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# WILDFIRE RESPONSE OF THE CRITICALLY ENDANGERED 'PERTH TO GINGIN IRONSTONE ASSOCIATION' THREATENED ECOLOGICAL COMMUNITY

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SWAN COASTAL DISTRICT

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## CONTENTS

## INTRODUCTION

The Department of Environment and Conservation's (DEC) Swan Coastal District has established a monitoring program for four Critically Endangered Threatened Ecological Communities, specifically those occurring within the Swan Catchment Council boundary of DEC's Swan Region. The project was established in 2003-04 with funds received from the Natural Heritage Trust and has continued to receive support in 2004-05, 2005-06 and 2006-07 from this source. The aim of the monitoring program for the communities is to determine the impact of threatening processes upon them including the introduction and/or spread of dieback, weed invasion and inappropriate fire regimes.

A threatened ecological community (TEC) may be defined as a naturally occurring biological assemblage that occurs in a particular type of habitat and whose existence is threatened by processes acting upon the community (English and Blyth 1997). A threatened ecological community is listed under one of the following categories of threat: 'presumed totally destroyed', 'critically endangered', 'endangered' or 'vulnerable' (CALM 2006 - 'unpublished data').

Four 'critically endangered' community types have been selected for detailed monitoring as part of this NHT funded project - implementing a recovery action identified in the four Interim Recovery Plans (IRPs) for these TEC's. This monitoring report is for one of the four TEC's known as 'Perth to Gingin Ironstone Association' (Gibson, Keighery and Keighery 2000).

The Gingin ironstone community occurs on the eastern side of the Swan Coastal Plain and is located on seasonally inundated ironstone and heavy clay soils. The community is characterised by a rich herb layer, with *Rhodanthe manglesii*, *Rhodanthe spicata* and *Myriocephalus helichrysoides* common. There is a general lack of shrubs in the community (Gibson, Keighery and Keighery 2000). The common exotic species include *Vulpia bromoides*, *Lotus subbiflorus* and *Hypochaeris glabra*.

The above mentioned community type is listed on DEC's Threatened Ecological Communities database and is endorsed by the WA Minister for the Environment and Heritage as 'Critically Endangered'. The community is also listed on the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* as 'Endangered'.

On the 14$^{th}$ January 2003 a wildfire occurred in the Timaru Nature Reserve (46373) in Gingin. The fire burnt out sections of the reserve, with some areas of the TEC impacted by the fire and other areas remaining unburnt. The purpose of establishing monitoring transects in areas of burnt and unburnt vegetation within the TEC is to determine, over time, the impact of fire upon the community and to identify management actions that are required to ensure the conservation of the TEC into the future. The purpose of this report is to provide a summary of the methodology used in establishing the monitoring project and to present a 'snapshot' of monitoring data two years post fire.

## METHODS

A total of ten transects, each measuring 10 metres in length were established within the largest known occurrence of this 'Critically Endangered' community type at Timaru Nature Reserve in Gingin. The transects were installed in Spring of 2003 proceeding a fire at the reserve in the Summer of 2002-2003, and sampled over two consecutive years in 2003 and 2004. The transects were established in pairs, with an equal number (five) placed in burnt and unburnt vegetation. No transects were established in the two other small occurrences of this community type known, which occur on private property to the north and the east of the reserve.

Figure 1 below illustrates the location of the paired transects within the Timaru Nature Reserve.

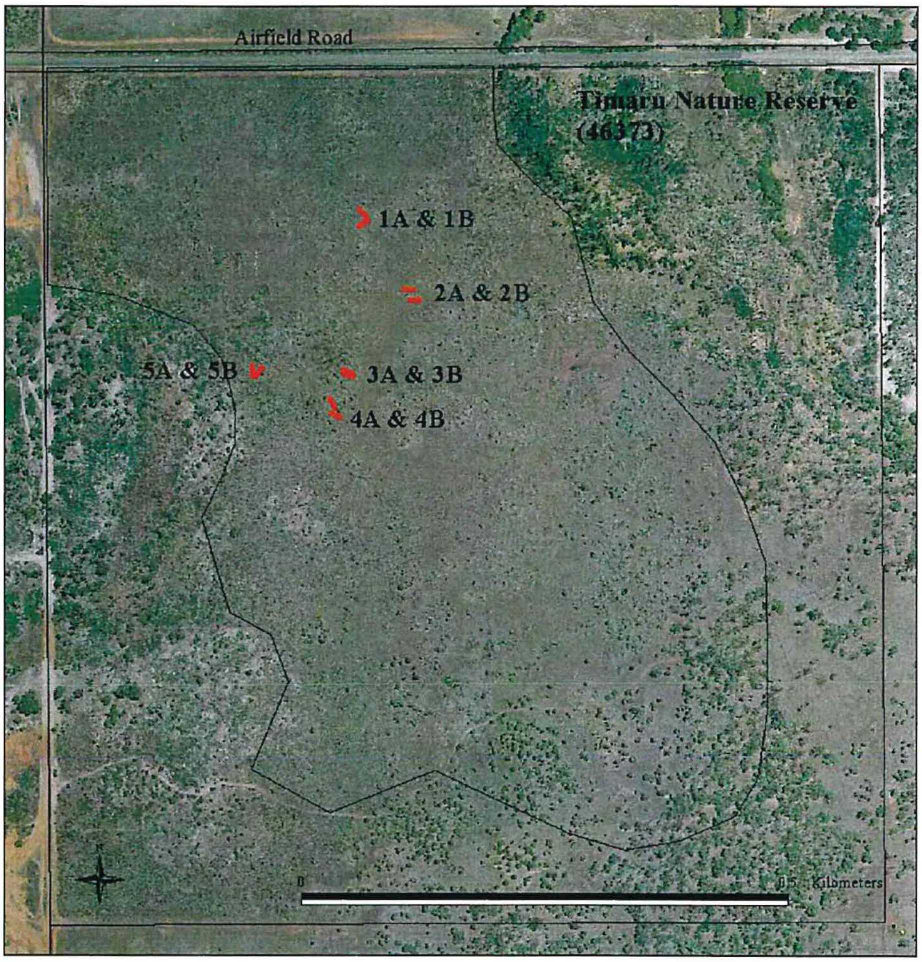


**Figure 1. Approximate location of paired transects within Timaru Nature Reserve in Gingin**

A map showing the location of the nature reserve within DEC's Swan Coastal District is presented in Figure 2 below.

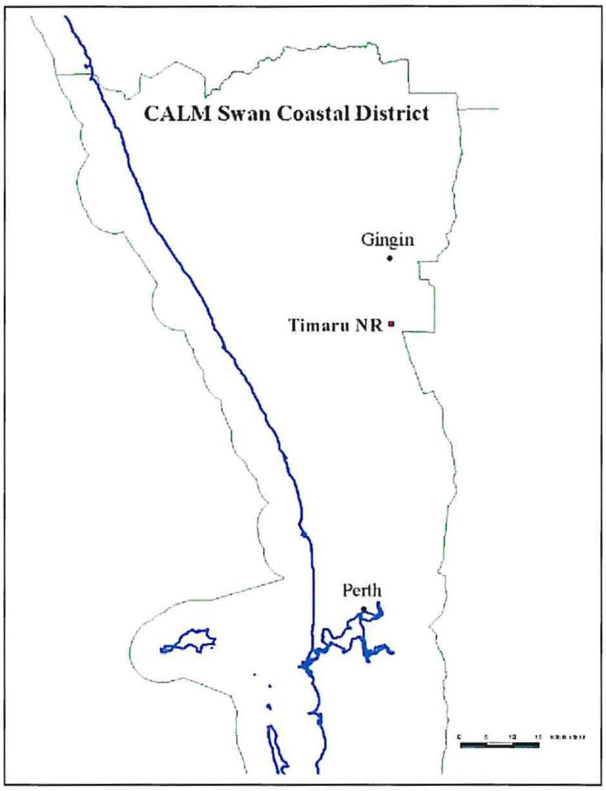


**Figure 2. Map showing location of Timaru NR, Gingin**

Within the community the following information was recorded for each transect:

- Date transect established and monitored
- GPS location
- Recent fire history
- Site data (including slope, soil, drainage, leaf litter)
- Vascular plant species, strata layer and height
- Other notes (including condition)

All vascular plant species, including introduced taxa, were recorded at five centimetre intervals along the length of each transect where the plant either intersected the transect directly or occurred as overhang. A total of 200 points were recorded. Non-vascular moss species were lumped as a single record, and bare ground, which comprised of cemented mottled zone, was recorded as rock.

Plant voucher specimens were collected for all taxa recorded along the transects in 2003 and 2004 and were identified by experienced botanists. It is intended that all specimens will be submitted to the Western Australian Herbarium for incorporation into the main collections. Refer to Appendix A for a full species list, including voucher number.

### Data Analyses

Differences in the mean number of native and exotic species and the mean number of hits of native and exotic species in the unburnt and burnt transects were tested using a Two Way Repeated Measures Analysis of Variance (RM-ANOVA). Normality of data sets was tested using the Kolmogorov-Smirnov test and heteroscedasticity was examined using the Levene Median Test (Zar 1984). No data transformations were required. All parametric statistical analyses were conducted using the appropriate modules of the *SigmaStat 3.1* statistical analysis package (Systat Software 2004).

Community data was examined using metric Multi-Dimensional Scaling (MDS) on the Primer 5 analysis package. Raw percent cover data for each year was square root transformed and then used to generate a similarity matrix by the Bray-Curtis similarity index. MDS ordination plots were generated with the factor of burn treatment displayed. Analysis of Similarity (ANOSIM) was used to test the hypothesis of differences between groups of community samples. Finally, bubble plots of selected exotic species were generated to examine the pattern of occurrence of these species.

## RESULTS

### Species richness of introduced and native plant species

A total of 36 native taxa from 19 families and 25 genera were recorded for the five transects established in the unburnt vegetation in 2003, and a total of 30 native taxa from 19 families and 24 genera were recorded for the five transects established in the burnt vegetation in 2003, as illustrated in Figure 3. Refer to Appendix A for a full species list.

A total of 18 introduced taxa from 11 families and 16 genera were recorded for the five transects established in the unburnt vegetation in 2003 (comprising 1A, 2A, 3A, 4A and 5A), and a total of 21 introduced taxa from 11 families and 18 genera were recorded for the five transects established in the burnt vegetation in 2003 (comprising 1B, 2B, 3B, 4B and 5B), as illustrated in Figure 3. Refer to Appendix A for a full species list.

A combined total flora of 22 native taxa from 12 families and 18 genera were recorded for the five transects established in the unburnt vegetation in 2004, and in those transects located in the burnt vegetation a total of 25 native taxa from 14 families and 20 genera were recorded, as illustrated in Figure 3. Refer to Appendix A for a full species list.

In 2004, a total of 13 introduced taxa from seven families and 12 genera were recorded for the five transects established in the unburnt vegetation (comprising 1A, 2A, 3A, 4A and 5A), and a total of 17 introduced taxa from eight families and 13 genera were recorded for the five transects in the burnt vegetation in 2004 (comprising 1B, 2B, 3B, 4B and 5B), as illustrated in Figure 3. Refer to Appendix A for a full species list.

The origins of the exotic species were southern and South Africa, western and southern Europe, Europe, the Mediterranean, Eurasia, southern Asia and Asia. The families containing the greatest number of introduced taxa in both the unburnt and burnt vegetation in 2003 and 2004 were Poaceae and Asteraceae. The Papilionaceae family was also common in those transects located in the burnt vegetation. The majority of exotic taxa recorded were annual herbs and grasses, with very few (four) perennial taxa.

The families containing the greatest number of native taxa in the unburnt vegetation in 2003 were Asteraceae (7), Cyperaceae (4) and Droseraceae (4) while in 2004 the dominant families were again Asteraceae (6) and Stylidiaceae (3) was common. In both 2003 and 2004 in the burnt vegetation the two families containing the greatest number of native taxa were Asteraceae and Cyperaceae. In three out of the four treatments the Asteraceae family contained the highest number of taxa. The majority of native taxa recorded were annual herbs, with a much lower number of perennials and the very occasional shrub or tree.

Refer to Appendix B for a list of exotic and native taxa recorded within the burnt and unburnt portions of the reserve for 2003 and 2004 at Timaru Nature Reserve.

The decreasing trend in the mean number of both native and exotic taxa recorded as a function of year is highly significant (native taxa; F=17.067, d.f.=1, p=0.003: exotic taxa; F=6.722, d.f.=1, p=0.032 – see figure 2 for total number of taxa). A posteriori analysis (Holms-Sidak method) indicates significant difference in the number of taxa in the years 2003 and 2004 for both native and exotic species. There was not a significant difference in the mean number of native taxa as a function of burn treatment (p=0.891); however, the increase in the mean number of exotic taxa within burnt transects approached significance (F=4.223, d.f.=1, p=0.074). There was no interaction effect between treatment and the year measured (natives p=0.263; exotics p=0.272).

Figure 3 illustrates the total number of exotic and native species recorded within the burnt and unburnt vegetation for the years 2003 and 2004, and a more detailed description of the trends in taxa follows.

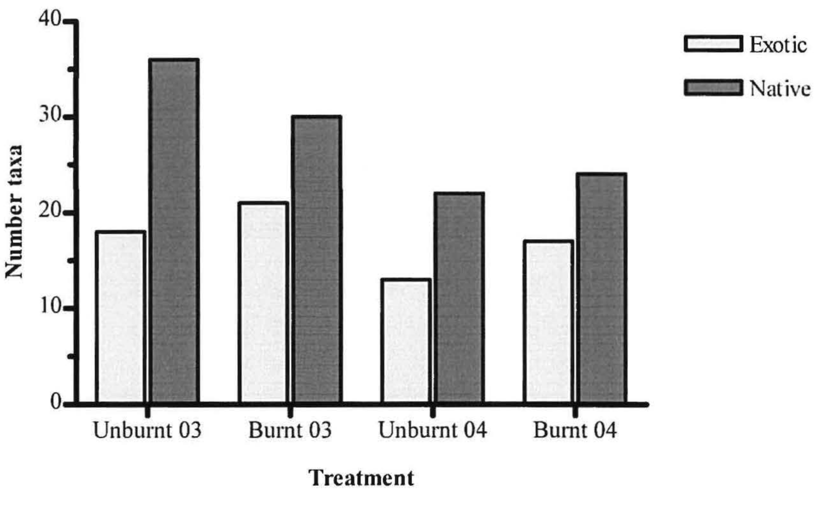


**Figure 3. Total number of exotic and native taxa recorded within burnt and unburnt vegetation for 2003 and 2004.**

The graph illustrates a slightly higher number of exotic taxa recorded in the burnt vegetation in contrast to those transects located in the unburnt vegetation, with 21 and 18 taxa recorded respectively in 2003. The graph shows a decreased number of native taxa recorded in the burnt vegetation with 30 taxa, in contrast to 36 recorded in the unburnt portion.

The graph illustrates that in 2004 the numbers of both exotic and native taxa recorded in the unburnt vegetation is less than the number recorded for those transects located in the burnt area, with 13 and 22 taxa and 17 and 24 taxa respectively.

The graph illustrates that the total number of exotic taxa recorded in the burnt vegetation decreased between the two monitoring periods, with 21 and 17 taxa recorded in 2003 and 2004 respectively. The graph illustrates a decrease of six native taxa (approximately 20 percent) in the burnt vegetation in 2004, with 24 and 30 taxa recorded in the years 2004 and 2003 respectively.

The graph suggests a substantial decrease of approximately 39 percent in the total number of native taxa recorded in the unburnt vegetation between 2003 and 2004 with 36 and 22 taxa recorded in these years respectively. It also shows a significant decrease of approximately 28 percent in the total number of exotic taxa between the two years, with 18 taxa recorded in 2003 and 13 taxa in 2004.

Figure 4 below, illustrates the total number of exotic and native species recorded for each pair of transects established in the unburnt and burnt vegetation at the Timaru Nature Reserve in 2003.

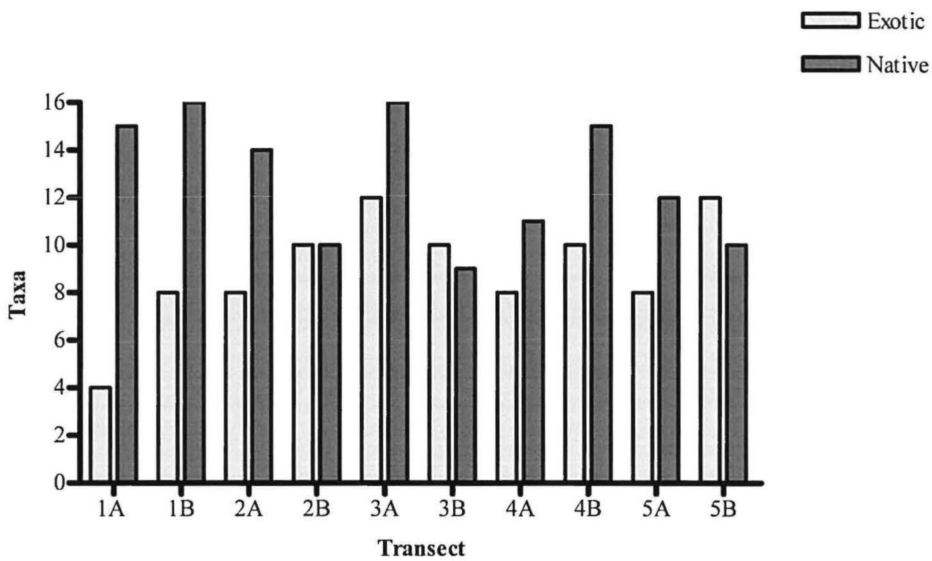


**Figure 4. Total number of exotic and native species recorded for each of the five pairs of transects in 2003.**

The graph illustrates a greater number of exotic taxa recorded in those transects established in the burnt vegetation in contrast to those in the unburnt portion, with transects 3A and 3B the exception. Transects 1A and 1B recorded a 50 percent increase in the number of exotic taxa with 4 and 8 taxa recorded in the unburnt and burnt vegetation respectively. Transects 2A and 2B, and 4A and 4B recorded a 20 percent increase in exotic taxa with 8 and 10 taxa recorded in each transect, and transects 5A and 5B recorded 8 and 12 taxa in the unburnt and burnt vegetation, that is an increase of approximately 33 percent.

The graph illustrates an increased number of native taxa recorded for two of the pairs of transects in the burnt vegetation in contrast to those that are unburnt, with transects 1A and 1B recording a very slight increase of just one taxa, and transects 4A and 4B showing an increase of approximately 27 percent. The graph illustrates a reduced number of native taxa recorded in the remaining three pairs of transects, with 14 and 10 taxa recorded in the unburnt and burnt vegetation respectively in transects 2A and 2B, 16 and 9 taxa in transects 3A and 3B, and 12 and 10 taxa in transects 5A and 5B.

Figure 5 below, illustrates the total number of exotic and native taxa recorded for each pair of transects established in the unburnt and burnt vegetation at the Timaru Nature Reserve in 2004.

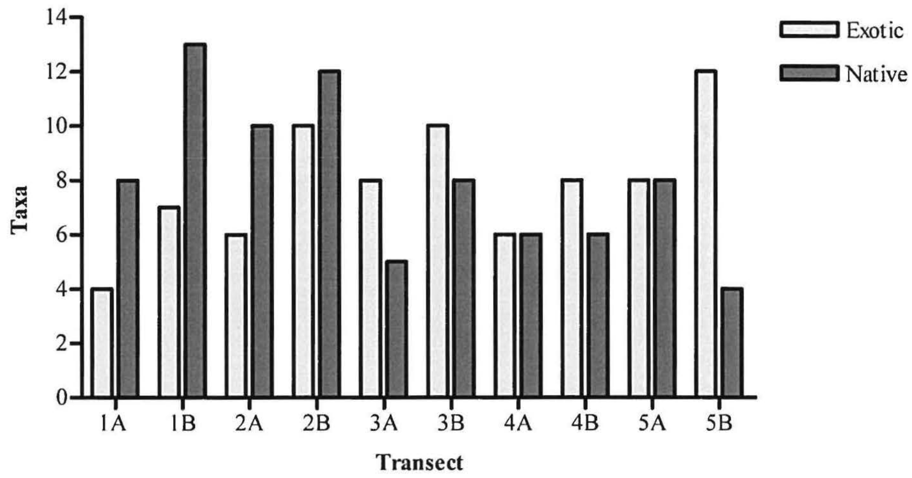


**Figure 5. Total number of exotic and native species recorded for each of the five pairs of transects in 2004.**

The graph illustrates a higher number of exotic taxa present in all of those transects established in the burnt vegetation in contrast to its corresponding pair in the unburnt vegetation. It shows that the greatest increase in the number of species recorded between the two treatments was in transects 2A and 2B, and 5A and 5B where 4 additional exotic taxa were recorded in the burnt vegetation. The largest difference between each pair, in terms of percentage, is a 43 percent increase in the exotic taxa in transects 1A and 1B, followed by a 40 percent increase in pair 2A and 2B.

The graph illustrates an increased number of native taxa recorded in three of the five pairs of transects established in the burnt vegetation in contrast to those in the unburnt vegetation, with 13 and eight taxa, 12 and ten taxa, and eight and five native taxa recorded in each pair of transects. The graph shows that there is no difference in the number of native taxa present between the unburnt and burnt vegetation in transects 4A and 4B, both with a total of 6 taxa. In transects 5A and 5B however there is a difference of 4 native taxa (i.e. 50 percent) recorded between the unburnt and burnt vegetation with the higher number of taxa in this instance being recorded in the unburnt vegetation.

Figure 6 below, illustrates the mean number of exotic and native species recorded within the burnt and unburnt vegetation for the years 2003 and 2004.

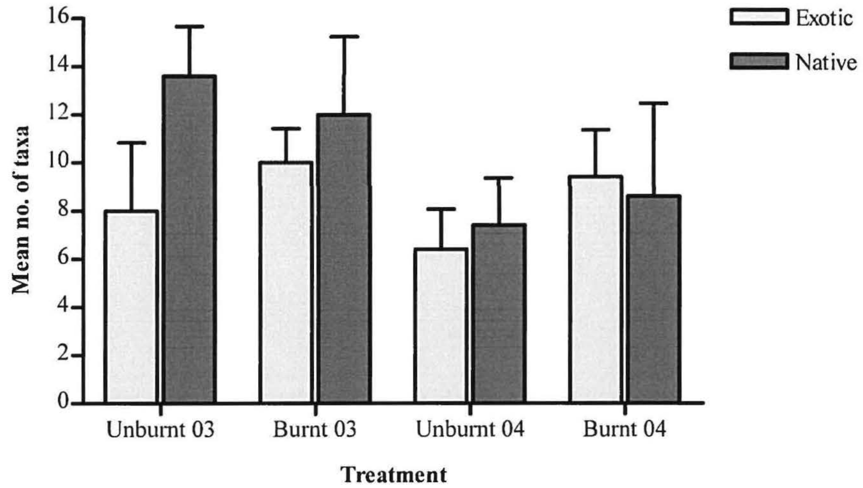


**Figure 6. Mean number of exotic and native taxa recorded within burnt and unburnt vegetation for 2003 and 2004.**

The general trend illustrated by the graph in both 2003 and in 2004 is for an overall increase in the mean number of exotic taxa recorded in the burnt vegetation in contrast to the unburnt. In 2003 the graph shows that there are fewer native taxa recorded in the burnt vegetation, and in 2004 it shows the reverse, that is, there are more native taxa present in the burnt vegetation.

The graph shows that in the first Spring following the fire of 2003 there are more native taxa present in both the unburnt and burnt vegetation, however in the second year the number of native taxa decreases substantially and in the burnt vegetation the number of exotic taxa increase to overtake the number of native taxa recorded.

The graph illustrates a very slight decrease in the mean number of exotic taxa recorded per transect in the burnt vegetation between these two years, with 10 and 9.4 taxa recorded in 2003 and 2004 respectively. The graph illustrates a decrease of 3.4 native taxa (approximately 28 percent) in the burnt vegetation in 2004, with 12 and 8.6 taxa recorded in the years 2003 and 2004 respectively.

The graph illustrates a substantial decrease of approximately 46 percent in the mean number of native taxa recorded in the unburnt vegetation between 2003 and 2004 with 13.6 and 7.4 taxa recorded in these years respectively. It also shows a decrease in the mean number of exotic taxa between the two years, with 8 taxa recorded in 2003 and 6.4 taxa in 2004, that is an approximately 20 percent decrease.

**Cover of introduced and native plant species**

The families containing the highest mean percentage cover of exotic taxa in the unburnt and burnt vegetation in 2003 and 2004 is Poaceae, Papilionaceae and Asteraceae. In the burnt vegetation in both years and in the unburnt vegetation in 2004 they occur in this order of highest to lowest cover. In the unburnt vegetation in 2003 the family Asteraceae contains the highest mean percentage cover followed by Poaceae and Papilionaceae.

The families containing the greatest mean percentage cover of native taxa in the unburnt vegetation in both 2003 and 2004 is Cyperaceae, Asteraceae and Centrolepidaceae, however in 2004 the cover of the former two of these families had decreased.

In the burnt vegetation in 2003 the families containing the greatest mean percentage cover of native taxa is Cyperaceae, Haloragaceae, Centrolepidaceae and Asteraceae. In 2004 taxa in the Asteraceae family contribute the highest cover followed by the Myrtaceae family (Melaleuca) and then Centrolepidaceae and Cyperaceae.

There was no significant difference in the mean cover of native species or exotic species as a function of burn treatment or the interaction between burn and year measures (native species treatment $p=0.647$; interaction $p=0.834$: exotic species treatment $p=0.594$, interaction $p=0.432$). However, the mean cover of native species decreased significantly in both the unburnt and burnt vegetation in 2004 ($F=29.925$, $d.f.=1$, $p<0.001$). The mean cover of exotics in burnt and unburnt vegetation was not significantly different between each year ($p=0.595$).

Figure 7 illustrates the mean percentage cover of exotic and native species recorded within the burnt and unburnt vegetation for the years 2003 and 2004, and a more detailed description of the trends in taxa follows.

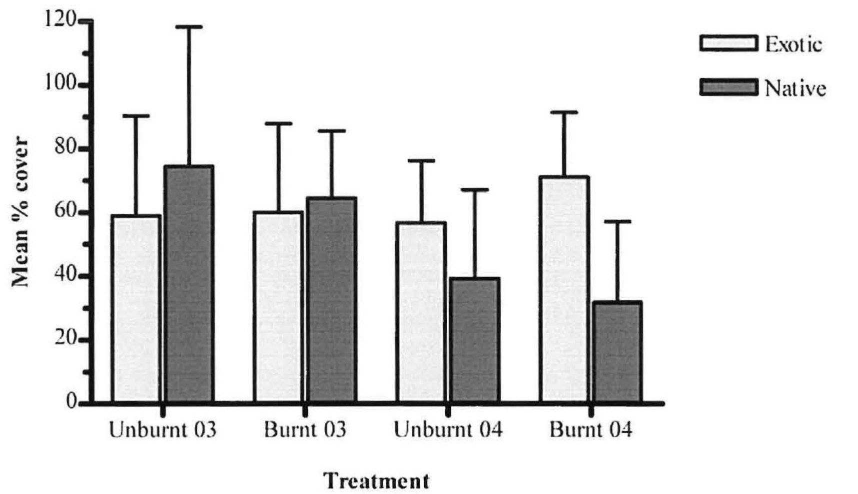


**Figure 7. Mean percentage cover of exotic and native taxa recorded within burnt and unburnt vegetation for 2003 and 2004.**

The graph illustrates that there is no difference in the mean cover of exotic taxa recorded between those transects in the unburnt and burnt vegetation in 2003, however it shows a slight decrease in the mean cover of native taxa recorded between these two types of vegetation.

The graph illustrates an increase in 2004 in the mean cover of exotic taxa recorded between those transects in the unburnt and burnt vegetation, with approximately 57 and 71 percent cover recorded respectively. A slight decrease (i.e. approximately 39 compared to 32) in the cover of native taxa between unburnt and burnt in 2004 is shown in the graph.

A comparison of the mean cover between the years 2003 and 2004 shows a significant decrease in the mean cover of native taxa recorded in both the unburnt and burnt vegetation with approximately 75 and 39 percent recorded in the unburnt vegetation in 2003 and 2004 respectively, and approximately 65 and 32 percent in the burnt vegetation.

A comparison of the mean cover of exotic taxa in the unburnt vegetation between 2003 and 2004 shows virtually no difference between the two, however there is an increase of 11 percent in the burnt vegetation over the two years.

Figures 8 and 9 below are multi-dimensional scaling ordination plots of burnt plant species community data from burnt and unburnt transects for 2003 and 2004 at Timaru Nature Reserve, Gingin in Western Australia.

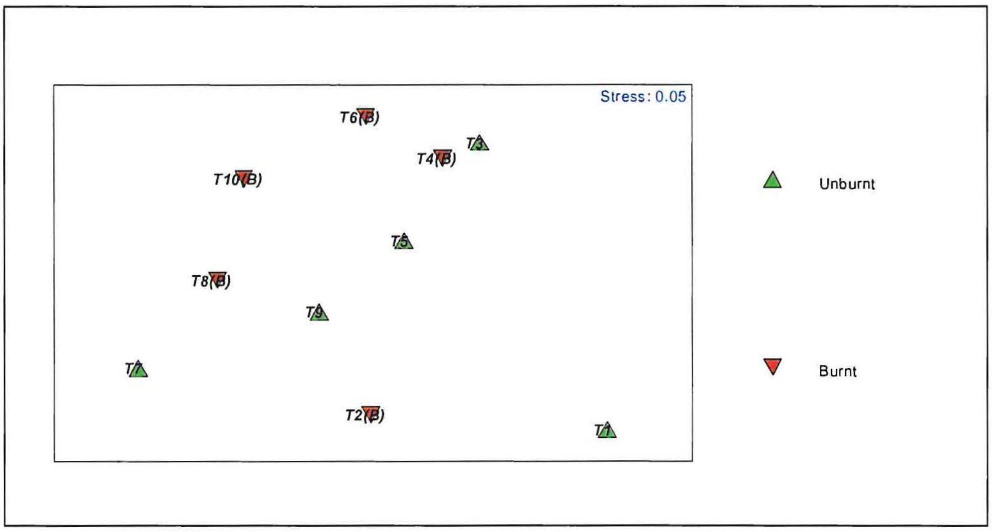


**Figure 8. Multidimensional scaling ordination plot of burnt plant species community data from burnt and unburnt transects in 2003, Timaru Nature Reserve.**

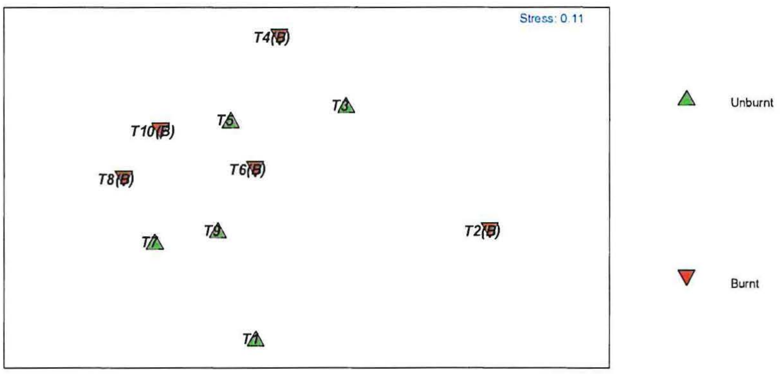

**Figure 9: Multidimensional scaling ordination plot of burnt plant species community data from burnt and unburnt transects in 2004, Timaru Nature Reserve.**

The multidimensional scaling ordination plots indicate that plant communities reflect the positions of paired transects in space rather than a strong division between burnt and unburnt vegetation. However, some exotic species do show strong trends as a function of treatment. These are presented as bubble plots for individual species.

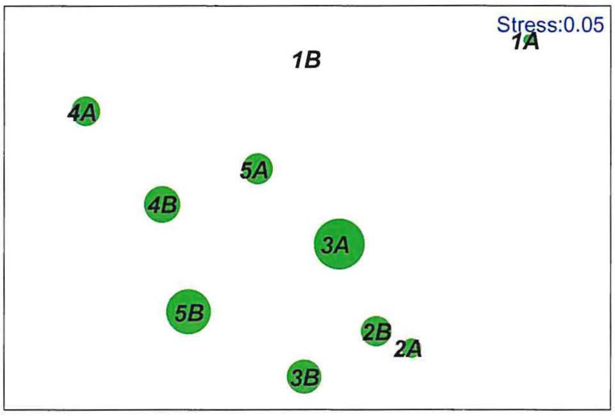


**Figure 10: Bubble plot of occurrence of *Vulpia bromoides* within burnt and unburnt treatments**

The bubble plot shows that the distribution of *Vulpia bromoides* is widespread and appears to reflect geographical position of each pair of burnt and unburnt transects. A strategy for management of this invasive species is recommended.

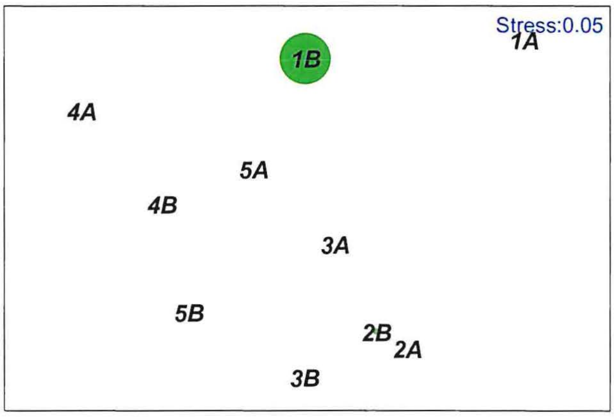


**Figure 11: Bubble plot of occurrence of *Vulpia muralis* within burnt and unburnt treatments**

The plot shows that the distribution of *Vulpia muralis* is restricted to a single transect within the burn boundary. This indicates that some assessment of its rate of spread and possible management action is warranted.

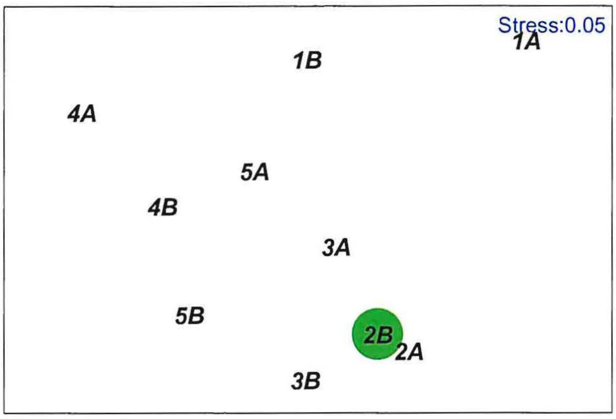


**Figure 12: Bubble plot of occurrence of *Agrostis capillaris* within burnt and unburnt treatments**

As illustrated in the diagram above the grassy weed *Agrostis capillaris,* is restricted to a single burnt treatment transect. It suggests that it is favoured either by the micro-environment of that transect, or it is geographically restricted within the reserve. An assessment of its distribution will provide useful information on management for this species.

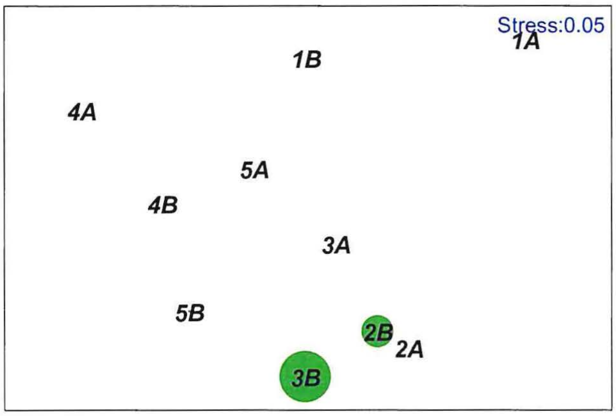


**Figure 13: Bubble plot of occurrence of *Arctotheca calendula* within burnt and unburnt treatments**

*Arctotheca calendula* is a serious weed in herb fields. It appears to be restricted to the areas encompassing transects 2A, 2B, 3B and 4A; however, it is dominating burnt transects and this may lead to these areas becoming the sources of wider spread of this species.

Figures 14 and 15 below illustrate that the occurrence of *Parentucellia latifolia* between the years 2003 and 2004 shows a dramatic increase in the species cover value for the burnt transect 1B.

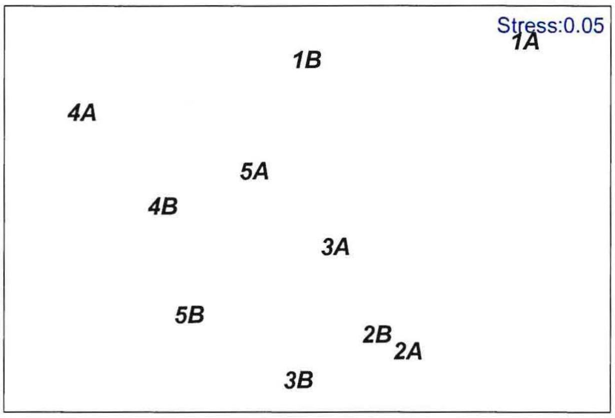


**Figure 14: Bubble plot of occurrence of *Parentucellia latifolia* within burnt and unburnt treatments in 2003**

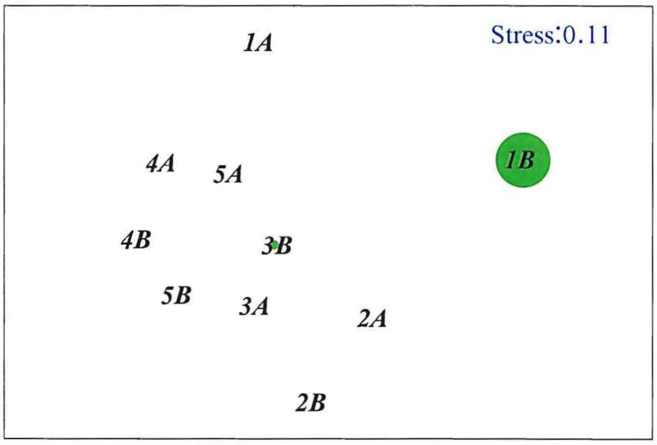


**Figure 15: Bubble plot of occurrence of *Parentucellia latifolia* within burnt and unburnt treatments in 2004**

**Discussion**

The data collected to date appears to indicate that the fire of 2003 in the Timaru Nature Reserve has had only a minor impact on the 'Critically Endangered' community type 'Shrublands and woodlands on Perth to Gingin Ironstone'. The increase in the mean number of exotic taxa recorded in the burnt transects in the community appears to be a result of the fire at the reserve. However the significant decrease in the mean number and cover of native and exotic taxa over the two monitoring periods appears to be as a function of year rather than of burn treatment.

In both 2003 and in 2004 the number of exotic taxa recorded in the burnt vegetation was higher than in the unburnt. This is likely to be a direct impact of the fire, resulting in the rapid colonisation of weeds and their ability to out-compete the native taxa. The decrease in the number of exotic taxa in 2004 compared to 2003 may be due to the number of years since the vegetation was burnt. Over time it is thought that the number and cover of exotic taxa in the burnt vegetation will decrease as the native taxa establish themselves. Further monitoring over a number of years will reveal whether this is the case.

The substantial decrease in the total and mean numbers of native taxa recorded in the unburnt vegetation between 2003 and 2004 may be attributed to a number of factors. The majority of the 17 native taxa that were recorded in the 2003 transects but not recorded again in the following year were recorded with very low frequencies in 2003. Approximately 70 percent of the taxa occurred less than six times each along the 200 point transect with five of the taxa being recorded only once each and therefore the taxa could easily have been unintentionally overlooked in the recording undertaken in 2004.

Another possibility is that these taxa simply did not occur in the transects the following year as a result of them having died out due to various environmental factors experienced throughout the year (i.e. low rainfall, intensity of fire destroyed seed store in the soil).

The substantial decrease in the mean cover of native taxa in the unburnt vegetation in 2004 may be explained by the drop in the number of taxa recorded over the two recording periods. With fewer native taxa recorded in 2004 there is a corresponding decrease in the cover. The increase of approximately five percent in the cover of bare ground recorded in 2004 perhaps indicating that some native taxa have died, and the presence of dead grass recorded in 2004 (and not in 2003) suggests this also.

The slight decrease in the mean number of native taxa recorded in the burnt vegetation between 2003 and 2004 may be attributed to the factors discussed above. It may also be that some of the native taxa recorded in the first year after the fire, in 2003 are short-lived fire ephemerals and in 2004 have naturally died out or been out-competed by exotic taxa.

The substantial decrease in the mean cover of native taxa from 65 to 32 percent appears to be the result of a number of taxa dropping out or dying in 2004, with a marked decrease in the cover of species in the Cyperaceae family in particular and in the taxa *Haloragis brownii*. The presence of dead grass is noted in the 2004 transects (and not in 2003). There is a corresponding increase in the mean cover of exotic taxa, with an increase in the cover of particular species including *Hypochaeris glabra* and *Vulpia bromoides* in the burnt vegetation in 2004. This increase indicates that these particular taxa have become well established and are suited to the current conditions, resulting in some of the native taxa being out-competed by the weeds.

The results summarized in this report represents a snapshot of the data collected from the monitoring transects established in the ironstone community to date, and as a result the findings are preliminary. With long-term monitoring of the transects the trends in the data will become more evident.

The following recommendations have been derived from the findings of the report:

- The monitoring should continue long-term so that statistical analyses are able to be performed on the data and therefore ensure the results of such tests are powerful. With long-term monitoring the trends in the data will become more evident and conclusions relating to the extent and impact of fire upon this particular community type will be able to be made.

- Weed management should be undertaken by the Department of Environment and Conservation for both the unburnt and burnt areas of the community. The results of this weed control should be monitored for its effectiveness.

- A fire management plan should be developed for Timaru Nature Reserve.

- Fire should be excluded from this Nature Reserve for 12-15 years to allow the floristic composition and structure of the community to regenerate.

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**Appendix A: Exotic and native taxa recorded in burnt and un-burnt vegetation in 2003 and 2004**

| | | 2003 | | 2004 | |
|---|---|---|---|---|---|
| | Voucher number | Un-burnt | Burnt | Un-burnt | Burnt |
| **Isoetaceae** | | | | | |
| *Isoetes drummondii* | 1B.16 | X | X | | |
| | | | | | |
| **Lycopodiaceae** | | | | | |
| *Phylloglossum drummondii* | 1B.23 | | X | | |
| | | | | | |
| **Ophioglossaceae** | | | | | |
| *Ophioglossum sp.* (1A.14 & 1A.17) | 1A.14, 1A.17 | X | | | |
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| **Anthericaceae** | | | | | |
| *Thysanotus sp.* (4B.2) | 4B.2 | | X | | |
| *Thysanotus manglesianus* | 4B.5 | | X | | |
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| **Asphodelaceae** | | | | | |
| *Bulbine semibarbata* | 1A.23, 3A.5 | X | X | X | |
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| **Boryaceae** | | | | | |
| *Borya scirpoidea* | 5A.1 | X | X | | |
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| **Centrolepidaceae** | | | | | |
| *Centrolepis sp.* (1A.6) | 1A.6 | X | | X | X |
| *Centrolepis aristata* | 1A.3, 1B.8, 2A.20 | X | X | X | X |
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| **Colchicaceae** | | | | | |
| *Wurmbea tenella* | 1A.10 | X | | | |
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| **Cyperaceae** | | | | | |
| **Cyperus tenellus* | 2A.12 | X | X | | |
| *Isolepis cernua* var. *setiformis* | 4B.1 | | X | | |
| *Isolepis stellata* | 1B.3 | X | X | X | X |
| *Schoenus nitens* | 3A.4 | X | X | | |
| *Schoenus plumosus* | 1B.5 | X | X | | X |
| *Schoenus variicellae* | 1A.4, 1B.13, 2A.21 | X | X | X | X |
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| **Haemodoraceae** | | | | | |
| *Haemodorum simplex* | 4A.2 | X | X | X | X |
| *Tribonanthes brachypetala* | 1B.19 | | X | | |
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| **Iridaceae** | | | | | |
| **Romulea rosea* | 2B.2 | X | X | X | X |
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| **Juncaceae** | | | | | |
| **Juncus bufonius* | 1B.1, 2B.4 | X | X | | |
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| **Orchidaceae** | | | | | |
| *Microtis media* | 2A.15 | | | X | |
| *Prasophyllum gracile* | 1A.13 | X | | | |
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| **Poaceae** | | | | | |
| **Aira cupaniana* | 1A.21, 1B.6 | X | X | X | X |
| **Agrostis capillaris* | 2B.3 | | X | | |
| **Briza maxima* | 1B.30, 5B.1 | | X | | X |
| **Briza minor* | 1B.26, 2A.13 | X | X | X | X |
| **Lolium rigidum* | 4B.3 | | X | | |
| *Polypogon tenellus* | 2A.8 | X | X | X | X |
| **Vulpia bromoides* | 1A.1, 2A.2, 3A.7 | X | X | X | X |
| **Vulpia muralis* | 1B.4 | X | X | | X |
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| **Apiaceae** | | | | | |
| *Hydrocotyle callicarpa* | 3A.6 | X | X | | |
| *Hydrocotyle tetragonocarpa* | 1B.9 | X | X | | X |
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| **Asteraceae** | | | | | |
| **Arctotheca calendula* | 2A.14 | X | X | X | X |
| *Brachyscome iberidifolia* | 1A.7, 2B.1 | X | X | X | X |
| **Hypochaeris glabra* | 1B.18, 4A.1 | X | X | X | X |
| **Hypochaeris radicata* | 1A.8, 1A.22, 2A.23 | X | | X | X |
| *Myriocephalus helichrysoides* | 2A.4 | X | | X | |
| *Podolepis gracilis* | 1B.28, 2A.1 | X | X | X | X |
| *Podotheca gnaphalioides* | 3A.20A | | | X | X |
| *Quinetia urvillei* | 1B.20 | X | X | | X |
| *Rhodanthe corymbosa* | 1A.9 | X | | X | |
| *Rhodanthe manglesii* | 2A.9 | X | | | X |
| *Rhodanthe spicata* | 1B.12, 2A.22 | X | X | X | X |
| **Ursinia anthemoides* | 1B.24 | X | X | X | X |
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| **Caryophyllaceae** | | | | | |
| **Spergula arvensis* | 1B.17 | X | X | X | X |
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| **Crassulaceae** | | | | | |
| **Crassula alata* var. *alata* | 1A.11, 1B.14, 3A.3 | X | X | | X |
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| **Droseraceae** | | | | | |
| *Drosera sp.* (1A.19) | 1A.19 | X | | | |
| *Drosera bulbosa* subsp. *bulbosa* | 1A.12 | X | | | |
| *Drosera ?heterophylla* | 1B.21 | X | X | X | X |
| *Drosera ?rosulata* | 1B.22 | X | X | | |
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| **Gentianaceae** | | | | | |
| **Cicendia filiformis* | 1B.11, 2A.7 | X | X | X | X |
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| **Goodeniaceae** | | | | | |
| *Goodenia micrantha* | 1B.15, 3A.2 | X | X | | X |
| *Goodenia pulchella* | 1A.5 | X | | X | |
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| **Haloragaceae** | | | | | |
| *Haloragis brownii* | 2A.10 | X | X | X | X |
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| **Lentibulariaceae** | | | | | |
| *Utricularia violaceae* | 1A.18 | X | | | |
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| **Lobeliaceae** | | | | | |
| **Monopsis debilis* | 2A.16 | X | | | |
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| **Menyanthaceae** | | | | | |
| *Villarsia violifolia* | 2A.3 | X | X | X | X |
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| **Mimosaceae** | | | | | |
| *Acacia saligna* | 1B.2 | | X | | X |
| | | | | | |
| **Myrtaceae** | | | | | |
| *Kunzea recurva* | | | X | | |
| *Melaleuca sp.* | 2B.22 | | | | X |
| *Melaleuca ciliosa* | 5A.20A | | | X | |
| *Melaleuca viminea* | 1B.31 | | | | X |
| | | | | | |
| **Papilionaceae** | | | | | |
| **Lotus subbiflorus* | 1A.20, 2A.6 | X | X | X | X |
| **Trifolium dubium* | 4B.4, 5B.3 | | X | | |
| **Trifolium glomeratum* | 2A.11 | X | X | X | X |
| | | | | | |
| **Plantaginaceae** | | | | | |
| **Plantago coronopus subsp. commutata* | 5B.2 | | X | | |
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| **Portulacaceae** | | | | | |
| *Calandrinia granulifera* | 1A.2, 1B.7, 1B.29A | X | X | | X |

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| **Scrophulariaceae** | | | | | |
| **Parentucellia latifolia* | 1B.27, 3A.1 | X | X | X | X |
| **Parentucellia viscosa* | 2B.20 | | | | X |
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| **Stylidiaceae** | | | | | |
| *Levenhookia lepthantha* | 1A.15, 1B.10 | X | X | X | X |
| *Stylidium inundatum* | 2A.5, 4A.3 | X | | X | X |
| *Stylidium obtusatum* | 1A.16 | X | | X | |