Australian Nature Conservation Agency
National Biodiversity Conservation Program

GRASSLANDS ECOLOGY PROGRAM - 1993/94

Project No. G008

A REVIEW OF GRASSY WOODLANDS IN THE WESTERN AUSTRALIAN WHEATBELT

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Prepared for: Department of Conservation and Land Management

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SUMMARY

Temperate grasslands are amongst the most threatened ecosystems in Australia due to widespread agricultural development (Lunt 1995). These grasslands have been dramatically altered and are poorly represented in conservation reserves (Lunt 1990). This report reviews Grassy woodlands in Western Australia and as such forms part of a wider study on these communities in Australia.

The south-west of Western Australia was previously covered with large areas of woodlands such as York Gum-Jam and Salmon Gum. These were often found on the heavier fertile soils of the valleys which were selectively cleared for agriculture. The aim of this project was to determine the existence, previous and current extent of Grassy woodlands, and through selected field trials establish the composition of these communities in the Wheatbelt of Western Australia.

It was determined from historical records that grasslands and grassy woodlands were a part of the early vegetation of the Western Australia. Records of early settlers at the Swan constantly referred to the open, parklike appearance of the country with scattered trees and grassy ground layer. The literature indicated that these communities, particularly the York Gum-Jam Grassy woodlands were subjected to frequent fire regimes from the Aboriginal population prior to European settlement. There were several critical consequences of settlement for these plant communities, namely the disruption of the native burning patterns, increased grazing by introduced animals and widespread clearing.

Field surveys undertaken to document the flora species composition of these Grassy woodlands defined two main types, these were - York Gum (*Eucalyptus loxophleba*)-Jam (*Acacia acuminata*) Woodland and Open Woodlands of mixed Eucalypts (*Eucalyptus wandoo, Eucalyptus capillosa* and *Eucalyptus salmonophloia*). One other type of community was described- the 'granite meadow', this was comprised of grasses and herbs with a few (less than 5%) shrubs usually of *Acacia sp.* on shallow soils over granite, in association with granite outcrops. The ten sites sampled were dominated by the native grasses *Neurachne alopecuroidea, Stipa trichophylla*, the herb *Borya sphaerocephala* and the low sedge *Loxocarya cinerea.* The herbs and forbes dominated the species composition.

The species composition of the Grassy woodlands sampled in 1995 is considered likely to be representative of the earlier examples of this vegetation. However, historical descriptions suggest that changed grazing and fire regimes have resulted in a reduction of the role of grass species in the understorey composition of this vegetation.

A series of recommendations summarising further research needs, monitoring and conservation needs of these areas have been suggested.

LIST OF PARTICIPANTS

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Plant Identifications:	Dr Eleanor Bennett, Principal Botanist

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1. INTRODUCTION

Temperate grasslands are amongst the most threatened ecosystems in Australia due to widespread agricultural development (Lunt, 1995).They have been dramatically altered and are poorly represented in conservation reserves.

Vegetation in the Western Australian Wheatbelt has been cleared extensively for agricultural purposes in less than 100 years. The Wheatbelt of Western Australia was previously covered with large areas of woodlands such as York Gum-Jam and Salmon Gum. They were often found on the heavier fertile soils of the valleys which were selectively cleared for agriculture.

After extensive clearing for agriculture, there were few remnants of these woodlands remaining in the Wheatbelt. Due to their open nature, their relatively high nutrient status and the levels of disturbance, most of these remnants have been invaded by introduced grasses and other weeds. Thus, there a very few examples of these woodlands which remain in their original condition and retain the original understorey. The remaining remnants are under continuing pressure, and hence location and documentation of these remnants are crucial in order to develop appropriate management to ensure their persistence.

In Western Australia, many vegetation and floristic studies have been undertaken on sandplain communities in the Wheatbelt (Pate and Beard 1984; Griffin *et al.* 1985; Brown 1989); however, there is little information on the biology, ecology and distribution of the once widespread woodland communities. Recently the C.S.I.R.O. have undertaken studies in this area with an investigation into regeneration of Salmon Gum *(Eucalyptus salmonophloia)* communities.

Remnant vegetation surveys have been undertaken in many areas of the Wheatbelt. These surveys have included documentation on the vegetation types, the condition of the vegetation, vegetation maps and distribution maps of these remnants. However the only source of systematic vegetation classification and distribution in the Wheatbelt is the broad scale vegetation mapping by Beard (1972-1980). An investigation as to the existence and distribution of remaining "grassy woodlands" has not been undertaken, and much land clearing has occurred since the date of those surveys.

2. OBJECTIVES

The objectives of the project were:

- Review the literature on grassy woodlands.
- Interview specialists in the field on the concept and potential locations and condition of grassy woodlands in Western Australia.
- Identify good quality, undisturbed York-gum, Jam wattle and other Grassy Woodland remnants in the Wheatbelt, based on information available in the scientific literature and supplied by specialists in the field.
- Survey a selection of the identified sites to document the (presumed) original flora species composition of these grassy woodlands.
- Prepare a final report giving details of the remnants and providing a basis for further research, monitoring and conservation of these areas.

3. METHODS

3.1 Literature Survey

A number of published and unpublished reports were reviewed (see Bibliography) to clarify a definition of grassy woodlands in Western Australia and to provide previously identified examples of grassy woodlands in Western Australia. The literature review was used to locate previous studies that provided information on the previous and current distribution, composition and status of grassy woodlands in the Wheatbelt of Western Australia.

Secondly the review was used to list people with expertise in this research area for participation in the interview process. This aspect of the review enabled the compilation of a target list of researchers and other people with expertise and possible knowledge of sites of grassy woodlands in Western Australia used in the interview process.

3.2 Interview Process

A list of potential interviewees was compiled from the review and from personal recommendations. An interview guide describing the project and a survey form were then developed. Initial contact with interviewees was made by phone and survey forms were then either sent out or a follow-up interview made in person.

The survey form and interviews were designed to obtain information to assist the project, specifically on types and locations of grassy woodlands as well as any data that people may have obtained on grassy woodlands, both published and unpublished. In addition, further suggestions were sought on other people to interview. The survey form and a list of respondents is included in Appendix A.

3.3 Field Survey

The project area is the region in Western Australia broadly described as the 'Wheatbelt', it includes Beards (1981) Wheatbelt Botanical Region and parts of the Mallee Botanical Region and Coolgardie Botanical Region (South-west Interzone). These Botanic Regions of Beard correspond respectively to the Avon-Wheatbelt, Mallee and Coolgardie Biogeographic Regions as defined by the Interim Biogeographic Regionalisation of Australia (Thackway and Cresswell 1994). The Department of Conservation and Land Management's Wheatbelt Region also falls within this area (Figures 1 and 2).

Sites of grassy woodlands were sampled for their floristic composition and environmental attributes. The sites were located in different land tenures, seven sites were located in conservation reserves, one vested with the Water Authority, one was listed as an unvested camping reserve and one was on private property.

A 20m x 20m plot was established at each site and marked permanently with star pickets at each corner. The plot was then subdivided into four quadrats and the species and foliage percentage cover recorded in each quadrat. The abundance of each species recorded was rated for the plot using a scale: 1- rare; 2 - uncommon; 3- medium; 4- common; 5 - abundant.

The environmental attributes recorded were: latitude and longitude using a Global Positioning System (GPS) at the North-west corner of each site, position in the landscape, soil, area, grazing history (if known) and fire history. Photographic records were made at each site.

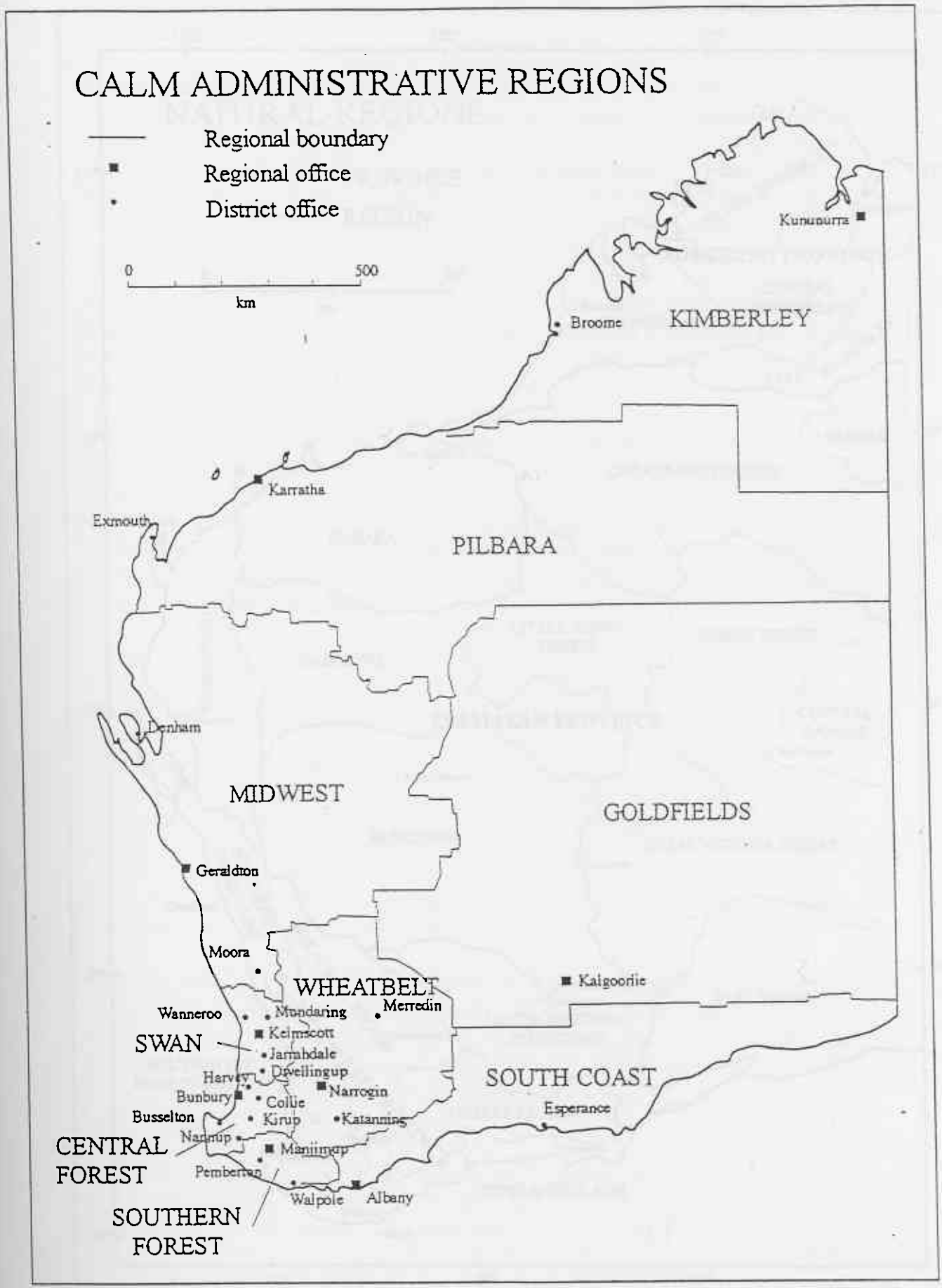


Figure 1 Administrative Regions of the Department of Conservation and Land Management (From Lyons and Gibson 1994)

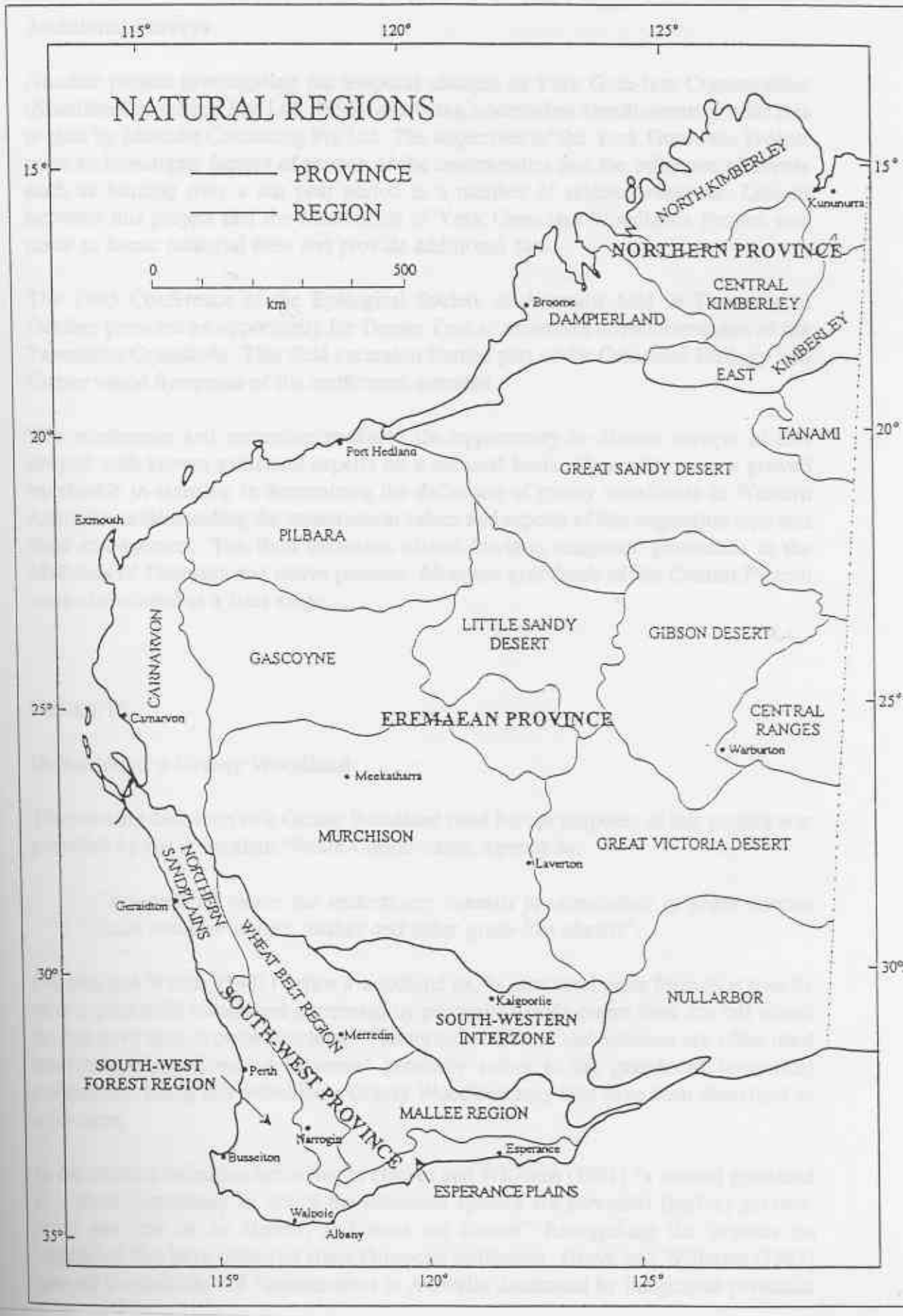


Figure 2 Natural Regions adapted from Beard 1990 (From Lyons and Gibson 1994)

3.4 Additional Surveys

Another project investigating the temporal changes in York Gum-Jam Communities (Mattiske Consulting Pty Ltd, 1995) was being undertaken simultaneously with this project by Mattiske Consulting Pty Ltd. The objectives of the York Gum-Jam Project were to investigate factors of growth of the communities and the influence of events such as burning over a ten year period in a number of selected reserves. Liaison between this project and the Monitoring of York Gum-Jam Woodlands Project was made to locate potential sites and provide additional data.

The 1995 Conference of the Ecological Society of Australia held in Tasmania in October provided an opportunity for Denise True to undertake a field excursion of the Tasmanian Grasslands. This field excursion formed part of the Grassland Ecology and Conservation Symposia of the conference attended.

The conference and excursion provided the opportunity to discuss aspects of this project with known grassland experts on a national basis. These discussions proved invaluable in assisting in determining the definition of grassy woodlands in Western Australia, understanding the conservation values and aspects of this vegetation type and their management. The field excursion visited lowland temperate grasslands in the Midlands of Tasmania and native pastures. Montane grasslands of the Central Plateau were also visited at a later stage.

4. RESULTS

4.1 Definition of a Grassy Woodland

The working definition of a Grassy Woodland used for the purposes of this project was provided by the Australian Nature Conservation Agency as:

> "*A woodland where the understorey consists predominately of grass species (also includes sedges, rushes and other grass-like plants)*".

Gillison and Walker (1981) define a woodland as, "a structural plant formation usually with a graminoid component dominated by perennial woody plants over 2m tall which do not have their crowns touching."The terms woodland and savanna are often used interchangeably, however 'savanna' generally refers to the graminoid (grasslike) component. Using this definition a Grassy Woodland may also have been described as a Savanna.

In the strictest definition according to Groves and Williams (1981) "a natural grassland is a plant community in which the dominant species are perennial (native) grasses, there are few or no shrubs, and trees are absent" Recognising the impacts on vegetation that have occurred since European settlement, Grove and Williams (1981) present the definition of "communities in Australia dominated by indigenous perennial

grasses, but which nearly always include some introduced and alien species".

Pertinent to this project Grove and Williams (1981) also include in the definition of Grasslands, "the perennial grass understorey to open Eucalyptus woodland in northern Australia; in southern Australia they (grassy woodlands) have evolved as a result of removing or thinning the original tree cover and repeated burning and grazing of the understorey".

4.2 Grassy Woodlands in the Wheatbelt of Western Australia

According to Moore (1973), the woodlands and forests of south-west of Western Australia originally resembled their counterparts in south-eastern Australia, particularly in the herbaceous species composition. However, "there no longer exist any grazing lands in the south-west of Australia." Previous records indicate that these grasslands and grassy woodlands were quite extensive and were promoted by burning regimes of the Aboriginal people.

The picture painted from accounts of early settlers and explorers (Hallam 1979) is one of the vegetation in much of the south-west being open, with large trees, few shrubs and a park-like appearance of a grassy nature (though not necessarily graminoids). Hallam notes that in journeys east from the colony of Perth made by James Henty, he often spoke of areas "thinly covered with grass and lightly timbered". Importantly Hallam (1979) describes constant references to the sighting of smoke from fires throughout the state.

Hallam (1979), describes that one of the explorers Moore in 1837, reported that the settlers were going to the interior to the "extensive grazing tracts" . There are several reports (Hallam, 1979) of the grazing areas of the Avon Valley in the regions of Northam, York and Toodyay, such as from Moore in 1835 -

> *"A hundred acres of ground in our view might be ploughed without clearing anything but a wattle here and there. Several miles....appeared to be of the same nature."*

and Landor in 1847

> *"Immense grassy plain, eight or nine miles wide without a tree upon it."*

There are also several references from these reports from the early 1800's (Hallam 1979) of areas that became shrubby or covered with low scrub when they were not recently burnt. There are several references from Roes' journey (Hallam, 1979) south-east from Perth toward Esperance, of grassy areas that had been extensively burnt by natives.

It seems Hallam (1979) suggests that although the Aboriginal population was low, that these people were responsible for opening up the landscape such that Europeans could easily move around and pasture their flocks. This evidence of early and extensive grazing seems to support the suggestion made by Beard (1981) that "We may have started losing our grasses and grassy woodlands as early as the 1800's".

4.3 Decline of Grassy Woodlands

Early vegetation surveys of Western Australia by Diels described country of *Eucalyptus loxophleba* and *E. occidentalis* as :Savannen-Wald' (savanna forest) , this description was continued in publications of Western Australian vegetation until 1975 (Beard, 1981). This change in the description of vegetation from a savanna forest to woodland may provide an indication of the recognition of the loss of these grassy woodlands.

Beard (1981) notes that "It is interesting that very few uncleared stands of *E. loxophleba* (York Gum) still survive in the Wheatbelt, apart from scattered trees left in paddocks, but where they do, they would not now be described as savanna woodland. Trees are more closely spaced and the ground layer is fairly sparse. Have such stands reverted to woodland since cessation of burning?" Lefroy (1990) supports this suggestion saying that the grass species described for six different types of grassy woodland would all have dependent on repeated burning. In fact there is support for a pattern of frequent burning over the last 20 000 years greater than that afforded by lightning due to the prominence of species that resist fire and species that are dependent on fire that could not have emerged over a shorter time period (Lefroy 1990).

"The interaction between fire and grazing is especially important in maintaining the herbaceous character of those grasslands which may have once been woodlands or shrublands" (Groves and Williams, 1981). In Tasmania many of the *Themeda triandra* grasslands require regular burning, slashing or grazing to promote regeneration, flower and seed production and the survival of smaller native herbs (Lunt 1995). Burning of grasslands and grassy woodlands is used as a management tool in many areas to promote species richness by opening up the interstitial spaces (grass canopy) to provide light and nutrients, without regular burning, the shrub and tree canopy increases (Jamie Kirkpatrick pers.comm.). Another important aspect of the use of burning in grasslands is in maintaining species diversity, in *Themeda triandra* grasslands if the fire interval exceeds 7-10 years, there is not re-instatement of the native species diversity after eventual burning. Lunt (1995) suggests that this means that many native species do not form long-term seed banks.

4.4 The Interview Process

A list of more than forty potential interviewees was compiled from the review, personal recommendations and other interviewees. Surveys were conducted by phone, followed up by fax, in person and by mail. The survey proforma used and list of respondents is included as Appendix A. Responses received were generally of high quality and provided valuable information.

The initial results of this process indicated that there were many small and degraded remnants of grassy woodlands, including many on roadsides and railway reserves. However, the data available enabled site selection of good condition York Gum (*Eucalyptus loxophleba)* - Jam (*Acacia acuminata*) and Wandoo Woodland (*Eucalyptus*

wandoo) over grasses and sedges. The list of sites identified from the interview process is included as Appendix B.

4.5 Field Survey

An initial list of possible examples of grassy woodlands for the Wheatbelt of Western Australian was compiled and included:-

York gum (*Eucalyptus loxophleba)* - Jam (*Acacia acuminata*)
Salmon Gum *(Eucalyptus salmonophloia)*
Wandoo (*Eucalyptus wandoo)*
Morrell (*Eucalyptus longicornis)*
Merrit *(Eucalyptus flocktoniae*)
Yate (*Eucalyptus occidentalis)*

From the literature review savanna woodlands of Tuart (*Eucalyptus gomphocephala*) were described as open and grassy (Hallam, 1979) however the distribution of this species falls outside the Wheatbelt focus of this project. Grassy woodlands of Yate (*Eucalyptus occidentalis)* were also described in the literature, this species often co-occurs with York Gum (*Eucalyptus loxophleba*) within the Wheatbelt region, particularly the southern areas of the region. Interestingly no respondents listed any examples of this vegetation. As a consequence of this and the fact that all of the sites listed occurred in the central and northern sections of the Wheatbelt, no sites were established in this possible type. This vegetation occurs on the lower slopes and valley and is often affected by salinity it may be that this vegetation is still in decline.

Following the interviews and literature review processes, two types of Woodland considered most likely to be defined as grassy woodlands, were determined. These were - York Gum (*Eucalyptus loxophleba*) - Jam (*Acacia acuminata*) Woodland and Open Woodlands of mixed Eucalypts (*Eucalyptus wandoo, Eucalyptus capillosa* and *Eucalyptus salmonophloia*). One other type of community was described- the 'granite meadow' this was comprised of grasses and herbs with a few (less than 5%) shrubs usually of *Acacia sp.* on shallow soils over granite, in association with granite outcrops.

Ten sites were selected to provide a range of Grassy Woodland types in good condition. These sites were used to provide descriptions of the composition of grassy woodlands and for the establishment of monitoring plots for long term comparisons. The sites were located within the Wheatbelt and distributed over a total distance of approximately 300km (see Figure 3).

4.5.1 Description of Established Grassy Woodlands Sites

Descriptions of the ten sites established are provided in Table 1 and diagrammatic representation of the location of these sites are presented in Figures 4 to 11. The plot data collected is presented in Appendix C and photographic records of the sites are presented in Appendix D.

The sites established comprised two main types with subdivision into the following groups:-

York Gum-Jam Woodlands	Tree Mallee/Small Tree (2 - 30%) over tall shrubs/low trees (5-15%) over grasses and herbs (70-80%) - Sites GW1, GW3 and GW10.
York Gum Mallee	Mallee (32%) over tall shrubs (15%) over tall grass (*Spartochloa scirpoidea* -35%) Site GW3.
Wandoo Woodlands	Trees (15%) over tall shrubs/low trees (5-15%) over grasses and herbs (80%) Sites GW2, GW5, GW7, GW8.
Mixed Eucalypt Woodlands	Tall Trees (30%) over tall shrubs/low trees (5-15%) over grasses and herbs (70%).Sites GW2 and GW9.
Granite Meadow	Sparse Low Trees (8%) of *Acacia acuminata* over grasses and herbs (80%). This is a variation of the York Gum-Jam Woodlands. Site GW4.

Although Site GW3 is a Mallee community, it was sampled as the understorey is dominated by a tall (0.5m), sedge-like tussock grass, *Spartochloa scirpoidea*. A tall sedge (0.5m) *Lepidosperma costale* is co-dominant (20-25% cover), this species was recorded in four other sites but at less than 1%. This site is also located in a water-gaining position below a large granite outcrop. Despite this differences, the species composition of Site GW3 was similar to the other sites, except for the absence of *Borya sphaerocephala* and *Loxocarya cinerea.*

Despite different overstorey species the remaining sites (with the current exception of the burnt site GW10) appear similar, that is, they are characterised by an open woodland (up to 30%) over a very sparse shrub layer (5-15%) over an almost continuous ground cover of grasses and grass-like herbs (70-80% cover).

In comparison with grassy woodlands in other parts of Australia, for example Tasmania, the grassy woodlands of Western Australia appear to be more sparse. This sparseness could be due to the low contribution of grass species that form a dense mat.

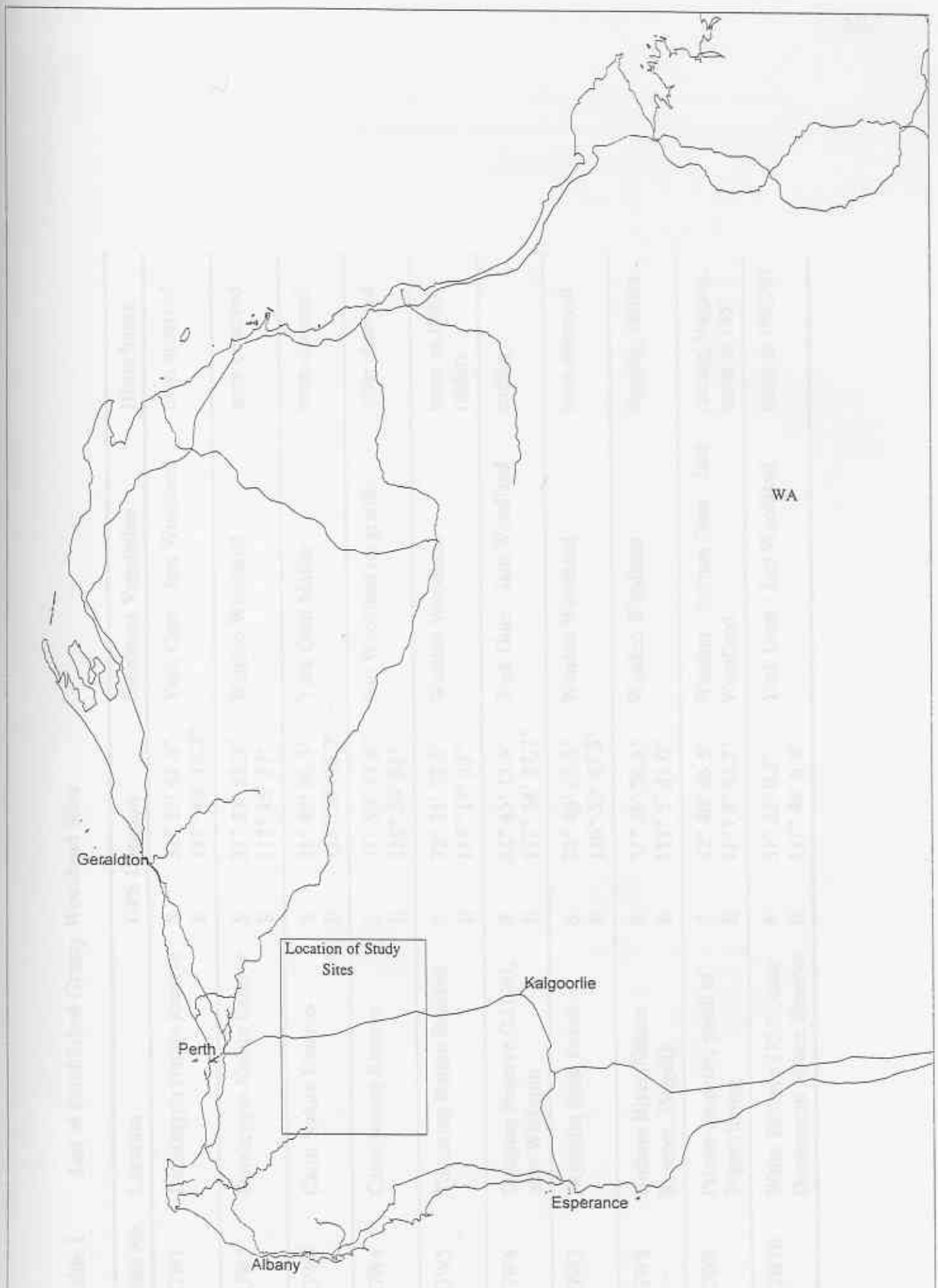


Figure 3 Location of Grassy Woodland Study Sites

Table 1 **List of Established Grassy Woodland Sites**

Site No.	Location	GPS Location		Dominant Vegetation	Disturbance
GW1	Durakoppin Nature Reserve	S E	31° 23' 41.8" 117° 46' 19.2"	York Gum - Jam Woodland	none observed
GW2	Durakoppin Nature Reserve	S E	31° 23' 52.3" 117° 45' 37"	Wandoo Woodland	none observed
GW3	Cairn Nature Reserve	S E	31° 49' 96.5" 118° 50' 56.7"	York Gum Mallee	none observed
GW4	Cairn Nature Reserve	S E	31° 50' 73.6" 118° 50' 81"	Jam Woodland on granite	none observed
GW5	Tutanning Nature Reserve	S E	32° 31' 53.5" 117° 17' 30"	Wandoo Woodland	burnt in 1990, rabbits
GW6	Camping Reserve (12109), near Wickepin	S E	32° 45' 13.9" 117° 34' 57.7"	York Gum - Jam Woodland	cutting
GW7	Dryandra State Forest	S E	32° 46' 33.3" 116° 59' 47.3"	Wandoo Woodland	none observed
GW8	Hotham River Nature Reserve, Pingelly	S E	32° 36' 54.4" 117° 5' 51.0"	Wandoo Woodland	logging, rabbits
GW9	Private property, south of Popanyinning	S E	32° 40' 46.5" 117° 8' 52.2"	Wandoo - Salmon Gum - Jam Woodland	cutting, logging, burnt in 1957
GW10	Water Reserve 13510, near Durakoppin Nature Reserve	S E	31° 22' 0.2" 117° 46' 6.8"	York Gum - Jam Woodland	burnt in 1992/93

Figure 4 **Map showing positions of Sites GW1 and GW2 in Durakoppin Nature Reserve**

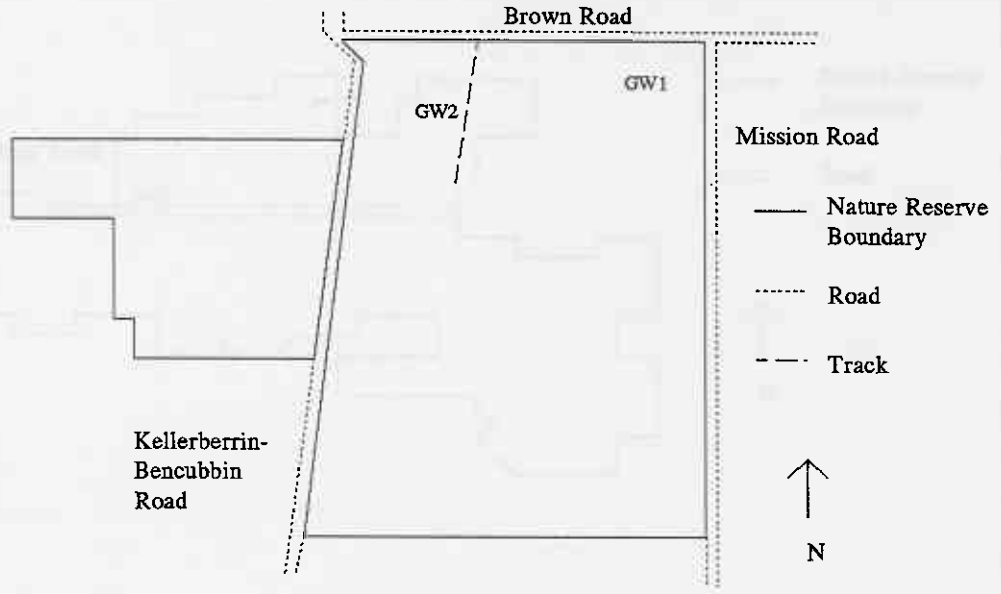


Figure 5 **Map showing positions of Sites GW3 and GW4 in Reserve 9754**

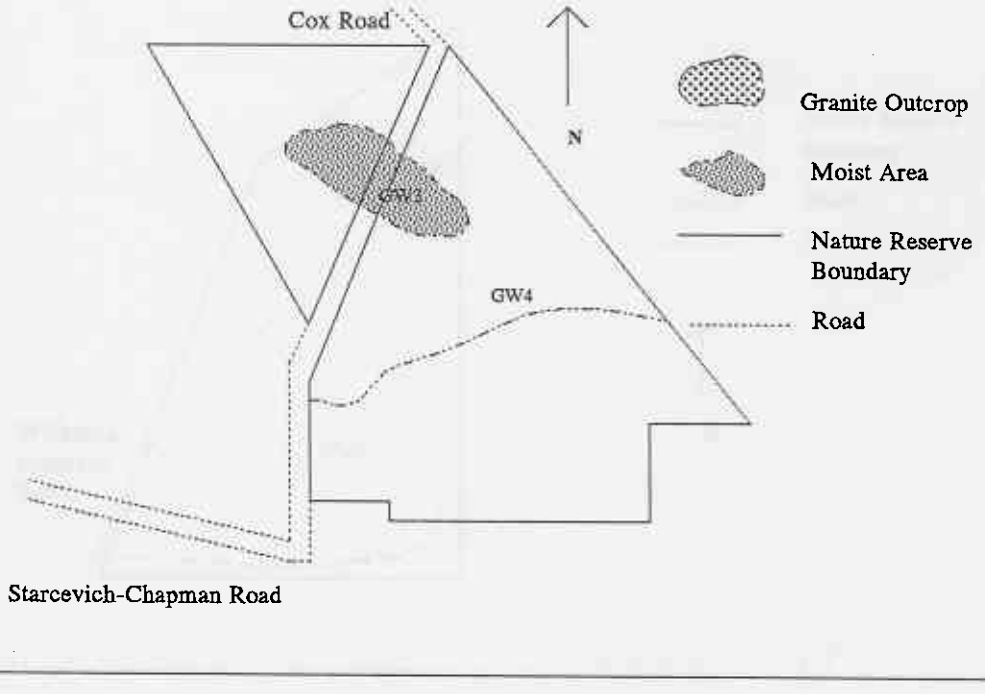


Figure 6 **Map showing position of GW5 in Tutanning Nature Reserve**

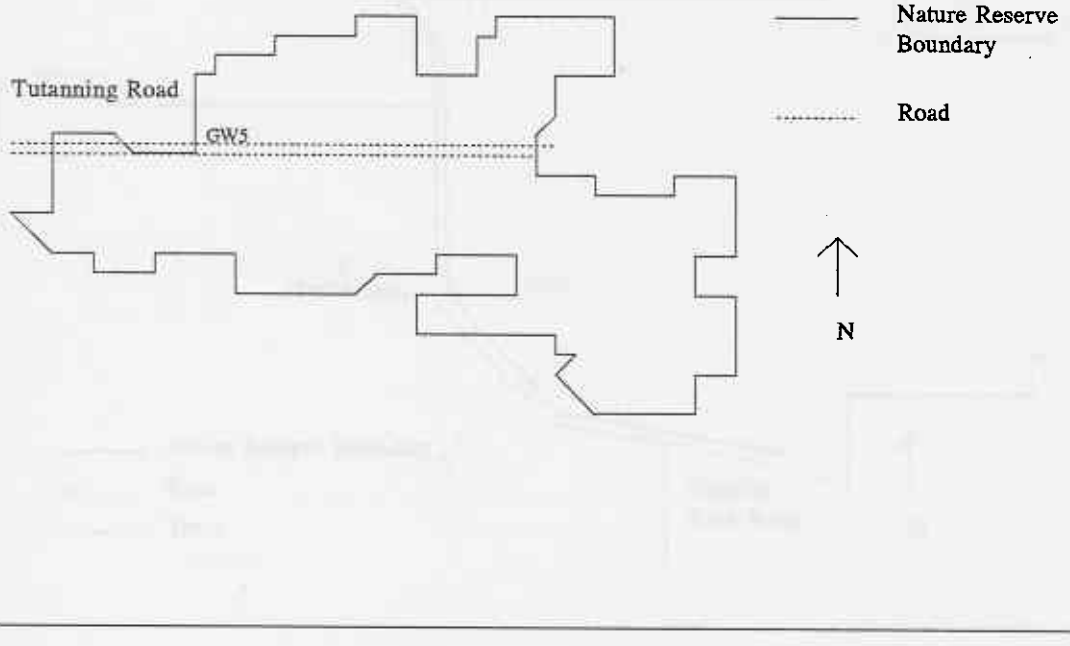


Figure 7 **Map showing position of Site GW6 in Reserve 12109**

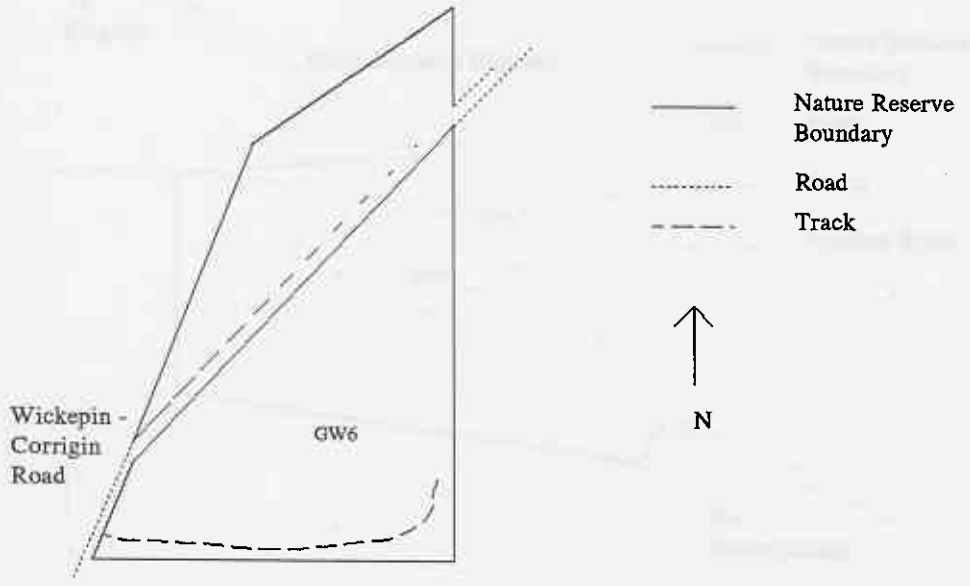


Figure 8 **Map showing position of Site GW7 in Dryandra State Forest**

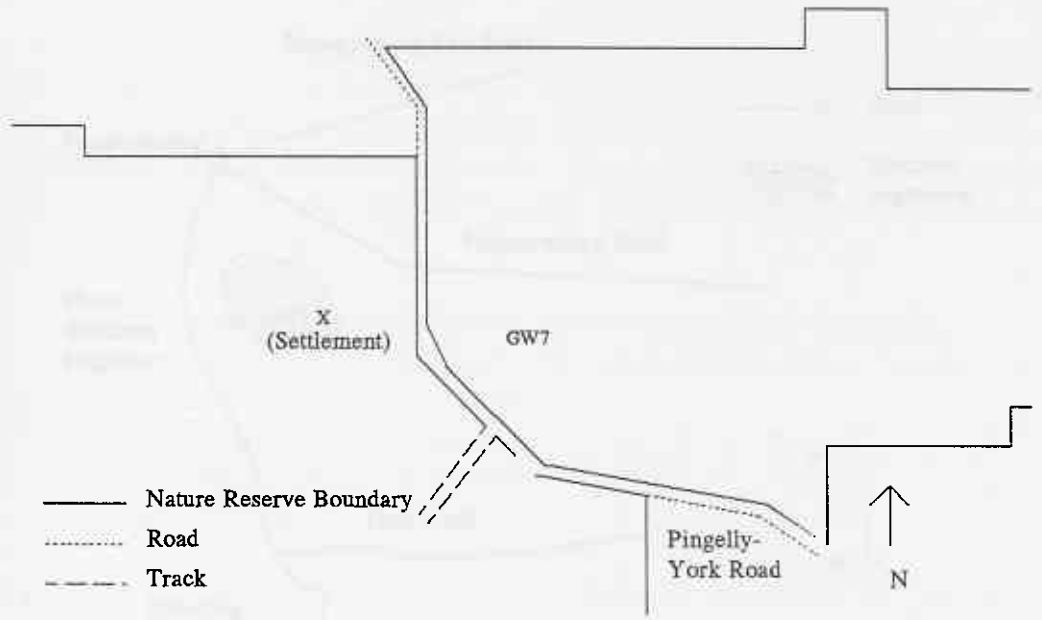


Figure 9 **Map showing position of Site GW8 in Hotham River Reserve (8291)**

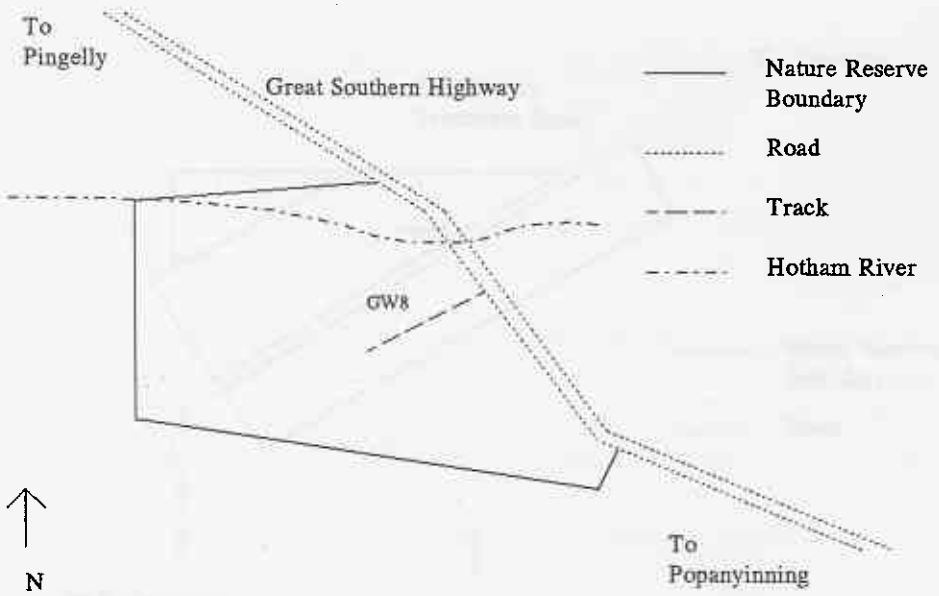


Figure 10 **Map showing position of Site GW9 on Private Property**

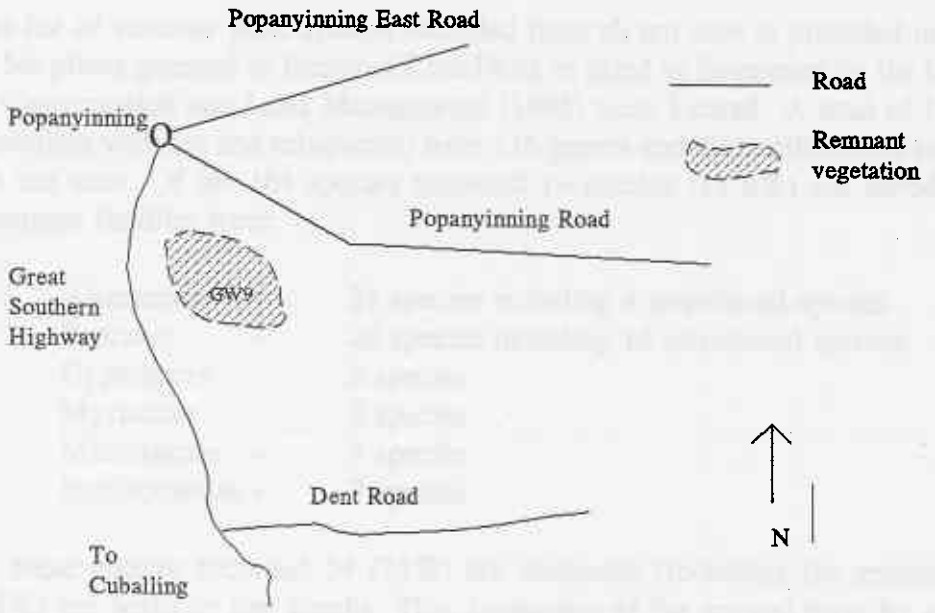
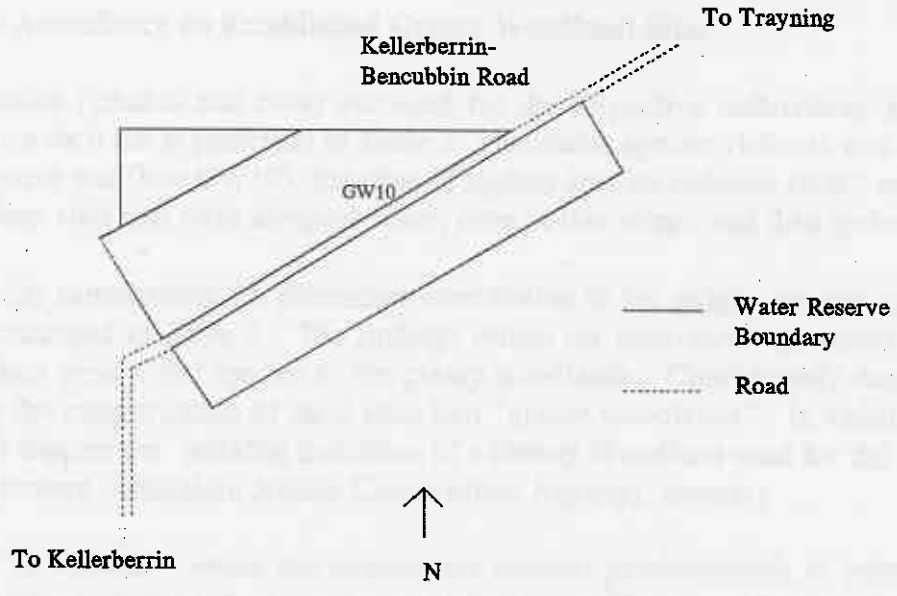


Figure 11 **Map showing position of Site GW10 in Water Reserve 13510**



4.5.2 Flora on Established Grassy Woodland Sites

The list of vascular plant species recorded from all ten sites is provided in Appendix E. No plants gazetted as Declared Rare Flora or listed as threatened by the Department of Conservation and Land Management (1995) were located. A total of 164 species (including varieties and subspecies) from 116 genera and 49 families were recorded for the ten sites. Of the 164 species recorded 19 species (11.6%) are introduced. The dominant families were:

Asteraceae	-	31 species including 4 introduced species
Poaceae	-	20 species including 10 introduced species
Cyperaceae	-	8 species
Myrtaceae	-	8 species
Mimosaceae	-	7 species
Papilionaceae	-	7 species

Of these species recorded 54 (33%) are monocots (including the grasses), and 85 (52%) are herbs or low shrubs. This dominance of the ground layer by grasses and grass-like species would provide the 'Grassy' appearance of these woodlands.

Of the total species recorded, 101 were recorded from one site and a further 31 species are recorded from only two sites, thus only a small number of species are common. Of the twenty species that were recorded from more than four sites, four are introduced or weed species, five are daisy species (Asteraceae), six are grasses, five are grass-like (Restionaceae, Anthericaceae, Dasypogonaceae) and the remaining four species are shrubs and trees. Once again the contribution of the grass and grass-like species would support the grassy woodland appearance of these sites.

4.5.3 Species Abundance on Established Grassy Woodland Sites

The species richness and cover recorded for the respective understorey groups or species on each site is presented in Table 2. The lowest species richness was recorded in the burnt site (Site GW10), the sites of highest species richness (GW3 and GW4) were those sites that were sampled twice, once in late winter and then spring.

The results summarising the percentage contribution of the sedges, grasses and *Borya* are summarised in Table 2. The findings reflect the relatively high contribution of these plant groups and species to the grassy woodlands. Consequently these results support the categorisation of these sites into "grassy woodlands". In addition, these findings support the working definition of a Grassy Woodland used for the purposes of this project (Australian Nature Conservation Agency), namely:

> "*A woodland where the understorey consists predominately of grass species (also includes sedges, rushes and other grass-like plants)*".

Table 2: Summary of Species Richness and Cover Results on the ten Grassy Woodland Sites

Site No.	Site Number									
	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	GW 9	GW 10
Species Richness	30	23	41	39	24	34	27	24	33	21
% Contribution of Sedges	7.8	23	23	-*	11	9	9	8	1	1
% Contribution of Grasses	5	3	22	-*	33	30	3	3	36	11
% Contribution of *Borya*	33.5	24	0	-*	28	23	38	69	0	2

Note: -* denotes data not available for this site.

The distribution of species within plots are provided in Appendix F. The plots were grouped according to the type of dominant species e.g Wandoo. The frequency of occurrence of species in each plot was summed and is provided in Appendix G.

Neurachne alopecuroidea was the most frequently recorded native grass species occurring in nine of the ten sites, and the most abundant grass. *Stipa trichophylla* was the second most abundant native grass species recorded. Species of the genera *Danthonia* - *Danthonia caespitosa* and *Danthonia setacea* were recorded from four sites and one site respectively, however they were not abundant in these sites. The introduced grass *Pentaschistis airoides* was frequently recorded (eight of ten sites), but was not abundant.

Borya sphaerocephala was the most frequently recorded native herb species, occurring in eight of the ten sites, and one of the most abundant species. The low sedge *Loxocarya cinerea* was the most frequently recorded and abundant species of this family. The grassy woodland sites were dominated by species from a variety of families, collectively referred to as herbs and forbes. This is representative of other grassy woodlands such as those in Tasmania where the grass species only contribute to approximately thirty percent of the total species.

Fifty two species (32%) have greater than 1% cover recorded at any site and only twenty species have greater than 5% cover recorded at any site. Only five of these are records from a single site. Hence the most common species also contribute the most to percentage foliage cover. In most cases, the uncommon species do not have a high percentage cover, with a couple of notable exceptions, for example *Spartochloa scirpoidea* is only found at Site GW3, but has an average cover of 21% at that site.

Table 3 provides a comparison of the genera recorded by Diels in 1906 (Beard, 1981) in *Eucalyptus loxophleba* Woodlands with the genera recorded in Site GW1 in 1995. As Beard observed, one of the most notable differences between these records is the increase in the observed number of grass species and lack of Restionaceae species. Beard (1981) suggested that the list of Diels' may have been selective, as there was no reference to Restionaceae or Cyperaceae species. However it may be suggested that the Juncaceae species from Diels records may have been mis- classified and instead be from these sedge families.

Table 3: Comparison of genera represented in *Eucalyptus loxophleba* Woodlands in 1906 and 1995.

Genera	1906 (Diels)	1995 (GW1)
Trees	1	1
Small trees	3	1
Shrubs	9	1
Grasses	1	7
Juncaceae	2	0
Sedges (Restionaceae)	0	3
Other Monocots	7	1
Dicots - Herbaceous Perennials	8	3
Asteraceae	16	11
Other annuals	3	0
Mosses	2	0

5. DISCUSSION

There has been some debate amongst ecologists in Western Australia as to the possibility of the representation of 'grassy woodlands' as a vegetation type in Western Australia. The vegetation in all parts of Australia has been fundamentally altered by people, firstly by the hunting, gathering and burning of the first immigrants tens of thousands of years ago, and secondly and more drastically from the European settlement (Adamson and Fox, 1981).

Historical records were used as the primary source to investigate the question of representation and previous distribution of grassy woodlands in Western Australia. Journals from the early explorers were examined for references to grassy woodlands. Water and grass were the two essential requirements for exploration in order to provide feed for horses and bullocks, the method of transportation at that time. Grassy areas were also considered suitable locations for bivouacking.

One example of historical evidence was provided in the 1846 and 1848 journals of Australian explorers Augustus Charles Gregory and Francis Thomas Gregory (1981) in their exploration of the interior of the state from Toodyay east to Mt Jackson, then north to Geraldton for new grazing lands. Several references are made to "grassy areas, with little timber; rich grassy valley timbered with eucalypti and raspberry-jam wattle (*Acacia acuminata*); grassy gum forest; wide grassy flats; rich grassy flats timbered with York Gum; granite country with some good grass".

In the area of the Chapman Valley near Geraldton, the Gregorys' descriptions indicate that these grassy areas were quite extensive:-

> *"good grassy country which appeared to extend ten to twelve miles to the east and north - clumps of York-gum, jam-wattle and sandalwood were observed on some of the hills...*
>
> *at 2:30 came on the stream-bed, the country improved and well-grassed, with scattered jam and black wattle trees as far as the country was visible...*
>
> *.. to the north and west the country was open and grassy for twelve miles, presenting at one view fifty or sixty thousand acres of fine sheep country"*

These statements provide support for the proposition that grassy woodlands did occur within the Wheatbelt of Western Australia and some indication as to their extent. According to Beard (1981), "the York Gum Woodlands in the Avon valley, inland from the Swan were described by pioneers as thickly populated, grassy and open...the Victoria Plains were also of this character when discovered, and it would appear that the Aborigines' burning had reduced the tree cover." Beard (1981) continues that "It seems probable that York Gum and Yate woodlands in the inner Wheatbelt may have constituted the prime habitat for Aborigines in the South-west. Occurring as they did on lower slopes and river flats, they would be near water, and the soils would best respond to burning for the production of herbage."

Records of early settlers at the Swan constantly referred to the open, parklike appearance of the country with scattered trees and grassy ground layer. Fraser in 1830 (Beard 1981) referred to this as 'The *Brome*, or Kangaroo-grass of New South Wales, in great luxuriance." Beard believes that the identity of this grass is now a mystery, as there seems to be no indigenous grass in Western Australia fitting the description." It is possible that this early record is referring to *Themeda triandra* which is commonly known as Kangaroo grass, however this species no longer exists "in great luxuriance".

Beard (1981) continued that "It is an equal botanical mystery to try to identify the plants growing in the 'beautiful open grassy country' so often alluded to by pioneers. There are very few native grasses in the southwest, and it seems unlikely that they actually formed grasslands. It is more probable that the settlers used the term 'grassy' in a loose sense to mean young green herbage which could consist of annuals of all kinds, new shoots of perennials, sedges and Restionaceae as well as grasses."

The species composition of Grassland and Grassy Woodland vegetation is influenced by soil moisture, soil type, seasonal temperature, fire and grazing regimes (Groves and Williams 1981). The species composition, structure and distribution of the grasslands and grassy woodlands of temperate south-eastern Australia have been strongly influenced by the Last Glacial (Gilfedder and Kirkpatrick 1994) and the rich basaltic soils of the region. Differences between the grassy woodlands of these regions could be expected following different historical climatic influences resulting in a Mediterranean climate and soils generally considered to be depauperate in the Wheatbelt of Western Australia.

While there were not the mat forming grasslands as found in temperate south-east Australia, there is historical evidence to support the proposition that grasslands and grassy woodlands did occur in the Wheatbelt of Western Australia. These historical records indicate that in some parts of the wheatbelt these grassy woodlands covered extensive areas. This is not the case today, a large proportion (93%) of the wheatbelt has been cleared for agriculture and these grassy woodlands were targeted due to being considered easily cultivated and good grazing land. As such, this vegetation type has had a long history of European modification.

From the historical descriptions, grass species seem to be a strong component of the grassy woodlands ("savanna"). However the modern grassy woodlands as surveyed do not have as dominant a grass understorey. The dominant grass species of the grassy woodland sites sampled in this project were *Neurachne alopecuroidea* and *Stipa trichophylla*. The ground layer was dominated by the herb *Borya sphaerocephala*, and the low sedge *Loxocarya cinerea* and by monocots, daisies and other herbs with a grass-like form. This, not the dominance of grasses, accounts for the park-like and grassy appearance of the sites.

The dominant genera in temperate Australian grasslands are *Danthonia, Poa* and *Themeda* (Groves and Williams 1981). The only location of *Poa* spp. in Wheatbelt regions of Western Australia is a record from on Middle Island in the Recherche Archipelago, near Esperance, where it occurs with the mallee *Eucalyptus angulosa* in

long unburnt (*ca.*170 years) vegetation (Hopkins 1981). Species of the genera *Danthonia* - *Danthonia caespitosa* and *Danthonia setacea* were recorded from four sites and one site respectively, however they were not abundant.

There was no recording of *Themeda triandra* in the sites, a species dominant in other grassy woodland areas of Australia. According to Adamson and Fox (1981), *Themeda triandra* is one of the first species to disappear from heavily grazed grasslands and its absence and replacement by *Stipa* spp. is usually indicative of a degraded grassland (Louise Gilfedder pers.comm.; Moore 1973). *Stipa trichophylla* was the second most abundant native grass species recorded. According to Paterson (1992), *Themeda triandra* is supposed to be widespread throughout the south-west of Western Australia, however no records were made during this survey. Perhaps this is one of the species so dominant in other temperate grasslands, that we have lost. Examination of *Themeda triandra* records from the Western Australian Herbarium Database (WAHERB) of all flora collections made in Western Australia (Appendix H), showed only one record (Toodyay) of this species in the area referred to as the Wheatbelt. However a recent collection made near Wandering, 150km south of Perth on the western edge of the Wheatbelt Region (David Mitchell, pers.comm.) indicates that further searches for this species are likely to increase the known distribution for this region.

So our modern grassy woodlands, as surveyed in this study, are characterised by an open woodland of several species of Eucalypt (up to 30% cover), over a sparse shrub layer (5-15%) over an almost continuous, but sparse looking, cover of grasses and grass-like herbs (70-80%). There is a large number of herb species recorded, however only a small number could be regarded as common. Many of these common species are grasses or grass-like, such as *Stipa trichophylla, Neurachne alopecuroidea, Loxocarya cinerea* and *Borya sphaerocephala.* The presence of these species result in grassy appearance of the understorey and in the description of these sites as grassy woodlands.

It is worthy of note that the sites were sampled in late spring, and at this time of year many of the annual species are dying off and hence the summer appearance of these woodlands would be much sparser than a winter and early spring appearance. A winter and early spring sampling would also provide additional annual species at these sites.

Comparison of the sites surveyed with historical evidence such as the York Gum Woodlands described in 1906 by Diels (Beard 1980) shows an increase in the observed number of grass species in 1995 (7, with 3 introduced, versus 1) and the presence of Restionaceae species which were not previously recorded by Diels. However the contribution of some of the other components for example, the Asteraceae and herbaceous perennial groups were similar between the samples. Hence it could be said that the species composition of the grassy woodlands sampled in 1995 is likely to be representative of the earlier examples of this vegetation. However, historical descriptions suggest that changed grazing and fire regimes have resulted in a reduction of the role of grass species in the understorey composition of this vegetation.

There have been three main factors contributing to the decline of Grasslands and Grassy Woodland communities in Western Australia as a consequence of the arrival of European settlers. Firstly the disruption of the burning regimes of the Aboriginal communities displaced by colonisation. As in most parts of Australia, there has been a fire-exclusion policy albeit not always intentionally, in order to protect livelihood and property. This same 'protection' has resulted in the replacement of these grassy woodlands with a more shrubby woodland.

Secondly, grazing of these communities by domestic stock and the introduction of set stocking as a result of fencing, rather than shepherding may have contributed to the decline of these communities and particular species (Lefroy 1990). According to Rossiter and Ozanne (1970) perennial grasses in Mediterranean climates do not persist under intense grazing.

Lastly, perhaps the most significant impact has been from the extensive clearing of vegetation for cultivation and improved pastures. The need to cultivate large areas to eliminate toxic plants such as *Gastrolobium* and *Oxylobium* (Lefroy 1990) may have influenced the move from grazing these woodlands to clearing them. The Avon Botanical District covers an area of approximately 93520 sq.km of this, 93 percent had been cleared by 1984 (Beard and Sprenger, 1984). Woodlands of York Gum, Wandoo and Salmon Gum comprised 39894 sq.km (or 54 percent of the District) and 97 percent of these have been cleared. Furthermore, very little of what does remain is reserved in the conservation estate.

A further result of the massive land clearing in the area is that much of the little remaining vegetation exists as small, isolated remnants. The threats of disturbance facing these communities is exacerbated by the lack of connectivity to other similar areas and continued clearing.

6. RECOMMENDATIONS FOR FURTHER RESEARCH

The following research is recommended:

R1. ***A review of the conservation issues relating to the distribution and types of Grassy Woodlands in Western Australia.***

This research would require access to the historical maps and recently finished databases contained in Geographic Information Systems (GIS) within Government Departments. The latter could not be achieved within the time frame or budget of this specific project. These databases include information on original vegetation distributions, remnant vegetation distributions and reserve locations and would provide other information that would be useful in determining the distribution and extent of these communities.

Further survey is required to clarify the conservation status of these vegetation types, particularly in view of the potential threats to these woodlands (e.g. weeds, further clearing, inappropriate grazing and fire regimes). The Wheatbelt Region of the Department of Conservation and Land Management will continue to build a register of grassy woodland sites (including location and tenure details, species lists and information on condition), based on the results of the GIS analysis and from further nominations by researchers and the community. If appropriate, these grassy woodlands will be nominated as "Threatened Communities" under existing departmental policies and possible future legislation.

R2. ***Survey the condition and threats faced by the remaining grassy woodlands.***

The sites surveyed detailed in R1 will also identify the condition and threats facing these remnants. Some of these threats include continued clearing of this vegetation, invasion of weeds, grazing by stock and fertiliser drift. Documentation of thee threats will enable prioritisation of sites and suggest management actions.

R3. ***Research on the ecology of grassy woodlands.***

Basic ecological research of grassy woodlands is essential to assist in determining management options. For example: investigation (by experiment) of the hypothesis that cessation of Aboriginal burning led to the decline of the native grass component of these communities of these communities; and further work on the distribution of *Themeda triandra* and other grass species, and their composition in grassy woodlands of Western Australia.

This research would require the design of a range of rigorous ecological and temporal studies to address fragmentation and management options (e.g. burning, fencing) for maintaining biodiversity and integrity of these communities.

R4. Further establishment and continued monitoring of permanent sites.

This would require long term commitment to monitor sites in a range of these communities to establish "best management" practices. For example, continued monitoring of the burnt site (Site GW10) may provide an opportunity without the necessity for an experimental burn, to examine the effects of fire on these communities. C.S.I.R.O., who have been studying the effects of fire on the nearby Durakoppin Nature Reserve for several years, have also established a monitoring transect in this location and perhaps liaison between CALM and C.S.I.R.O. can be undertaken to provide further information.

R5. Raising the awareness of the conservation status of grassy woodlands in Western Australia on a state and national level.

Raise awareness of the existence of and threats to these communities through other researchers, managers and local landcare groups; and by publications. The Department of Conservation and Land Management Wheatbelt Region is investigating the development of a "GrassWatch Program" to solicit additional locations and types of this community (David Mitchell pers.comm.).

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APPENDIX A: SURVEY FORM AND LIST OF RESPONDENTS

Survey of Grassy Woodlands in the Western Australian Wheatbelt

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Definitions

The project area is the region broadly described as the "Wheatbelt", it includes Beards Wheatbelt Botanical Region and parts of the Mallee Botanical Region and Coolgardie Botanical Region (South-west Interzone). The Department of Conservation and Land Management's Wheatbelt Region also falls within this area.

We have defined Grassy Woodlands as

"A woodland where the understorey consists predominately of grass species (also includes sedges, rushes and other grass-like plants). "

Examples of grassy woodlands include communities that are dominated by the following species or a combination of these species:-

York gum (*Eucalyptus loxophleba*) - Jam (*Acacia acuminata*)
Salmon Gum *(Eucalyptus salmonophloia)*
Wandoo (*Eucalyptus wandoo)*
Morrell (*Eucalyptus longicornis)*
Merrit *(Eucalyptus flocktoniae*)
Yate (*Eucalyptus occidentalis)*

Name: _____

Organization: _____

Contact Details: _____

_____

COMMENTS:

APPENDIX A: SURVEY FORM AND LIST OF RESPONDENTS

1. Have you undertaken any studies of grassy woodlands? Yes No

2. Based on the definition provided, can you add any other Grassy Woodlands types?

_____

_____

3. Do you know the location of any Grassy Woodlands, e.g. in your district, or in your research area? Yes No

_____

4. Do you have or know of any reports, projects, databases or maps (published or unpublished) that include information on Grassy Woodlands? Yes No

_____

_____

_____

_____

5. Are there any other people that you know of with knowledge in this area that I can talk to?

_____

_____

_____

6. Can you describe any sites of Grassy Woodlands on the attached tables (attach additional pages if required).

APPENDIX A: SURVEY FORM AND LIST OF RESPONDENTS

	Site 1	Site 2
Vegetation description (eg open woodland of Salmon Gum over etc.)		
Associated species		
Size (approximate) or proportion of reserve		
Condition e.g. grazing, weeds, rabbits, fire, logged		
Land Tenure e.g. reserve, private land		
Location - general (e.g. reserve name/number, shire or nearest town)		
Location - specific site within reserve e.g.southwest corner past blue tank (attach map if possible)		

APPENDIX A: SURVEY FORM AND LIST OF RESPONDENTS

Name of Respondent	Department/Position
Penny Hussey	Department of Conservation and Land Management, Como
Dr Ken Atkins	Department of Conservation and Land Management, Como
Sarah McEvoy	Department of Conservation and Land Management, Como
David Bell	University of Western Australia
Dr Richard Hobbs	CSIRO
Lyn Atkins	CSIRO
Dr Colin Yates	CSIRO
Val English	Department of Conservation and Land Management, Woodvale
Mike Fitzgerald	Department of Conservation and Land Management, Merredin
David Mitchell	Department of Conservation and Land Management, Narrogin
Claire Welbon	Department of Conservation and Land Management, Merredin
Keith McDougall	PhD student, Murdoch University
Angas Hopkins	Department of Conservation and Land Management, Woodvale
Rod Safstrom	Environs Consulting
Anne Coates	Consultant Botanist
Cathy Godden	Mattiske Consulting Pty Ltd
Libby Mattiske	Mattiske Consulting Pty Ltd

APPENDIX A: SURVEY FORM AND LIST OF RESPONDENTS

Name of Respondent	Department/Position
Natalie Keals	Curtin University of Technology
Terry McFarlane	Department of Conservation and Land Management, Manjimup
Grant Wardell-Johnston	Department of Conservation and Land Management, Woodvale
Don Bennett	Department of Agriculture, Bunbury
John Dell	Western Australian Museum
Mal Graham	Department of Conservation and Land Management, Katanning

APPENDIX B: LIST OF THE GRASSY WOODLAND SITES IDENTIFIED BY INTERVIEWEES

Grassy woodland type	Vegetation description	Associated species	Size	Condition	Tenure	Location - general	Location - specific
York gum - Jam	Open York-Jam Woodland	*Stipa sp., Aristida sp. Danthonia sp.*	117ha	burnt Autumn 1992/93	Water Reserve	Reserve 13510	whole reserve
York Gum Jam	Open York-Gum Jam woodland	*Lomandra effusa, Dampiera stenophyllya, Lepidosperma sp.*	~2 ha	slightly weedy	Nature Reserve	Durakoppin NR	northeast corner
York Gum - Jam	Open Woodland	*Grevillea paniculata, Stipa spp. , Danthonia sp.*	100 x 700m	burnt 1988	Nature Reserve	Durakoppin NR	southern edge of reserve
York Gum	Open Woodland	*Hakea recurva,* lots of annual grasses and herbs	250 x 250m	grazed until 10 years ago, weedy	private property	Nanyanine Farm	northern edge backs onto reserve.
Wandoo *(E. capillosa)*	Open Woodland	*Lomandra effusa, Acacia* spp. Restionaceae spp.	200 x 200m	logged ~60 yrs ago	Nature Reserve	Kodj Kodjin NR	track from road
Wandoo - Salmon Gum	Open Woodland	*Lomandra effusa, Acacia* spp., Restionaceae spp.	200 x 200m	campsite	Nature Reserve	Durakoppin NR	off Harvey Rd
Wandoo (*E. capillosa*)	Open Woodland	*Acacia acuminata, Stipa sp. Gastrolobium parvifolium, Lomandra effusa*	400 x 400m	logged ~60 yrs ago	Nature Reserve	Durakoppin NR	off Brown Rd

APPENDIX B: LIST OF THE GRASSY WOODLAND SITES IDENTIFIED BY INTERVIEWEES

Grassy woodland type	Vegetation description	Associated species	Size	Condition	Tenure	Location - general	Location - specific
York Gum - Jam	York Gum grasslands				reserve	East of Wickepin	south of the Malyalling East Road on the Wickepin-Yealering Rd
York Gum	Woodland	native grasses		good	private property	Gabby Quoi Quoi	?
Wandoo	Woodland	*Loxocarya* sp. *Allocasuarina sp., Eucalyptus loxophleba*		good	reserve	Noombling NR 26150	west of Pingelly
Wandoo	Woodland			good	State Forest	Dryandra State Forest	east of Pingelly-York Rd
Wandoo	Woodland			good	Reserve	Hotham River NR 8291	south of Pingelly
Wandoo - Salmon Gum	Woodland	*Acacia acuminata, Allocasuarina* sp.		fair	private property	south of Popanyinning	3km south of Popanyinning, west side
Wandoo	Open Woodland	*Gastrolobium parvifolium, Allocasuarina huegeliana*		good, not burnt for at least 15yrs	State Forest	Dryandra State Forest	opposite settlement

APPENDIX B: LIST OF THE GRASSY WOODLAND SITES IDENTIFIED BY INTERVIEWEES

Grassy woodland type	Vegetation description	Associated species	Size	Condition	Tenure	Location - general	Location - specific
Wandoo	Wandoo Woodland	*Loxocarya sp.*, *Allocasuarina sp.*		good, burnt in 1990	Nature Reserve	Tutanning NR	western end
Wandoo	Woodland	grasses			Nature Reserve	Hopkins Nature Reserve	western end
Wandoo	Open Woodland			slightly disturbed	Water Reseve/Golf Course	Namalkatching NR	
Wandoo	Open Woodland				Old Water Reseve	Namalkatching NR	Cunderdin-Minnivale Rd
York Gum - Jam	Woodland	grasses, *Casuarina sp.*	part of 97ha	poor - rabbits, people	Reserve	Nallion Springs Reserve 4458	Wagin
York Gum - Jam	Woodland		part of 35ha	good, some rabbits	Reserve	The Ovens (2023)	16.7km west of Pingelly
York Gum	Forest over grass		part of 27ha	fairly good, some dead trees	Reserve	Reserve 16714	19km SSE of Corrigin
York Gum	Open Woodland		~2ha	introduced grasses	Nature Reserve	Dumbleyung NR	1.6km south of Dumbleyung

APPENDIX B: LIST OF THE GRASSY WOODLAND SITES IDENTIFIED BY INTERVIEWEES

Grassy woodland type	Vegetation description	Associated species	Size	Condition	Tenure	Location - general	Location - specific
York Gum	Mallee	*Spartochloa scirpoidea*		good	Nature Reserve	Cairn Nature Reserve	Cox Road
Jam	Jam on granite	grasses		fair	Nature Reserve	Cairn Nature Reserve	track east of Cox Rd
York Gum - Jam - Wandoo	Woodland	*Conostylis sp., Burchardia, Loxoxcarya sp.*	~20 acres	very good	nature reserve	Drummond NR	Old Plains Rd, Toodyay
York Gum - Jam - Wandoo	Woodland	*Conostylis sp., Burchardia, Loxoxcarya sp.*	~100 acres	good	nature reserve	Bewnelling NR	Old Plains Rd, Toodyay
York Gum- Jam	woodland on granite	wild oats, *Allocasuarina huegeliana*	~50ac	very high grass weed invasion	private property	Northam	off the Northam/ Goomalling Rd
Wandoo - Jam	Woodland	*Acacia saligna*, Marri	~40ac	grazed for 40yrs, weeds but native grasses returning	reserve	St Romans Well, York	Wambya Rd
Wandoo	Open Woodland	*Borya sphaerocephala, Loxocarya cinerea*	2ha	good	Water reserve	Wyalkatchem Water Reserve 19014	West of Wyalkatchem

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW1	*Acacia acuminata*	20	3	20	15
GW1	*Amphipogon strictus*	1	0	0.1	0
GW1	**Avena fatua*	0	2	0	0
GW1	*Borya sphaerocephala*	60	35	45	65
GW1	*Brachyscome bellidioides*	2	2	3	5
GW1	*Brunonia australis*	0.1	1	0.1	0.1
GW1	*Dampiera lavandulacea*	3	25	4	35
GW1	*Dianella revoluta*	0.1	0	0	0
GW1	*Dichopogon capillipes*	2	5	1	1
GW1	*Enchylaena tomentosa*	0.1	0.1	0	0
GW1	*Eucalyptus loxophleba*	30	0	0	0
GW1	*Gilberta tenuifolia*	1	1	3	20
GW1	*Gnephosis tenuissima*	5	1	0	1
GW1	**Hypochaeris glabra*	0	0.1	0.1	0.1
GW1	*Isotropis cuneifolia*	0.1	0.1	0.1	0
GW1	*Lepidosperma ?costale*	1	1	0	1
GW1	*Lomandra effusa*	1	0.1	2	2
GW1	*Loxocarya cinerea*	15	15	2	8
GW1	*Neurachne alopecuroidea*	1	1	0.1	0.1
GW1	**Pentaschistis airoides*	5	2	0.1	2
GW1	*Podolepis canescens*	1	1	1	0
GW1	*Podolepis lessonii*	1	0	0	0
GW1	*Podotheca gnaphalioides*	0	0.1	0	0
GW1	*Schoenia cassiniana*	0.1	0	0	0
GW1	*Stackhousia monogyna*	0.1	0	0.1	0.1
GW1	*Stipa trichophylla*	0.1	0	0.1	1
GW1	*Trachymene cyanopetala*	1	10	5	5
GW1	**Ursinia anthemoides*	2	1	0.1	0.1
GW1	**Vulpia bromoides*	4	8	2	2
GW1	*Waitzia acuminata*	45	15	30	30
GW2	*Blennospora drummondii*	0	0	0	1
GW2	*Borya sphaerocephala*	3	20	3	65
GW2	*Dampiera lavandulacea*	0	0	1	0.1
GW2	*Danthonia caespitosa*	0.1	0	0	1
GW2	*Dianella revoluta*	0	0	0.1	0
GW2	*Dichopogon capillipes*	5	3	5	2
GW2	*Eucalyptus capillosa ssp. capillosa*	50	20	55	0
GW2	*Gastrolobium parvifolia*	0.1	0	1	0
GW2	*Helichrysum leucopsideum*	0.1	0	0.1	0
GW2	*Isotoma hypocrateriformis*	0.1	0	0	0
GW2	*Lepidosperma costale*	0	0.1	0.1	1
GW2	*Lomandra collina*	0.1	0.1	0.1	0.1
GW2	*Lomandra effusa*	3	1	1	1
GW2	*Loxocarya cinerea*	3	50	2	25
GW2	*Neurachne alopecuroidea*	1	1	0	1
GW2	*Olearia axillaris*	1	1	0	1
GW2	*Podolepis capillaris*	0	0	0.1	0
GW2	*Podolepis lessonii*	4	4	2	5
GW2	*Ptilotus ?roei*	0	0	0.1	0
GW2	*Stipa trichophylla*	2	1	2	2
GW2	*Trachymene cyanopetala*	1	0	1	0
GW2	**Ursinia anthemoides*	5	5	3	3

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW2	*Waitzia acuminata*	1	5	1	5
GW3	*Acacia acuminata*	8	2	5	10
GW3	*Acacia sp.*	0	0.1	0	0
GW3	**Anagallis arvensis*	2	8	3	0.1
GW3	*Aphelia brizula*	0	0.1	0	0
GW3	**Arctotheca calendula*	0.1	0	0	0
GW3	**Avellinia michelii*	2	2	0.1	1
GW3	*Blennospora drummondii*	4	1	0	0
GW3	*Borya sphaerocephala*	0	0	0	0
GW3	**Briza maxima*	0	0.1	0.1	0
GW3	**Briza minor*	0.1	0.1	0.1	0.1
GW3	*Caladenia roei*	0	0	0	0
GW3	*Centrolepis aristata*	5	0	0.1	0.1
GW3	*Dampiera lavandulacea*	2	1	0.1	0
GW3	*Daucus glochidiatus*	0.1	0.1	0.1	0
GW3	*Dianella revoluta*	0	0	0	0
GW3	*Dichopogon capillipes*	1	0.1	2	1
GW3	*Drosera erythrorhiza*	0	0	0	0.1
GW3	*Drosera glanduligera*	0.1	0.1	0.1	1
GW3	**Erodium botrys*	0	0	0	0
GW3	*Eucalyptus loxophleba ssp. lissophloia*	20	30	50	10
GW3	*Gnephosis tenuissima*	0.1	0.1	0	4
GW3	*Grevillea paniculata*	3	4	0	0.1
GW3	*Helipterum demissum*	0	0	0	0
GW3	*Hydrocotyle callicarpa*	0.1	0.1	0.1	0.1
GW3	*Hydrocotyle rugulosa*	0.1	0.1	0.1	0.1
GW3	**Hypochaeris glabra*	1	2	2	1
GW3	*Lepidosperma costale*	25	25	20	25
GW3	**Lolium rigidum*	0	0.1	0	0
GW3	*Melaleuca hamulosa*	5	2	0	5
GW3	*Millotia tenuifolia*	0.1	0.1	0.1	0
GW3	*Neurachne alopecuroidea*	0.1	0	1	0.1
GW3	*Parietaria debilis*	0	0	0	0
GW3	**Pentaschistis airoides*	0.1	1	1	1
GW3	*Phylloglossum drummondii*	0	0.1	0	0
GW3	*Plantago varia*	0	0.1	0	0
GW3	*Podolepis lessonii*	0	0.1	0	0.1
GW3	*Podotheca gnaphalioides*	0.1	0	0	0
GW3	*Rhodanthe laevis*	0	0	0	0
GW3	*Santalum acuminatum*	0	5	8	1
GW3	*Schoenus humilis*	0.1	0.1	0.1	0.1
GW3	**Sonchus oleraceus*	0	0	0.1	0
GW3	*Spartochloa scirpoidea*	20	20	25	20
GW3	*Stipa elegantissima*	0	0	0	0.1
GW3	*Stipa tenuifolia*	2	0.1	0	0
GW3	*Thysanotus patersonii*	0.1	0.1	0.1	0
GW3	*Trachymene pilosa*	1	1	0	1
GW3	**Ursinia anthemoides*	0	0	0	0
GW3	*Velleia cycnopotamica*	3	1	0.1	0.1
GW3	**Vulpia bromoides*	0	0	0	0
GW3	*Waitzia acuminata*	0.1	1	0	0
GW3	*Wurmbea tenella*	0	0	0	0

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW5	*Acacia acuminata*	1	1	3	8
GW5	*Allocasuarina huegeliana*	2	0	3	1
GW5	**Anagallis arvensis*	0	0.1	0	0
GW5	*Anigozanthos sp.*	0	0.1	0	0.1
GW5	*Blennospora drummondii*	0	0	0.1	0.1
GW5	*Borya sphaerocephala*	25	5	10	4
GW5	*Calytrix leschenaultii*	0.1	0	0	0
GW5	*Dampiera lavandulacea*	1	4	1	5
GW5	*Dichopogon capillipes*	0	0.1	0	0
GW5	*Eucalyptus wandoo*	0	40	0	8
GW5	*Haemodorum laxum*	0	0	0	0
GW5	**Hypochaeris glabra*	0	0.1	0	0
GW5	*Lepidosperma ?costale*	1	0.1	0.1	0.1
GW5	*Loxocarya cinerea*	2	5	5	4
GW5	*Neurachne alopecuroidea*	1	0.1	1	0.1
GW5	*Opercularia sp.*	0	0	0.1	0.1
GW5	**Pentaschistis airoides*	0.1	1	1	4
GW5	*Podolepis lessonii*	4	1	3	1
GW5	*Ptilotus declinatus*	0.1	0	0.1	0
GW5	*Schoenus sp.*	0	0	0	0
GW5	*Sowerbaea laxiflora*	0	0.1	0	0
GW5	*Stackhousia monogyna*	0.1	0	0	0.1
GW5	*Stipa trichophylla*	0.1	0.1	0.1	0.1
GW5	*Stipa trichophylla*	0	0.1	0	0
GW5	*Stylidium sp.*	0	0.1	0	0
GW5	*Trachymene pilosa*	0.1	0.1	0.1	0.1
GW5	**Ursinia anthemoides*	0.1	0.1	0.1	0.1
GW6	*Acacia acuminata*	4	1	3	2
GW6	*Acacia erinacea*	0.1	3	0	0
GW6	*Acacia microbotrya*	0	0.1	0	0
GW6	*Amphipogon strictus*	0	0	1	0.1
GW6	**Anagallis arvensis*	0.1	0.1	1	0.1
GW6	**Avena fatua*	0.1	1	5	0.1
GW6	*Borya sphaerocephala*	1	15	1	50
GW6	**Briza maxima*	1	1	5	1
GW6	**Bromus rubens*	0	1	0	0
GW6	*Dampiera lavandulacea*	1	0.1	0.1	1
GW6	*Danthonia caespitosa*	1	5	0	0
GW6	*Danthonia setacea*	0	0	0.1	0.1
GW6	*Dianella revoluta*	1	1	1	0
GW6	*Eremophyllum tenellum*	0.1	0	0	0
GW6	*Eucalyptus loxophleba ssp. loxophleba*	8	0	0	0
GW6	*Eucalyptus salmonophloia*	0	0	0	0
GW6	*Eucalyptus wandoo*	20	10	30	0
GW6	*Isotoma hypocrateriformis*	0	0	1	0
GW6	*Lomandra effusa*	0	1	0	0.1
GW6	*Loxocarya cinerea*	0.1	5	1	20
GW6	*Neurachne alopecuroidea*	20	5	1	1
GW6	*Oxalis sp.*	0.1	0.1	0	0
GW6	**Pentaschistis airoides*	1	0.1	1	0
GW6	*Podolepis capillaris*	0	0.1	0	0
GW6	*Podolepis lessonii*	5	5	2	5

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW6	*Ptilotus declinatus*	0	0	0.1	0.1
GW6	*Ptilotus manglesii*	0.1	0.1	1	1
GW6	*Scaevola humifusa*	0	0.1	0	0
GW6	*Stenanthemum tridentatum*	0.1	0	1	0.1
GW6	*Stipa elegantissima*	5	1	3	0.1
GW6	*Stipa trichophylla*	20	5	2	1
GW6	*Stypandra glauca*	0	0	0	0.1
GW6	*Thysanotus parviflorus*	2	0	0	0
GW6	*Trachymene pilosa*	0	0.1	0	0
GW6	**Ursinia anthemoides*	1	0.1	0.1	1
GW7	*Astroloma serratifolium*	0.2	0.4	1	0.5
GW7	*Borya sphaerocephala*	30	65	20	35
GW7	*Conostylis setigera ssp. setigera*	0.1	0.5	0.4	0
GW7	*Dampiera lavandulacea*	10	4	0.1	1
GW7	*Danthonia caespitosa*	0.1	0.5	0.2	0.2
GW7	*Daviesia ?incrassata*	0.2	0	0.5	0
GW7	*Drosera menziesii ssp. menziesii*	0	0	0	0
GW7	*Eucalyptus wandoo*	10	10	50	70
GW7	*Hakea lissocarpha*	1D	1	0	0
GW7	*Hibbertia sp.*	1	1	0.5	3
GW7	*Hyalosperma cotula*	5	2	1	3
GW7	*Lepidobolus preissianus*	1	0.1	10	1
GW7	*Lepidosperma angustatum*	0	0.5	0	0.1
GW7	*Lepidosperma tenue*	0.1	0	0	0
GW7	*Leschenaultia biloba*	0	0	0	1
GW7	*Linum marginale*	0	0	0	0
GW7	*Loxocarya cinerea*	5	3	5	10
GW7	*Neurachne alopecuroidea*	2	2	3	1
GW7	*Orthrosanthus laxus*	1	0	0.2	0.5
GW7	*Oxylobium microcardium*	0	0.4	0.2	1D
GW7	*Patersonia drummondii*	0	0	0	0
GW7	**Pentaschistis airoides*	0	0.1	0.1	0.1
GW7	*Podolepis lessonii*	0.5	1	0.1	0
GW7	*Rhodanthe citrina*	5	2	3	2
GW7	*Stipa trichophylla*	2	0.1	1	1
GW7	*Stylidium calcaratum*	0	0	0	0
GW7	*Stylidium miniatum*	0	0	0.2	0
GW7	*Stylidium uniflorum*	0	0	0.1	0
GW7	*Trachymene pilosa*	0.1	0	0	0
GW7	*Tricoryne elatior*	0	0	0	0
GW7	**Ursinia anthemoides*	0.1	0.5	0	1
GW7	*Utricularia violacea*	0.1	0.1	0.1	0.1
GW8	*Acacia lasiocarpa var. bracteolata*	0.1	0.1	0	0
GW8	*Allocasuarina huegeliana*	0	2	0	0
GW8	*Astroloma serratifolium*	0.4	1	0.2	0.1
GW8	*Billardiera sericea*	0	0.1	0	0
GW8	*Borya sphaerocephala*	45	45	35	60
GW8	*Conostylis setigera ssp. setigera*	0.1	0.1	0.1	0.1
GW8	*Dampiera ?lindleyi*	0	1	0	0
GW8	*Dampiera lavandulacea*	0.2	0.1	0	0
GW8	*Daviesia hakeoides ssp. subnuda*	0.4	0	0	0.5
GW8	*Eucalyptus wandoo*	0.5	0	30	5

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW8	*Hakea lissocarpha*	0	0	0	0.2
GW8	*Isotoma hypocrateriformis*	0	0	0.1	0
GW8	*Lepidobolus preissianus*	4	2	4	5
GW8	*Lepidosperma tenue*	0.1	0.2	0.2	0.5
GW8	*Lomandra effusa*	0	0.1	0	0.1
GW8	*Loxocarya cinerea*	0.1	0.3	5	1
GW8	*Nemcia sp. (Crisp 6183)*	0.1	0.2	0	0
GW8	*Neurachne alopecuroidea*	1	0.1	1	1
GW8	*Podolepis lessonii*	0.5	4	1	0.5
GW8	*Stackhousia sp.*	0	0	0	0.1
GW8	*Stipa elegantissima*	0.1	0	1	0.1
GW8	*Stipa trichophylla*	0.1	0	4	0.1
GW8	*Thysanotus patersonii*	0	0	0.1	0
GW8	*Xanthorrhoea ?drummondii*	0	3	0	1
GW9	**Briza maxima*	0	0.1	0	0
GW9	**Briza minor*	0	0	0.1	0.1
GW9	**Hypochaeris glabra*	5	4	5	2
GW9	**Lolium rigidum*	1	0.1	0	0.2
GW9	**Pentaschistis airoides*	1	5	2	0.2
GW9	**Polypogon monspeliensis*	0	0.5	0	0.1
GW9	**Romulea rosea*	1	0.5	1	1
GW9	**Sonchus oleraceus*	0	0	0	0.1
GW9	**Ursinia anthemoides*	0	0	0.1	0
GW9	**Vulpia bromoides*	30	10	5	4
GW9	*?Amphipogon sp.*	1	1	1	1
GW9	*Acacia ?pulchella*	0	0.1	0.1	0
GW9	*Acacia acuminata*	0	5	3	2
GW9	*Allocasuarina huegeliana*	8	0	20	0
GW9	**Avellinia michelii*	0.1	0	0.1	1
GW9	*Centaurium spicatum*	0	0.4	0	0
GW9	*Dichopogon capillipes*	1	0	0	0
GW9	*Eucalyptus salmonophloia*	2	5	2	15
GW9	*Eucalyptus wandoo*	10	8	0	20
GW9	*Gonocarpus nodulosus*	0	0	30	2
GW9	*Hibbertia rupicola*	0	0	0.5	0.1
GW9	*Hordeum leporinum*	0	0	0	0.1
GW9	*Lepidosperma brunonianum*	0	0	0.5	0
GW9	*Lomandra effusa*	0	0	0	0.2
GW9	*Loxocarya cinerea*	0	1	1	0.1
GW9	*Neurachne alopecuroidea*	4	5	10	8
GW9	*Oxalis sp.*	0	0	0.1	0
GW9	*Podolepis gracilis*	5	8	2	1
GW9	*Ptilotus declinatus*	0	0.1	0	0
GW9	*Stipa ?pycnostachya*	0	0.1	3	2
GW9	*Stipa elegantissima*	0.1	0	0	0
GW9	*Stipa trichophylla*	0	0	3	2
GW9	*Tricoryne elatior*	0	0	0.1	0
GW9	*Trifolium sp.*	0.5	1	1	0.1
GW10	**Pentaschistis airoides*	0	0	0	0.1
GW10	*Acacia acuminata*	1	15	10	4
GW10	*Amphipogon strictus*	3	3	2	1
GW10	*Bare ground*	2	5	15	3

APPENDIX C: RECORDED DATA FROM GRASSY WOODLAND MONITORING SITES

Plot No.	Plant Species	Percentage cover NW	NE	SW	SE
GW10	*Borya sphaerocephala*	1	5	0	2
GW10	*Brunonia australis*	1	2	1	2
GW10	*Dampiera lavandulacea*	4	6	4	34
GW10	*Dianella revoluta*	0.2	0	0.2	0.2
GW10	*Dichopogon preissii*	0.5	1	1	1
GW10	*Drosera sp.*	0.1	0.1	0.1	0.1
GW10	*Gnephosis tenuissima*	60	0.1	15	30
GW10	*Grevillea paniculata*	3	0.5	2	3
GW10	*Lepidosperma costale*	0	0	0	1
GW10	*Lobelia heterophylla*	1	0.4	1	1
GW10	*Loxocarya cinerea*	1	0.4	0.4	0.2
GW10	*Neurachne alopecuroidea*	1	2	2	2
GW10	*Opercularia echinocephala*	0.3	0	0.1	0.1
GW10	*Podolepis canescens*	0.2	2	0.2	2
GW10	*Podotheca gnaphalioides*	0	0	0.1	0
GW10	*Schoenia cassiniana*	0.1	1	1	1
GW10	*Stipa trichophylla*	5	8	5	8
GW10	*Waitzia acuminata*	15	40	30	45

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

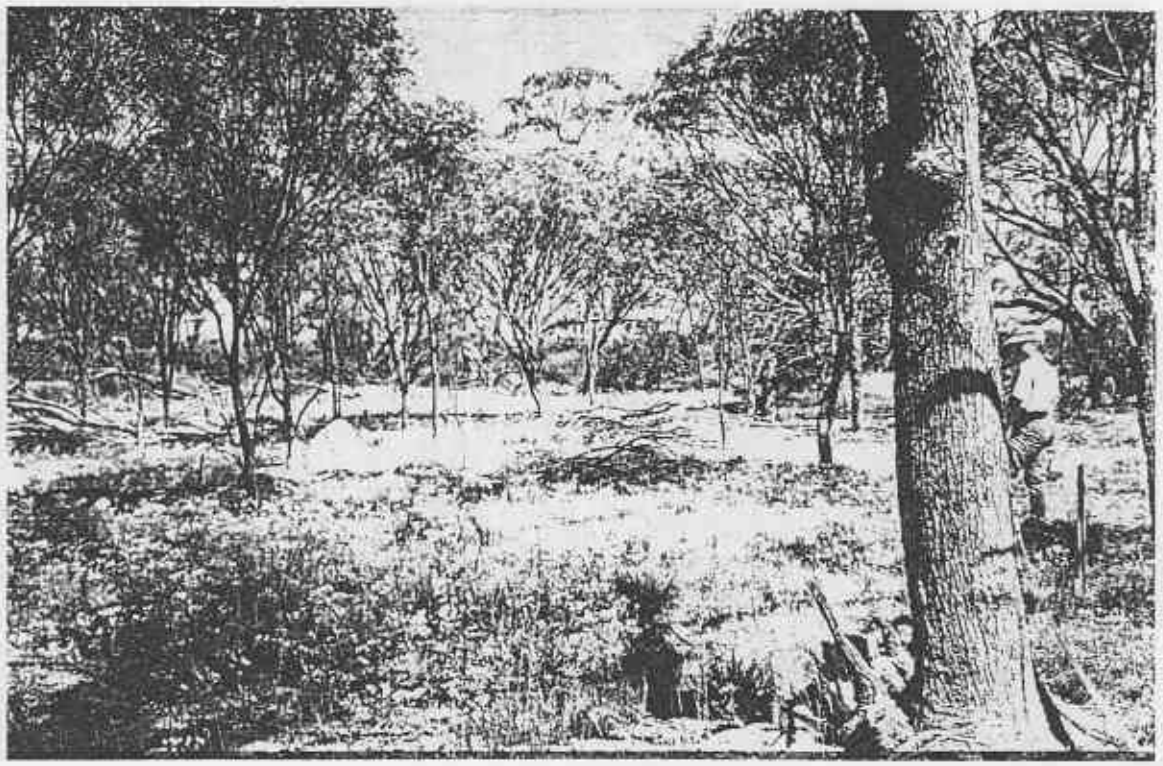

Plate 1 *Eucalyptus loxophleba* - *Acacia acuminata* (York Gum-Jam) Grassy Woodland, Durakoppin Nature Reserve - Site GW1.

Plate 2 Open *Eucalyptus wandoo* (Wandoo) Grassy Woodland, Durakoppin Nature Reserve - Site GW2.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 3 *Eucalyptus loxophleba* - *Spartochloa scirpoidea* Grassy Mallee, Cairn Nature Reserve - Site GW3.

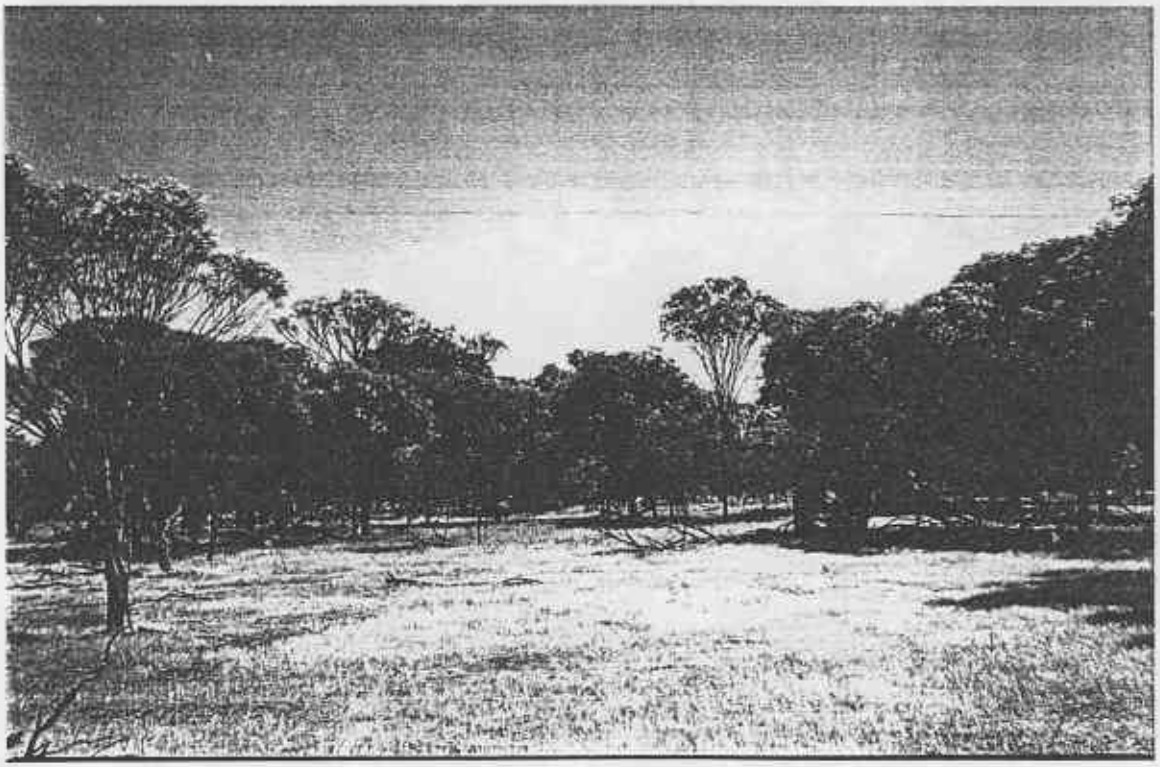

Plate 4 Open *Acacia acuminata* (Jam) Grassy Woodland on shallow granite, Cairn Nature Reserve - Site GW4.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 5 *Eucalyptus wandoo - Allocasuarina huegeliana - Acacia acuminata* (Wandoo-Sheoak-Jam) Grassy Woodland, Tutanning Nature Reserve - Site GW5.

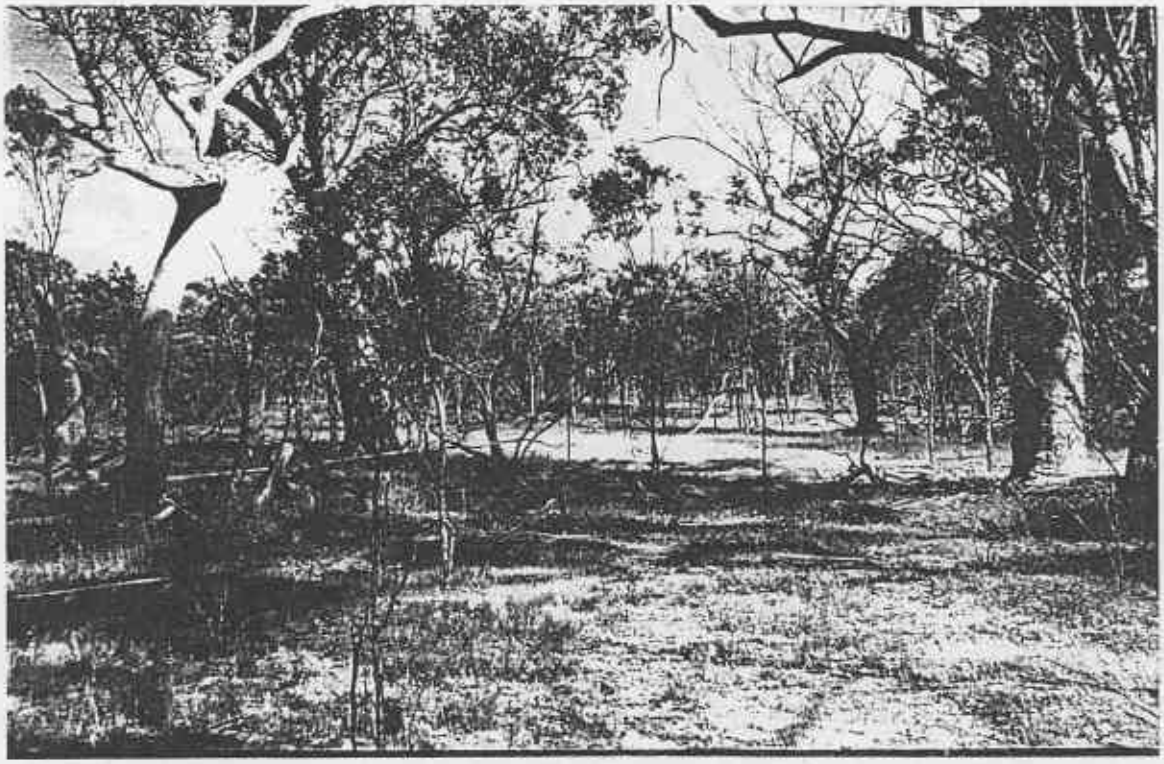

Plate 6 Open *Eucalyptus salmonophloia - Eucalyptus wandoo - Eucalyptus loxophleba* (Salmon Gum-Wandoo-York Gum) Grassy Woodland, Camping Reserve (12109) - Site GW6.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 7 *Eucalyptus wandoo* (Wandoo) Grassy Woodland, Dryandra State Forest - Site GW7.

Plate 8 Open *Eucalyptus wandoo* (Wandoo) Grassy Woodland, Hotham River Nature Reserve (8291) - Site GW8.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 9 Open *Eucalyptus salmonophloia - Eucalyptus wandoo - Acacia acuminata* (Salmon Gum-Wandoo-Jam) Grassy Woodland, private property Popanyinning - Site GW9.

Plate 10 *Eucalyptus loxophleba - Acacia acuminata* (York Gum-Jam) Grassy Woodland, Water Reserve (13510) - Site GW10.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 11 *Poa* Grassland in the Midlands (Central), Tasmania.

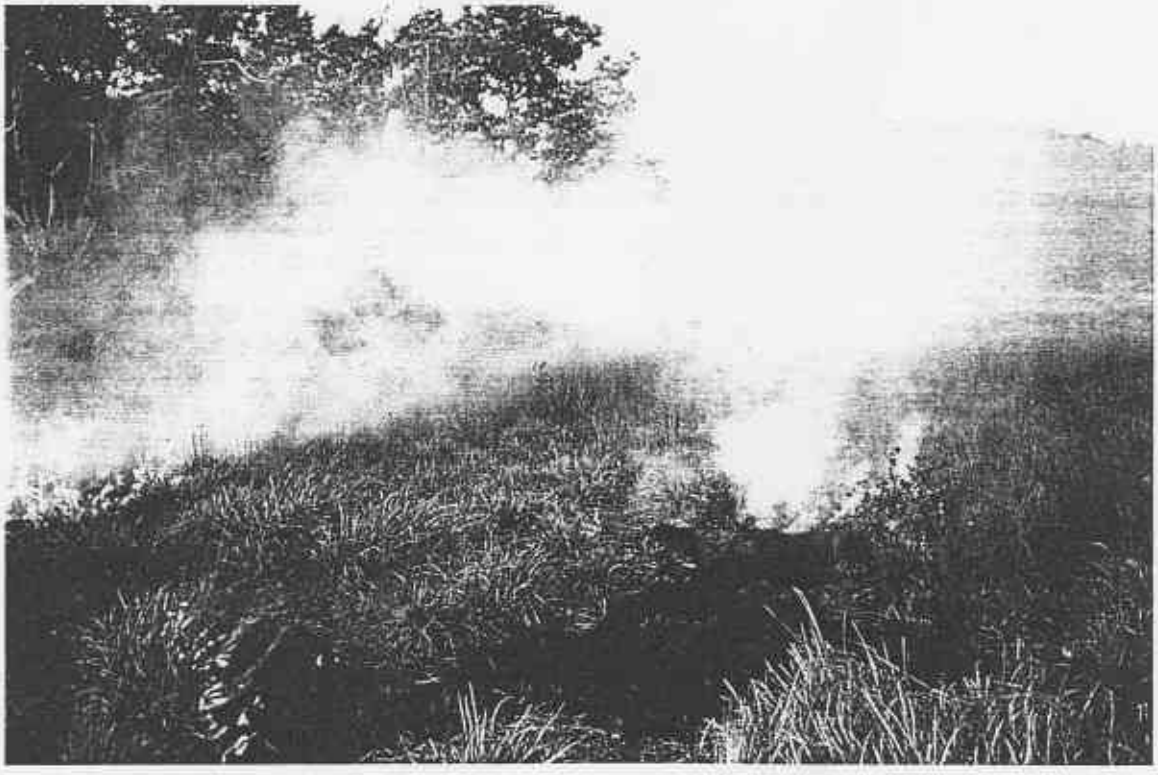

Plate 12 Burning of grassland paddock to maintain species richness.

APPENDIX D: PHOTOGRAPHIC RECORDS OF GRASSY WOODLAND MONITORING PLOTS

Plate 13 Button Grass Grassy Woodlands, Western Tasmania.

APPENDIX E: VASCULAR PLANT SPECIES OF GRASSY WOODLANDS
(*denotes introduced species)

FAMILY		GENUS	SPECIES
LYCOPODIACEAE		*Phylloglossum*	*drummondii*
POACEAE		*Amphipogon*	*strictus*
	*	*Avellinia*	*michelii*
	*	*Avena*	*fatua*
	*	*Briza*	*maxima*
	*	*Briza*	*minor*
	*	*Bromus*	*rubens*
		Danthonia	*caespitosa*
		Danthonia	*setacea*
	*	*Hordeum*	*leporinum*
	*	*Lolium*	*rigidum*
		Neurachne	*alopecuroidea*
	*	*Pentaschistis*	*airoides*
		Polypogon	*monspeliensis*
		Spartochloa	*scirpoidea*
		Stipa	*elegantissima*
		Stipa	*?pycnostachya*
		Stipa	*tenuifolia*
		Stipa	*trichophylla*
	*	*Vulpia*	*bromoides*
	*	*Vulpia*	*myuros*
CYPERACEAE		*Lepidosperma*	*angustatum*
		Lepidosperma	*brunonianum*
		Lepidosperma	*costale*
		Lepidosperma	*drummondii*
		Lepidosperma	*tenue*
		Schoenus	*humilis*
		Schoenus	*sp.*
RESTIONACEAE		*Lepidobolus*	*preissianus*
		Loxocarya	*cinerea*
CENTROLEPIDACEAE		*Aphelia*	*brizula*
		Centrolepis	*aristata*
DASYPOGONACEAE		*Lomandra*	*collina*
		Lomandra	*effusa*
XANTHORRHOEACEAE		*Xanthorrhoea*	*?drummondii*

APPENDIX E: VASCULAR PLANT SPECIES OF GRASSY WOODLANDS
(*denotes introduced species)

FAMILY	GENUS	SPECIES
PHORMIACEAE	*Dianella*	*revoluta*
	Stypandra	*glauca*
ANTHERICACEAE	*Borya*	*sphaerocephala*
	Dichopogon	*capillipes*
	Dichopogon	*preissii*
	Sowerbaea	*laxiflora*
	Thysanotus	*parviflorus*
	Thysanotus	*patersonii*
	Tricoryne	*elatior*
ASPHODELACEAE	*Bulbine*	*semibarbata*
COLCHICACEAE	*Wurmbea*	*tenella*
HAEMODORACEAE	*Anigozanthos*	*sp.*
	Conostylis	*setigera ssp. setigera*
	Haemodorum	*laxum*
IRIDACEAE	*Orthrosanthus*	*laxus*
	Patersonia	*drummondii*
	* *Romulea*	*rosea*
ORCHIDACEAE	*Caladenia*	*roei*
	Microtis	*unifolia*
CASUARINACEAE	*Allocasuarina*	*huegeliana*
URTICACEAE	*Parietaria*	*debilis*
PROTEACEAE	*Grevillea*	*paniculata*
	Hakea	*lissocarpha*
SANTALACEAE	*Santalum*	*acuminatum*
CHENOPODIACEAE	*Enchylaena*	*tomentosa*
AMARANTHACEAE	*Ptilotus*	*declinatus*
	Ptilotus	*holosericeus var rosea*
	Ptilotus	*manglesii*
	Ptilotus	*?roei*
PORTULACACEAE	*Calandrinia*	*calyptrata*

APPENDIX E: VASCULAR PLANT SPECIES OF GRASSY WOODLANDS
(*denotes introduced species)

FAMILY		GENUS	SPECIES
BRASSICACEAE		*Brassicaceae*	*sp. (CG399)*
DROSERACEAE		*Drosera*	*erythrorhiza*
		Drosera	*glanduligera*
		Drosera	*macrantha*
		Drosera	*menziesii ssp. menziesii*
		Drosera	*sp.*
CRASSULACEAE		*Crassula*	*colorata*
PITTOSPORACEAE		*Billardiera*	*sericea*
MIMOSACEAE		*Acacia*	*acuminata*
		Acacia	*erinacea*
		Acacia	*lasiocarpa var. bracteolata*
		Acacia	*microbotrya*
		Acacia	*?pulchella*
		Acacia	*sp. (CG405)*
PAPILIONACEAE		*Daviesia*	*hakeoides ssp. subnuda*
		Daviesia	*?incrassata*
		Gastrolobium	*parvifolia*
		Isotropis	*cuneifolia*
		Nemcia	*sp. (Crisp 6183)*
		Oxylobium	*microcardium*
		Trifolium	*sp.*
GERANIACEAE	*	*Erodium*	*botrys*
	*	*Erodium*	*cicutarium*
OXALIDACEAE		*Oxalis*	*sp.*
LINACEAE		*Linum*	*marginale*
STACKHOUSIACEAE		*Stackhousia*	*monogyna*
		Stackhousia	*sp.*
RHAMNACEAE		*Stenanthemum*	*tridentatum*
DILLENIACEAE		*Hibbertia*	*rupicola*
		Hibbertia	*sp.*

APPENDIX E: VASCULAR PLANT SPECIES OF GRASSY WOODLANDS
(*denotes introduced species)

FAMILY		GENUS	SPECIES
MYRTACEAE		*Calytrix*	*leschenaultii*
		Eucalyptus	*capillosa ssp. capillosa*
		Eucalyptus	*loxophleba ssp. lissophloia*
		Eucalyptus	*loxophleba ssp. loxophleba*
		Eucalyptus	*salmonophloia*
		Eucalyptus	*wandoo*
		Melaleuca	*arenicola*
		Melaleuca	*hamulosa*
HALORAGACEAE		*Gonocarpus*	*nodulosus*
APIACEAE		*Daucus*	*glochidiatus*
		Hydrocotyle	*callicarpa*
		Hydrocotyle	*rugulosa*
		Trachymene	*cyanopetala*
		Trachymene	*pilosa*
EPACRIDACEAE		*Astroloma*	*serratifolium*
PRIMULACEAE	*	*Anagallis*	*arvensis*
GENTIANACEAE		*Centaurium*	*spicatum*
SOLANACEAE		*Nicotiana*	*rotundifolia*
SCROPHULARIACEAE	*	*Parentucellia*	*latifolia*
		Zaluzianskya	*divaricata*
LENTIBULARIACEAE		*Utricularia*	*violacea*
PLANTAGINACEAE		*Plantago*	*varia*
RUBIACEAE		*Opercularia*	*echinocephala*
		Opercularia	*sp.*
CAMPANULACEAE		*Wahlenbergia*	*gracilenta*
LOBELIACEAE		*Isotoma*	*hypocrateriformis*
		Lobelia	*heterophylla*

APPENDIX E: VASCULAR PLANT SPECIES OF GRASSY WOODLANDS
(*denotes introduced species)

FAMILY	GENUS	SPECIES
GOODENIACEAE	*Brunonia*	*australis*
	Dampiera	*lavandulacea*
	Dampiera	*?lindleyi*
	Lechenaultia	*biloba*
	Scaevola	*humifusa*
	Velleia	*cycnopotamica*
STYLIDIACEAE	*Levenhookia*	*dubia*
	Stylidium	*calcaratum*
	Stylidium	*miniatum*
	Stylidium	*uniflorum*
	Stylidium	*sp.*
ASTERACEAE	*Actinobole*	*uliginosum*
	* *Arctotheca*	*calendula*
	Blennospora	*drummondii*
	Brachyscome	*bellidioides*
	Ceratogyne	*obionoides*
	Chthonocephalus	*pseudevax*
	Cotula	*cotuloides*
	Eremophyllum	*tenellum*
	Gilberta	*tenuifolia*
	Gilruthia	*osbornei*
	Gnephosis	*tenuissima*
	Helichrysum	*leucopsideum*
	Helipterum	*demissum*
	Hyalosperma	*cotula*
	* *Hypochaeris*	*glabra*
	Millotia	*tenuifolia*
	Millotia	*tenuifolia var. tenuifolia*
	Olearia	*axillaris*
	Podolepis	*canescens*
	Podolepis	*capillaris*
	Podolepis	*gracilis*
	Podolepis	*lessonii*
	Podotheca	*gnaphalioides*
	Podotheca	*sp. (CG361)*
	Quinetia	*urvillei*
	Rhodanthe	*citrina*
	Rhodanthe	*laevis*
	Schoenia	*cassiniana*
	* *Sonchus*	*oleraceus*
	* *Ursinia*	*anthemoides*
	Waitzia	*acuminata*

APPENDIX F: DISTRIBUTION OF PLANT SPECIES RECORDED IN GRASSY WOODLANDS

LEGEND
+ - recorded in plot
# - recorded in associated vegetation
@ - recorded by other survey (Mattiske Consulting Pty Ltd), August 1995

Plant Species	Plot									
	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9	GW10
Acacia acuminata	+		+	@	+	+			+	+
Acacia erinacea						+				
Acacia lasiocarpa var. bracteolata								+		
Acacia microbotrya						+				
Acacia ?pulchella									+	
Acacia sp.			+							
Acacia sp. (CG405)										
Actinobole uliginosum				@						
Allocasuarina huegeliana					+			+	+	
Amphipogon strictus	+					+				+
?Amphipogon sp.									+	
**Anagallis arvensis*			+		+	+				
Anigozanthos sp.					+					
Aphelia brizula			+							
**Arctotheca calendula*			+	@						
Astroloma serratifolium							+	+		
**Avellinia michelii*			+						+	
**Avena fatua*	+					+				
Billardiera sericea								+		
Blennospora drummondii		+	+		+					
Borya sphaerocephala	+	+	@		+	+	+	+		+
Brachyscome bellidioides	+			@						
Brassicaceae sp. (CG399)										
**Briza maxima*			+			+			+	
**Briza minor*			+						+	
**Bromus rubens*				@		+				
Brunonia australis	+									+
Bulbine semibarbata				@						
Caladenia roei			@							
Calandrinia calyptrata				@						
Calytrix leschenaultii					+					
Centaurium spicatum									+	
Centrolepis aristata			+							
Ceratogyne obionoides				@						
Chthonocephalus pseudevax				@						
Conostylis setigera ssp. setigera							+	+		
Cotula cotuloides				@						
Crassula colorata				@						
Dampiera lavandulacea	+	+	+		+	+	+	+		+
Dampiera ?lindleyi								+		
Danthonia caespitosa		+		@		+	+			
Danthonia setacea						+				
Daucus glochidiatus			+							
Daviesia ?incrassata							+			
Daviesia hakeoides ssp. subnuda								+		
Dianella revoluta	+	+	@			+				+
Dichopogon capillipes	+	+	+		+				+	
Dichopogon preissii										+
Drosera erythrorhiza			+							
Drosera glanduligera			+	@						

APPENDIX F: DISTRIBUTION OF PLANT SPECIES RECORDED IN GRASSY WOODLANDS

LEGEND
+ - recorded in plot
# - recorded in associated vegetation
@ - recorded by other survey (Mattiske Consulting Pty Ltd), August 1995

Plant Species	Plot									
	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9	GW10
Drosera macrantha				@						
Drosera menziesii ssp. menziesii							#			
Drosera sp.										+
Enchylaena tomentosa	+									
Eremophyllum tenellum						+				
**Erodium botrys*			@	@						
**Erodium cicutarium*				@						
Eucalyptus capillosa ssp. capillosa		+								
Eucalyptus loxophleba ssp. lissophloia			+							
Eucalyptus loxophleba ssp. loxophleba	+					+				
Eucalyptus salmonophloia						#			+	
Eucalyptus wandoo					+	+	+	+	+	
Gastrolobium parvifolia		+								
Gilberta tenuifolia	+									
Gilruthia osbornei				@						
Gnephosis tenuissima	+		+							+
Gonocarpus nodulosus									+	
Grevillea paniculata			+	@						+
Haemodorum laxum					#					
Hakea lissocarpha							+	+		
Helichrysum leucopsideum		+								
Helipterum demissum			@							
Hibbertia rupicola									+	
Hibbertia sp.							+			
Hordeum leporinum									+	
Hyalosperma cotula							+			
Hydrocotyle callicarpa			+							
Hydrocotyle rugulosa			+							
**Hypochaeris glabra*	+		+	@	+				+	
Isotoma hypocrateriformis		+				+		+		
Isotropis cuneifolia	+									
Lechenaultia biloba							+			
Lepidobolus preissianus							+	+		
Lepidosperma angustatum							+			
Lepidosperma brunonianum									+	
Lepidosperma costale		+	+							+
Lepidosperma ?costale	+				+					
Lepidosperma drummondii										
Lepidosperma tenue							+	+		
Levenhookia dubia				@						
Linum marginale							#			
Lobelia heterophylla										+
**Lolium rigidum*			+						+	
Lomandra collina		+								
Lomandra effusa	+	+				+		+	+	
Loxocarya cinerea	+	+			+	+	+	+	+	+
Melaleuca hamulosa			+							
Microtis unifolia				@						
Millotia tenuifolia			+							
Millotia tenuifolia var. tenuifolia										

APPENDIX F: DISTRIBUTION OF PLANT SPECIES RECORDED IN GRASSY WOODLANDS

LEGEND

\+ - recorded in plot
\# - recorded in associated vegetation
@ - recorded by other survey (Mattiske Consulting Pty Ltd), August 1995

Plant Species	Plot									
	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9	GW10
Nemcia sp. (Crisp 6183)								+		
Neurachne alopecuroidea	+	+	+		+	+	+	+	+	+
Nicotiana rotundifolia				@						
Olearia axillaris		+								
Opercularia echinocephala										+
Opercularia sp.					+					
Orthrosanthus laxus							+			
Oxalis sp.						+			+	
Oxylobium microcardium							+			
**Parentucellia latifolia*				@						
Parietaria debilis			@							
Patersonia drummondii							#			
**Pentaschistis airoides*	+		+	@	+	+	+		+	+
Phylloglossum drummondii			+	@						
Plantago varia			+	@						
Podolepis canescens	+									+
Podolepis capillaris		+				+				
Podolepis gracilis									+	
Podolepis lessonii	+	+	+	@	+	+	+	+		
Podotheca gnaphalioides	+		+	@						+
Podotheca sp. (CG361)										
**Polypogon monspeliensis*									+	
Ptilotus declinatus					+	+			+	
Ptilotus holosericeus var rosea										
Ptilotus manglesii						+				
Ptilotus ?roei		+								
Quinetia urvillei				@						
Rhodanthe citrina							+			
Rhodanthe laevis			@							
**Romulea rosea*									+	
Santalum acuminatum			+	@						
Scaevola humifusa						+				
Schoenia cassiniana	+									+
Schoenus humilis			+	@						
Schoenus sp.					#					
**Sonchus oleraceus*			+						+	
Sowerbaea laxiflora					+					
Spartochloa scirpoidea			+							
Stackhousia monogyna	+				+					
Stackhousia sp.								+		
Stenanthemum tridentatum						+				
Stipa elegantissima			+	@		+		+	+	
Stipa ?pycnostachya									+	
Stipa tenuifolia			+							
Stipa trichophylla	+	+		@	+	+	+	+		+
Stylidium calcaratum							#			
Stylidium miniatum							+			
Stylidium uniflorum							+			
Stylidium sp.					+					
Stypandra glauca						+				

APPENDIX F: DISTRIBUTION OF PLANT SPECIES RECORDED IN GRASSY WOODLANDS

LEGEND

+ - recorded in plot
# - recorded in associated vegetation
@ - recorded by other survey (Mattiske Consulting Pty Ltd), August 1995

Plant Species	Plot									
	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9	GW10
Thysanotus parviflorus						+				
Thysanotus patersonii			+					+		
Trachymene cyanopetala	+	+								
Trachymene pilosa			+		+	+	+			
Tricoryne elatior									+	
Trifolium sp.									+	
**Ursinia anthemoides*	+	+	@	@	+	+	+		+	
Utricularia violacea							+			
Velleia cycnopotamica			+	@						
**Vulpia bromoides*	+		@	@					+	
**Vulpia myuros*				@						
Wahlenbergia gracilenta				@						
Waitzia acuminata	+	+	+	@						+
Wurmbea tenella			@							
Xanthorrhoea ?drummondii								+		

APPENDIX G: SPECIES RECORDED FROM PLOTS IN ORDER OF DECREASING FREQUENCY
(* denotes introduced species)

Plant Species	York Gum Woodlands				Wandoo Woodlands				Salmon Gum-Wandoo Woodlands	
	GW1	GW4	GW10	GW3	GW2	GW5	GW7	GW8	GW6	GW9
Neurachne alopecuroidea	+		+	+	+	+	+	+	+	+
Loxocarya cinerea	+		+		+	+	+	+	+	+
Podolepis lessonii	+	+		+	+	+	+	+	+	
Stipa trichophylla	+	+	+		+	+	+	+	+	
Dampiera lavandulacea	+		+	+	+	+	+	+	+	
**Pentaschistis airoides*	+	+	+	+		+	+		+	+
**Ursinia anthemoides*	+	+		+	+	+	+		+	+
Borya sphaerocephala	+		+	+	+	+	+	+	+	
Acacia acuminata	+	+	+	+		+			+	+
Dianella revoluta	+		+	+	+				+	
Dichopogon capillipes	+			+	+	+				+
Eucalyptus wandoo						+	+	+	+	+
**Hypochaeris glabra*	+	+		+		+				+
Lomandra effusa	+				+			+	+	+
Stipa elegantissima		+		+				+	+	+
Waitzia acuminata	+	+	+	+	+					
Danthonia caespitosa		+			+		+		+	
Podotheca gnaphalioides	+	+	+	+						
Trachymene pilosa				+		+	+		+	
**Vulpia bromoides*	+	+		+						+
**Anagallis arvensis*				+		+			+	
Allocasuarina huegeliana						+		+		+
Amphipogon strictus	+		+						+	
Blennospora drummondii				+	+	+				
**Briza maxima*				+					+	+
Gnephosis tenuissima	+		+	+						
Grevillea paniculata		+	+	+						
Isotoma hypocrateriformis					+			+	+	
Lepidosperma costale			+	+	+					
Ptilotus declinatus						+			+	+
**Arctotheca calendula*		+		+						
**Avellinia michelii*				+						+
**Avena fatua*	+								+	
**Briza minor*				+						+
**Bromus rubens*		+							+	

APPENDIX G: SPECIES RECORDED FROM PLOTS IN ORDER OF DECREASING FREQUENCY

(* denotes introduced species)

Plant Species	York Gum Woodlands				Wandoo Woodlands				Salmon Gum-Wandoo Woodlands	
	GW1	GW4	GW10	GW3	GW2	GW5	GW7	GW8	GW6	GW9
**Erodium botrys*		+		+						
**Lolium rigidum*				+						+
**Sonchus oleraceus*				+						+
Astroloma serratifolium							+	+		
Brachyscome bellidioides	+	+								
Brunonia australis	+		+							
Conostylis setigera ssp. setigera							+	+		
Drosera glanduligera		+		+						
Eucalyptus loxophleba ssp. loxophleba	+								+	
Eucalyptus salmonophloia									+	+
Hakea lissocarpha							+	+		
Lepidobolus preissianus							+	+		
Lepidosperma ?costale	+					+				
Lepidosperma tenue							+	+		
Oxalis sp.									+	+
Phylloglossum drummondii		+		+						
Plantago varia		+		+						
Podolepis canescens	+		+							
Podolepis capillaris					+				+	
Santalum acuminatum		+		+						
Schoenia cassiniana	+		+							
Schoenus humilis		+		+						
Stackhousia monogyna	+					+				
Thysanotus patersonii				+				+		
Trachymene cyanopetala	+				+					
Velleia cycnopotamica		+		+						
**Erodium cicutarium*		+								
**Parentucellia latifolia*		+								
**Polypogon monspeliensis*										+
**Romulea rosea*										+
**Vulpia myuros*		+								
**Zaluzianskya divaricata*		+								
?Amphipogon sp.										+
Acacia ?pulchella										+
Acacia erinacea									+	

APPENDIX G: SPECIES RECORDED FROM PLOTS IN ORDER OF DECREASING FREQUENCY

(* denotes introduced species)

Plant Species	York Gum Woodlands				Wandoo Woodlands				Salmon Gum-Wandoo Woodlands	
	GW1	GW4	GW10	GW3	GW2	GW5	GW7	GW8	GW6	GW9
Acacia lasiocarpa var. bracteolata								+		
Acacia microbotrya									+	
Acacia sp.				+						
Actinobole uliginosum		+								
Anigozanthos sp.						+				
Aphelia brizula				+						
Billardiera sericea								+		
Bulbine semibarbata		+								
Caladenia roei				+						
Calandrinia calyptrata		+								
Calytrix leschenaultii						+				
Centaurium spicatum										+
Centrolepis aristata				+						
Ceratogyne obionoides		+								
Chthonocephalus pseudevax		+								
Cotula cotuloides		+								
Crassula colorata		+								
Dampiera ?lindleyi								+		
Danthonia setacea									+	
Daucus glochidiatus				+						
Daviesia ?incrassata							+			
Daviesia hakeoides ssp. subnuda								+		
Dichopogon preissii			+							
Drosera erythrorhiza				+						
Drosera macrantha		+								
Drosera menziesii ssp. menziesii							+			
Drosera sp.			+							
Enchylaena tomentosa	+									
Eremophyllum tenellum									+	
Eucalyptus capillosa ssp. capillosa					+					
Eucalyptus loxophleba ssp. lissophloia				+						
Gastrolobium parvifolia					+					
Gilberta tenuifolia	+									
Gilruthia osbornei		+								
Gonocarpus nodulosus										+

APPENDIX G: SPECIES RECORDED FROM PLOTS IN ORDER OF DECREASING FREQUENCY
(* denotes introduced species)

Plant Species	York Gum Woodlands				Wandoo Woodlands				Salmon Gum-Wandoo Woodlands	
	GW1	GW4	GW10	GW3	GW2	GW5	GW7	GW8	GW6	GW9
Haemodorum laxum						+				
Helichrysum leucopsideum					+					
Helipterum demissum				+						
Hibbertia rupicola										+
Hibbertia sp.							+			
Hordeum leporinum										+
Hyalosperma cotula							+			
Hydrocotyle callicarpa				+						
Hydrocotyle rugulosa				+						
Isotropis cuneifolia	+									
Lepidosperma angustatum							+			
Lepidosperma brunonianum										+
Lechenaultia biloba							+			
Levenhookia dubia		+								
Lobelia heterophylla			+							
Lomandra collina					+					
Melaleuca hamulosa				+						
Microtis unifolia		+								
Millotia tenuifolia				+						
Nemcia sp. (Crisp 6183)								+		
Nicotiana rotundifolia		+								
Olearia axillaris					+					
Opercularia echinocephala			+							
Opercularia sp.						+				
Orthrosanthus laxus							+			
Oxylobium microcardium							+			
Parietaria debilis				+						
Podolepis gracilis										+
Ptilotus ?roei					+					
Ptilotus manglesii									+	
Quinetia urvillei		+								
Rhodanthe citrina							+			
Rhodanthe laevis				+						
Scaevola humifusa									+	
Schoenus sp.						+				

APPENDIX G: SPECIES RECORDED FROM PLOTS IN ORDER OF DECREASING FREQUENCY

(* denotes introduced species)

Plant Species	York Gum Woodlands				Wandoo Woodlands				Salmon Gum-Wandoo Woodlands	
	GW1	GW4	GW10	GW3	GW2	GW5	GW7	GW8	GW6	GW9
Sowerbaea laxiflora						+				
Spartochloa scirpoidea				+						
Stackhousia sp.								+		
Stenanthemum tridentatum									+	
Stipa ?pycnostachya										+
Stipa tenuifolia				+						
Stylidium miniatum							+			
Stylidium sp.						+				
Stylidium uniflorum							+			
Stypandra glauca									+	
Thysanotus parviflorus									+	
Tricoryne elatior										+
Trifolium sp.										+
Utricularia violacea							+			
Wahlenbergia gracilenta		+								
Wurmbea tenella				+						
Xanthorrhoea ?drummondii								+		

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Keighery G.J. 6972 Date: 27 05 1984 (PERTH 00489387)
Locality: Base Scarp, 1 km S of Crystal Brook, 25 km E of Perth
Lat.: 35° 02' 26" S Long.: 116° 38' 30" E
mossy sand steep slope low open heath

Themeda australis (Poaceae)
Coll.: Hay G.K.B. s.n. Date: 12 1924 (PERTH 00489603)
Locality: Mount Barker
Lat.: 34° 39' 23" S Long.: 117° 38' 47" E
Previous det.: *Themeda triandra*

Themeda australis (Poaceae)
Coll.: McCallum Webster M. WA/160 Date: 28 01 1979 (PERTH 00489700)
Locality: Roadside verge E of Mt. Barker, Warren
Lat.: 34° 37' 35" S Long.: 117° 39' 54" E

Themeda australis (R. Br.) Stapf. (Poaceae)
Coll.: K.R. Newbey 3844 Date: 23 09 1973 (PERTH 02820544)
Locality: Along Pallinup River, Marra Bridge
Lat.: 34° 20' 36" S Long.: 118° 40' 35" E
35-40 cm high. Granitic sandy loam.

Themeda australis (Poaceae)
Coll.: Beauglehole A.C. ACB 12582 Date: 08 09 1965 (PERTH 00489506)
Locality: 4 ml W of Bridgetown on Brockman Highway
Lat.: 33° 57' 30" S Long.: 116° 04' 05" E

Themeda australis (Poaceae)
Coll.: K.R. Newbey 4034 Date: 14 01 1974 (PERTH 00489611)
Locality: 11.5 km NNW of Pt. Ann, Fitzgerald River National Park
Lat.: 33° 44' 04" S Long.: 119° 53' 39" E
sand & silt river flat

Themeda australis (Poaceae)
Coll.: E.N.S. Jackson 1362 Date: 09 10 1968 (PERTH 00489573)
Locality: Lort River crossing on Esperance-Ravensthorpe main road, [Lort River crossing is ca. 60 km W of Esperance].
Lat.: 33° 44' 00" S Long.: 121° 15' 30" E
granite outcrop beside river

Themeda australis (Poaceae)
Coll.: Stoward R.F. s.n. Date: 12 1916 (PERTH 00489697)
Locality: Harvey
Lat.: 33° 04' 41" S Long.: 115° 53' 29" E
Previous det.: *Anthistiria ciliata*

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: K.J. Atkins KA285 Date: 27 09 1982 (PERTH 00490199)
Locality: Worsley Mine Site, 10 km S of Boddington
Lat.: 32° 53' 41" S Long.: 116° 28' 18" E
heath Wandoo

Themeda australis (Poaceae)
Coll.: K.J. Atkins KA99 Date: 07 01 1982 (PERTH 00489360)
Locality: Worsley Mine Site, 10 km S of Boddington, near study plot M13H
Lat.: 32° 53' 41" S Long.: 116° 28' 18" E
heath Wandoo

Themeda australis (Poaceae)
Coll.: Anonymous s.n. Date: 29 11 1898 (PERTH 00489557)
Locality: Drakesbrook
Lat.: 32° 52' 00" S Long.: 115° 57' 00" E
Previous det.: *Anthistiria ciliata*

Themeda australis (Poaceae)
Coll.: T.E.H. Aplin 1254 Date: 14 11 1961 (PERTH 00489522)
Locality: Roleystone
Lat.: 32° 07' 05" S Long.: 116° 03' 47" E

Themeda australis (Poaceae)
Coll.: R.J. Cranfield 1327/80 Date: 05 08 1980 (PERTH 489530)
Locality: Gooseberry Hill, Kalamunda
Lat.: 31° 59' 0 " S Long.: 116° 5 ' 0 " E
lateritic soil

Themeda australis (Poaceae)
Coll.: Sawyer P. 124 Date: 07 12 1985 (PERTH 00404470)
Locality: Reserve C8120, Coulston Road, Boya
Lat.: 31° 55' 00" S Long.: 116° 02' 59" E
granitic soil near granite outcrops

Themeda australis (Poaceae)
Coll.: Meebold A. Nr. 520 Date: 10 1928 (PERTH 00490237)
Locality: Swan View
Lat.: 31° 52' 59" S Long.: 116° 02' 59" E
Previous det.: *Themeda triandra*

Themeda australis (Poaceae)
Coll.: R.J. Cranfield 1989 Date: 10 12 1981 (PERTH 00489549)
Locality: 17 km NE of Keating Road towards Bindoon, in Chittering Valley
Lat.: 31° 30' 12" S Long.: 116° 06' 53" E
road verge

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: R.J. Anketell s.n. Date: 18 08 1901 (PERTH 00489832)
Locality: E of Kalgoorlie
Lat.: 30° 44' 23" S Long.: 121° 28' 06" E
Previous det.: *Themeda triandra*

Themeda australis (Poaceae)
Coll.: R.J. Cranfield 2854 Date: 24 08 1983 (PERTH 489727)
Locality: Mills lookout, Nanson-Geraldton Road, South Moresby Range
Lat.: 28° 43' 0 " S Long.: 114° 43' 0 " E
red clayey sand high shrubland

Themeda australis (Poaceae)
Coll.: R.J. Cranfield 2946 Date: 25 08 1983 (PERTH 489719)
Locality: 4.4 km NE of Moonyoonooka turnoff Nanson-Geraldton Road, Heinricks, Farm, East Moresby Range
Lat.: 28° 40' 0 " S Long.: 114° 43' 0 " E
brown sandy clay open scrub

Themeda australis (Poaceae)
Coll.: S.T. Blake 18082 Date: 02 09 1947 (PERTH 00490326)
Locality: Buller River, N of Geraldton
Lat.: 28° 38' 17" S Long.: 114° 36' 12" E
scrub Acacia

Themeda australis (Poaceae)
Coll.: E. de C. Clarke 102 Date: 07 1916 (PERTH 00489581)
Locality: E of Laverton
Lat.: 28° 37' 42" S Long.: 122° 24' 06" E

Themeda australis (Poaceae)
Coll.: Blackall W.E. 4513 Date: 31 08 1940 (PERTH 00489514)
Locality: Near Lynton
Lat.: 28° 12' 41" S Long.: 114° 17' 59" E

Themeda australis (Poaceae)
Coll.: Gardner C.A. s.n. Date: 08 1927 (PERTH 00489778)
Locality: Lake Darlot
Lat.: 27° 44' 35" S Long.: 121° 29' 48" E
granite rises

Themeda australis (Poaceae)
Coll.: George A.S. 11974 Date: 17 07 1974 (PERTH 490261)
Locality: Cooper Creek, N of Neale Junction
Lat.: 27° 19' 0 " S Long.: 126° 20' 0 " E
loam flat Mulga

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: D.A. Herbert H.175 Date: 07 1918 (PERTH 00489859)
Locality: Nuendah Creek, Mount Keith
Lat.: 27° 17' 00" S Long.: 120° 30' 00" E
dried up creeks on the goldfields
Previous det.: *Anthistiria*

Themeda australis (Poaceae)
Coll.: Mitchell A.A. 920 Date: 01 03 1982 (PERTH 00489379)
Locality: 20 km W of Coodardy Homestead on road to Noondie
Lat.: 27° 15' 18" S Long.: 117° 25' 51" E
creekline

Themeda australis (Poaceae)
Coll.: George A.S. 2983 Date: 31 08 1961 (PERTH 00490350)
Locality: Near "The Zoo", Laverton - Warburton Road
Lat.: 27° 09' " S Long.: 124° 34' " E

Themeda australis (Poaceae)
Coll.: Lefroy A.L.B. s.n. Date: (PERTH 00490296)
Locality: Boolardy Station
Lat.: 26° 59' 00" S Long.: 116° 31' 59" E

Themeda australis (Poaceae)
Coll.: Speck N.H. 839 Date: 15 09 1957 (PERTH 00489638)
Locality: N of Wiluna
Lat.: 26° 35' 23" S Long.: 120° 13' 29" E
creek flat
Previous det.: *Themeda*

Themeda australis (Poaceae)
Coll.: L.A. Craven 5166 Date: 26 04 1978 (PERTH 489417)
Locality: North Pool, edge of waterhole
Lat.: 26° 27' 0 " S Long.: 120° 9 ' 0 " E

Themeda australis (Poaceae)
Coll.: G. Buchanan s.n. Date: 04 1925 (PERTH 00490083)
Locality: Murchison district
Lat.: 26° 16' 24" S Long.: 116° 35' 41" E

Themeda australis (Poaceae)
Coll.: G. Buchanan s.n. Date: 04 1925 (PERTH 00489816)
Locality: Murchison district
Lat.: 26° 16' 24" S Long.: 116° 35' 41" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: R.J. Cranfield 5448 Date: 03 05 1986 (PERTH 805947)
Locality: 14 km SSE of Belele Station
Lat.: 26° 7 ' 0 " S Long.: 118° 19' 0 " E
red clayey sand river plain open forest

Themeda australis (R. Br.) Stapf. (Poaceae)
Coll.: A.S. George 8185 Date: 30 09 1966 (PERTH 00490172)
Locality: Near Mount Talbot, 5 miles E of Warburton Mission
Lat.: 26° 06' 06" S Long.: 126° 39' 09" E
Perennial grass. In creek bed.

Themeda australis (Poaceae)
Coll.: George A.S. 5225 Date: 21 07 1963 (PERTH 00490148)
Locality: Mt. Aloysius, E of Blackstone Range
Lat.: 26° 02' 00" S Long.: 128° 35' 59" E
rocky creek bed

Themeda australis (Poaceae)
Coll.: P.J. Fuller 12 Date: 10 01 1977 (PERTH 00489425)
Locality: 16 km NE of Warburton on Giles Road
Lat.: 26° 01' 53" S Long.: 126° 42' 25" E
red sandy soil open flat

Themeda australis (Poaceae)
Coll.: Lay b. 869 Date: 29 08 1937 (PERTH 00489492)
Locality: Ca. 5 km W of Blackstone Camp near Blackstone Range, (Blackstone Mining Camp is ca. 80 km W of S.A.-N.T.-W.A. border)
Lat.: 25° 59' 30" S Long.: 128° 06' 54" E
clayey soil gilgai

Themeda australis (Poaceae)
Coll.: A.M. Ashby 4018 Date: (PERTH 00489891)
Locality: Blythe Pool
Lat.: 25° 59' 00" S Long.: 125° 30' 30" E
Previous det.: *Themeda australia*

Themeda australis (Poaceae)
Coll.: Gardner C.A. s.n. Date: 08 1932 (PERTH 00489751)
Locality: Gascoyne River
Lat.: 25° 09' 18" S Long.: 116° 56' 29" E

Themeda australis (Poaceae)
Coll.: Barnett G. s.n. Date: (PERTH 00489743)
Locality: Carnarvon
Lat.: 24° 52' 47" S Long.: 113° 39' 29" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Stewart A. s.n. Date: 02 1938 (PERTH 00490334)
Locality: 36 ml N of Three Rivers
Lat.: 24° 36' 26" S Long.: 119° 08' 47" E
plain Spinifex

Themeda australis (Poaceae)
Coll.: Meadly G.R.W. M.43 Date: 15 07 1937 (PERTH 00489824)
Locality: Wandagee Station - via Carnarvon
Lat.: 23° 45' 59" S Long.: 114° 32' 59" E

Themeda australis (Poaceae)
Coll.: G.G. Gooch 403 Date: (PERTH 00490091)
Locality: Wandagee Station
Lat.: 23° 45' 59" S Long.: 114° 32' 59" E

Themeda australis (Poaceae)
Coll.: G.G. Gooch s.n. Date: 01 08 1937 (PERTH 00490342)
Locality: Wandagee - Kookilya Dlk
Lat.: 23° 45' 54" S Long.: 114° 33' 11" E

Themeda australis (Poaceae)
Coll.: George A.S. 3285 Date: 22 02 1962 (PERTH 00489476)
Locality: Learmonth Road, 44 ml S of Bullara turnoff
Lat.: 23° 16' 05" S Long.: 113° 43' 41" E
red sand

Themeda australis (Poaceae)
Coll.: J.S. Beard 3544 Date: 21 07 1964 (PERTH 00489484)
Locality: 17 ml N of Cardabia turnoff
Lat.: 22° 56' " S Long.: 113° 58' " E
Spinifex

Themeda australis (Poaceae)
Coll.: A.S. Mitchell 704 Date: 25 04 1979 (PERTH 490628)
Locality: Little Sandy Desert
Lat.: 22° 51' 0 " S Long.: 121° 55' 0 " E
sand-plain Spinifex

Themeda australis (Poaceae)
Coll.: Stewart A. s.n. Date: 02 1938 (PERTH 00490369)
Locality: Roy Hill
Lat.: 22° 36' 00" S Long.: 119° 57' 11" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Stewart A. s.n. Date: 02 1938 (PERTH 00490377)
Locality: Roy Hill
Lat.: 22° 36' 00" S Long.: 119° 57' 11" E

Themeda australis (Poaceae)
Coll.: Stewart A. s.n. Date: 02 1938 (PERTH 00490105)
Locality: Roy Hill
Lat.: 22° 36' 00" S Long.: 119° 57' 11" E

Themeda australis (Poaceae)
Coll.: George A.S. 10795 Date: 16 07 1979 (PERTH 490253)
Locality: S of Rudall River
Lat.: 22° 34' 0 " S Long.: 122° 11' 0 " E
sandy sandy creek bed

Themeda australis (Poaceae)
Coll.: K.R. Newbey 10723 Date: 05 08 1984 (PERTH 490229)
Locality: Boolgeeda Creek, 9km ESE of Quarry Hill, ca 120 km W of Tom Price
Lat.: 22° 33' 17" S Long.: 116° 39' 24" E
well-drained, stony, red alluvium narrow flood plain high shrubland *Acacia citrinoviridis*

Themeda australis (Poaceae)
Coll.: Royce R.D. 8422 Date: 14 06 1968 (PERTH 00490180)
Locality: Dale's Gorge, Hamersley Range
Lat.: 22° 29' 35" S Long.: 118° 36' 53" E
red loam among rocks on sides of gorge

Themeda aff. australis (Poaceae)
Coll.: J.S. Beard 4510 Date: 14 08 1966 (PERTH 00489840)
Locality: Dales Gorge
Lat.: 22° 29' 35" S Long.: 118° 36' 53" E
cliffs Callitris
Previous det.: *Themeda australis*

Themeda aff. australis (Poaceae)
Coll.: M.I.H. Brooker 2208 Date: 29 09 1969 (PERTH 00489794)
Locality: Dale's Gorge, on western (shaded) side of gorge
Lat.: 22° 29' 35" S Long.: 118° 36' 53" E
Previous det.: *Themeda australis*

Themeda australis (Poaceae)
Coll.: Pullen R. 10.933 Date: 01 05 1977 (PERTH 319902)
Locality: Turn-off to Kalamina Gorge, Hamersley Range National Park
Lat.: 22° 23' 0 " S Long.: 118° 20' 0 " E
ironstone gravel plain grassland Mallee *Eucalyptus Grevillea Triodia*

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda aff. australis (Poaceae)
Coll.: K.R. Newbey 10044 Date: 29 03 1984 (PERTH 00490202)
Locality: 12 km S of Wittenoon
Lat.: 22° 20' 0 " S Long.: 118° 19' 0 " E
excessively-drained, red sandy loam colluvial slope of gorge high open shrubland Acacia pruinocarpa
Previous det.: *Themeda australis*

Themeda australis (Poaceae)
Coll.: George A.S. 1085 Date: 26 08 1960 (PERTH 00489441)
Locality: 138 ml S of Port Hedland
Lat.: 22° 18' 30" S Long.: 118° 35' 42" E
open creek bed, plain *Triodia*

Themeda australis (Poaceae)
Coll.: J.S. Beard 6131 Date: 08 1970 (PERTH 00490156)
Locality: Hamersley Station
Lat.: 22° 17' 00" S Long.: 117° 41' 00" E
grassplain

Themeda australis (Poaceae)
Coll.: George A.S. 6679 Date: 27 05 1965 (PERTH 00489468)
Locality: 4-5 ml N of Yardie Creek
Lat.: 22° 15' 31" S Long.: 113° 51' 41" E

Themeda australis (Poaceae)
Coll.: R. Black s.n. Date: 13 05 1976 (PERTH 00490318)
Locality: W of Weelumurra Creek
Lat.: 21° 55' 35" S Long.: 117° 37' 53" E

Themeda australis (Poaceae)
Coll.: K.R. Newbey 9917 Date: 23 03 1984 (PERTH 490210)
Locality: 15 km E of Panawonica Hill
Lat.: 21° 41' 0 " S Long.: 116° 34' 0 " E
well-drained, red, stony loamy sand lower slope of Banded Ironstone Formation hills

Themeda australis (Poaceae)
Coll.: R. Black s.n. Date: 09 05 1976 (PERTH 00490636)
Locality: Robe River, upper transect, to N
Lat.: 21° 37' 42" S Long.: 115° 55' 48" E
rocky ledge

Themeda australis (Poaceae)
Coll.: R. Black s.n. Date: 09 05 1976 (PERTH 00490601)
Locality: Rocky bank of pool to north, Robe River Upper transect
Lat.: 21° 37' 42" S Long.: 115° 55' 48" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: J.S. Beard 4545 Date: 17 08 1966 (PERTH 00489735)
Locality: Millstream Station
Lat.: 21° 34' 59" S Long.: 117° 03' 59" E
grass plain

Themeda australis (R. Br.) Stapf in Prain (Poaceae)
Coll.: K.L. Tinley 3272 Date: 04 1988 (PERTH 1848577)
Locality: In Fold Ranges on E margin of Abydos/Woodstock Reserve, North Pilbara region
Lat.: 21° 23' " S Long.: 118° 50' " E
Tufted perennial up to 80 cm high. On alluvia of stony creeks. Abundance: common.

Themeda australis (Poaceae)
Coll.: N.T. Burbidge 1197 Date: 13 06 1941 (PERTH 00489395)
Locality: Mount Edgar Station, SE from Marble Bar
Lat.: 21° 18' 00" S Long.: 120° 03' 59" E
amongst boulders on rocky hillside

Themeda australis (Poaceae)
Coll.: N.T. Burbidge 1036 Date: 08 06 1941 (PERTH 00490113)
Locality: Eginbah Station, bank of Coongan River
Lat.: 20° 52' 00" S Long.: 119° 46' 59" E
sandy soil

Themeda australis (Poaceae)
Coll.: Olsson C. 81 Date: 23 03 1986 (PERTH 837091)
Locality: Beside North West Coastal Highway about 10 km due SW of Karratha near Humes turnoff
Lat.: 20° 48' 0 " S Long.: 116° 47' 0 " E
growing in scattered clumps about 1 m high, leaves medium green, stalks a light purple-brown green with pinkish brown bracts coarse sand and gravel over clay
flat plain bordering a small creek

Themeda aff. australis (Poaceae)
Coll.: A.S. Weston 12715 Date: 11 09 1981 (PERTH 00489786)
Locality: Cossack
Lat.: 20° 41' 0 " S Long.: 117° 11' 0 " E
steep, barren slopes of boulders
Previous det.: *Themeda australis*

Themeda australis (Poaceae)
Coll.: N.T. Burbidge 686 Date: 05 1941 (PERTH 00490121)
Locality: Warralong Station, near water in Coongan River
Lat.: 20° 38' 08" S Long.: 119° 35' 03" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Royce R.D. 7193 Date: 05 06 1962 (PERTH 00489883)
Locality: Dolphin Island, Dampier Archipelago
Lat.: 20° 30' 29" S Long.: 116° 50' 24" E
Previous det.: Themeda

Themeda australis (Poaceae)
Coll.: Anderson s.n. Date: 1898 (PERTH 00489808)
Locality: Mulyie Station, De Grey River
Lat.: 20° 27' 59" S Long.: 119° 30' 59" E

Themeda australis (Poaceae)
Coll.: Royce R.D. 7266 Date: 09 06 1962 (PERTH 00490164)
Locality: Legendre Island, Dampier Archipelago
Lat.: 20° 23' 59" S Long.: 116° 54' 18" E

Themeda australis (Poaceae)
Coll.: Anonymous s.n. Date: (PERTH 00490245)
Locality: De Grey River
Lat.: 20° 21' 47" S Long.: 119° 20' 36" E
Previous det.: *Anthistiria ciliata*

Themeda australis (Poaceae)
Coll.: George A.S. 15514 Date: 30 04 1979 (PERTH 490288)
Locality: Kunningarra Rockhole, Southesk Tablelands
Lat.: 20° 15' 0 " S Long.: 126° 34' 0 " E
sand flat below sandstone hills near dry creek herbs grasses

Themeda australis (Poaceae)
Coll.: Kenneally K.F. 5420 Date: 04 08 1976 (PERTH 490032)
Locality: Edgar Ranges Survey, Site R1, SE of Broome
Lat.: 18° 55' 0 " S Long.: 123° 57' 0 " E
sandy alluvium gorge

Themeda australis (Poaceae)
Coll.: Kenneally K.F. 5420 Date: 04 08 1976 (PERTH 490040)
Locality: Edgar Ranges Survey, Site R1, SE of Broome
Lat.: 18° 55' 0 " S Long.: 123° 57' 0 " E
sandy alluvium gorge

Themeda australis (Poaceae)
Coll.: Slatyer R.O. 50 Date: 22 02 1949 (PERTH 00490008)
Locality: Ord
Lat.: 17° 25' 42" S Long.: 127° 36' 41" E
sandy loam

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Slatyer R.O. 50 Date: 22 02 1949 (PERTH 00490024)
Locality: Ord River
Lat.: 17° 25' 42" S Long.: 127° 36' 41" E
sandy loam

Themeda australis (Poaceae)
Coll.: Gardner C.A. 7270 Date: 26 05 1944 (PERTH 00489921)
Locality: Ord River, below Carlton Reach
Lat.: 17° 25' 42" S Long.: 127° 36' 41" E
basaltic soil

Themeda australis (Poaceae)
Coll.: W.R. Easton 508 Date: 04 1922 (PERTH 00490075)
Locality: Lennard River, Kimberley
Lat.: 17° 24' 36" S Long.: 125° 03' 11" E
Previous det.: *Anthistiria imberbis*

Themeda australis (Poaceae)
Coll.: W.V. Fitzgerald 814 Date: 05 1905 (PERTH 00489905)
Locality: Base of Mount Broome
Lat.: 17° 21' 00" S Long.: 125° 22' 41" E
Previous det.: Anthistiria imberbis

Themeda australis (Poaceae)
Coll.: Forbes S.J. 2664 Date: 14 7 1984 (PERTH 477923)
Locality: SE Kimberley Red Rock Creek Crossing of Bungle Bungle outstation Winnama Spring track
Lat.: 17° 20' 6 " S Long.: 128° 21' 30" E
brown sandy loam above floodplain floodplain open woodland
Spinifex *Eucalyptus dichromophloia, Lysiphhyllum cunninghamii, Hakea orborescens*

Themeda australis (Poaceae)
Coll.: George A.S. 12391 Date: 18 08 1974 (PERTH 489948)
Locality: Blyxa Creek, Prince Regent River Reserve
Lat.: 15° 48' 0 " S Long.: 125° 20' 0 " E
sand open woodland

Themeda australis (Poaceae)
Coll.: Michael P. 3 Date: 16 12 1970 (PERTH 00489999)
Locality: Kununurra, near Irrigation Channel on Department of Agriculture Farm
Lat.: 15° 45' 42" S Long.: 128° 44' 06" E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Gardner C.A. 7403 Date: 11 06 1944 (PERTH 00490016)
Locality: Ivanhoe Station, Lower Ord River
Lat.: 15° 41' 59" S Long.: 128° 41' 00" E

Themeda australis (Poaceae)
Coll.: Langfield E.C.B. 148 Date: 13 02 1950 (PERTH 00490067)
Locality: Kimberley Research Station
Lat.: 15° 39' 17" S Long.: 128° 42' 18" E
Previous det.: Themeda

Themeda australis (Poaceae)
Coll.: George A.S. 12385 Date: 17 08 1974 (PERTH 489980)
Locality: Bushfire Hill, Prince Regent River Reserve
Lat.: 15° 28' 0 " S Long.: 125° 39' 0 " E
lateritic lateritic plateau & basaltic slopes woodland

Themeda australis (Poaceae)
Coll.: Wilson P.G. 10833 Date: 18 05 1972 (PERTH 489964)
Locality: Augustus Island, Bonaparte Archipelago
Lat.: 15° 25' 0 " S Long.: 124° 35' 0 " E

Themeda australis (Poaceae)
Coll.: C.A. Gardner 1323 Date: 09 05 1921 (PERTH 00489956)
Locality: Camden Sound
Lat.: 15° 24' 48" S Long.: 124° 30' 17" E
Previous det.: Anthistiria avenacea

Themeda australis (Poaceae)
Coll.: Kenneally K.F. 4101 Date: 08 08 1975 (PERTH 490059)
Locality: Pseudomys Hills, Drysdale River National Park, N. Kimberley
Lat.: 15° 17' 0 " S Long.: 127° 12' 0 " E
Eucalyptus

Themeda australis (Poaceae)
Coll.: Kenneally K.F. 4359 Date: 16 08 1975 (PERTH 489913)
Locality: Euro Gorge, Drysdale River National Park, N Kimberley
Lat.: 15° 3 ' 0 " S Long.: 126° 44' 0 " E

Themeda australis (Poaceae)
Coll.: G. Chippendale s.n. Date: 25 11 1954 (PERTH 00490407)
Locality: Ayer's Rock Waterhole
Lat.: ° ' " S Long.: ° ' " E

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Perry R.A. 3209 Date: 05 03 1953 (PERTH 00490466)
Locality: 1 ml E of Alice Springs township
Lat.: ° ' " S Long.: ° ' " E
near washaways & eroded areas Acacia aneura

Themeda australis (Poaceae)
Coll.: Lazarides M. 5269 Date: 12 05 1955 (PERTH 00490431)
Locality: Sandover River, 14 ml NW of Ooratippra Station
Lat.: ° ' " S Long.: ° ' " E
sandy red levee *Eucalyptus papuana*

Themeda australis (Poaceae)
Coll.: Winkworth R.E. 1 Date: 26 02 1954 (PERTH 00490458)
Locality: Alice Springs to Owen springs on Jay Creek Reserve - 18 ml WSW of Alice Springs
Lat.: ° ' " S Long.: ° ' " E
creek bank Eucalyptus camaldulensis

Themeda australis (Poaceae)
Coll.: R.J. Anketell s.n. Date: 18 07 1901 (PERTH 00489875)
Locality: Not given
Lat.: ° ' " S Long.: ° ' " E
Previous det.: *Anthistiria australis*

Themeda australis (Poaceae)
Coll.: Koch M. 315 Date: 05 1899 (PERTH 00490482)
Locality: Mt. Lyndhurst
Lat.: ° ' " S Long.: ° ' " E
Previous det.: *Anthistiria ciliata*

Themeda australis (Poaceae)
Coll.: Nelson D.J. 1658 Date: 13 02 1968 (PERTH 00490474)
Locality: McGrath Flat, 30 ml N of Alice Springs
Lat.: ° ' " S Long.: ° ' " E
clayey flat clayey swamp grasses

Themeda australis (Poaceae)
Coll.: Gardner C.A. 11713 Date: 18 03 1953 (PERTH 00489433)
Locality: Palmer River
Lat.: ° ' " S Long.: ° ' " E

Themeda australis (Poaceae)
Coll.: G. Chippendale s.n. Date: 26 03 1958 (PERTH 00490415)
Locality: White Range, 4 ml NE of Arltunga Mission
Lat.: ° ' " S Long.: ° ' " E
rocky hill

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda australis (Poaceae)
Coll.: Nelson D.J. 296 Date: 13 04 1962 (PERTH 00490423)
Locality: 26 ml E of Pine Creek
Lat.: ° ' " S Long.: ° ' " E
blue granite rocks undulating land open forest *Eucalyptus*

Themeda australis (Poaceae)
Coll.: Luehmann J.G. - Date: 1779 (PERTH 00489867)
Locality: Africa, South Asia, all Australia
Lat.: ° ' " S Long.: ° ' " E
Previous det.: Anthistiria ciliata

Themeda australis (Poaceae)
Coll.: Lazarides M. 4372 Date: 15 03 1954 (PERTH 00490393)
Locality: Near Mt. Isa township
Lat.: ° ' " S Long.: ° ' " E
red gravelly soil

Themeda australis (Poaceae)
Coll.: R.J. Anketell s.n. Date: 18 08 1901 (PERTH 00489409)
Locality: Muirs Trans Austr Rly Survey
Lat.: ° ' " S Long.: ° ' " E

Themeda triandra (Poaceae)
Coll.: C. Andrews s.n. Date: 03 1903 (PERTH 00489646)
Locality: Bridgetown
Lat.: 33° 57' 30" S Long.: 116° 08' 06" E
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: R.J. Cranfield 1012/79 Date: 02 11 1979 (PERTH 00489565)
Locality: Mills Road, 0.5 km E of Metro Water Supply access road, Gosnells
Lat.: 32° 04' 30" S Long.: 116° 00' 11" E
lateritic gravel and clay

Themeda triandra (Poaceae)
Coll.: C. Andrews s.n. Date: 07 1902 (PERTH 00489689)
Locality: Darlington
Lat.: 31° 54' 53" S Long.: 116° 04' 18" E

Themeda triandra (Poaceae)
Coll.: King H.J. s.n. Date: 05 05 1924 (PERTH 00489670)
Locality: Toodyay
Lat.: 31° 33' 12" S Long.: 116° 28' 11" E
Previous det.: Themeda forskalii

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda triandra (Poaceae)
Coll.: Morrison A. s.n. Date: 01 11 1903 (PERTH 00489654)
Locality: Bowes River (State Farm)
Lat.: 28° 23' " S Long.: 114° 40' " E
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: D. Pearson DJP 639 Date: 26 06 1989 (PERTH 01781235)
Locality: Pungkalpirri (Banggalbiri) Rockhole, Walter James Range
Lat.: 24° 40' " S Long.: 128° 45' " E
Tussock grass 90 cm tall. On rocky creekline in brown sand.
In grassland with *E. camaldulensis*, sedges, *Grevillea wickhamii*. Abundance: dominant.

Themeda triandra (Poaceae)
Coll.: M.K. Deighton 72 Date: 04 04 1981 (PERTH 00489662)
Locality: Pistol Club flats, Newman
Lat.: 23° 21' 05" S Long.: 119° 43' 48" E
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: E. Leyland MC. 181 Date: 15 05 1990 (PERTH 01781243)
Locality: Millstream Creek crossing Panawonnica Road, Millstream
Lat.: 21° 35' 23" S Long.: 117° 03' 59" E
Stiffly erect grass 1-2 m. Tufted at base. Heads clustered in spikes and racemes, subtended by long linear acute bracts.
Edge of claypan near runoff with regrowth of spinifex.

Themeda triandra (Poaceae)
Coll.: A.A.Mitchell 2664 Date: 20 08 1992 (PERTH 3144909)
Locality: 10km W of Karratha on road to Dampier opp & Mile Railway sheds on E side of road
Lat.: 20° 43' 45" S Long.: 116° 45' 44" E
1.8m tall upright grass bsaes not buried in ground Drainage focus in cracking clay plain
Eragrostis xerophila grassland Common

Themeda triandra Forsskal (Poaceae)
Coll.: B.K. Simon 3895 Date: 11 04 1988 (PERTH 02522535)
Locality: Sandy Creek, 53 km on road to Millewinde from Gibb River road
Lat.: 17° 23' " S Long.: 125° 33' " E
Tufted perennial. High grass savanna woodland.

Themeda triandra (Poaceae)
Coll.: B.K. Simon & M. Sands BKS 4023 Date: 20 04 1988 (PERTH 01775723)
Locality: 30 km on Millewinde road from Gibb River road, King Leopold Ranges
Lat.: 17° 19' " S Long.: 125° 24' " E
Black cracking clay.

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda triandra (Poaceae)
Coll.: R.D. Blythe 26 Date: (PERTH 00489336)
Locality: Mount House Station
Lat.: 17° 03' 00" S Long.: 125° 42' 00" E
Previous det.: *Themeda arguens*

Themeda triandra (Poaceae)
Coll.: Hartley T.G. 14539 Date: 13 03 1978 (PERTH 00274453)
Locality: About 1 mile N of the mouth of Revolver Creek, base of the Southern Carr Boyd Ranges bordering Lake Argyle
Lat.: 16° 14' 0 " S Long.: 128° 34' 0 " E
rocky, open slope
Previous det.: *Themeda triandra*

Themeda triandra (Poaceae)
Coll.: Kenneally K.F. 9564 Date: 11 05 1986 (PERTH 00912654)
Locality: small unnamed bay just S of entrance to Sale River in Doubtful Bay, W Kimberley
Lat.: 15° 59' 0 " S Long.: 124° 46' 0 " E
grass sandstone below sandstone cliffs vine thicket

Themeda triandra (Poaceae)
Coll.: T.E.H. Aplin et al. 426 Date: 25 04 1985 (PERTH 00846554)
Locality: 34 km W of Kununurra, ca 10 km E of junction of Great Northern and Victoria Highways, Gardner Botanical district
Lat.: 15° 53' 0 " S Long.: 128° 28' 0 " E
Caespitose herb 1.3 m high. Undulating basalt country.
With sparse low woodland with *Eucalyptus tectifera* and *E. terminalis*. Abundance: frequent.
Previous det.: *Themeda australis*

Themeda triandra Forsskal (Poaceae)
Coll.: K.M. Durack s.n. Date: 04 1945 (PERTH 00559229)
Locality: Ord River
Lat.: 15° 35' 0 " S Long.: 128° 46' 0 " E
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Paijmans K. 2249 Date: 08 03 1978 (PERTH 00311316)
Locality: 30 km NW of Kununurra, dry plain of Ord River
Lat.: 15° 33' 0 " S Long.: 128° 33' 0 " E
dry plain grassland
Previous det.: *Themeda australis*

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda triandra (Poaceae)
Coll.: Gardner C.A. 823 Date: 09 05 1921 (PERTH 00490717)
Locality: Port George IV Mission, Camden Sound, Kimberley
Lat.: 15° 19' 35" S Long.: 124° 39' 12" E
Previous det.: *Themeda triandra*

Themeda triandra (Poaceae)
Coll.: T.E.H. Aplin et al. 769 Date: 30 04 1985 (PERTH 00845485)
Locality: Rocky Creek, Kalumburu road, 129.1 km by road N of junction with Gibb River and Ellenbrae road, Gardner Botanical district
Lat.: 15° 14' 0 " S Long.: 126° 12' 0 " E
Caespitose herb 1.5 m high. On basaltic rocks with waterhole.
Previous det.: *Themeda avenacea*

Themeda triandra Forsskal (Poaceae)
Coll.: K.F. Kenneally 10064 Date: 30 05 1987 (PERTH 00844462)
Locality: Careening Bay in Port Nelson, NW Kimberley coast
Lat.: 15° 6 ' 0 " S Long.: 125° 03' 00" E
Caespitose grass. In dense clumps. In scree on either side of creek bed.
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: A.A. Mitchell 2138 Date: 04 03 1992 (PERTH 3210839)
Locality: East side of main road
Lat.: 14° 57' 08" S Long.: 128° 44' 06" E
1.0m tall tussocking perennial Tail drain beside main road Weeds Sparse

Themeda triandra (Poaceae)
Coll.: Kenneally K.F. 6743 Date: 20 05 1978 (PERTH 00490520)
Locality: Dog Leg Swamp, 35 km SE of Amax Campsite on the Theda Station Road, Mitchell Plateau, West Kimberley
Lat.: 14° 56' 0 " S Long.: 126° 0 ' 0 " E
laterite
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: R. Hnatiuk MP 192 Date: 25 06 1976 (PERTH 00490563)
Locality: Mitchell Plateau, gauging station
Lat.: 14° 53' 0 " S Long.: 125° 50' 0 " E
Beside very small, intermittent creek.
"Closed grassland" (Specht-ABRS) with a few emergent trees.
Previous det.: *Themeda australis*

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda triandra (Poaceae)
Coll.: J.S. Beard 8325 Date: 21 02 1979 (PERTH 00490512)
Locality: River plain on Camp Creek below crusher, Mitchell Plateau, N.W. Kimberley
Lat.: 14° 52' 0 " S Long.: 125° 46' 0 " E
very open savanna *Eucalyptus papuana* Sorghum
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Shivas R. RS 17 Date: 09 02 1986 (PERTH 00879231)
Locality: Mitchell Plateau, Camp Creek roadside
Lat.: 14° 50' " S Long.: 125° 45' " E
Previous det.: *Themeda triandra*

Themeda triandra (Poaceae)
Coll.: K.F. Kenneally 4886 Date: 15 06 1976 (PERTH 00490571)
Locality: Mitchell Plateau, (Palm Woodland area) W Kimberley
Lat.: 14° 50' 0 " S Long.: 125° 50' 0 " E
Caespitose grass. On bauxite. Palm woodland. Abundance: patchy in understorey.
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Kenneally K.F. 7873 Date: 21 01 1982 (PERTH 00490539)
Locality: 1.5 km SE of mining campsite, Mitchell Plateau, N. Kimberley
Lat.: 14° 50' 0 " S Long.: 125° 50' 0 " E
red clay over basalt exposed sheets of basalt
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: K.F. Kenneally 4887 Date: 15 06 1976 (PERTH 00490598)
Locality: Mitchell Plateau, (Palm Woodland area) W Kimberley
Lat.: 14° 50' 0 " S Long.: 125° 50' 0 " E
Caespitose grass. On bauxite. Under palms.
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Kenneally K.F. 7725 Date: 14 01 1982 (PERTH 00490547)
Locality: Fuel Dump Swamp, 1 km NW of mining campsite, Mitchell Plateau, N. Kimberley
Lat.: 14° 49' 0 " S Long.: 125° 50' 0 " E
Eucalyptus apodophylla, Banksia dentata
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Shivas R. RS 7 Date: 08 02 1986 (PERTH 00879258)
Locality: Mitchell Plateau, Base Camp
Lat.: 14° 44' " S Long.: 125° 44' " E
Previous det.: *Themeda triandra*

APPENDIX H: KNOWN LOCATIONS OF *Themeda triandra (T. australis)* FROM THE WAHERB SPECIMEN DATABASE

Themeda triandra (Poaceae)
Coll.: Shivas R. RS 8 Date: 08 02 1986 (PERTH 00879266)
Locality: Mitchell Plateau, Bent Orchid Falls turnoff
Lat.: 14° 44' " S Long.: 125° 44' " E
Previous det.: *Themeda triandra*

Themeda triandra (Poaceae)
Coll.: J.S. Beard 8386 Date: 23 02 1979 (PERTH 00490504)
Locality: Mitchell Plateau, near Surveyor's Pool, N.W. Kimberley
Lat.: 14° 41' 0 " S Long.: 125° 43' 0 " E
savanna Terminalia
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: J.S. Beard 8488 Date: 28 02 1979 (PERTH 00490490)
Locality: Mitchell Plateau, Lone Dingo, N.W. Kimberley
Lat.: 14° 35' 0 " S Long.: 125° 45' 0 " E
vine thicket
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: Kenneally K.F. 7962 Date: 25 01 1982 (PERTH 00490555)
Locality: Remote weather station, 29 km N of mining camp, Mitchell Plateau, N. Kimberley
Lat.: 14° 34' 6 " S Long.: 125° 48' 6 " E
red soil over basalt vine thicket
Previous det.: *Themeda australis*

Themeda triandra (Poaceae)
Coll.: E.A. Chesterfield & S.J. Forbes EAC 339 Date: 24 05 1984 (PERTH 00817902)
Locality: North Kimberley, Woppinbie Creek, 4 km E of Cone Mountain
Lat.: 14° 11' 40" S Long.: 126° 29' 10" E
black cracking clay *Eucalyptus microtheca - E. tectifera, Themeda - Sorghum - Heteropogon*
Previous det.: *Themeda triandra*

Themeda triandra (Poaceae)
Coll.: J. Borle 82 Date: 15 01 1921 (PERTH 00490857)
Locality: Essexvale, Rhodesia
Lat.: ° ' " S Long.: ° ' " E