

**A BOTANICAL SURVEY OF A RABBIT STUDY AREA,
CHIDLOW**

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ABSTRACT

A botanical survey of a Rabbit Study Area at Chidlow recognised nine plant communities in three structural formations of vegetation. 240 plant species were recorded of which 183 were native and 57 were naturalised aliens.

The vegetation and flora of the RSA were typical of those present in the eastern Darling Range, under similar conditions of clearing and disturbance.

INTRODUCTION

The Rabbit Study Area (RSA) in the Darling Range at Chidlow (31°57'S, 116°19'E) lies due east and approximately 55 km from Perth. At the time the survey was conducted the area was being used by the Research Section of the Agriculture Protection Board for studying the biology and control of rabbit populations. The RSA Avon Location 3444, is an old farm which was resumed for water catchment. It covers an area of approximately 800 hectares of which about 40% is cleared, and is surrounded by native vegetation.

The area experiences a Mediterranean-type climate with an annual rainfall averaging 920 mm. The wettest six-monthly period is from May to October. The maximum mean temperatures are 30.8°C in February and 15.7°C in July, with the minimum temperature means for the same months being 17.5°C and 8.5°C respectively, recorded at Kalamunda (see Table 1).

The soil is heavy, being lateritic gravel on the upper slopes and heavy loam on the lower slopes and floodplain of the Helena River, a winter-flowing creek which passes through the area. The soils overlie granite which outcrops in localised patches.

The cleared area sown to pasture is situated on the floodplain and is surrounded by native vegetation, mostly *Eucalyptus* woodland with a low

Table 1. Mean maximum and minimum temperatures recorded at Kalamunda ($32^{\circ} 0'S$, $116^{\circ} 4'E$, elevation 317.0 M) and mean monthly rainfall recorded at Chidlow ($31^{\circ} 52'S$, $116^{\circ} 16'E$, elevation 300.0 M). (Courtesy of Dept. of Science and Technology, Bureau of Meteorology, Perth).

	Daily Maximum Temperature ($^{\circ}C$) Mean	Daily Minimum Temperature ($^{\circ}C$) Mean	Rainfall (mm) Mean
JAN	29.3	15.9	11
FEB	30.8	17.5	17
MAR	28.1	15.4	19
APR	22.7	12.4	44
MAY	19.8	11.2	118
JUN	16.1	9.2	186
JUL	15.7	8.5	192
AUG	15.5	8.0	145
SEP	17.0	8.8	90
OCT	21.3	10.4	60
NOV	23.6	11.5	24
DEC	28.1	14.0	14
		ANNUAL TOTAL	920

sparse shrub and herb layer. The pasture is rank except in the vicinity of some of the larger groups of rabbit warren, where the grazing pressure of rabbits maintains a short sward.

There has been no domestic stock on the property since 1971, but there is some grazing by the Western grey kangaroo, *Macropus fuliginosus ocydromus*.

METHOD

The plant communities in the RSA were mapped by aerial photographic interpretation, supported by data obtained from ground traverses. The structural classification used follows that adopted by Aplin (1981).

Several locations in each of the vegetation communities were sampled floristically to provide a flora list of the area. Nomenclature follows Green (1981), and voucher specimens have been lodged at the Western Australian Herbarium (PERTH).

RESULTS

Three structural forms of vegetation were recognised. These consist of forest, woodland and herbland communities and are shown on the aerial photograph (Fig. 1).

Forest communities

1. Plantations of *Pinus radiata*.
2. Fringing forest of paperbarks, *Melaleuca raphiophylla*, along creeks (Fig. 2a).

Woodland communities

1. *Casuarina huegeliana* on granite outcrop.
2. *Eucalyptus wandoo* on granite and heavy loams (Fig. 2b).
3. *Eucalyptus calophylla* on loam (Fig. 2c).
4. *Eucalyptus marginata* on laterites.
5. *Eucalyptus patens* on alluvial soils of floodplain (Fig. 2d).
6. *Eucalyptus rudis* along creeks.

Herbland community

1. A man-made pasture land, consisting of annual species of naturalised aliens, situated on the floodplain.

240 plant species were recorded in the RSA, of which 183 were native and 57 were aliens. These are listed in Appendix 1. Most of the species were recorded in more than one of the vegetation communities.

The vegetation communities with the most number of alien species were *E. wandoo*-*E. calophylla*-*E. marginata* woodlands (44) and *E. patens* woodlands and associated herblands (41). *E. rudis* and *M. raphiophylla* fringing communities (32) and *C. huegeliana* woodland (23) contained lesser numbers of alien species.

The number of native species were also very much higher in the *E. wandoo*-*E. calophylla* (142) and *E. patens* (81) communities, than in the fringing (46) and *Casuarina* (39) communities.

194 of the total number of species were herbaceous annuals or short-lived perennials, while only 48 woody perennial species were present, these latter belonging to such families as the Casuarinaceae, Dilleniaceae, Epacridaceae, Leguminosae, Myrtaceae, Proteaceae and Thymelaeaceae.

DISCUSSION

The vegetation of the RSA was typical of the general region of the eastern Darling Range (Beard, 1981). *E. wandoo* and *E. calophylla* are dominant on valley sides with *E. patens* occupying the valley floors; *E. rudis* and *M. raphiophylla* typically fringing water courses; and *Casuarina huegeliana* being associated with granite rocks. *E. loxophleba* which is found in valleys of larger watercourses to the east was not present in the RSA.

The high proportion of naturalised alien species, 57 out of 240 (24%) must be attributed to the disturbances that had taken place while the RSA was a farm and by subsequent activities of man.

The botanical survey showed that a large proportion of plants, native and naturalized aliens, are probably important in the diet of rabbits.

REFERENCES

- Aplin, T.E.H. (1981). The Vegetation of Western Australia in Western Australian Year Book No. 19: 66-80.
- Beard, J.S. (1981). Vegetation Survey of Western Australia, 1:1,000,000 series, Swan. Univ. of W. Aust. Press, Nedlands.
- Green, J.W. (1981). Census of Vascular Plants of Western Australia. Published by the Western Australian Herbarium.

APPENDIX I

List of plant species

Families, genera and species are arranged alphabetically. The site record numbers refer to plant communities groups as follows:

1. *Eucalyptus wandoo*, *E. calophylla* and *E. marginata* woodlands.
2. *E. patens* and herbland on alluvial soils of floodplain.
3. *E. rudis* and *Melaleuca raphiophylla* on creek lines.
4. *Casuarina huegeliana* on granite outcrop.

* Introduced aliens

	Site Records			
	1	2	3	4
Adiantaceae				
Cheilanthes tenuifolia (N.L. Burman) Swartz	+			+
Amaranthaceae				
Ptilotus declinatus Nees	+	+		
Ptilotus drummondii (Moq.) F. Muell.	+		+	
Ptilotus humilis (Nees) F. Muell.			+	
Ptilotus manglesii (Lindl.) F. Muell.	+	+	+	
Apiaceae				
Daucus glochidiatus (Labill.) Fisch	+	+		
Eryngium pinnatifidum Bunge	+	+		
Homalosciadum homalocarpum (F. Muell.) Hj. Eichler				+
Trachymene pilosa Sm.				+
Asteraceae				
Angianthus demissus (A. Gray) Benth.	+			
*Arctotheca calendula (L.) Levyns	+	+	+	+
Brachycome bellidioides Steetz	+			
Brachycome iberidifolia Benth.	+			
Calocephalus drummondii (A. Gray) Benth.	+			
Calotis erinacea Steetz	+			
*Carduus pycnocephalus L.	+	+	+	
Centipeda cunninghamii (DC.) A. Braun & Aschers				+
*Conyza albida Spreng	+			
*Conyza bonariensis (L.) Cronquist	+		+	
*Dittrichia graveolens (L.) W. Greuter		+		
*Gnaphalium candidissimum Lamarck	+		+	
Gnaphalium gymnocephalum DC.				+
Helichrysum bracteatum (Vent.) Andr.	+	+		
Helipterum corymbosum (A. Gray) Benth.	+			
Helipterum cotula (Benth.) DC.	+	+		
Helipterum demissum (A. Fray) Druce	+	+		

	Site Records			
	1	2	3	4
<i>Helipterum hyalospermum</i> F. Muell. ex Benth.	+			+
<i>Helipterum manglesii</i> (Lindl.) Benth.	+			
* <i>Hypochoeris glabra</i> L.	+	+	+	+
* <i>Hypochoeris radicata</i> L.	+	+		
<i>Lagenifera huegelii</i> Benth.	+	+		
<i>Millotia tenuifolia</i> Cass.		+		
<i>Podolepis canescens</i> A. Cunn. ex DC.	+	+		
<i>Podolepis lessonii</i> (Cass.) Benth.	+	+		+
<i>Podotheca chrysantha</i> (Steetz) F. Muell.	+	+		
<i>Quinetia urvillei</i> Cass.	+			+
<i>Rutidosia multiflora</i> (Nees) B.L. Robinson	+	+		
<i>Senecio lautus</i> G. Forster ex Willd.	+	+		+
<i>Senecio quadridentatus</i> Labill.	+	+		+
* <i>Sonchus asper</i> (L.) Hill	+	+	+	+
* <i>Sonchus oleraceus</i> L.	+	+	+	+
* <i>Tolpis barbata</i> (L.) Gaertn.	+			
* <i>Ursinia anthemoides</i> (L.) Poir	+	+		+
<i>Waitzia citrina</i> (Benth.) Steetz	+	+	+	
<i>Waitzia paniculata</i> F. Muell. ex Benth.	+			+
Brassicaceae				
* <i>Raphanus raphanistrum</i> L.	+	+		
Campanulaceae				
<i>Wahlenbergia preissii</i> De Vriese	+			
Caryophyllaceae				
* <i>Cerastium glomeratum</i> Thuill.	+	+	+	+
* <i>Petrorhagia nanteuilii</i> (Burnat) P.W. Ball & V.H. Heywood	+	+	+	+
* <i>Silene gallica</i> L.	+	+		
* <i>Spergularia diandra</i> Heldr. & Sart. ex Heldr.				+
Casuarinaceae				
<i>Casuarina huegeliana</i> Miq.				+
Centrolepidaceae				
<i>Centrolepis aristata</i> (R.Br.) Roemer & Schultes	+			
Clusiaceae				
<i>Hypericum gramineum</i> G. Forster		+	+	
Convolvulaceae				
<i>Convolvulus erubescens</i> Sims	+			
Crassulaceae				
<i>Crassula bonariensis</i> DC.	+			
<i>Crassula colorata</i> (Nees) Ostenf.	+	+	+	+
Cyperaceae				
<i>Carex inversa</i> R.Br.	+		+	
<i>Cyperus gracilis</i> R.Br.	+		+	
<i>Cyperus tenellus</i> L.f.	+		+	
<i>Lepidosperma gracile</i> R.Br.		+		
<i>Schoenus grammatophyllus</i> F. Muell.		+		
Dilleniaceae				
<i>Hibbertia hypericoides</i> (DC.) Benth.	+			
<i>Hibbertia montana</i> Steud.	+	+		
<i>Hibbertia stellaris</i> Endl.	+	+		
Droseraceae				
<i>Drosera gigantea</i> Lindl.	+	+	+	
<i>Drosera glanduligera</i> Lehm.	+	+	+	
<i>Drosera microphylla</i> Endl.	+	+	+	
<i>Drosera pallida</i> Lindl.	+	+		+
<i>Drosera stolonifera</i> Endl.	+			
<i>Drosera stricticaulis</i> (Diels) O.H. Sargent		+		

	Site Records			
	1	2	3	4
Epacridaceae				
<i>Astroloma pallidum</i> R.Br.			+	
<i>Leucopogon propinquus</i> R.Br.		+	+	
Euphorbiaceae				
<i>Phyllanthus calycinus</i> Labill.		+	+	+
<i>Poranthera ericoides</i> Klotzsch		+		
Gentianaceae				
* <i>Centaurium erythraea</i> Rafn.		+		
Geraniaceae				
* <i>Erodium botrys</i> (Cav.) Bertol.		+	+	+
* <i>Erodium cicutarium</i> (L.) L'Herit.		+		
<i>Geranium solanderi</i> Carolin		+		+
<i>Pelargonium littorale</i> Huegel			+	+
Goodeniaceae				
<i>Dampiera alata</i> Lindl.			+	
<i>Dampiera cuneata</i> R.Br.		+	+	
<i>Dampiera linearis</i> R.Br.		+	+	
<i>Lechenaultia biloba</i> Lindl.		+	+	+
<i>Scaevola striata</i> R.Br.		+	+	
<i>Velleia trinervis</i> Labill.		+	+	+
Haemodoraceae				
<i>Conostylis setigera</i> R.Br.		+	+	+
<i>Haemodorum paniculatum</i> Lindl.		+	+	+
<i>Tribonanthes uniflora</i> Lindl.			+	+
Haloragaceae				
<i>Gonocarpus nodulosa</i> Nees			+	
Hypoxidaceae				
<i>Hypoxis leptantha</i> Benth.			+	
Iridaceae				
* <i>Gladiolus caryophyllaceus</i> (N.L. Burman) Poir		+		+
<i>Orthrosanthus laxus</i> (Endl.) Benth.		+		
<i>Patersonia occidentalis</i> R.Br.		+		
<i>Patersonia umbrosa</i> Endl.		+		
* <i>Romulea rosea</i> (L.) Eckl.		+	+	+
Juncaceae				
* <i>Juncus bufonius</i> L.				+
<i>Juncus pallidus</i> R.Br.			+	+
<i>Juncus paucifloris</i> R.Br.		+		
<i>Luzula meridionalis</i> Nordensk		+		+
Juncaginaceae				
<i>Triglochin procera</i> R.Br.				+
Lamiaceae				
* <i>Stachys arvensis</i> (L.) L.		+	+	+
Leguminosae - subfamily Mimosoideae				
<i>Acacia diptera</i> Lindl.			+	
<i>Acacia pulchella</i> R.Br.		+	+	+
<i>Acacia rostellifera</i> Benth.			+	
<i>Acacia saligna</i> (Labill.) H.L. Wendl.			+	
Leguminosae - subfamily Papilionoideae				
<i>Bossiaea eriocarpa</i> Benth.		+		
<i>Bossiaea ornata</i> (Lindl.) Benth.		+	+	
<i>Daviesia divaricata</i> Benth.		+		
<i>Daviesia hakeoides</i> Meisn.			+	
<i>Gastrolobium calycinum</i> Benth.			+	
<i>Gastrolobium villosum</i> Benth.		+		

	Site Records			
	1	2	3	4
<i>Gompholobium marginatum</i> R.Br.	+	+		
<i>Gompholobium tomentosum</i> Labill.				+
<i>Isotropis cuneifolia</i> (Sm.) Benth.	+			
<i>Kennedia coccinea</i> Vent.	+		+	+
<i>Kennedia prostrata</i> R.Br.	+	+	+	+
* <i>Lotus subbiflorus</i> Lag.		+		
* <i>Lupinus cosentinii</i> Guss.	+		+	
* <i>Medicago polymorpha</i> L.		+		
<i>Oxylobium capitatum</i> Benth.	+	+		
* <i>Trifolium arvense</i> L.	+		+	+
* <i>Trifolium campestre</i> Schreber	+	+	+	+
* <i>Trifolium subterraneum</i> L.	+	+	+	
Lentibulariaceae				
<i>Polypompholyx tenella</i> (R.Br.) Lehm.	+			
Liliaceae				
<i>Agrostocrinum scabrum</i> (R.Br.) Bail.		+		
<i>Arthropodium capillipes</i> Endl.	+			
<i>Borya nitida</i> Labill.	+	+		+
<i>Bulbine semibarbata</i> (R.Br.) Haw.				+
<i>Burchardia umbellata</i> R.Br.	+	+		
<i>Caesia parviflora</i> R.Br.	+			
<i>Chamaescilla corymbosa</i> (R.Br.) F. Muell. ex Benth.	+	+		
<i>Lomandra caespitosa</i> (Benth.) Ewart	+			
<i>Lomandra preissii</i> (Endl.) Ewart		+		
<i>Sowerbaea laxiflora</i> Lindl.	+	+		
<i>Stypandra grandiflora</i> Lindl.	+	+		+
<i>Stypandra imbricata</i> R.Br.	+			
<i>Thysanotus isantherus</i> R.Br.	+			+
<i>Thysanotus patersonii</i> R.Br.	+	+		
<i>Tricoryne elatior</i> R.Br.	+	+		
<i>Tricoryne humilis</i> Endl.	+			
<i>Wurmbea dioica</i> (R.Br.) F. Muell.		+		
<i>Xanthorrhoea preissii</i> Endl.	+	+	+	+
Linaceae				
<i>Linum marginale</i> A. Cunn. ex Planch	+	+		
Lobeliaceae				
<i>Isotoma hypocrateriformis</i> (R.Br.) Druce	+	+		
<i>Isotoma pusilla</i> Benth.	+		+	
<i>Isotoma scapigera</i> (R.Br.) G. Don.	+			
<i>Lobelia alata</i> Labill.			+	
<i>Lobelia tenuior</i> R.Br.	+			
Loganiaceae				
<i>Mitrasacme paradoxa</i> R.Br.	+			
Lythraceae				
<i>Lythrum hyssopifolia</i> L.		+	+	
Myrtaceae				
<i>Eucalyptus calophylla</i> Lindl.	+			
<i>Eucalyptus marginata</i> Donn ex Sm.	+		+	
<i>Eucalyptus patens</i> Benth.	+	+		
<i>Eucalyptus rudis</i> Endl.	+		+	
<i>Eucalyptus wandoo</i> Blakely	+			
<i>Hypocalymma angustifolium</i> Endl.	+			+
<i>Leptospermum erubescens</i> Schauer	+			
<i>Melaleuca raphiophylla</i> Schauer			+	

Site Records
1 2 3 4

Orchidaceae

<i>Caladenia filamentosa</i> R.Br.	+			
<i>Caladenia flava</i> R.Br.	+	+		
<i>Caladenia gemmata</i> Lindl.	+			
<i>Caladenia huegelii</i> H. Reichenb	+			
<i>Diuris laxiflora</i> Lindl.				+
<i>Diuris longifolia</i> R.Br.	+	+		+
<i>Prasophyllum triangulare</i> Fitzg.	+			
<i>Thelymitra antennifera</i> (Lindl.) J.D. Hooker			+	
<i>Thelymitra canaliculata</i> R.Br.				+

Orobanchaceae

<i>Orobanche australiana</i> F. Muell.	+			
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Oxalidaceae

<i>Oxalis corniculata</i> L.	+	+		+
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Pinaceae

* <i>Pinus radiata</i> D. Don	X			
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Pittosporaceae

<i>Billardiera bicolor</i> (Putterl.) E.M. Bennett			+	+
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Poaceae

* <i>Aira caryphyllea</i> L.	+	+		+
* <i>Avena barbata</i> Link	+	+	+	+
* <i>Briza maxima</i> L.	+	+	+	+
* <i>Briza minor</i> L.	+	+	+	+
* <i>Bromus diandrus</i> Roth.	+	+	+	+
* <i>Bromus hordeaceus</i> L.	+	+		
* <i>Bromus madritensis</i> L.	+			
<i>Danthonia caespitosa</i> Gaud.	+	+		+
* <i>Ehrharta longiflora</i> Sm.	+	+	+	
* <i>Eragrostis curvula</i> (Schrad.) Nees			+	+
<i>Eriachne ovata</i> Nees	+			
* <i>Holcus lanatus</i> L.	+	+	+	
* <i>Holcus setiger</i> Nees			+	+
* <i>Hordeum leporinum</i> Link			+	
* <i>Lolium rigidum</i> Gaud.			+	+
<i>Microlaena stipoides</i> (Labill.) R.Br.	+		+	+
<i>Neurachne alopecuroidea</i> R.Br.	+	+		+
* <i>Poa annua</i> L.	+		+	
<i>Poa drummondiana</i> Nees				+
<i>Stipa elegantissima</i> Labill.	+			
<i>Stipa semibarbata</i> R.Br.	+	+		+
<i>Stipa trichophylla</i> Benth.	+	+	+	+
* <i>Vulpia bromoides</i> (L.) S.F. Gray	+	+		+
* <i>Vulpia myuros</i> (L.) C.C. Gmelin	+	+		

Polygalaceae

<i>Comesperma calymega</i> Labill.	+			
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Polygonaceae

<i>Muehlenbeckia adpressa</i> (Labill.) Meisn.	+			+
<i>Polygonum prostratum</i> R.Br.			+	
* <i>Rumex acetosella</i> L.			+	
* <i>Rumex pulcher</i> L.	+	+		

Portulacaceae

<i>Calandrinia calyptrata</i> J.D. Hooker				+
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X Plantations

	Site Records			
	1	2	3	4
Primulaceae				
* <i>Anagallis arvensis</i> L.	+	+	+	+
Proteaceae				
<i>Dryandra nivea</i> (Labill.) R.Br.	+	+		
<i>Grevillea paniculata</i> Meisn.		+		
<i>Hakea prostrata</i> R.Br.	+	+	+	
Ranunculaceae				
<i>Clematis pubescens</i> Huegel ex Endl.	+			
<i>Ranunculus colonorum</i> Endl.			+	
* <i>Ranunculus muricatus</i> L.		+		
Restionaceae				
<i>Leptocarpus coangustatus</i> Nees	+	+	+	
<i>Loxocarya flexuosa</i> (R.Br.) Benth.	+			
Rhamnaceae				
<i>Trymalium ledifolium</i> Fenzl.	+			
<i>Trymalium spathulatum</i> (Labill.) Ostenf.	+			
Rosaceae				
<i>Acaena ovina</i> A. Cunn.	+	+		
Rubiaceae				
* <i>Galium divaricatum</i> Lamarck	+		+	
* <i>Galium murale</i> (L.) All.	+	+		+
Santalaceae				
<i>Leptomeria axillaris</i> R.Br.	+			
<i>Leptomeria cunninghamii</i> Miq.	+			
Sapindaceae				
<i>Diplopeltis huegelii</i> Endl.	+			
Scrophulariaceae				
* <i>Bellardia trixago</i> (L.) All.		+		
<i>Gratiola peruviana</i> Linn.		+		
* <i>Kickxia spuria</i> (L.) Dumort.	+		+	
* <i>Parentucellia latifolia</i> (L.) Caruel	+	+	+	+
Solanaceae				
<i>Nicotiana rotundifolia</i> Lindl.				+
* <i>Solanum nigrum</i> L.	+	+	+	+
Stackhousiaceae				
<i>Stackhousia pubescens</i> A. Rich	+	+	+	+
Sterculiaceae				
<i>Thomasia triphylla</i> (Labill.) J. Gray		+		
Stylidiaceae				
<i>Levenhookia pusilla</i> R.Br.	+			
<i>Levenhookia stipitata</i> (Sonder) F. Muell.	+			
<i>Stylidium brunonianum</i> Benth.	+	+		
<i>Stylidium bulbiferum</i> Benth.	+	+		+
<i>Stylidium calcaratum</i> R.Br.	+			+
<i>Stylidium caricifolium</i> Lindl.	+			
<i>Stylidium ciliatum</i> Lindl.	+			+
<i>Stylidium petiolare</i> Sond.	+	+		
Thymelaeaceae				
<i>Pimelea argentea</i> R.Br.	+			
<i>Pimelea rosea</i> R.Br.	+	+		
<i>Pimelea spectabilis</i> (Fisch. & Mey.) Lindl.	+			
Urticaceae				
<i>Parietaria debilis</i> G. Forster	+			
Zamiaceae				
<i>Macrozamia reidleyi</i> (Gand.) C.A. Gardn.	+	+	+	+

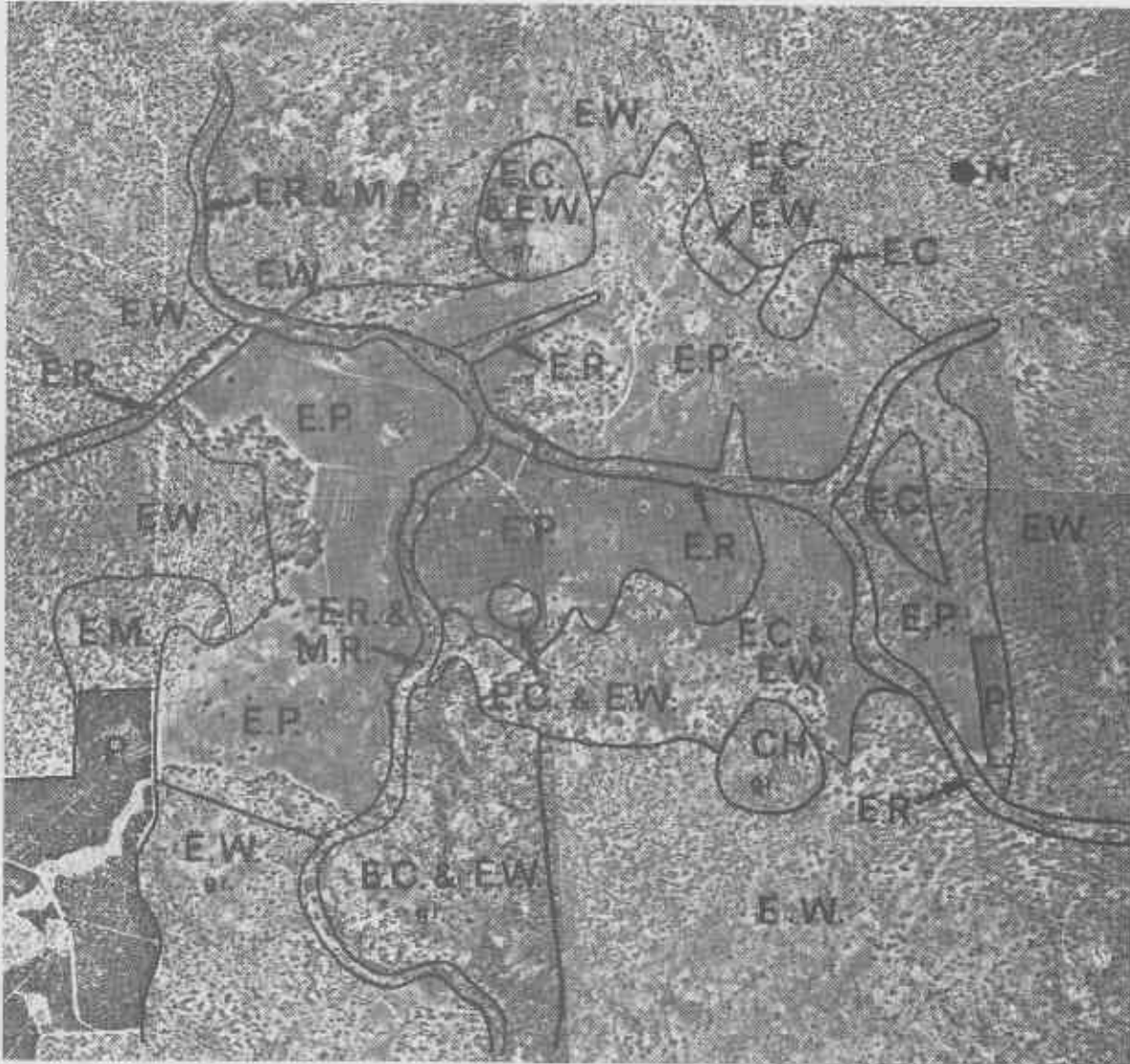


Fig. 1. Aerial photograph of rabbit study area at Chidlow with locations of vegetation communities depicted.

P = *Pinus radiata* plantations; M.R. = *Melaleuca raphiophylla* along creeks; E.R. = *Eucalyptus rudis* along creeks; C.H. = *Casuarina huegeliana*; E.W. = *Eucalyptus wandoo*; E.C. = *Eucalyptus calophylla*; E.M. = *Eucalyptus marginata*; E.P. = *Eucalyptus patens*; gr = granite outcrops.



Fig. 2. *Melaleuca raphiophylla* along creek, pasture in foreground.



Fig. 3. *Eucalyptus wandoo* woodland in background, pasture and *Xanthorrhoea preissii* in foreground.



Fig. 4. *Eucalyptus calophylla* with *Eucalyptus wandoo* woodland in background, pasture in foreground.

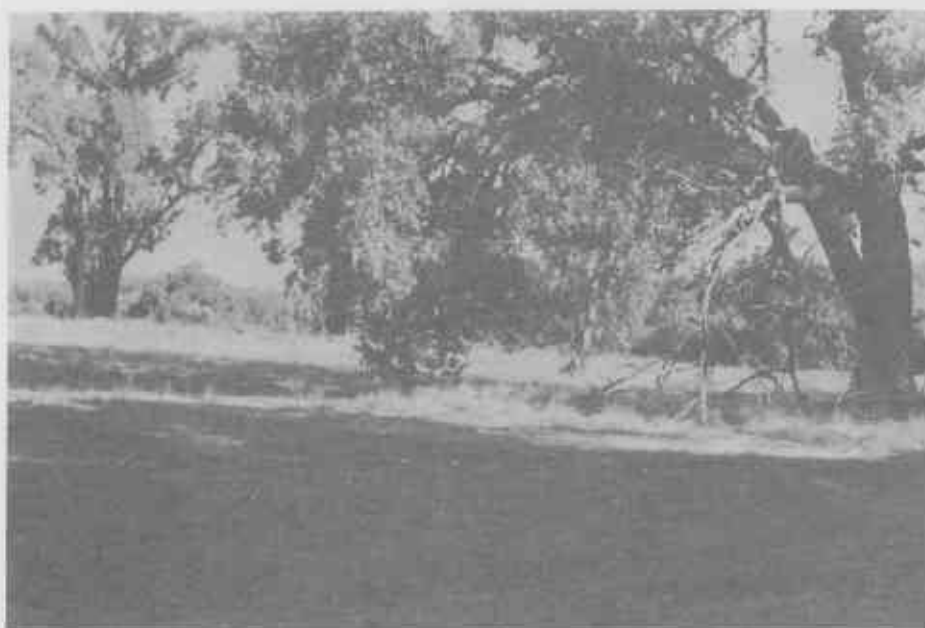


Fig. 5. *Eucalyptus patens* woodland, pasture understorey.