

VEGETATION SURVEY OF MT. HARRIS (RESERVE NO. 16904)

REPORT PREPARED FOR: DEPARTMENT OF CONSERVATION AND
LAND MANAGEMENT

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MAY, 1985.

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1.0 INTRODUCTION

Mt. Harris (Reserve No. 16904), located at $116^{\circ} 46'E$ and $33^{\circ} 17'S$, is ca 180km south-east of Perth and 7km north of Darkan. It has a total area of ca 247ha and lies in the Shire of West Arthur. The reserve has been set aside for "Water and Conservation of Flora and Fauna" and is vested in the Minister for Water Supply.

Recently the West Arthur Shire Council queried the Department of Conservation and Land Management concerning fire protection for the reserve, and use of the area for recreation and tourism. This report presents detailed information on the vegetation and floristics so that the appropriate management decisions can be made.

The highest point on the reserve is Mt. Harris, ca 360m, which is located in the northwest corner. Exposed granite is found on the higher ground in the northern half. The water courses are all intermittent and have been converted to concrete culverts, which drain into a covered dam. A contour map of the reserve, showing 20m contours and water-courses is shown in Figure 1.

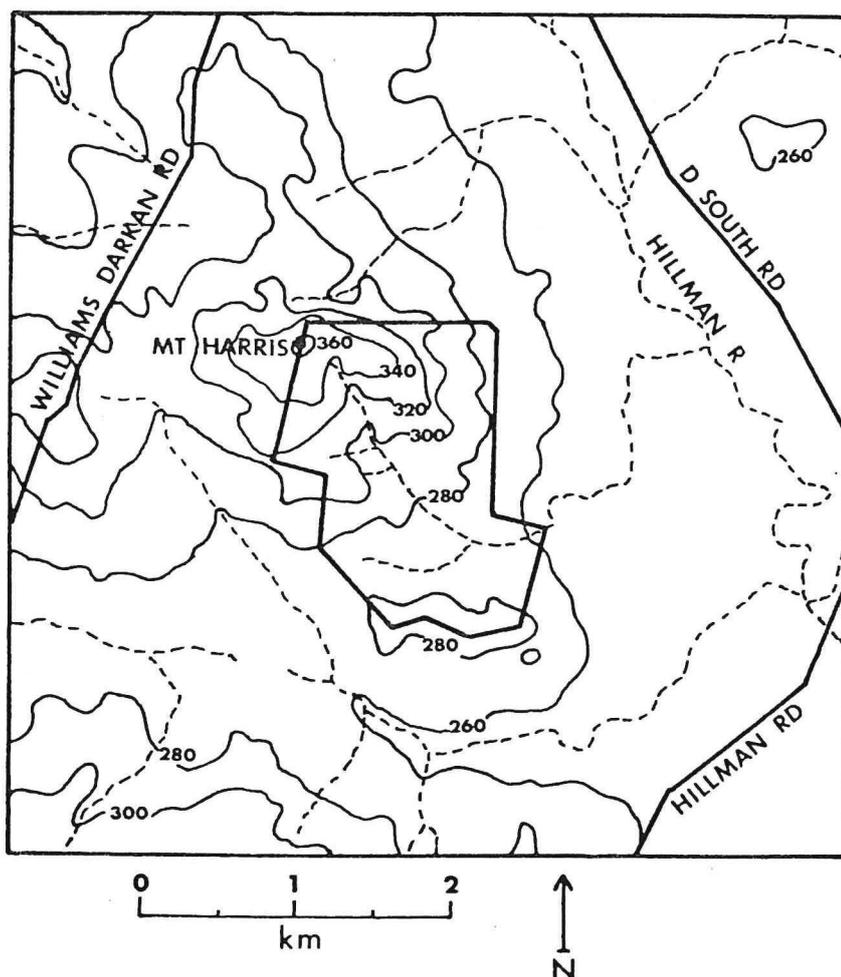


FIGURE 1.

Mt. Harris Reserve showing 20m contours and water courses. Re-produced from Lands & Surveys, Hillman Sheet 2231-II.

2.0 METHODS

The vegetation was surveyed on a 200m x 200m grid. At each intersecting grid point the formation and association were described, based on the method of Muir (1977). The associations were described by the dominant species in the highest stratum. An association map was constructed with the aid of 1:50,000 black and white aerial photography (Level 1 of the reliability scale set out in Muir, 1977).

Detailed association descriptions, based on the classification system devised by B. Muir, were recorded for each association found on the reserve. The site of each description was indicated on the vegetation map. A representative sample of the flora were collected and identified, and unmounted specimens were lodged with the Department of Conservation and Land Management, Katanning office. Gazetted rare flora were taken into consideration during the field survey.

3.0 RESULTS

3.1 Floristics

A total of 63 species were recorded in the reserve, of which 2 are introduced species (Appendix 1.). Specimens of 54 species were collected and lodged with the Department. No gazetted rare flora were recorded (Anonymous, 1983; Rye and Hopper, 1981; Patrick and Hopper, 1982).

3.2 Vegetation Mapping and Descriptions

The following formations and associations were described and mapped for Mt. Harris Reserve.

1. WOODLAND FORMATION

Eucalyptus wandoo

E. wandoo - *E. marginata*

E. marginata

E. calophylla - *E. marginata* - *E. wandoo*

3.0 RESULTS (Cont)

3.2 Vegetation Mapping and Descriptions (Cont)

1. WOODLAND FORMATION (Cont)

E. calophylla - *E. wandoo**Allocasuarina huegeliana* - *Acacia acuminata**E. wandoo* - *Allocasuarina huegeliana* -
Acacia acuminata

2. LITHIC COMPLEX

Stypandra imbricata

TOTALS ARE:

Woodland	7 associations
Lithic Complex	1 association
TOTAL	8 associations

The vegetation map showing the association boundaries is presented in Figure 2, and the detailed association descriptions are tabulated in Appendix 2.

The *Eucalyptus wandoo* association was generally restricted to broad gullies and gentle slopes (Appendix 3, Fig. 3.). The ridges were occupied by the *E. marginata* association.

E. wandoo - *E. marginata* association is perhaps a transition vegetation between the *E. wandoo* and *E. marginata* associations (Appendix 3, Fig. 4.). The *E. calophylla* - *E. marginata* - *E. wandoo* association was restricted to steep gullies and moist conditions.

The shallow soils adjacent to granite outcrops were dominated by the *Allocasuarina huegeliana* - *Acacia acuminata* association (Appendix 3, Fig. 5.). There was often a sharp boundary between *A. huegeliana* - *A. acuminata* and *E. wandoo* (Appendix 3, Fig. 6.).

3.0 RESULTS (Cont)

3.2 Vegetation Mapping and Descriptions (Cont)

Based on the system of B. Muir, the *Eucalyptus wandoo* - *Allocasuarina huegeliana* - *Acacia acuminata* association should have been included in the *E. wandoo* association, as both *Allocasuarina huegeliana* and *Acacia acuminata* occupy stratum 2 of the vegetation profile. It was felt, however, that because the understorey was significantly different from *E. wandoo* it should be mapped as a separate association (Appendix 2.). This association is a transition vegetation between the *E. wandoo* and *Allocasuarina huegeliana* - *Acacia acuminata* associations (Appendix 3, Fig. 7.). There were only two occurrences of the *E. calophylla* - *E. wandoo* association, both on moist sites.

4.0 MANAGEMENT

There currently appears to be little usage of Mt. Harris reserve, and most people who visit live close to the reserve. If the area was developed for recreation and tourism, then important management plans should be implemented to conserve the flora and fauna. These plans could be divided into four sections - fire, dieback disease, people and introduced animals.

4.1 FIRE

With increased usage the occurrence of uncontrolled fires would increase and a fire management plan would be required. Such a plan must take into consideration the predominance of *Eucalyptus wandoo*, a fire sensitive species. High intensity fires will kill this species. It is also important that fire-breaks are maintained, as the reserve is surrounded by agricultural land, which poses a high fire risk.

3.0 RESULTS (Cont)

3.2 Vegetation Mapping and Descriptions (Cont)

Based on the system of B. Muir, the *Eucalyptus wandoo* - *Allocasuarina huegeliana* - *Acacia acuminata* association should have been included in the *E. wandoo* association, as both *Allocasuarina huegeliana* and *Acacia acuminata* occupy stratum 2 of the vegetation profile. It was felt, however, that because the understorey was significantly different from *E. wandoo* it should be mapped as a separate association (Appendix 2.). This association is a transition vegetation between the *E. wandoo* and *Allocasuarina huegeliana* - *Acacia acuminata* associations (Appendix 3, Fig. 7.). There were only two occurrences of the *E. calophylla* - *E. wandoo* association, both on moist sites.

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4.0 MANAGEMENT (Cont)

4.1 FIRE (Cont)

The fauna should also be considered in a fire management plan. Unless a particular fauna group is being conserved in the reserve, a mosaic effect should be developed so that different seral stages are present (Pickett and Thompson, 1978).

Several features indicate that most of the reserve has not been burnt for many years (except area marked on Fig. 2.);

- deep litter layer
- senescent trees and shrubs, particularly
Allocasuarina huegeliana, *Dryandra sessilis* and
D. carduacea
- thick bark on *Eucalyptus marginata*

The large fuel loads present a high fire risk. This adds to the urgency of a fire management plan, as an uncontrolled high intensity fire may cause considerable damage to vegetation and fauna.

4.2 DIEBACK DISEASE

Some areas, particularly the southwest corner, were reflecting the presence of the fungus disease, *Phytophthora cinnamomi*. This was evident in the recent deaths of about one third of the sapling and pole size Jarrah. For this reason, vehicle movement should be restricted or prohibited.

4.3 PEOPLE

The main tourist attraction of the reserve is Hillman Rock (Fig. 2.). This is a large area of exposed granite which offers scenic views of the surrounding landscape. If tourism was developed then the following facilities should be established to minimize disturbance:

4.0 MANAGEMENT (Cont)

4.3 PEOPLE (Cont)

- a) Picnic area and rubbish bins. During the botanical survey, rubbish was only observed in the south-east corner, adjacent to the access gate. This would be a suitable location for a picnic area as it is already disturbed and on the edge of the reserve.
- b) Walk trail. This could be established next to the existing culvert (Fig. 2.), where there has been some disturbance already.
- c) Public Awareness. With increased usage, the exposed granite areas will be put under stress through trampling and removal of rocks (refuge for many fauna). The public will need to be made aware of the sensitivity of the "granite community".

4.4 ANIMALS

In some areas there was destructive grazing of *Xanthorrhoea preissii*. The possible cause may be horses or cattle, because of the height of the graze line. Introduced animals must be kept out of the reserve to prevent grazing damage.

5.0 REFERENCES

Anonymous (1983). "Protecting Our Flora". Department of Fisheries and Wildlife.

Green, J.W. (1981). "Census of the Vascular Plants of Western Australia". Western Australian Herbarium, Department of Agriculture.

Muir, B.G. (1977). "Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and Habitat of Bendering Reserve". Western Australian Museum, Supplement No. 3.

Patrick, S.J. and Hopper, S.D. (1982). "A guide to the Gazetted Rare Flora of Western Australia: Supplement 1". Report No. 54, Dept. Fisheries and Wildlife.

Pickett, S.T.A. and Thompson, J.N. (1978). "Patch Dynamics and the Design of Nature Reserves". Biological Conservation 13: 27-37.

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APPENDIX 1VASCULAR PLANT LIST FOR MT. HARRIS (RESERVE NO. 16904)

Families are arranged according to the Engler System of Classification (Green, 1981).

* - signifies naturalized or introduced species

N - no specimen collected.

ADIANTACEAE

Cheilanthes tenuifolia

ZAMIACEAE

Macrozamia riedlei N

POACEAE

* *Avena fatua* N

* *Briza maxima* N

CYPERACEAE

Lepidosperma gracile

Lepidosperma longitudinale

Tetraria capillaris

RESTIONACEAE

Lepidobolus chaetocephalus

Loxocarya fasciculata

Loxocarya flexuosa

LILIACEAE

Borya nitida

Stypandra imbricata

Xanthorrhoea preissii N

HAEMODORACEAE

Haemodorum paniculatum

CASUARINACEAE

Allocasuarina huegeliana

Allocasuarina humilis

APPENDIX 1

PROTEACEAE

Banksia grandis N
Dryandra armata
Dryandra bipinnatifida
Dryandra carduacea
Dryandra fraseri
Dryandra nivea
Dryandra sessilis
Grevillea bipinnatifida
Hakea incrassata
Hakea lissocarpa
Hakea prostrata
Hakea trifurcata
Hakea undulata
Persoonia quinquenervis
Petrophile serruriae
Petrophile squamata
Petrophile striata
Synaphea petiolaris

SANTALACEAE

Santalum acuminatum

PITTOSPORACEAE

Sollya heterophylla

LEGUMINOSAE SUBFAM. MIMOSOIDEAE

Acacia acuminata
Acacia celastrifolia
Acacia lasiocarpa var. *sedifolia*
Acacia nervosa
Acacia pulchella var. *pulchella*

LEGUMINOSAE SUBFAM. PAPILIONOIDEAE

Bossiaea eriocarpa
Bossiaea ornata
Gastrolobium bilobum
Gastrolobium calycinum
Gastrolobium spinosum
Gastrolobium sp.
Jacksonia sternbergiana

EUPHORBIACEAE

Phyllanthus calycinus

SAPINDACEAE

Dodonaea humifusa
Dodonaea pinifolia

RHAMNACEAE

Trymalium ledifolium

APPENDIX 1.

DILLENIACEAE

*Hibbertia commutata**Hibbertia enervia*

MYRTACEAE

*Calothamnus aff. quadrifidus**Eucalyptus calophylla* N*Eucalyptus marginata* N*Eucalyptus wandoo* N*Hypocalymma aff. robustum**Leptospermum erubescens*

EPACRIDACEAE

Astroloma pallidum N*Leucopogon propinquus**Styphelia tenuiflora*

APPENDIX 2VEGETATION DESCRIPTIONS1. WOODLAND FORMATIONS

* Location 1.1

Key Description

Woodland over Open Low Woodland B over Low Scrub B over
Low Heath D on gravel-sand

Location Details.

Stratum 1. 100% *Eucalyptus wandoo*, sometimes with scattered
E. calophylla. Both species senescent, stratum
15-20m tall, 10-30% canopy cover at sample point.

Stratum 2. *Dryandra sessilis*, *Hakea prostrata* and *Santalum*
acuminatum trees. All species mature, stratum 2m tall,
2-10% canopy cover at sample point.

Stratum 3. *Xanthorrhoea pressii*, *Dryandra carduacea*, *Allocasuarina*
humilis, *Grevillea bipinnatifida* and *Petrophile serruriae*
shrubs. All species mature, stratum 1m tall, 10-30%
canopy cover at sample point.

Stratum 4. *Bossiaea ornata*, *B. eriocarpa*, *Hakea lissocarpha*,
Trymalium ledifolium, *Petrophile striata* and *Tetraria*
capillaris shrubs. All species mature, stratum 0.4m
tall, 30-70% canopy cover.

Comments: No evidence of recent fire or logging.

Litter : Depth 1cm and 80% ground cover. Composed of bark and
broad leaves.

APPENDIX 2

* Location 1.2

Key Description

Forest over Open Low Woodland B over Heath A over Low
Sedges on sand-loam

Location Details.

- Stratum 1. 50% *Eucalyptus wandoo*, 50% *E. marginata* at sample point, but varying ratio throughout reserve. Scattered *E. calophylla*. All species mature, stratum 20m tall, 30-70% canopy cover at sample point.
- Stratum 2. *Dryandra sessilis* and *Hakea prostrata* tree. All mature, stratum 3m tall, 2-10% canopy cover at sample point.
- Stratum 3. *Xanthorrhoea preissii*, *Leptospermum erubescens* and *Dryandra carduacea* shrubs. All mature, stratum 2m tall, 30-70% canopy cover at sample point.
- Stratum 4. *Loxocarya fasciculata*, *L. flexuosa* and *Tetraria capillaris* sedges and *Hibbertia commutata*, *Bossiaea eriocarpa* shrubs (not dominant). All mature, 0.2m tall, 30-70% canopy cover at sample point.
- Comment: No evidence of recent fire or logging. Some deaths of mature *Eucalyptus marginata*, not recent. May be due to *Phytophthora cinnamomi*.
- Litter : 2cm deep and 90% ground cover. Composed of broad leaves, bark and small branches.

APPENDIX 2

* Location 1.3

Key Description

Forest over Low Forest B over Open Low Scrub B over Very Open
Low Sedges on gravel-sand

Location Details.

- Stratum 1. 100% *Eucalyptus marginata*, sometimes scattered
E. calophylla. Both species mature, stratum 20-25m
tall, 30-70% canopy cover at sample point.
- Stratum 2. *Dryandra sessilis*, *Leptospermum erubescens* and
Acacia celastrifolia trees. All mature, 4m tall,
30-70% canopy cover at sample point.
- Stratum 3. *Dryandra carduacea*, *Xanthorrhoea preissii*, *Petrophile*
serruriae, *Trymalium ledifolium*, *Styphelia tenuiflora*
and *Bossiaea eriocarpa* shrubs. All mature, stratum
1m tall, 2-10% canopy cover at sample point.
- Stratum 4. *Tetraria capillaris* and *Lepidobolus chaetocephalus*
sedges and *Hibbertia commutata* and *H. enervia* shrubs.
(Not dominant). All mature, 0.2m tall, 2-10% canopy
cover at sample point.
- Comments: No evidence of recent fire.
- Litter : Depth 2cm and 50% ground cover. Composed of broad
leaves and small branches.

APPENDIX 2

* Location 1.4

Similar to location 1.3, except stratum 1.

Location Details.

Stratum 1. 100% *Eucalyptus marginata*, with scattered
E. wandoo. Both species senescent, stratum
20-25m tall, 10-30% canopy cover at sample
point.

APPENDIX 2

* Location 1.5

Key Description

Forest over Low Forest A over Low Scrub B over Very Open
Low Sedges on loam-sand

Location Details.

Stratum 1. 45% *Eucalyptus calophylla*, 40% *E. marginata*
15% *E. wandoo*, at sample point. *E. calophylla*
is always dominant, but ratios of other two
species varies throughout reserve. All species
mature, stratum 25m tall, 30-70% canopy cover
at sample point.

Stratum 2. *Gastrolobium bilobum* and *Dryandra sessilis* trees.
Both mature, 5m tall, 30-70% canopy cover at
sample point.

Stratum 3. *Hakea lissocarpa*, *Acacia pulchella*, *Trymalium*
ledifolium, *Xanthorrhoea preissii*, *Leucopogon*
propinquus, *Phyllanthus calycinus* and
Gastrolobium spinosum shrubs. All mature,
stratum 1m tall, 10-30% canopy cover at sample
point.

Stratum 4. *Tetraria capillaris*, *Loxocarya fasciculata* sedges
and *Hibbertia commutata* shrubs (not dominant).
All mature, stratum 0.3m tall, 2-10% canopy cover
at sample point.

Comments: No evidence of recent fire.

Litter: Depth 2cm and 90% ground cover. Composed of broad
leaves and small branches.

APPENDIX 2

* Location 1.6

Key Description

Forest over Low Forest A over Low Scrub A over Dense Low
Sedges on sand-clay

Location Details.

Stratum 1. 70% *Eucalyptus calophylla* and 30% *E. wandoo*.

Both species mature, stratum 15m tall, 30-70%
canopy cover at sample point.

Stratum 2. *Acacia acuminata*. Mature, 8-10m tall, 30-70% canopy cover
at sample point.

Stratum 3. *Gastrolobium calycinum*, *Dryandra carduacea*, *Xanthorrhoea*
preissii, *Hibbertia enervia* and *Trymalium ledifolium*
shrubs. All mature, stratum 2m tall, 10-30% canopy cover
at sample point.

Stratum 4. *Loxocarya flexuosa* and *Briza maxima*. Mature, 0.2m tall,
70-100% canopy cover at sample point.

Comment: No evidence of recent fire.

Litter: Depth 1cm, 50% ground cover. Composed of broad leaves.

APPENDIX 2

* Location 1.7

Key Description

Dense Low Forest A over Open Low Scrub A over Low Sedges
on shallow gravel overlying granite.

Location Details.

Stratum 1. 95% *Allocasuarina huegeliana* and 5% *Acacia acuminata*. Both species often senescent, stratum 10m tall, 70-100% canopy cover at sample point.

Stratum 2. *Xanthorrhoea preissii*, *Macrozamia riedlei* and *Sollya heterophylla* shrubs. All mature, 2m tall, 2-10% canopy cover at sample point.

Stratum 3. *Loxocarya flexuosa* sedge (dominant) and *Hibbertia commutata*, *Briza maxima* (not dominant). All mature, stratum 0.2m tall, 30-70% canopy cover at sample point.

Comments: No evidence of recent fires.

Litter : Depth 4cm, 95% ground cover. Composed of terete leaves.

APPENDIX 2

* Location 1.8

Key Description

Woodland over Low Forest A over Open Low Scrub A over Open Dwarf Scrub D over Low Sedges on Shallow gravel overlying granite

Location Details.

Stratum 1. 100% *Eucalyptus wandoo*. Mature, stratum 20m tall, 10-30% canopy cover at sample point.

Stratum 2. 90% *Allocasuarina huegeliana*, 10% *Acacia acuminata*. All species mature, stratum 6-8m tall, 30-70% canopy cover at sample point.

Stratum 3. *Hakea prostrata* and *Xanthorrhoea preissii* shrubs. Both mature, 2m tall, 2-10% canopy cover at sample point.

Stratum 4. *Bossiaea eriocarpa*. Mature, stratum 0.4m tall, 2-10% canopy cover at sample point.

Stratum 5. *Loxocarya flexuosa* and *Tetraria capillaris* sedges. Mature, stratum 0.2m tall, 30-70% canopy cover at sample point.

Comments: No evidence of recent fire.

Litter: Depth 4cm, 90% ground cover. Composed of terete leaves.

APPENDIX 25. LITHIC COMPLEXES

* Location 5.1

Key Description

Open Dwarf Scrub D over Very Open Herbs over Very Open Ferns
and Mosses on exposed granite

Location Details.

Stratum 1. *Stypandra imbricata* and *Phyllanthus calycinus* shrubs.
Scattered occurrences of *Avena fatua*. Mature, stratum
0.5m tall, 2-10% canopy cover at sample point.

Stratum 2. *Borya nitida*. Mature, 0.1m tall, 2-10% canopy cover
at sample point.

Stratum 3. *Cheilanthes tenuifolia* and Mosses. Mature, 2-10%
canopy cover at sample point.

Comment: No evidence of human disturbance.

Litter: Very sparse.

ASSOCIATION PHOTOGRAPHS

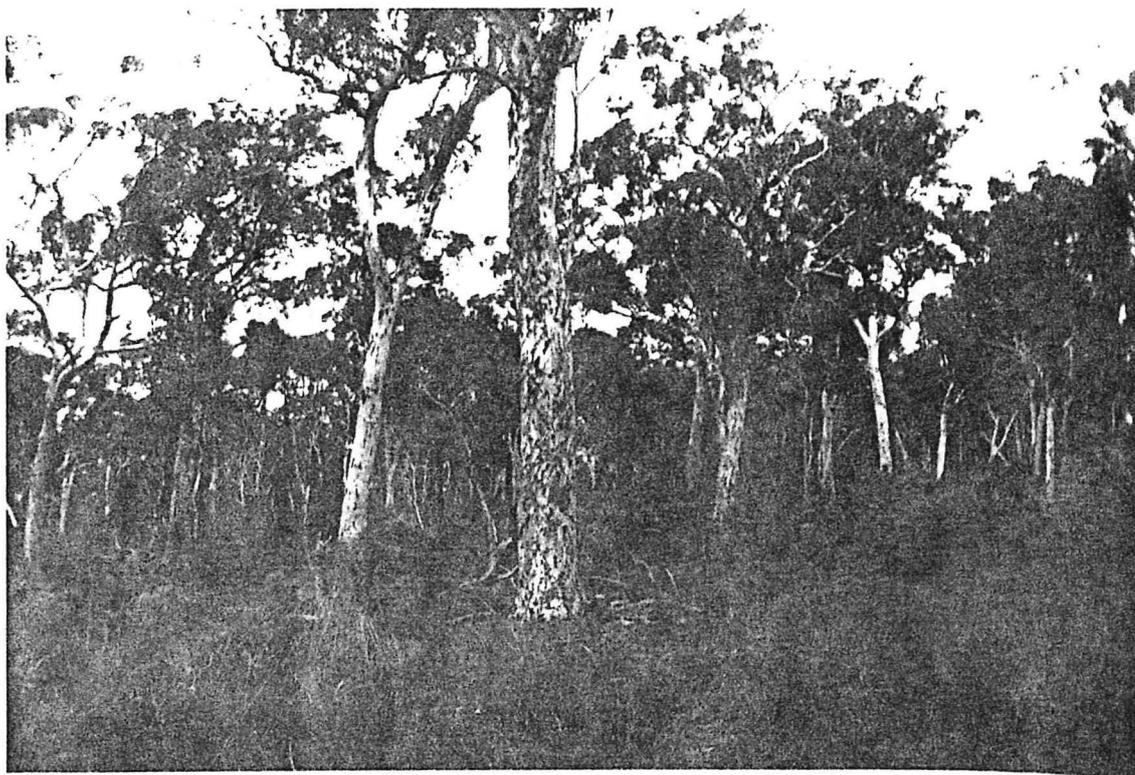


Figure 3. *Eucalyptus wandoo* association



Figure 4. *Eucalyptus wandoo* - *E. marginata* association



LEFT. FIGURE 5.

Allocasuarina huegeliana -
Acacia acuminata association.

BELOW: FIGURE 6.

Sharp boundary between
Allocasuarina huegeliana -
Acacia acuminata association
(foreground) and *Eucalyptus*
wandoo association (background)

