

BIOLOGICAL SURVEYS OF FOUR GOLDFIELDS RESERVES

KURRAWANG NATURE RESERVE
BURRA ROCK NATURE RESERVE
CAVE HILL NATURE RESERVE
DORDIE ROCKS NATURE RESERVE

BY ANDREW CHAPMAN, IAN KEALLEY,
DAVID McMILLAN, PETER McMILLAN
AND GEOFF ROLLAND

INTRODUCTION

The requirement to conduct these surveys is part of an on-going commitment to undertake biological surveys of reserves in CALM's Goldfields Region. These particular reserves were selected because they are all relatively small, close to Kalgoorlie and two in particular are subject to high levels of recreational use. The objectives were to survey vertebrate species present (and invertebrates in the case of Kurrawang), to map the vegetation and search for endangered and poorly known plant species, particularly eucalypts.

METHODS

Methods of survey were identical for each reserve. Four lines of pit traps were set for mammals, reptiles and insects (Kurrawang only). Each trap line comprised six pit traps, 250 mm and 140 mm external diameter alternated at a 10 m spacing, joined by a 200 mm high fly-wire drift fence. The disposition of traplines is indicated on figs. 1, 2, 3 and 4. As far as possible, pit trap lines were established to sample principal vegetation types as determined from aerial photography and ground inspection. Elliot traps were set to supplement pit trapping effort or where it was impossible to set pits. All traps were set for five consecutive days and all work done between October and December 1988. All fauna, except for a few voucher specimens, were identified and released. Mammals were additionally weighed, measured and temporarily marked to identify recaptures. Headtorching and spotlighting were undertaken for nocturnal fauna. Other fauna data, particularly for birds, were recorded opportunistically. At each trapping site

vegetation was described by the Muir (1977) structural classification. Soil classification was by the Northcote (1971) method.

Vegetation was mapped by aerial photo interpretation and ground truthing. Collections of plants principally from trapping sites were made and sent to the Herbarium for identification.

KURRAWANG NATURE RESERVE

Kurrawang Nature Reserve (No 35453) of 621 ha is located between Great Eastern Highway and the Goldfields Water Supply pipeline between 13 and 17 km south west of Kalgoorlie. Its purpose is 'conservation of flora and fauna' and it is vested in the National Parks and Nature Conservation Authority. Kurrawang takes its name from Kurrawang townsite which was partly on the reserve and operated as a centre for woodline operations between 1915 and 1938. As a result of this the reserve consists entirely of re-growth woodland.

Vegetation Types See figure 1 for a map of vegetation types.

Area A

This area is *Eucalyptus griffithsii* open woodland, situated in the middle slope of the area with undulating topography. The soils are red gravelly loam with areas of quartz/ironstone alluvium.

The dominant species are *E. griffithsii* and *E. transcontinentalis* with areas containing *E. lesouefii* and *E. loxophleba*.

The shrub stratum species include *Acacia hemiteles*, *A. tetragonophylla*, *Eremophila* species including *E. alternifolia*, *E. serrulata* and *E. scoparia*, *Dodonea lobulata* and *Alyxia buxifolia*. Other species in this stratum that are less common include *Santalum spicatum*, *S. acuminatum*, *Grevillea nematophylla*, *Acacia quadrimarginea*, *Atriplex nummularia* and *Cassia nemophila*.

The understorey is dominated by *Atriplex vesicara*, *Olearia* sp., *Daviesia* sp (*eremaea*), and *Cassia artemisioides*. Other species which are less conspicuous include *Triodia scariosa*, *Ptilotus obovatus*, *Enchyleana tomentosa* and many herbs and grasses.

Area B

This area is classed as the 'Jam' area situated in a water gaining site with a deep red sandy loam.

The dominant species are *Acacia acuminata*, *A. hemiteles* and *A. linophylla*.

The understorey is made up primarily of Wandarrie grass and herbs with occasional *Ptilotus obovatus*, *Enchyleana tomentosa* and *Scaevola spinescens*.

Area C

This area is dominated as *Eucalyptus lesouefii* open woodland. It takes up the upper slopes and ridges within the reserve. The soil is a red clay loam covered in quartz alluvium and very dark ironstone pebbles.

The dominant species are *E. lesouefii* and *E. transcontinentalis* with less common *E. griffithsii* and *E. gracilis* making up the upper stratum.

The shrub stratum is basically a broombush scrub dominated by *Eremophila scoparia*, *E. alternifolia*, *E. glabra* and *E. serrulata*. Other species present in this stratum include *Acacia tetragonophylla*, *A. hemiteles*, *Santalum spicatum*, *S. acuminatum*, *Atriplex nummularia* and *Casuarina cristata*.

The understorey is made up of herbs and grasses with *Scaevola spinescens*, *Atriplex vesicaria* and *Ptilotus exaltatus*.

Area D

This area is classified as the *Eucalyptus salubris* open woodland. It is situated in the lower areas of the reserve in water gaining sites with heavy red clay.

The dominant species is *E. salubris* with occasional *E. loxophleba*, *E. transcontinentalis* and *E. salmonophloia* noted.

The shrub stratum is sparse and is dominated by *Eremophila scoparia*, *E. alternifolia* and *Acacia linophylla*. Scattered *A. tetragonophylla* and *Scaevola spinescens* were seen.

Area E

This area is classed as the spinifex area located on a rise covered with red clay loam with an underlying ironstone.

The upper stratum is made up mainly of *Eucalyptus transcontinentalis*, *E. lesouefii* and *E. loxophleba*.

Melaleuca uncinata and *Allocasuarina campestris* dominate the shrub stratum with five species of *Eremophila*, ie., *Eremophila alternifolia*, *E. scoparia*, *E. glabra*, *E. sp aff-*

gilesii and *E. oldfieldii*. Other less common species noted were *Dodonaea lobulata*, *Acacia hemiteles*, *Cassia artemisioides*, *Scaevola spinescens* and *Santalum acuminatum*.

The understorey is made up primarily of *Triodia scariosa* with the occasional *Olearia sp.* and herbs and grasses.

Area F

This area is classified as *Eucalyptus salmonophloia* open woodland.

The upper stratum is taken up purely by *Eucalyptus salmonophloia*.

The shrub stratum is a typical Goldfields 'broombush' scrub dominated by *Eremophila scoparia* with *E. alternifolia*, *E. glabra* and *E. sp aff. gilesii* also very common. *Acacia linophylla*, *A.tetragonophylla*, *Casuarina cristata*, *Melaleuca uncinata*, *Cassia artemisioides*, *C. nemophilla* and *Scaevola spinescens* were noted as abundant. Other less commonly seen shrub species were *Acacia hemiteles*, *Santalum spicatum*, *S. acuminatum* and *Atriplex nummularia*.

The lower stratum is made up mainly of saltbush, *Atriplex vesicaria* and greybush, *Cratystylis conocephala* with herbs and grasses.

Area G

This area is known as "regeneration gravel pit". It is situated on an ironstone gravel hill; all vegetation was at some stage removed; the species on the site are thickets of *Melaleuca uncinata* and *Allocasuarina*.

Area H

This area is classed as "*Casuarina cristata*" flat, and is situated in a water gaining site on a red clay loam.

The dominant species are *Casuarina cristata*, *Melaleuca uncinata*, *Acacia linophylla* and *A. tetragonophylla*. Other less common species noted were *Santalum spicatum*, *Scaevola spinescens*, *Acacia hemiteles*, *Olearia sp.* and many annual herbs and grasses.

Description of Trapping Sites

KNR #1 Salmon Gum Woodland on sandy clay loam at 121°20'00"E, 30°49'45"S.

Muir Classification: Mi/SAi/SCi

Stratum 1: *Eucalyptus salmonophloia*, occasional *E. lesouefii*.

Stratum 2: *Acacia hemiteles*, *Maireana radiata*, *M. georgei*, *M. pentatropis*,
M. sedifolia, *Eremophila scoparia*, *E. weldii*, *E. ionantha*, *Cassia*
nemophila, *Atriplex vesicaria*, *Scaevola spinescens*, *Exocarpus aphyllus*.

Stratum 3: *Maireana radiata*, *M. pentatropis*.

KNR #2 Mixed Eucalypt woodland on clayey sand at 121°20'20E, 30°49'45"S.

Muir Classification: LAi/Sr.SBr/Hi

Stratum 1: *Eucalyptus griffithsii*, *E. transcontinentalis*, *E. lesouefii*.

Stratum 2: *Eremophila sp.*

Stratum 3: *Halgania andromedifolia*, *Olearia muelleri*, *Eremophila weldii*, *Westringia*
dampieri, *Scaevola spinescens*.

Stratum 4: *Triodia sp.*

KNR #3 Redwood/Gimlet woodland on clayey sand at 121°21'15"E, 30°49'30"S.

Muir Classification: LAi/SAr/SCr/SDi

Stratum 1: *Eucalyptus salubris*, *E. transcontinentalis*, *E. oleosa*.

Stratum 2: *Eremophila scoparia*, *Acacia tetragonophylla*, *Alyxia buxifolia*, *Acacia*
hemiteles.

Stratum 3: *Cratystylis subspinescens*, *Enchyleana tomentosa*, *Cassia nemophila*, *Atri*
plex vesicaria, *Olearia muelleri*, *Eremophila oldfieldii spp angustifolia*, *E.*
weldii, *Zygophyllum fruticulosum*.

Stratum 4: *Maireana georgei*, *M. tomentosa*, *Sclerolaena drummondii*, *Ptilotus*
exaltatus.

KNR #4 Griffiths Grey Gum tree mallee on clayey sand at 121°21'15"E, 30°49'30"S.

Muir Classification: KTi/Sr/SBr/Hi

Stratum 1: *Eucalyptus griffithsii*, *E.oleosa*.

Stratum 2: *Santalum acuminatum*, *Dodonaea stenozyga*.

Stratum 3: *Grevillea sarissa*, *Westringia cephalantha*, *Acacia igulata*, *Scaevola*
spinescens, *Olearia muelleri*.

Stratum 4: *Triodia sp.*

KNR #5 Griffiths Grey Gum woodland on sandy loam at 121°22'00"E, 30°49'00"S.

Muir Classification: LAi/Sr/SBi/Hr

Stratum 1: *Eucalyptus griffithsii*, *E. lesouefii*.

Stratum 2: *Santalum spicatum*, *S. acuminatum*, *Acacia tetragonophylla*.

Stratum 3: *Acacia hemiteles*, *Dodonaea stenozyga*, *Olearia muelleri*, *Scaevola spinescens*,
Cassia nemophila, *Acacia erinacea*, *Enchylaeana tomentosa*,
Zygophyllum glaucum, *Halgania andromedifolia*.

KNR #6 Mixed Eucalypt woodland on sandy loam at 121°21'45"E, 30°49'20"S.

Muir Classification: LAi/Si/SBi/SDr

Stratum 1: *Eucalyptus transcontinentalis*, *E. lesouefii*, *E. oleosa*.

Stratum 2: *Eremophila scoparia*.

Stratum 3: *Maireana sedifolia*, *Acacia hemiteles*, *Cassia nemophila*, *Olearia muelleri*,
Atriplex vesicaria, *Scaevola spinescens*.

Stratum 4: *Maireana spp*, *Ptilotus obovatus*.

TABLE 1: VERTEBRATE FAUNA OF KURRAWANG NATURE RESERVE

BIRDS	Site No.	#1	#2	#3	#4	#5	#6	#7
Emu								x
Square-tailed Kite							x	
Kestrel								x
Crested Pigeon								x
Port Lincoln Parrot			x	x				x
Mulga Parrot								x
Galah		x						x
Owlet Nightjar							x	
Rainbow Bee-eater				x	x	x		
Tawny Frogmouth								x
Richard's Pipit								x
Ground Cuckoo Shrike								x
Black-faced Cuckoo Shrike		x						x
Brown Flycatcher		x				x		
Red-capped Robin								x
Grey Shrike Thrush						x		x
Crested Bellbird				x	x	x		x
Chestnut Quail Thrush						x	x	
Weebill		x	x	x	x	x		
Broad-tailed Thornbill							x	
Chestnut-rumped Thornbill					x	x		
Yellow-rumped Thornbill					x	x		
Splendid Wren								x

BIRDS	Site No.	#1	#2	#3	#4	#5	#6	#7
Striated Pardalote		x	x	x	x			
Brown Honeyeater						x		
Yellow-plumed Honeyeater		x	x		x	x		x
White-eared Honeyeater						x		
Yellow-throated Miner			x				x	x
Spiny-cheeked Honeyeater			x	x				
Red Wattlebird		x	x	x		x		x
Magpie Lark								x
Black-faced Woodswallow						x		
Grey Butcherbird			x	x	x			x
Pied Butcherbird			x	x	x			x
Australian Magpie								x
Grey Currawong							x	x
Little Crow								x
MAMMALS								
Western Grey Kangaroo (<i>Macropus fuliginosus</i>)								x
Euro (<i>Macropus robustus</i>)								x
Echidna (<i>Tachyglossus aculeatus</i>)				+	+			
Fat-tailed Dunnart (<i>Sminthopsis crassicaudata</i>)				2				
Goldfields Ningauai (<i>Ningauai yvonnae</i>)			1					
Sandy Inland Mouse (<i>Pseudomys hermannsburgensis</i>)			1					
Mitchell's Hopping Mouse (<i>Notomys mitchellii</i>)						1		
House Mouse (<i>Mus musculus</i>)					1			
Pygmy Possum (<i>Cercartetus concinnus</i>)		2						
REPTILES								
<i>Diplodactylus maini</i>		x	x					
<i>Diplodactylus granariensis</i>			x					
<i>Diplodactylus pulcher</i>								x
<i>Diplodactylus assimilis</i>			x					
<i>Gehyra variegata</i>			x					
<i>Heteronotia binoei</i>								x
<i>Omolepida branchialis</i>			x					
<i>Ctenotus schomburgkii</i>					x			
<i>Ctenotus atlas</i>					x			
<i>Ctenophorus fordii</i>					x			
<i>Menetia greyii</i>								x
<i>Ctenophorus cristatus</i>							x	
<i>Phyllurus millii</i>			x					
<i>Moloch horridus</i>								x
<i>Tiliqua occipitalis</i>								x
<i>Tiliqua rugosa</i>								x

#7 Recorded elsewhere on reserve

+ Signs only observed

Numbers in the table refer to numbers of animals trapped.

TABLE 2: SCORPIONS, SPIDERS AND INSECTS OF KURRAWANG NATURE RESERVE

Group	Family	Species	
SCORPIONS (2 species)	Buthidae	<i>Lychas marmoreus</i>	
		<i>Lychas alexandrinus</i>	
SPIDERS (20 species)	Nemesiidae	1 unidentified sp.	
	Dipluridae	<i>Cethegus</i> sp.	
	Dictynidae	<i>Baduma candida</i>	
	Pholcidae	1 unidentified sp	
	Gnaphosidae	<i>Lampona</i> sp.	
		1 unidentified sp.	
	Clubionidae	<i>Chirocanthium</i> sp.	
	Miturgidae	1 unidentified sp.	
	Salticidae	<i>Simaethula</i> sp.	
		<i>Ospisthoncup</i> sp.	
	1 unidentified sp.		
	Ctenidae	1 unidentified sp.	
	Zoridae	1 unidentified sp.	
	Heteroodidae	3 unidentified spp.	
	Agelenidae	<i>Coradoides</i> sp.	
	Oxyopidae	1 unidentified sp.	
	Zodariidae	<i>Storena formosa</i>	
<i>Storena</i> sp.			
WASPS (13 species)	Bembecidae	<i>Bembex</i> sp.	
	Proctotrypidae	<i>Acanthoserphus</i> sp.	
		<i>Podalonia</i> sp.	
	Sphecidae	<i>Sphex</i> sp.	
	Pteromalidae	2 unidentified spp.	
	Encyrtidae	1 unidentified sp.	
	Thynninae	1 unidentified sp.	
	Brachonidae	1 unidentified sp.	
	Pompilidae	3 unidentified spp.	
	Tiphiidae	1 unidentified sp.	
	BEEES (4 species)	Anthophoridae	<i>Exoneura tridentata</i>
			<i>Exoneura</i> sp.
		Colletidae	<i>Xenohesma</i> sp.
		<i>Leioproctus</i> sp.	
ANTS (16 Species)	Sub Family:		
	Myrmecinae	<i>Myrmecia (Promyrmecia) picta</i>	
	Ponerinae	<i>Rhytidoponera violacea</i>	
		<i>R. metallica</i>	
	Myrmicidae	<i>Anisopheidole</i> sp.	
	Dolichoderinae	<i>Iridomyrmex purpureus</i>	
		3 <i>Iridomyrmex</i> spp.	
	Formicinae	<i>Paratrechina</i> sp.	
		<i>Calomyrmex</i> sp.	
		2 <i>Melophorus</i> spp.	
<i>Camponotus</i> spp.			

BURRA ROCK NATURE RESERVE

Burra Rock Nature Reserve (No 7038) of 809 ha is located approximately 60 km south of Coolgardie. Its purpose is 'water and conservation of flora and fauna' and it is vested in the Minister for Water Resources. Burra Rock is a prominent granite tor which was used as a catchment and dam water supply for woodline locomotives between 1920 and 1927. The rock is surrounded by mallee, shrubland, thicket and re-growth woodland. The reserve is used extensively for recreation including picnicking, yabbing and rock exploring.

Vegetation Types See figure 2 for a vegetation map of the reserve.

The woodland areas are not virgin, they were clearfelled for mining timber and firewood in 1927-28 resulting in a 60 y.o. regrowth woodland.

Area A

This type surrounds the granite outcrops and at times extends onto the rock in places of deep soil.

The vegetation is dominated by dense thickets of *Acacia lasiocalyx* and other less dense thickets of *Allocasuarina huegeliana*. Adjoining these thickets are areas of *Leptospermum erubescens* and *Acacia acuminata*.

Further from the rock *Eucalyptus loxophleba* and *E.occidentalis var stenantha* occur with other mallee species.

In crevices on the rock *Borya nitida* and *Kunzea pulchella* occur. Other species noted around the edge of the rock included *Thryptomene australis* and *Dodonaea attenuata*.

Area B

This type is situated adjacent to type A alongside the granite. It is best described as open mallee woodland.

The upper stratum is dominated by *Eucalyptus eremophila* and several unidentified species. The next stratum is a mixture of relatively open *Acacia*, *Melaleuca* and *Allocasuarina* scrub consisting of *Acacia linopylla*, *A. acuminata*, *Melaleuca uncinata*, *Allocasuarina campestris* and *A. acutivalvis*.

Other more common species in this vegetation type include *Alyxia buxifolia*, *Santalum spicatum*, *Scaevola spinescens*, *Eremophila scoparia*, *E. gilesii*, *A. tetragono-*

phylla, *Exocarpus aphyllus*, *A. hemiteles*, *Solanum lasiophyllum*, *Triodia scariosa*, *Persoonia coriacea*, *Melaleuca lanceolatum*.

Area C

Further from the granite the vegetation changed again to the next vegetation type which is open Salmon gum woodland.

The upper stratum is dominated by *Eucalyptus salmonophloia* and a few *E. salubris* and a number of unidentified mallees.

The shrub layer includes *Eremophila scoparia*, *E. gilesii*, *Allocasuarina huegeliana*, *Alyxia buxifolia*, *Santalum spicatum*, *S. acuminatum*, *Acacia tetragonophylla*, *A. hemiteles*, *A. linophylla*, *Melaleuca lanceolatum*, *Dodonaea lobulata*, *Olearia* sp., *Daviesia* sp., and some very sparse occurrences of *Eremophila glabra* and *E. serrulata*.

Area D

This area is sandplain shrubland with at least five unidentified mallees.

The shrubland species are dominated by *Allocasuarina campestris* and *Melaleuca* sp. Other common shrubs include *Allocasuarina acutivalvis*, *Acacia acuminata*, *Callitris collumelaris*, *Thryptomene australis*, *Melaleuca acuminatum* and *Triodia scariosa*.

Description of Trapping Sites

BRNR # 1 Mixed shrubland on clay sand at 121°11'45"E, 31°23'20"S.

Muir classification: Sr/SBc

Stratum 1: *Acacia acuminata*, *Allocasuarina campestris*, *Eucalyptus* sp.

Stratum 2: *Allocasuarina campestris*, *Thryptomene australis*, *Verticordia helmsii*, *Leptospermum* sp. *Wehlia thryptomenoides*.

BRNR #2 Salmon gum woodland on sandy clay loam at 121°12'15"E, 31°23'30"E.

Muir classification: LAi/SrSbi/SDi

Stratum 1: *Eucalyptus salmonophloia*.

Stratum 2: *Eremophila oppositifolia*, *Alyxia buxifolia*, *Acacia tetragonophylla*, *Exocarpus aphyllus*.

Stratum 3: *Scaevola spinescens*, *Acacia hemiteles*, *Olearia muelleri*, *Eremophila scoparia*.

Stratum 4: *Acacia erinacea*.

BRNR #3 Mallee on sandy loam at 121°12'30"E, 31°23'45"S.

Muir classification: KSi/SBi

Stratum 1: *Eucalyptus eremophila*, *Acacia acuminata*, *A. hemiteles*,
A. camptoclada, *A. tetragonophylla*, *A. prainii*, *Westringia*
cephalantha, *Eremophila ionatha*, *Thryptomene australis*.

BRNR #4 Mixed mallee and shrubland on sandy loam at 121°11'00"E, 31°24'00"S.

Muir classification: KSi & Sc/SBi.

Stratum 1: *Eucalyptus occidentalis* var. *stenantha*, *E. sheathiana*, *Acacia acuminata*, *Allocasuarina acutivalvis*.

Stratum 2: *Dodonaea microzyga*, *Spartochloa scirpoidea*, *Dianella revoluta*,
Phebalium fififolium, *Prostanthera grylloana*.

TABLE 3: VERTEBRATE FAUNA OF BURRA ROCK NATURE RESERVE

BIRDS	Site No.	#1	#2	#3	#4	#5	#6
Little Pied Cormorant							x
Emu			x			x	
Collared Sparrowhawk						x	
Little Eagle			x			x	
Wedge-tailed Eagle						x	
Brown Falcon							x
Banded Plover						x	
Bronzewing Pigeon			x			x	x
Purple-crowned Lorikeet			x		x		x
Smoker Parrot			x	x	x		x
Port Lincoln Parrot				x	x	x	x
Rainbow Bee-eater						x	x
Tawny Frogmouth							x
Tree/Fairy Martin						x	
Richard's Pipit						x	
Black-faced Cuckoo Shrike				x			
Red-capped Robin						x	x
Western Shrike Thrush		x		x		x	x
Bellbird		x					x
Western Yellow Robin							x
Willie Wagtail						x	
Southern Scrub Robin				x	x		
White-browed Babbler					x		
Weebill			x	x	x		x
Broad-tailed Thornbill		x	x		x		x
Yellow-rumped Thornbill						x	x
Redthroat		x		x	x		
Variiegated Wren		x		x			x
Striated Pardalote			x	x			x
Brown Honeyeater						x	x

BIRDS	Site No.	#1	#2	#3	#4	#5	#6
Yellow-plumed Honeyeater							X
Purple-gaped Honeyeater				X			X
White-eared Honeyeater			X		X		X
Brown-headed Honeyeater					X		
Spiny-cheeked Honeyeater							X
Red Wattlebird							X
Masked Woodswallow						X	
Dusky Woodswallow							X
Grey Butcherbird							X
Grey Currawong		X	X		X	X	X
Little Crow				X			X
REPTILES							
<i>Diplodactylus assimilis</i>							X
<i>Diplodactylus maini</i>			X	X			
<i>Geyhra variegata</i>			X				
<i>Phyllurus milii</i>					X		
<i>Ctenophorus cristatus</i>							X
<i>Ctenophorus ornatus</i>							X
<i>Ctenophorus scutulatus</i>				X			
<i>Pogona minor</i>							X
<i>Cryptoblepharus plagiocephalus</i>							X
<i>Tiliqua occipitalis</i>							X
<i>Vermicella bertholdii</i>				X			
FROGS							
<i>Pseudophryne occidentalis</i>							X
MAMMALS							
<i>Sminthopsis dolichura</i>		1		2			
<i>Notomys mitchellii</i>		1	8	2			
(Mitchell's Hopping Mouse)							

#5 Recorded on "Farm" site

#6 Elsewhere on reserve

Numbers in table refer to numbers of animals trapped.

CAVE HILL NATURE RESERVE

Cave Hill Nature Reserve (No 17804) of 202 ha is located 50 km west of Higginsville. Its purpose is 'water and conservation of flora and fauna' and it is vested in the Minister for Water Resources. Like Burra Rock, the reserve is dominated by the granite tor called Cave Hill and this reserve has a similar history of catchment dam and woodline locomotive use. This reserve is more remote, less disturbed and not as intensively used as Burra Rock.

Vegetation Types See figure 3 for a vegetation map of the reserve.

Area A - Fringing Vegetation

Occurs on shallow granite soils fringing the rock and adjacent rock outcrops. Consists of dense thickets of *Allocasuarina huegeliana* and *Acacia* species including *Acacia acuminata* in washes from the rock. Occasional *Eucalyptus loxophleba* and *Eucalyptus occidentalis var stenantha* occur. On shallow soils vegetation is sparse including open grassy areas. In all cases this type has a transition into the surrounding woodland and mallee.

Area B - Gullies

Similar in composition to Type 1 with *Allocasuarina* and *Acacia*, however includes more *Eucalyptus loxophleba* and some *Eremophila sp.* Very dense, is restricted to the gullies with a transition into surrounding woodland.

Area C - Salmon Gum

Eucalyptus salmonophloia regrowth open woodland on sandy soils over heavy clay. An understorey of *Eremophila sp.*, *Exocarpus sp.*, *Acacia sp.* and *Maireana sedifolia* with scattered *Eucalyptus concinna*. Again a transition into surrounding types.

Area D - Wandoo

Occurs on weathered granite soils with numerous small "breakaway" outcrops. Regrowth *Eucalyptus wandoo* mallee form with occasional *Eucalyptus salubris* and *Acacia acuminata*. A transition towards the rock into Type 1 and away from the rock into Type 3, 5 and 7. The understorey is dominated by *Eremophila sp.*, *Santalum acuminatum* and *Acacia sp.* as dense scrub.

Area E - Gimlet

Regrowth *Eucalyptus salubris* and *Eucalyptus salubris* var *glauca* woodland on heavy clay loam "crabhole" soils. The understorey is dominated by broombush *Eremophila scoparia*. Soil type determines the transition into surrounding woodland, mallee and rock fringing vegetation.

Area F - Mallee

On deeper sandy soils mallees dominate with *Eucalyptus eremophila*, *Eucalyptus gracilis*, *Eucalyptus loxophleba* and occasional *Eucalyptus concinna* and *Eucalyptus celastroides*. The understorey consists of *Acacia graffiana*, *Melaleuca uncinata*, *Melaleuca pauperiflora* with scattered *Exocarpus* and *Santalum spicatum*. A transition into surrounding types is determined by change to heavier soils.

Area G - Rock

Granite outcrops contain pockets of soil. Deeper pockets support Type 1 vegetation with shallower pockets supporting less vegetation including small herbs *Borya nitida* and mosses with occasional *Kunzea* sp. and *Calothamnus* sp.

Description of Trapping Sites

CHNR #1 *Eucalyptus* woodland on loam at 121°13'30"E, 31°39'10"S.

Muir classification: LAc/Sr/SCr

Stratum 1: *Eucalyptus flocktoniae*, *E. concinna*.

Stratum 2: *Alyxia buxifolia*, *Eremophila scoparia*, *Melaleuca* sp, *Eremophila oppositifolia*.

Stratum 3: *Acacia merrallii*, *Maireana georgei*, *Eremophila caerulea*.

CHNR #2 Salmon gum woodland on sandy loam at 121°13'30"E, 31°39'40"S.

Muir classification: LAi/Sr/SBi

Stratum 1: *Eucalyptus salmonophloia*, occasional *Pittosporum phylliraeoides*.

Stratum 2: *Santalum acuminatum*, *Acacia acuminata*, *A. jennerae*.

Stratum 3: *Scaevola spinescens*, *Exocarpus aphyllus*, *Cassia nemophila*, *Olearia axilaris*.

CHNR #3 Jam shrubland on fine sandy loam at 121°13'20"E, 31°40'05"S.

Muir classification: Sc

Stratum 1: *Acacia acuminata* and occasional *Eucalyptus loxophleba subsp. lissophloia*, occasional understorey plants were *Solanum lasiophyllum*, and *Ptilotus obovatus*.

CHNR #4 Mallee on sandy clay loam at 121°14'00"E, 31°40'05"S.

Muir classification: Kti/SAr/SBr

Stratum 1: *Eucalyptus loxophleba subsp lissophloia*, *E. concinna*, *E. eremophila*.

Stratum 2: *Acacia acuminata*, *Melaleuca acuminata*, *Eremophila oppositifolia*, *Santalum acuminatum*.

Stratum 3: *Olearia axillaris*, *Acacia camptoclada*, *Melaleuca sp*, *Westringia cephalantha*.

TABLE 4: VERTEBRATE FAUNA OF CAVE HILL NATURE RESERVE

BIRDS	Site No	#1	#2	#3	#4	#5	#6	#7
Emu							x	
Little Pied Cormorant						x		
Square-tailed Kite						x		
Collared Sparrowhawk								x
Brown Goshawk						x		
Brown Falcon							x	
Wedge-tailed Eagle							x	
Little Eagle								x
Common Bronzewing						x		
Purple-crowned Lorikeet		x						
Smoker Parrot						x		
Western Rosella							x	
Port Lincoln Parrot		x	x			x		
Mulga Parrot		x						
Boobook Owl							x	
Spotted Nightjar							x	
Sacred Kingfisher							x	
Rainbow Bee-eater			x		x	x		x
Owlet Nightjar							x	
Richard's Pipit							x	x
Black-faced Cuckoo Shrike		x				x		
Brown Flycatcher						x		
Western Shrike Thrush						x		
Red-capped Robin				x				
Bellbird		x		x		x		
Willie Wagtail						x	x	
Restless Flycatcher						x		
Chestnut Quail Thrush						x		
Southern Scrub Robin						x		
White-browed Babbler						x		
Weebill				x	x	x		
Broad-tailed Thornbill							x	

BIRDS	Site No.	#1	#2	#3	#4	#5	#6	#7
Variegated Wren					X			
Yellow-rumped Thornbill					X		X	
Striated Pardalote	X	X	X	X				
Brown Honeyeater		X			X			
Singing Honeyeater					X			
White-eared Honeyeater					X		X	
Yellow-plumed Honeyeater	X							
Purple-gaped Honeyeater					X			
Spiny-cheeked Honeyeater			X					
White-fronted Honeyeater	X				X			
Red Wattlebird		X						
White-fronted Chat					X			
Black-faced Wood Swallow						X		
Currawong		X			X			
Little Crow	X						X	
Australian Raven						X		
REPTILES								
<i>Crenadactylus ocellatus</i>	X							
<i>Diplodactylus granariensis</i>		X						
<i>Diplodactylus maini</i>	X	X	X					
<i>Gehyra variegata</i>			X					
<i>Heteronotia binoei</i>					X			
<i>Ctenophorus cristatus</i>						X		
<i>Ctenophorus scutulatus</i>				X				
<i>Moloch horridus</i>							X	
<i>Varanus tristis</i>						X		
<i>Lerista muelleri</i>								X
<i>Menetia greyii</i>			X					
<i>Morelia spilota</i>						X		
<i>Pseudechis australis</i>								X
MAMMALS								
<i>Tachyglossus aculeatus</i>								X
Echidna								
<i>Macropus fuliginosus</i>						X		
Grey Kangaroo								
<i>Macropus robustus</i>						X		
Euro								
<i>Cercartetus concinuus</i>		5						
Pygmy Possum								
<i>Sminthopsis dolichura</i>				2				
<i>Mus musculus</i>			1			3		
House Mouse								
#5 In vegetation fringing Cave Hill								
#6 Elsewhere on reserve								
#7 On Cave Hill								
Numbers in the table refer to numbers of animals trapped.								

DORDIE ROCK NATURE RESERVE

Dordie Rock Nature Reserve (No 3211) of 121 ha is located 10 km south of Widgiemooltha. Its purpose is 'water and conservation of flora and fauna', and it is vested in the Minister for Water Resources. The reserve is named after Dordie Rock, a sheet granite exposure surrounded by *Acacia acuminata* 'Jam' thicket and re-growth woodland.

Vegetation Types See figure 4 for a map of vegetation sites.

Area A - Low Eucalypt Woodland

This site consists of a mixed canopy of *Eucalyptus transcontinentalis*, *E. flocktoniae* and *E. salmonophloia* with occasional *E. celestroides* and *E. esouefii*.

A second classification of open woodland describes the pockets of *Melaleuca pauperiflora* that occurs throughout this area.

An open shrub layer classified as low shrub includes *Acacia hemitiles*, *A. tetragonophylla*, *Eremophila scoparia* and *Cratystylis conceptala*. Within this layer another class of low shrub describes the lower plants of *Scaevola spinescens*, *Eremophila ionantha*, *Cratystylis conocephala*, *Cassia nemophila* and *Olearia axillaris*.

Area B

This area contains the granite outcrops and surrounding vegetation. It was broken into two classes - B(i) which describes the vegetation surrounding the outcrops; B(ii) describes the vegetation change further out from the rock.

Area B(i)

The upper stratum consists of *Eucalyptus griffithsii* in small fruited form and was classed as very open tree mallee.

The first shrub layer, classified as scrub, contains *Acacia acuminata*, *Alyxia buxifolia*, *Melaleuca uncinata*, *Acacia prainii var linearis* with the occasional *Santalum spicatum*.

A low scrub B stratum contains *Beyeria leschenaultii*, *Leptosperma roei*, *Cryptandra nutans*, *Prostanthera grylloana* and *Melaleuca sp.* A very open tall sedge consisted of a *Lepidosperma sp.*

Area B(ii)

The *Eucalyptus griffithsii* of B(i) is replaced by *E. loxophleba* subsp. *lissophloia* further out from the outcrops forming an open tree mallee.

Acacia acuminata, *Santalum spicatum* and *S. acuminatum* make a class of low forest.

An open scrub layer describes the *Acacia acuminata* regeneration, *A. prainii* var *linearis* and *Dodonaea microzyga* present here.

Area C - Low Woodland A

The canopy consists primarily of *Eucalyptus transcontinentalis* with *E. lesouefii* and *E. flocktoniae*. There is the occasional *E. salmonophloia* and the very occasional *E. celastroides* and *Melaleuca pauperiflora*.

An open scrub layer of *Exocarpus aphylla*, *Santalum acuminatum*, *Eremophila* sp., *E. caerulea* and a *Melaleuca* sp. precedes the low scrub B consisting of *Scaevola spinescens*, *Cratystylis conocephala*, *Eremophila scoparia*, *Acacia hemiteles*, *A. tetragonophylla* and *E. ionatha*.

Sclerolaena drummondii and *Acacia erinacea* form an open dwarf scrub C level.

Description of Trapping Sites

DRNR #1 Mixed eucalypt woodland on sandy clay loam at 121°35'45"E, 31°35'30"S.

Muir classification LAi/Sr/SAi/SBi

Stratum 1: *Eucalyptus salmonophloia*, *E. transcontinentalis*, *E. flocktoniae*,
E. celastroides, occasional *Melaleuca pauperiflora*.

Stratum 2: *Santalum acuminatum*, *Exocarpus aphyllus*, *Acacia hemiteles*.

Stratum 3: *Eremophila scoparia*, *Acacia tetragonophylla*.

Stratum 4: *Olearia axillaris*, *Cassia nemophila*, *Scaevola spinescens*.

DRNR #2 Mallee and shrubland on sandy clay loam surrounding Dordie Rock at 121°35'50"E, 31°35'40"S.

Muir classification: KTr/Si/SBi/VTr

Stratum 1: *Eucalyptus griffithsii* (small fruited form) ,

Stratum 2: *Acacia acuminata*, *Melaleuca uncinata*, *Cassia Nemophila*, *Alyxia buxifolia*.

Stratum 3: *Beyeria leschenaultii*, *Lepidosperma roei*, *Cryptandra nutans*, *Melaleuca sp.*, *Prostanthera grylloana*.

Stratum 4: *Lepidosperma sp.*

Further out from the rock *Eucalyptus loxophleba subsp. lissophloia* replaces *E. griffithsii* and *Acacia prainii* and *Dodonaea microzyga* form an Sr shrub layer.

DRNR #3 Redwood woodland on sandy loam at 121°36'00"E. 31°35'45"S.

Muir classification: LAi/Sr/SBi/SDr

Stratum 1: *Eucalyptus transcontinentalis*, *E. salmonophloia*, *E. lesouefii*, *E. flocktoniae* very occasional *E. celastroides* and *Melaleuca pauperiflora*.

Stratum 2: *Exocarpus aphyllus*, *Santalum acuminatum*, *Melaleuca sp.*, *Eremophila caerulea*, *Eremophila sp.*

Stratum 3: *Cratystylis conocephala*, *Scaevola spinescens*, *Eremophila scoparia*, *E. ionantha*, *Acacia hemiteles*, *A. tetragonophylla*.

Stratum 4: *Sclerolaena drummondii*, *Acacia erinacea*.

TABLE 4: VERTEBRATE FAUNA OF DORDIE ROCK NATURE RESERVE

BIRDS	Site No.	#1	#2	#3	#4	#5
Emu		x				
Mallee Fowl		x				
Port Lincoln Parrot		x	x	x		
Purple-crowned Lorikeet		x				
Owlet Nightjar		x				
Rainbow Bee-eater				x		
Black-faced Cuckoo Shrike			x	x		
Brown Flycatcher		x				
Red-capped Robin			x			
Grey Shrike Thrush		x		x		
Crested Bellbird		x	x	x		
Chestnut Quail Thrush				x		
Willie Wagtail		x				
Weebill		x	x			
Broad-tailed Thornbill			x			
Chestnut-rumped Thornbill		x	x			
Redthroat			x			
Rufous tree-creeper				x		
Striated Pardalote		x				
Yellow-plumed Honeyeater		x	x	x		
White-eared Honeyeater		x				
Brown-headed Honeyeater		x				
White-fronted Honeyeater		x				
Spiny-cheeked Honeyeater		x		x		
Red Wattlebird		x	x	x		
Dusky Woodswallow				x		
Currawong		x	x			
Grey Butcherbird		x				
Pied Butcherbird				x		
Australian Raven		x				
Little Crow		x				
REPTILES						
<i>Diplodactylus maini</i>		x				
<i>Diplodactylus pulcher</i>		x				
<i>Gehyra variegata</i>					x	
<i>Phyllurus milii</i>					x	
<i>Varanus gouldii</i>				x		
<i>Ctenophorus cristatus</i>		x		x		
<i>Egernia inornata</i>				x		
<i>Morethia obscura</i>				x		
MAMMALS						
<i>Macropus sp.</i>						x
<i>Tachyglossus aculeatus</i>				+		
Echidna						
<i>Sminthopsis sp.</i>			1			
<i>Notomys Mitchellii</i>			1	1		
Mitchell's Hopping Mouse						
<i>Mus musculus</i>			1			
House Mouse						

#4 On Dordie Rock

#5 Elsewhere on reserve

+ Signs only recorded

Numbers in the table refer to numbers of animals trapped.

DISCUSSIONS AND CONCLUSIONS

1. Kurrawang Nature Reserve

These surveys indicate that Kurrawang Nature Reserve with eight mammal species has a rich mammal fauna for a relatively small area of re-growth woodland. The avifauna here is of particular interest because it can be compared to a list of forty-seven species recorded in 1904 by G.C. Shortridge (Ogilvie-Grant 1909). The presence of some ten woodland species in Shortridge's list suggests the area had not been clear-felled at this date.

Two predominantly south west species, Purple-gaped Honeyeater and *Hylacola* do not on present knowledge occur at Kurrawang. In view of the scarcity of historical data on fauna in WA, Shortridge's list is of great interest. Further research on both birds currently present at Kurrawang, and the date of clear-felling this woodland would be well worthwhile.

The collection of invertebrate fauna was confined to Kurrawang Reserve and there are no data on similar collections for comparison. Other studies have, however, established the presence of a rich invertebrate fauna in flora-rich semi-arid habitats (McMillan & Foulds, 1980; Loneragan *et al*, 1984; Foulds & McMillan, 1988). The collection of fifty-five species in a very limited period at Kurrawang suggests a relatively rich invertebrate fauna and in turn, infers a healthy diversity in other sectors of the biota.

Kurrawang Nature Reserve is free of all past mining activity, and feral stock. As the closest nature reserve to Kalgoorlie, its management is not hindered by distance, and it also has considerable potential for environmental education and interpretation. Management requirements include controlling trail bike use, illegal wood cutting and liaison with the Kurrawang Aboriginal Christian Community. Some gravel pit rehabilitation works are required.

2. Burra Rock Nature Reserve

With the exception of a small population of *Eucalyptus occidentalis var. stenantha*, a rare and poorly known eucalypt which must be protected, Burra Rock Nature Reserve only appears to have moderate conservation value. However, it is an extremely popular recreation destination for residents and tourists due to the rock itself, the barbecues and picnic tables and the presence of the dam. Camping is a popular activity here. Management requirements include rehabilitating the old paddock site, provision of a display panel, provision of firewood, maintenance of barbecues and tables, rubbish removal and weekend patrolling to reduce driving on the rock and in the rehabilitation area. Due to high levels of use it will be very difficult to manage Burra Rock as a nature reserve.

3. Cave Hill Nature Reserve

This reserve has high conservation values, including the presence of *Eucalyptus occidentalis* var. *stenantha*, *Grevillea petrophiloides* growing as an outlier population, *Morelia spilotes* a python gazetted rare and endangered, and *Varanus tristis* at the southern edge of its range. Cave Hill Nature Reserve offers identical recreation opportunities to Burra Rock Nature Reserve. However the level of usage is much less due to its remoteness and poor access. This situation could change if a roading proposal joining Burra Rock Nature Reserve, Cave Hill Nature Reserve and Higginsville comes about.

4. Dordie Rock Nature Reserve

On present knowledge Dordie Rock Nature Reserve has moderate conservation value based on the presence of the small fruited form of *Eucalyptus griffithsii* which is not known to grow on any other reserve.

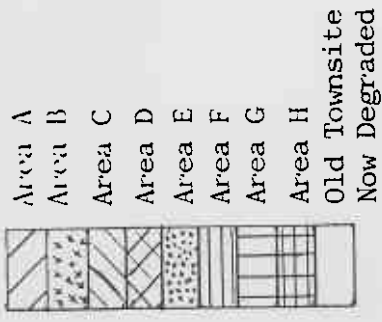
ACKNOWLEDGEMENTS

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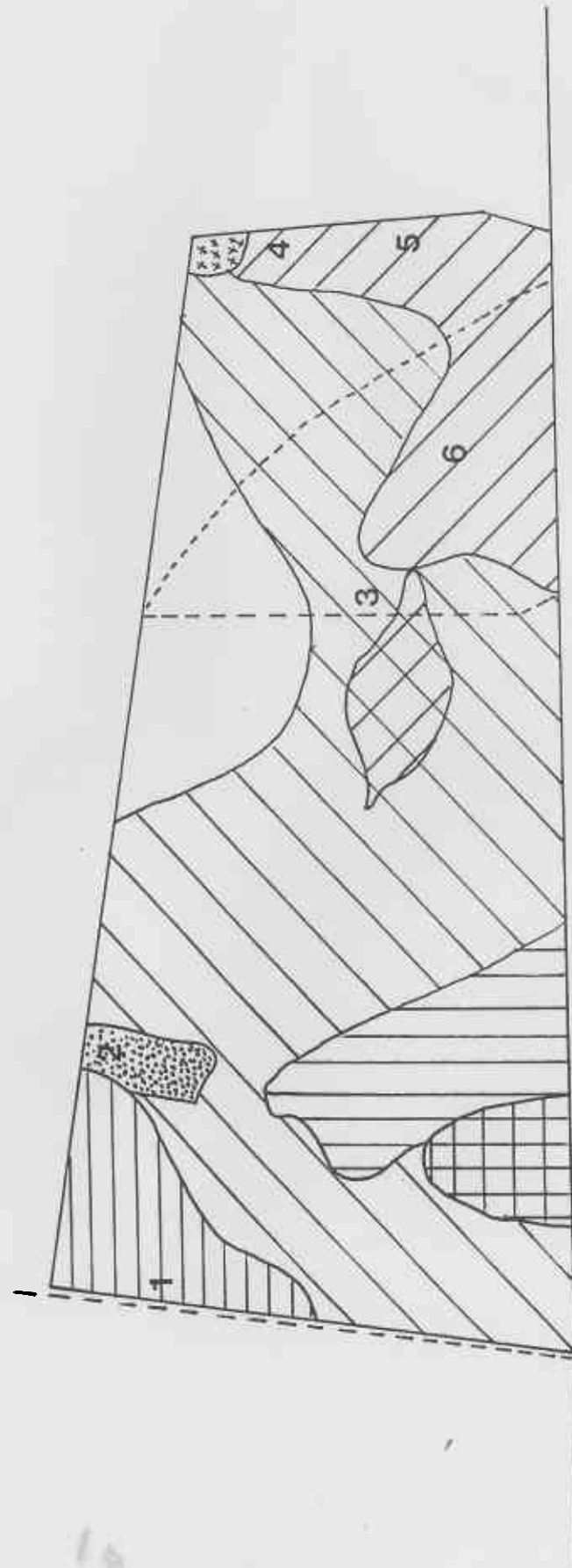
REFERENCES

- Foulds W, and McMillan R.P. (1988) An Ecological Study of Burma Road Reserve, Greenough Shire, Western Australia. Australian Heritage Commission. The Tree Society & Department of CALM. WACE.
- Loneragan W.A, McMillan P. Townley L.R and Watson L.E (1984) Star Swamp Bushland Reserve. Proposals for its development and management. Australian Heritage Commission Report. Dept. of Botany, University of Western Australia.
- McMillan R.P and Foulds W (1980) An investigation of the proposed landscape protection area of Greenough, Western Australia. Australian Heritage Commission Report. Canberra.
- Muir B.G (1977). Biological Survey of the Western Australian Wheatbelt, Part 2: vegetation and habitat of Bendering Reserve. *Rec. West. Aust. Mus.* Supp No 3 1-142.
- Northcote K.H (1971) A factual key for the recognition of Australian soils. Glenside, S.A, CSIRO/ Pelcan.
- Ogilvie Grant, (1909) On a collection of birds from Western Australia with field notes by Mr G.C. Shortridge. *Ibis* (9)3:650-689 and 1910 *Ibis* (9)4:156-191.

Figure 1: Vegetation - Kurrawang Nature Reserve



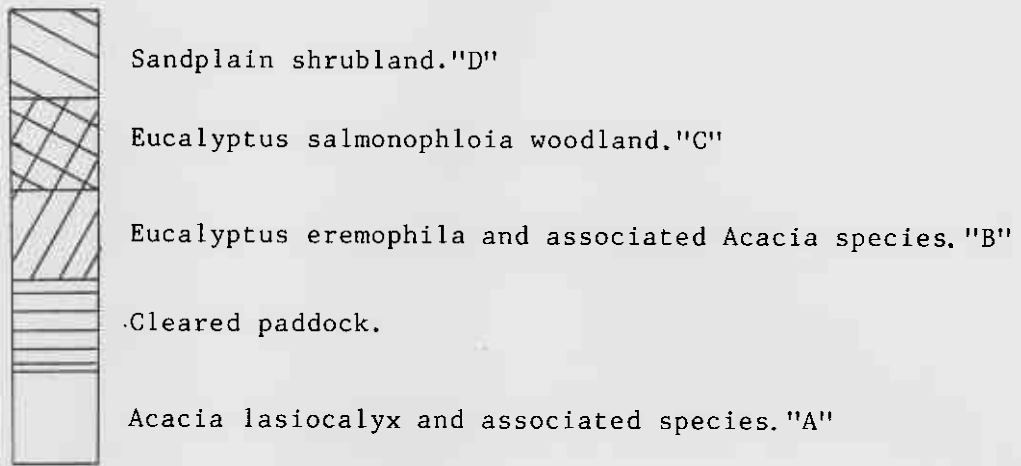
X Kurrawang
1 Trapline Site



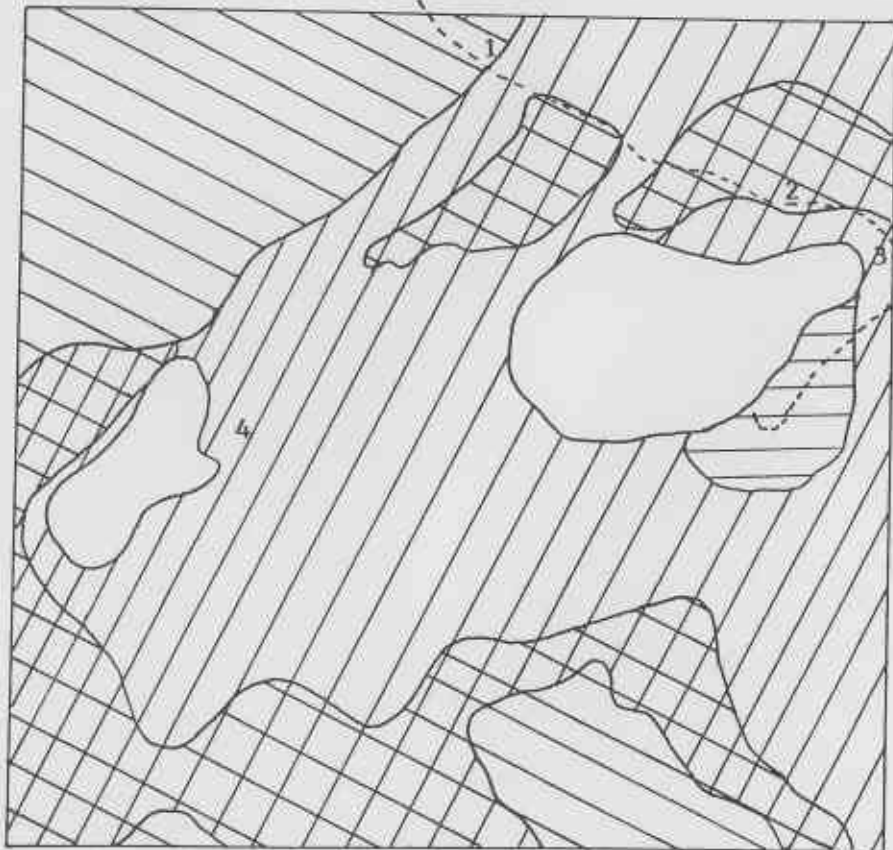
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FIGURE 2: Vegetation - Burra Rock Nature Reserve



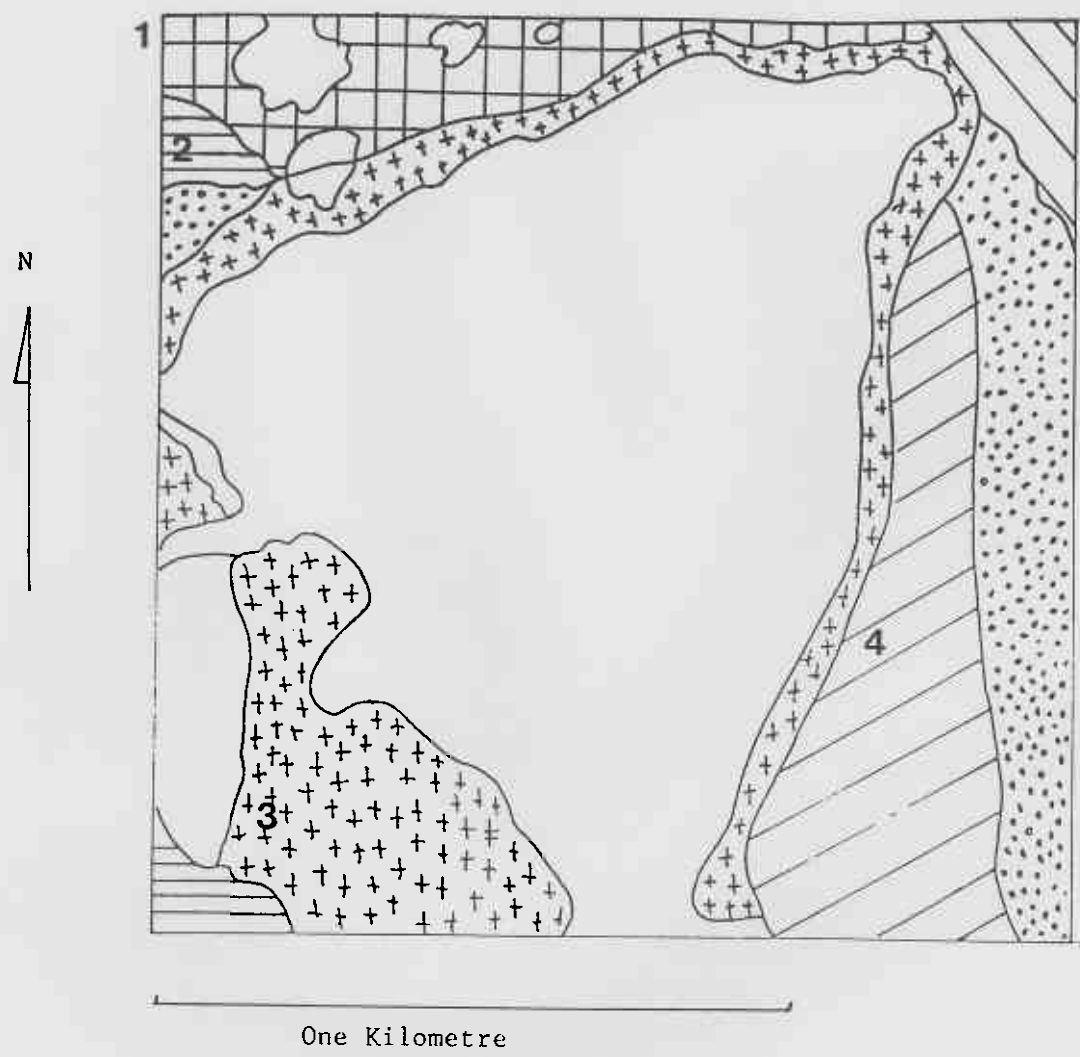
1 Trapline site To Coolgardie



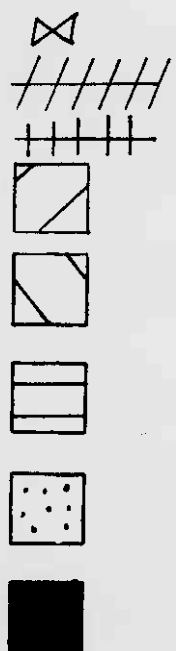
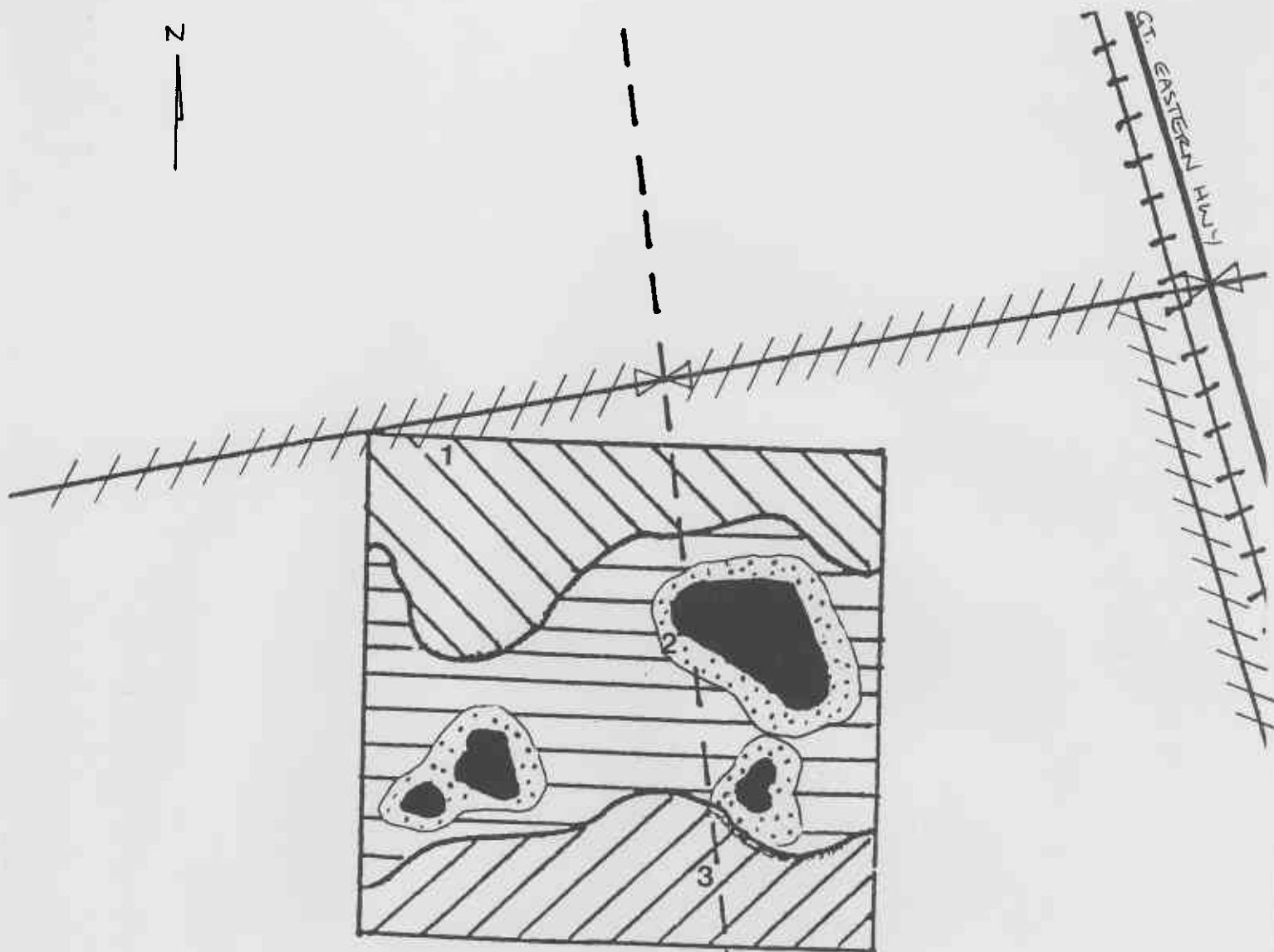
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FIG. 3 VEGETATION CAVE HILL NATURE RESERVE



++ +++	AREA A	FRINGING VEGETATION
•••	AREA B	GULL THICKET
— — —	AREA C	SALMON GUM WOODLAND
□ □ □	AREA D	WANDOO LOW WOODLAND
///	AREA E	GIMLET LOW WOODLAND
\\	AREA F	MALLEE MIXED SPECIES
	AREA G	GRANITE ROCK
1		TRAPLINE NO.



GATE/GRID
 FENCE
 RAILWAY LINE
 LOW WOODLAND A Area 'C'
 LOW WOODLAND Area 'A'
 OPEN TREE MALLEE }
 VERY OPEN TREE MALLEE Area 'B'
 ROCK

FIGURE 4: Vegetation - Dordie Rock Nature Reserve

1
 Trapline Site
 1 KM.