

Monitoring of grazing exclusions and other reference sites established within *Allocasuarina luehmannii*, Buloke, grassy woodland remnants of the Wimmera Plains, Victoria.

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BACKGROUND

The Buloke grassy woodlands of western Victoria have been severely depleted through clearing and grazing. The species is listed under the Fauna and Flora Guarantee. Studies undertaken by the University of Ballarat in conjunction with Natural Resources and Environment over the past five years have shown that naturally this community has a species rich understorey. Two hundred and seventy eight native species have been recorded from 127 study sites across the Wimmera, including 27 VROTS recorded from 47 locations (Morcom & Westbrooke unpubl). The community is however severely depleted and the understorey of most remnants retains few native species. A greater understanding of this community is needed: to increase our understanding of this significant community; to enable provision of better information to private and public land managers who wish to rehabilitate remnant Buloke patches; and to assist in the recovery of rare and threatened species within Buloke remnants. The pre-settlement distribution of the community in the Wimmera has been discussed (Morcom & Westbrooke 1998). The community has also been demonstrated to have a rich reptile and bat fauna in sites with an intact understorey (Hadden & Westbrooke 1996; Adler & Westbrooke in prep.). It is important that restoration of this understorey is carried out in association with other protection measures that tend to concentrate on the overstorey species only.

AIMS

This project aimed to:

- trial a system of monitoring based on a user friendly GIS database, MapInfo;
- fully document known VROTS in Buloke remnants;
- re-assess those VROTS determined to be at risk during 1996 and 1997.

METHODS

1. Monitoring of exclusions

A GIS based monitoring system has been established for four sites at which grazing exclusions have been established and at ten other sites from which grazing has recently been removed.

Monitoring sites including exclusions have been established as follows:

- Gerang Gerung Flora Reserve ungrazed, unburnt; grazed, unburnt; grazed burnt
- Bushland Reserve (Roberts) unburnt, ungrazed; unburnt, grazed; burnt, ungrazed; burnt, grazed
- Barrett Flora and Fauna Reserve unburnt, ungrazed; unburnt, grazed
- West Wail Reserve unburnt, ungrazed; unburnt, grazed

A geographic information system (GIS), MapInfo, was used to store spatial and relational data from the exclusion plots. The exact location of all individual perennials was plotted on a representative grid with a coding for species, type of regeneration if young, and number of stems. A table containing the date of monitoring and dbh or height of the plant was created separately to record growth differences between monitoring times. Each plant was assigned an identification number that enabled data to be stored in several different tables and joined to make a complete and useable database. Maps of each plot were produced and ground-truthed for accuracy of species and location. Assessment included full species occurrence and cover abundance values stored in FIS. The sites were also monitored in spring 1997. Perennial plants within the four exclusions and controls will be compared to the GIS database to assess change and provide a reliable base for long term monitoring and/or future research. Photo-points are also being maintained at these sites.

2. Endangered and vulnerable species

Fifteen other sites of floristic significance on which VROTS occur are being subjected to long term monitoring.

The following species listed as endangered or vulnerable occur at these sites:

<i>Lepidium pseudopapillosum</i> (Ve)	<i>Acacia rupicola</i> (r)
<i>Swainsona murrayana</i> (Ve)	<i>Daviesia pectinata</i> (r)
<i>Caladenia stricta</i> (e)	<i>Myoporum montanum</i> (r)
<i>Ptilotus erubescens</i> (e)	<i>Eutaxia diffusa</i> (r)
<i>Swainsona reticulata</i> (e)	<i>Ixolaena sp.</i> (r)
<i>Swainsona swainsonioides</i> (e)	<i>Poa lowanensis</i> (r)
<i>Acacia glandulicarpa</i> (Vv)	<i>Stipa gibbosa</i> (r)
<i>Acacia trineura</i> (v)	<i>Stipa puberula</i> (r)
<i>Amyema linophyllum</i> (v)	<i>Stipa setacea</i> (r)
<i>Comesperma polygaloides</i> (v)	<i>Velleia arguta</i> (r)
<i>Ixolaena tomentosa</i> (v)	<i>Santalum acuminatum</i> (d)
<i>Maireana excavata</i> (v)	<i>Hakea tephrosperma</i> (d)
<i>Templetonia stenophylla</i> (d)	<i>Acacia oswaldii</i> (d)
<i>Eremophila deserti</i> (d)	

Known populations of VROTs from these Buloke remnants are being documented using the DNRE database (VROTPOP). Assessment includes a description of factors at the site, which are currently acting or likely to place the population at risk, a risk grading, and a description of the population structure and notes on the vegetation community and management activities. A marking flag was placed at known distance and bearing from VROT populations to make location easier during future monitoring but ensuring security for vulnerable individuals. Species recorded during studies in 1996 were re-assessed in 1997.

RESULTS

The 9 exclusions and controls have been established on a MapInfo GIS database. An example of the format of this database is given as Figure 1.

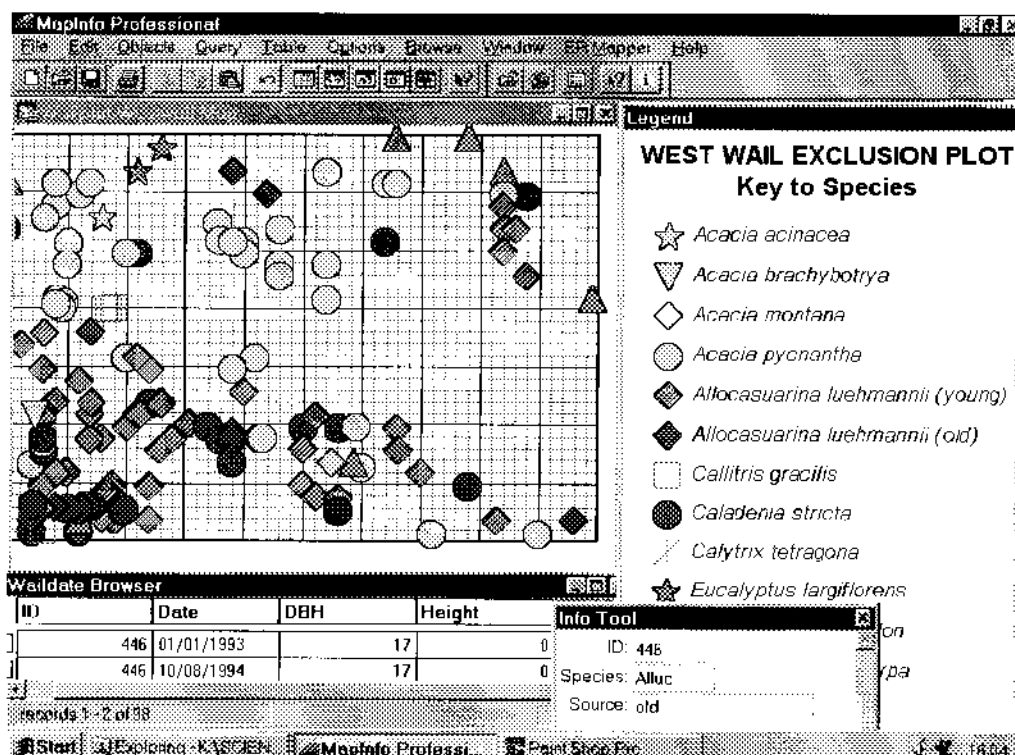


Figure 1. Example of GIS database showing plant locations and associated data for West Wail enclosure and control plots

Twenty two VROTS were monitored at eighteen sites and 47 individual locations during spring 1996 and spring 1997. Summary results of the VROT monitoring are given in Table 1. Grazing was found to be the greatest risk to populations, most sites having evidence of substantial rabbit populations.

Table 1. Summary of VROT monitoring

Species	Locations	Status	Risk	Risk factors
<i>Acacia enterocarpa</i>	1	Ee	high	grazing
<i>Acacia glandilucarpa</i>	2	Vv	medium	rabbit grazing, fire
<i>Acacia rupicola</i>	1	r	low	rabbit grazing
<i>Acacia trineura</i>	1	v	low	
<i>Amyema linophyllum</i>	5	v	low	
<i>Caladenia stricta</i>	1	e	high	not found
<i>Comesperma polygaloides</i>	5	v	low	
<i>Daviesia pectinata</i>	1		low	?recreation pressure
<i>Eremophilla deserti</i>	3	d	medium	rabbit grazing
<i>Eutaxia diffusa</i>	2	r	high	grazing
<i>Hakea tephrosperma</i>	1	d	low	
<i>Lepidium pseudopapillosum</i>	1	Ve	medium	rabbit grazing
<i>Maireana excavata</i>	3	v	high	rabbit grazing
<i>Ptilotus erubescens</i>	3	e	high	not found
<i>Santalum acuminatum</i>	3	d	low	future roadworks
<i>Stipa gibbosa</i>	2	r	high	not found
<i>Stipa setaceae</i>	1	r	medium	rabbit grazing
<i>Swainsona murrayana</i>	1	Ve	high	not found
<i>Swainsona reticulata</i>	2	e	high	rabbit grazing, natural regeneration failure
<i>Swainsona swainsonoides</i>	1	e	high	not found
<i>Templetonia stenophylla</i>	7	d	low	mowing along railway
			high	rabbit grazing
<i>Velleia arguta</i>	1	r	low	

DISCUSSION

Threats

Grazing was found to be the greatest threat to populations, most sites having evidence of substantial rabbit populations.

Benefits of the research

The research conducted was in line with stated Grassy Ecosystems Research Group priorities in that:

- it has increased our knowledge of a severely depleted ecosystem;
- it will assist in the conservation of existing species rich remnants of this severely depleted ecosystem;
- it will lead to maintenance and enhancement of floristic and faunal biodiversity in grassy woodlands;
- it will provide guidance for restoration and regeneration of significant communities and habitats;
- it will establish a basis for long term monitoring of significant Buloke remnants;
- it demonstrates the value of GIS in documenting site data for long term studies.

REFERENCES

- Adler, R. and Westbrooke, M.E. (in prep) Habitat relationships of the bat fauna of remnant Buloke, *Allocasuarina leuhmannii*, woodlands of the Wimmera Plains, Victoria.
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