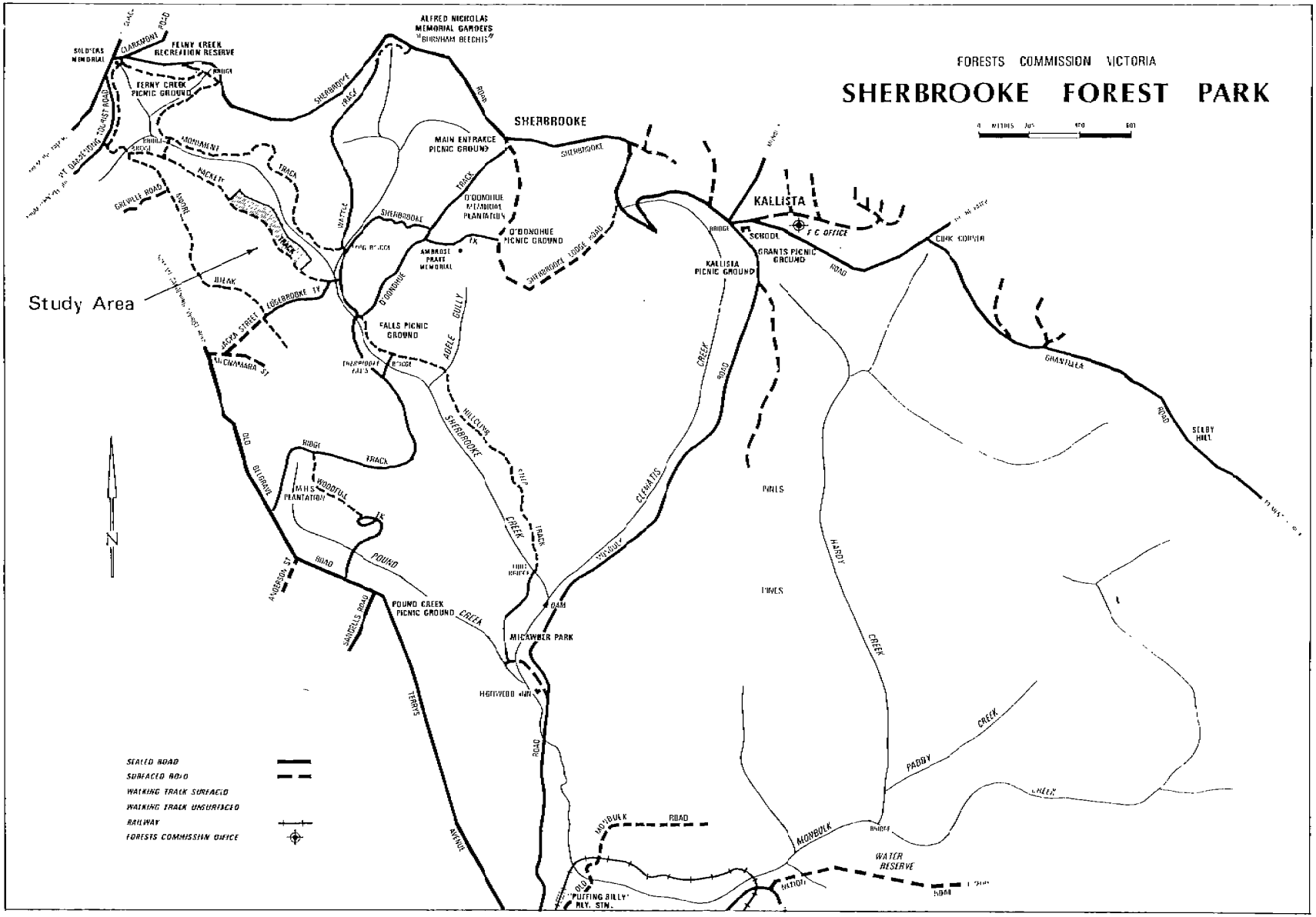

FIGURE 1 – STUDY AREA

Plots 2, 4 and 8 were burnt in late spring 1968. Fire intensities were generally low and estimated to be less than the upper limit for fuel reduction burning of 350 kw/m defined by McArthur (1962). Plots 1, 3 and 6 were slashed during late winter and early spring 1968. Plots 5, 7 and 9 remained untreated.

2 Data Recording and Calculation of Indices

Data were recorded on two permanently marked 30.5 m transects located within each plot (see Appendix 1). One hundred sampling points were defined at 0.3 m intervals along each transect.

Two strata were defined. All foliage below 3.0 m was classified as ground vegetation and all 3.0 m and above as overstorey vegetation.

The first measurement was in January 1970 with remeasurements in December 1971 and May 1977, 1979 and 1980.

(a) Ground Vegetation

The method described by Levy and Madden (1933) was used as a basis for recording ground vegetation data. A 10 gauge wire pin was placed vertically at each sampling point and the number of contacts made by each species recorded.

These data were used to derive the following indices

(i) Cover Percent (CP) - a measure of the ground area shaded by the vertical projection of the foliage of a species.

$$CP = \frac{\text{No. of pins contacting the species} \times 100}{\text{No. of pins located}}$$

(ii) Vegetation Percent (VP) - a measure of the contribution of a species to the total amount of vegetation.

$$VP = \frac{\text{Total no. of contacts for a species} \times 100}{\text{Total no. of contacts for all species}}$$

(iii) Cover Density (CD) - a measure of the density of cover of a given species.

$$CD = \frac{\text{Total no. of contacts for a species}}{\text{No. of pins contacting the species}}$$

These first three indices have been described by Levy and Madden (1933).

(iv) Diversity Index (DI)

Ths Shannon-Wiener function (Krebs, 1972) has been used to help describe the diversity of ground vegetation.

$$DI = -\sum_{i=1}^{s} (p_i)(\log_e p_i)$$

Where p_i = the proportion of the i^{th} species in the population as defined by $p_i = VP_i/100$.

S = The total number of species recorded.

$\log_e p_i$ = The natural logarithm of p_i

This index is a function of the number of species recorded and the evenness of distribution of the total amount of vegetation between species. An index of evenness has been described by Krebs (1972) and is defined below.

(v) Evenness Index (EI)

$$EI = \frac{DI}{\log_e S}$$

The numbers of seedlings contacted on each transect were recorded during remeasurement in December 1971.

(b) Overstorey Vegetation.

An assessment of the crown cover of each species was made by recording the presence of crown vertically above every fourth sample point.

RESULTS AND DISCUSSION

Tables 1 and 2 show the treatment means for cover percent and vegetation percent respectively, for ground vegetation species that have shown significant change in the period since treatment. Appendix 2 gives the results for all species recorded.

TABLE 1 - MEAN COVER PERCENT

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Festuca dives						0.7	3.5								0.2
Goodenia ovata				0.2		0.2	7.3	10.2	7.5	9.0		0.2	0.5	0.3	0.8
Hydrocotyle geraniifolia	0.2				0.2	10.8				0.8	0.8	0.2			0.2
Pimelea axiflora	0.3	0.3	0.8	0.2		0.8	4.0	18.8	12.8	7.7		0.8	10.0	6.3	2.2
Parsonsia brownii	9.5	10.5	27.3	24.7	27.3	4.0	9.7	21.7	20.7	22.2	5.2	9.7	19.5	20.2	20.5
Prostanthera lasianthos	0.3	0.3	1.3	2.0	0.8	2.3	17.5	23.7	31.3	29.0	0.8	3.7	11.7	14.0	13.0
Tetrarrhena juncea	59.0	69.8	75.7	69.8	77.3	18.0	61.3	60.2	48.8	52.2	40.3	80.0	74.0	71.2	77.8

TABLE 2 - MEAN VEGETATION PERCENT

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Festuca dives						1.0	1.4								0.1
Goodenia ovata				0.1		0.3	5.0	5.1	4.0	4.7		0.1	0.1	0.2	0.4
Hydrocotyle geraniifolia	0.1				0	7.6				0.3	1.0	0.1			0
Pimelea axiflora	0.2	0.8	0.3	0.1		2.6	3.3	10.8	7.2	4.6		0.6	5.9	4.1	0.7
Parsonsia brownii	8.4	6.2	16.2	13.6	14.7	7.5	4.8	9.5	10.2	9.7	6.9	5.1	9.2	9.7	9.4
Prostanthera lasianthos	0.2	0.1	0.5	1.1	0.9	4.9	15.3	10.8	17.8	15.0	6.7	2.3	5.3	7.4	6.8
Tetrarrhena juncea	80.8	82.0	67.3	68.6	70.2	42.6	60.7	51.2	46.1	52.0	66.1	82.7	67.5	66.2	69.8

Table 3 shows the numbers of seedlings counted on the transects during the 1970 survey.

TABLE 3 - SEEDLING COUNT - 1970

Species	Untreated	Burnt	Slashed
Acacia dealbata		3	
Acacia melanoxylon			2
Coprosma quadrifida		2	
Hedycarya angustifolia		1	1
Olearia argophylla	4	10	1
Olearia lirata		4	
Pittosporum bicolor			1
Pomaderris aspera		12	2
Prosthanthera lasianthos	1	103	14
Zieria arborescens	5		7
Totals	10	135	28

Crown covers recorded for the major species within the overstorey vegetation other than *E. regnans* are shown in Table 4.

TABLE 4 - CROWN COVER (PERCENT)

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Pomaderris aspera	44.7	50.0	30.0	38.7	33.3	31.3	22.7	12.0	14.0	21.3	39.3	41.3	30.0	42.0	51.3
Cyathea australis	7.3	4.3	3.3	10.7	10.0	-	-	1.3	-	0.7	3.3	0.7	1.3	4.7	7.3
Prostanthera lasianthos	2.7	2.0	0.7	3.3	5.3	-	-	16.7	26.7	46.0	4.7	2.0	6.7	16.7	26.7

These results show that there remain substantial differences between the vegetation of burnt and untreated plots 12 years after establishment.

The low intensity fire stimulated the development of a number of species. *Hydrocotyle geraniifolia* (forest pennywort) rapidly recolonised the burnt plots, but was not recorded during remeasurement three years after burning. Similarly, *Festuca dives* (giant mountain grass) was recorded in both 1970 and 1971 but disappeared from the site between three and nine years after burning. There was substantial regeneration of *P. lasianthos* from seed and this is reflected in the cover values for the species shown in both Tables 1 and 4. *Pimelea axiflora* (bootlace bush) showed continuing development on burnt plots until 1977 after which its importance in the understorey has declined. Three years after establishment *Goodenia ovata* (hop goodenia) had become a significant component of the vegetation on burnt plots and it has remained so to this stage. *Parsonsia brownii* (twining silkpod) has remained unaffected by either treatment. This species increased in cover on all areas up to 1977, but has remained fairly static since then.

The results in Table 1 indicate a trend towards a reduced cover of *T. juncea* on burnt plots with little obvious effect on slashed plots. Analyses of variance for each year of measurement showed that the effects of treatment were significant ($p = 0.05$) in all years apart from 1971. Scheffe's test was used to compare the differences in mean cover percent between treatments in these remaining years. The mean cover on burnt plots was significantly different ($p = 0.05$) from untreated plots for each year. The differences between slashed plots and untreated plots were not significant at any measurement. Apart from the obvious short-term effect on *T. juncea* cover, burning has also had a significant long-term effect while slashing has proven to be ineffective.

Inspection of the results in Table 1 indicates that the increased competition associated with the prolific regeneration of woody understorey species on burnt plots could be a reason for the decreased cover of *T. juncea* from 1977 onwards. Examination of the correlation between the total number of counts for *T. juncea* at each point, and the total number of counts for each of *P. lasianthos*, *G. ovata* and *P. axiflora* at the same points, tends to support this possibility. There were significant ($p = 0.05$) negative correlations between each measure for years 1979 and 1980.

Diversity indices were calculated for each treatment/measurement combination using pooled data (Table 5). In this study, the values of pi used in the calculation of diversity indices have been derived from the percentage contribution of each species to the total amount of vegetation as described by vegetation percent. This approach of using an estimate of biomass or productivity in place of numbers of individuals has been used by Whittaker (1965), and is considered by Venning (1978) to be a desirable means of quantifying the diversities of vegetation communities.

TABLE 5 – DIVERSITY INDICES

	1970	1971	1977	1979	1980
Untreated	0.818	0.808	1.194	1.258	1.154
Burnt	1.778	1.504	1.752	1.811	1.744
Slashed	1.323	0.862	1.297	1.332	1.220

Diversity indices were also calculated for each measurement/transect combination and analyses of variance used to define the statistical significance of differences in the calculated indices. There were significant differences between treatments for all years of measurement apart from 1970. Using Scheffe's test there were found to be significant differences ($p = 0.05$) between the mean indices for burnt plots and both slashed and untreated plots for 1977, 1979 and 1980 and for untreated plots only in 1971. The only difference between years was found on slashed plots where the mean index for 1971 was signficantly different from the mean indices for all other years.

The index derived using the Shannon-Wiener function is a measure of the uncertainty of randomly selecting a given species from a community. The larger the index the greater the uncertainty and therefore the diversity. The results clearly indicate that burning has created a more diverse ground vegetation stratum. While the analysis of mean transect indices show that there are now significant differences between burnt and unburnt areas, the trend to greater diversity on burnt plots has been apparent since the first measurement in 1970.

The evenness indices calculated from pooled data are shown in Table 6. This index can have a maximum value of 1.0, and the larger the index the more even the distribution of the total amount of vegetation among the species present.

TABLE 6 - EVENNESS INDICES

	1970	1971	1977	1979	1980
Untreated	0.289	0.280	0.405	0.413	0.379
Burnt	0.575	0.486	0.585	0.639	0.573
Slashed	0.489	0.288	0.433	0.461	0.389

The total numbers of species recorded at each measurement are shown in Table 7.

TABLE 7 - NUMBER OF SPECIES

	1970	1971	1977	1979	1980
Untreated	17	18	19	21	21
Burnt	22	22	20	17	21
Slashed	15	20	20	18	23

As mentioned earlier, the index derived using the Shannon-Weiner equation is a function of both the number of species and the evenness of distribution of the total amount of vegetation between species. Increasing numbers of species and increasing evenness will result in increased species diversity. The results in Tables 6 and 7 therefore show that, while the trend to greater diversity on burnt plots in 1970 and 1971 was probably due to a combination of both factors, the increased diversity from 1977 onwards must be due to a more even distribution of vegetation.

CONCLUSION

Of the two treatments only burning has caused any long-term decrease in the cover of *T. juncea*. In 1980, twelve years after establishment, the cover on burnt plots was approximately 68% of the cover recorded on both untreated and slashed plots. There is evidence that this difference is associated with the increased regeneration of woody understorey species on burnt plots.

Burning has created a more diverse ground vegetation. In the first two to three years following treatment the trend towards increased diversity was due to both an increased number of species and a more even distribution of vegetation. From 1977 onwards the more even distribution of vegetation has caused the increased diversities calculated for burnt plots.

ACKNOWLEDGEMENTS

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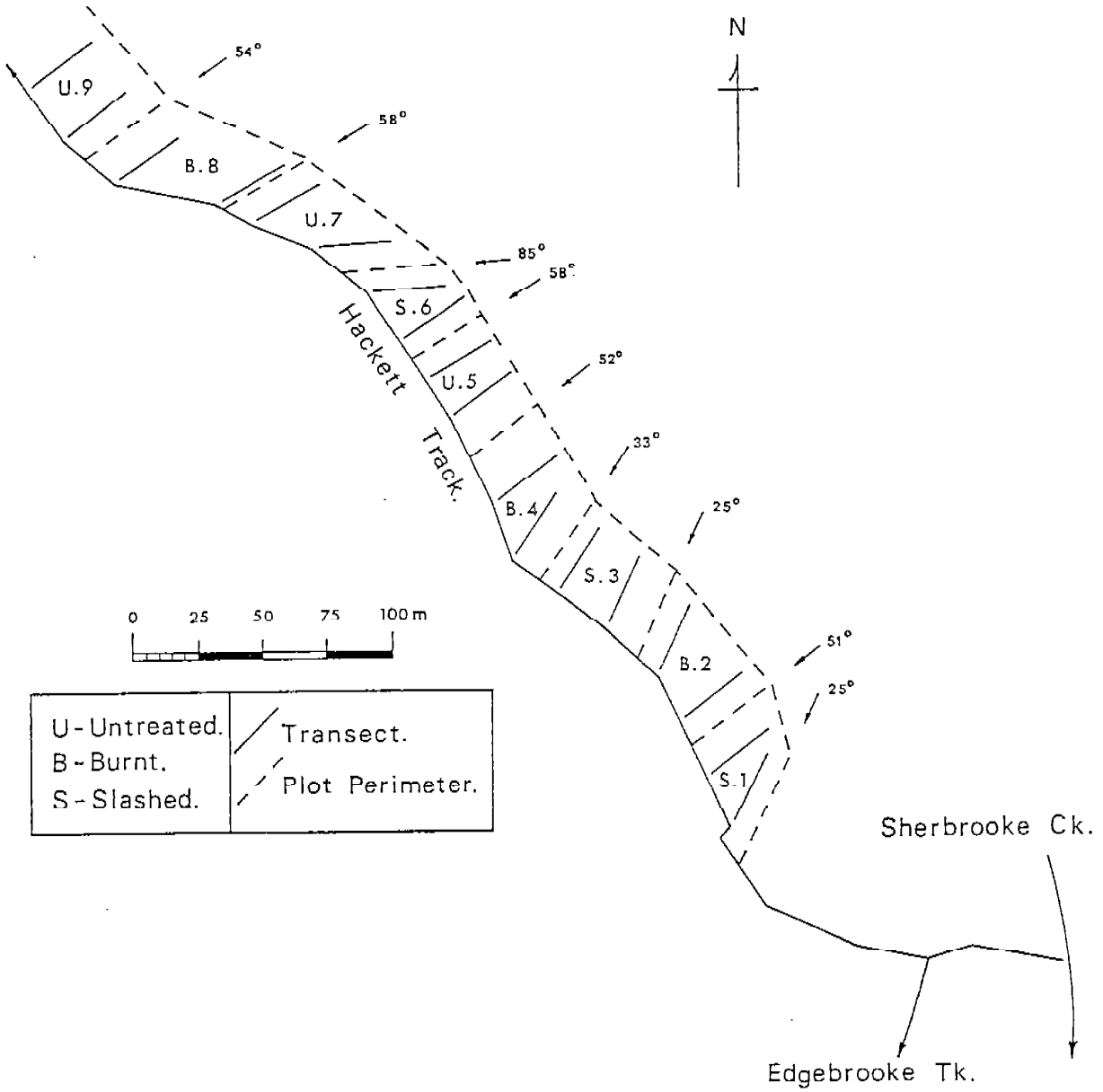
APPENDIX 1 - PLOT LOCATION



APPENDIX 2 - VEGETATION PERCENT

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Acacia dealbata	0	0	0	0	0	0	0.5	1.6	1.4	1.3	0	0	0.1	0.2	0.1
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2	0	0
Acaena anserinifolia	0	0.1	0	0.2	0	0	0	0	0.1	0	0	0	0.1	0	0
Bedfordia salicina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera longiflora	0.2	0.1	0	0	0	0	0	0	0	0	0	0.1	0.5	0.2	0.4
Chiloglottis gunnii	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Clematis aristata	0.1	0.5	0.2	0.6	0.1	0.3	0.4	0	0	0.2	0.6	0.6	0.1	0.2	0.1
Coprosma quadrifida	0	0.1	0.1	0.2	0.2	0	0.2	0	0	0	0.2	0.2	0.1	0	0.1
Cyathea australis	4.5	5.8	7.0	6.1	5.6	4.7	2.3	1.5	2.1	1.6	7.9	1.4	1.3	2.3	1.7
Dicksonia antartica	0	0	0.6	0.6	0.6	0	0	0	0	0	0	0.6	0.5	0.5	0.4
Festuca dives	0	0	0	0	0	1.0	1.4	0	0	0	0	0	0	0	0.1
Gahnia sieberiana	0.1	0	0	1.4	0	1.0	0.1	0	3.2	0	0.2	0	0	1.7	0
Goodenia ovata	0	0	0	0.1	0	0.3	5.0	5.1	4.0	4.7	0	0.1	0.1	0.2	0.4
Haloragis tetragyna	0	0	0	0	0	0	0.8	0	0	0	0	0.1	0	0	0
Hedycarya angustifolia	0.4	0.7	0.6	1.0	1.2	0.8	0.1	2.1	2.0	2.3	0.4	0.3	1.0	0	0.7
Helichrysum dendroideum	0	0.3	0	0	0.9	0	0	0.2	0	0	0	0	0	0.8	0
Histiopteris incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
Hydrocotyle geraniifolia	0.1	0	0	0	0	7.6	0	0	0	0.3	1.0	0.1	0	0	0
Hydrocotyle hirta	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma elatius	0.1	0.5	1.0	0	0.9	0.3	1.0	2.1	0	2.5	0.2	0.9	1.4	0	1.9
Olearia argophylla	0.5	1.0	1.9	0.6	0	0.8	1.2	0.5	0.9	0.6	0	0.7	0.3	0	0
Olearia lirata	0	0	0	0	0	0	0.6	0.9	0	0	1.4	0	0	0	0
Oxalis species	0	0	0	0	0	0.3	0	0	0	0	0.4	0	0	0	0
Pandorea pandorana	0.1	0	0	0.3	0.1	0	0	0	0	0	0	0	0	0	0
Parsonsia brownii	8.4	6.2	16.2	13.6	14.7	7.5	4.8	9.5	10.2	9.7	6.9	5.1	9.2	9.7	9.4
Pimelea axiflora	0.2	0.8	0.3	0.1	0	2.6	3.3	10.8	7.2	4.6	0	0.6	5.9	4.1	0.7
Pittosporum bicolor	0	0	0.1	0.1	0.3	0	0	0.2	0.7	0.5	0	0.2	0.1	0.9	0.5
Poa australis	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Polystichum proliferum	0	0.1	0	0	0	1.3	1.0	0.9	1.0	1.2	0	0	0	0	0
Pomaderris aspera	0.1	0.1	2.0	1.8	0.8	0.5	0.8	1.7	2.2	1.5	0	0.9	0.4	0.3	0.7
Prostanthera lasianthos	0.2	0.1	0.5	1.1	0.9	4.9	15.3	10.8	17.8	15.0	6.7	2.3	5.3	7.4	6.8
Pteridium esculentum	1.1	0.4	0.5	0.2	0.2	2.3	0.5	0.2	0.3	0.8	3.9	0.6	0.3	0.1	0.2
Rubus fruticosus	0	0	0	0.6	0	0	0	0.3	0	0	0	0	0	0	0
Senecio sp	0	0	0	0	0	0.3	0.1	0	0	0	0.2	0	0	0	0
Senecio vagus	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0
Sonchus sp	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0
Tetrarrhena juncea	80.8	82.0	67.3	68.6	70.2	42.6	60.7	51.2	46.1	52.0	66.1	82.7	67.5	66.2	69.8
Tieghemopanax sambucifolius	0.1	0	0.5	0.9	0.9	0.3	0	0.1	0.3	0.3	0	0	0	0	0
Unknown	0	0	0	0.6	0	0	0	0	0	0.1	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0
Zieria arborescens	2.7	1.1	1.0	1.0	1.4	0.3	0	0.2	0.4	0.6	3.9	2.4	5.5	4.8	5.7

APPENDIX 2 - COVER DENSITY

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Acacia dealbata	0	0	0	0	0	0	2.3	2.4	1.7	1.8	0	0	1.0	1.3	1.0
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	1.0	1.3	0	1.0
Acaena anserinifolia	0	1.0	1.0	1.5	0	0	0	0	1.0	0	0	0	3.0	0	0
Bedfordia salicina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera longiflora	1.0	1.0	0	0	0	0	0	0	0	0	0	2.0	2.0	1.3	1.6
Chiloglottis gunnii	0	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0
Clematis aristata	1.0	1.0	1.3	1.8	1.0	1.0	1.1	1.0	0	1.5	1.0	1.3	3.0	1.0	1.0
Coprosma quadrifida	0	1.0	3.0	3.0	1.3	0	1.0	0	0	0	1.0	2.0	2.0	0	1.0
Cyathea australis	1.1	1.6	2.4	1.4	2.2	1.2	1.9	2.0	1.7	1.8	1.3	1.4	1.8	1.5	1.3
Dicksonia antartica	0	0	1.6	1.4	1.6	0	0	0	0	0	0	1.8	1.8	1.0	1.1
Festuca dives	0	0	0	0	0	1.0	1.2	0	0	0	0	0	0	0	3.0
Gahnia sieberiana	1.0	0	0	1.4	0	1.0	1.0	0	1.2	0	1.0	0	0	1.1	0
Goodenia ovata	0	0	0	1.0	0	1.0	2.1	2.3	1.7	2.1	0	1.0	1.0	2.0	1.6
Haloragis tetragyna	0	0	0	0	0	0	1.4	0	0	0	0	1.0	0	0	0
Hedycarya angustifolia	1.0	2.8	2.2	1.9	3.0	1.5	2.0	2.3	1.6	2.2	1.0	1.0	1.6	0	2.1
Helichrysum dendroideum	0	4.0	0	0	3.3	0	0	2.5	0	0	0	0	0	1.2	0
Histiopteris incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	0
Hydrocotyle geraniifolia	1.0	0	0	0	1.0	1.6	0	0	0	1.4	1.0	1.0	0	0	1.0
Hydrocotyle hirta	0	1.0	1.5	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma elatius	1.0	1.2	1.2	0	1.6	1.0	1.2	1.4	0	1.4	1.0	1.1	1.4	0	1.2
Olearia argophylla	1.0	1.7	2.4	1.8	2.6	1.5	1.8	2.8	2.6	2.0	2.3	1.9	2.3	0	0
Olearia lirata	0	0	0	0	0	0	1.8	3.4	0	1.0	2.0	0	0	0	0
Oxalis species	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0
Pandorea pandorana	1.0	0	0	1.3	1.0	0	0	0	0	1.0	0	0	0	0	0
Parsonsia brownii	1.2	1.5	2.2	1.6	2.1	1.2	1.5	2.1	1.6	1.8	1.1	1.6	1.8	1.4	1.7
Pimelea axiflora	1.0	6.0	1.2	2.0	0	2.0	2.5	2.7	1.8	2.5	0	2.2	2.3	1.8	1.2
Pittosporum bicolor	0	0	2.0	1.5	3.0	0	0	3.0	2.3	2.2	0	3.0	1.5	2.5	5.5
Poa australis	0	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0
Polystichum proliferum	0	1.0	0	0	1.0	1.3	1.5	1.9	1.6	2.5	0	0	0	0	1.0
Pomaderris aspera	1.0	1.0	1.9	1.3	1.3	1.0	1.4	1.8	1.6	1.7	0	2.0	2.5	1.7	1.4
Prostanthera lasianthos	1.0	1.0	1.4	1.6	4.2	1.4	2.7	2.1	1.8	2.1	6.6	1.9	1.7	1.5	1.9
Pteridium esculentum	1.1	1.2	1.7	1.0	1.0	1.3	1.1	1.0	1.3	1.8	1.1	1.0	1.8	1.0	1.0
Rubus fruticosus	0	0	1.0	1.7	1.0	0	0	1.8	0	0	0	0	0	0	0
Senecio sp	0	0	0	0	0	1.0	1.0	0	0	0	1.0	0	0	0	0
Senecio vagus	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0
Sonchus sp	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0
Tetrarrhena juncea	1.8	2.9	3.3	2.9	3.5	1.5	3.1	4.0	3.0	4.1	1.3	3.0	3.5	2.7	3.3
Tieghemopanax sambucifolius	1.0	0	3.0	1.3	2.3	0	0	2.0	1.7	2.3	0	0	0	0	0
Unknown	0	0	0	2.2	0	0	0	0	0	1.5	0	0	0	0	0
Veronica calycina	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	1.8	1.0	0	0	0	0	0	0	0	0	1.0
Zieria arborescens	1.5	1.5	1.8	1.6	1.7	0	0	1.2	2.0	1.9	1.1	1.9	3.3	1.8	2.6

APPENDIX 2 – COVER PERCENT

Species	Untreated					Burnt					Slashed				
	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980	1970	1971	1977	1979	1980
Acacia dealbata	0	0	0	0	0	0	0.7	3.0	2.5	3.0	0	0	0.3	0.5	0.5
Acacia melanoxylon	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5	0	0.2
Acaena anserinifolia	0	0.3	0.2	0.3	0	0	0	0	0.2	0	0	0	0.2	0	0
Bedfordia salicina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Billardiera longiflora	0.3	0.3	0	0	0	0	0	0	0	0	0	0.2	1.0	0.5	0.8
Chiloglottis gunnii	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Clematis aristata	0.2	1.3	0.7	1.0	0.3	0.2	1.2	0.2	0	0.7	0.5	1.3	0.2	0.5	0.5
Coprosma quadrifida	0	0.2	0.2	0.2	0.5	0	0.5	0	0	0	0.2	0.3	0.2	0	0.3
Cyathea australis	5.5	9.2	10.7	12.8	10.0	2.5	3.7	3.5	4.0	3.7	5.2	2.8	2.7	4.3	4.8
Dicksonia antartica	0	0	1.5	1.3	1.3	0	0	0	0	0	0	1.0	1.0	1.5	1.2
Festuca dives	0	0	0	0	0	0.7	3.5	0	0	0	0	0	0	0	0.2
Gahnia sieberiana	0.2	0	0	3.0	0	0.7	0.2	0	8.5	0	0.2	0	0	4.3	0
Goodenia ovata	0	0	0	0.2	0	0.2	7.3	10.2	7.5	9.0	0	0.2	0.5	0.3	0.8
Haloragis tetragyna	0	0	0	0	0	0	1.7	0	0	0	0	0.3	0	0	0
Hedycarya angustifolia	0.5	0.7	1.0	1.5	1.5	0.3	0.2	4.3	4.2	4.3	0.3	0.8	2.3	0	1.2
Helichrysum dendroideum	0	0.2	0	0	1.0	0	0	0.3	0	0	0	0	0	1.8	0
Histiopteris incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
Hydrocotyle geraniifolia	0.2	0	0	0	0.2	10.8	0	0	0	0.8	0.8	0.2	0	0	0.2
Hydrocotyle hirta	0	0.2	0.3	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma elatius	0.2	1.0	2.8	0	2.2	0.2	2.5	7.0	0	7.3	0.3	2.3	3.8	0	5.7
Olearia argophylla	0.7	1.5	2.8	1.0	1.3	0.3	2.0	0.8	1.2	1.3	0.5	1.2	0.5	0	0
Olearia lirata	0	0	0	0	0	0	1.0	1.2	0	0.2	0.2	0	0	0	0
Oxalis species	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Pandorea pandorana	0.2	0	0	0.7	0.3	0	0	0	0	0.2	0	0	0	0	0
Parsonsia brownii	9.5	10.5	27.3	24.7	27.3	4.0	9.7	21.7	20.7	22.2	5.2	9.7	19.5	20.2	20.5
Pimelea axiflora	0.3	0.3	0.8	0.2	0	0.8	4.0	18.8	12.8	7.7	0	0.8	10.0	6.3	2.2
Pittosporum bicolor	0	0	0.2	0.7	0.3	0	0	0.3	1.0	1.0	0	0.2	0.3	1.0	0.3
Poa australis	0	0	0	0	0.2	0	0.2	0	0	0	0	0	0	0	0
Polystichum proliferum	0	0.2	0	0	0	0.7	2.2	2.2	2.0	2.0	0	0	0	0	0.2
Pomaderris aspera	0.2	0.3	3.8	4.0	2.3	0.3	1.8	4.3	4.5	3.7	0	1.3	0.7	0.5	1.8
Prostanthera lasianthos	0.3	0.3	1.3	2.0	0.8	2.3	17.5	23.7	31.3	29.0	0.8	3.7	11.7	14.0	13.0
Pteridium esculentum	1.3	0.8	1.0	0.5	0.7	1.2	1.3	1.2	0.7	1.8	2.8	1.8	0.7	0.3	0.8
Rubus fruticosus	0	0	0.2	1.0	0.2	0	0	0.8	0	0	0	0	0	0	0
Senecio sp	0	0	0	0	0	0.2	0.2	0	0	0	0.2	0	0	0	0
Senecio vagus	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Sonchus sp	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Tetrarrhena juncea	59.0	69.8	75.7	69.8	77.3	18.0	61.3	60.2	48.8	52.2	40.3	80.0	74.0	71.2	77.8
Tieghemopanax sambucifolius	0.2	0	0.7	2.0	1.5	0	0	0.3	0.5	0.5	0	0	0	0	0
Unknown	0	0	0	0.8	0	0	0	0	0	0.3	0	0	0	0	0
Veronica calycina	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0.2
Zieria arborescens	2.5	1.8	2.0	1.0	3.2	0.2	0	1.0	0.7	1.3	3.0	3.7	6.3	7.5	8.0