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DEPARTMENT OF FISHERIES AND FAUNA
WESTERN AUSTRALIA

REPORT No. 12

RESULTS OF A BIOLOGICAL SURVEY OF A PROPOSED WILDLIFE SANCTUARY AT DRAGON ROCKS NEAR HYDEN, WESTERN AUSTRALIA

by

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C O N T E N T S

I INTRODUCTION

In 1972, three visits were made to an area of vacant crown land 30 kilometres south-south-east of Hyden, Western Australia.

A preliminary survey was made in April 1972 and following this recommendations were made on the equipment and staff required for a detailed survey of the vegetation and animals.

From the 30th July to the 4th August 1972, a team from the Fauna Research Branch of the Department of Fisheries and Fauna began a detailed fauna survey.

Between the 20th August and the 25th August 1972, the fauna survey was continued and a botanist from the Western Australian Herbarium undertook a flora survey.

The object of the survey was to assess the potential of this 40,000 hectare area as a reserve for the Conservation of Flora and Fauna by :

(i) determining the quality and diversity of the flora and fauna;

(ii) discovering as far as possible, the distribution and hence the habitat requirements of the indigenous animals;

(iii) making comparisons with other large reserves already set aside as wildlife sanctuaries in neighbouring parts of the State.

The results of the above assessment were used to prepare a case justifying the acquisition of a reserve with boundaries encompassing the habitats regarded as important for the future conservation of the animals and plants indigenous to the region.

II HISTORY

In 1966 the Chief Warden of Fauna received a letter from the Secretary of the Lake Grace Zone of the Farmer's Union, requesting that certain land be gazetted a Flora and Fauna Reserve. The instigator of this move, Mr. Richard Lane, owns a property adjoining the western edge of the proposed reserve. The request was supported by the Department of Fisheries and Fauna but a decision by the Department of Lands and Surveys was deferred until a soil survey was carried out.

A soils map (East Newdegate Classification No. 811) was subsequently produced and in July and August 1972 the boundaries, roads and tracks were surveyed by the Department of Lands and Surveys personnel.

In August 1972 the Fisheries and Fauna Department undertook the first detailed wildlife survey of the Dragon Rocks area in order to assist the Department of Lands and Surveys in delineating the boundaries of any reserve.

III LOCATION AND ACCESS

The vacant crown land under consideration is covered by lithographs 375/80 and 388/80. The northern section is included in the Shire of Kulin and the southern part is in the Lake Grace Shire. The area extends from 32°34'S to 32°50'S and from 118°52'E to 119°12'E.

A series of tracks and gravel roads provided reasonable access to all sections of the land (Fig. 1). The nature of the vegetation and the gentle gradients of the slopes permitted vehicle movement virtually anywhere within the boundaries.

IV FIRE HISTORY

The appearance of the vegetation supported Mr. Lane's observation that the last major bushfire was in 1949. There was clear evidence however, that a series of small fires had burnt some areas within the past ten years.

V CLIMATE

The Atlas of Australian Resources includes the area in a region of unco-ordinated drainage and describes the climate as "inland temperate". Average rainfall and temperature figures are listed in the following tables.

Hyden Average Rainfall Figures (points) Over 34 Years

Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1331	56	73	87	85	167	209	202	161	96	79	62	54

Lake Grace Temperatures (°C) Over 10 Years

Month	Average Maximum	Average Minimum
January	32.2	14.4
April	23.4	10.8
July	14.8	5.3
October	22.9	8.3

The weather during the August surveys was cool with occasional heavy showers and several overcast days.

VI GEOMORPHOLOGY AND SOILS

A detailed description of the several landscape units present in the area can be found in the C.S.I.R.O. publication "Atlas of Australian Soils".

The dominant landscape is gently undulating uplands (ironstone ridges and gravelly sandplains) with long and very gentle slopes and occasional breakaways. There are also areas of slopes and valleys where soils are duplex (sand or loam over clay) and areas of broken terrain characterised by granitic rock outcrops.

The soils on the block have been mapped in detail by the Department of Lands and Surveys (N.E. Newdegate Classification No. 811).

VII FLORA

The Hyden area is in the transition zone between the drier Eremean botanical province and the wetter South West province. The South West province is subdivided into botanical districts largely based on climate and the species present. The Dragon Rocks reserve proposal is at the boundary of two of these, Avon and Stirling.

The vegetation of the Hyden area has been mapped by Beard (1972). No detailed studies of the vegetation have been made in the past except for a few collections in the area of Dragon Rocks. During the present study specimens of as many as possible of the species represented on the reserve were collected for identification. A list of these will be available at a later date. The vegetation patterns were studied by field surveys and a vegetation map (Fig. 2) was prepared based on aerial photographs.

The area is a generally well vegetated, low altitude ridge with a few broad valleys. Granite outcrops are common, these mostly occur as flat, partly soil covered expanses or as rounded monadnocks, raised well above the surrounding plain. The dominant landform is a gently undulating ridge of sand and gravel with associated vegetation. The lower areas with alluvial soils largely occur around the perimeter of the area, these being more suited to agriculture. Very few areas of alluvial soil with their associated woodland reach into the area under consideration.

Seven vegetation formations are recognised. The classification of these follows Specht (1970) which is based on the life form and height, as well as the density of foliage (projective foliage cover) of the tallest stratum. Plates 1 - 14 illustrate the various formations.

1. Tree Formations

a) Woodland. Low lying areas of alluvial soil support a Salmon Gum (Eucalyptus salmonophloia F. Muell.) woodland. These are widely spaced trees up to 25 m with a low projective foliage cover which allows considerable light penetration to the woodland floor.

This woodland is typical of the areas further east. The associated shrubs are : Acacia merrallii F. Muell., Boronia capitata Benth., and species of Eremophila, Thryptomene and Santalum. On more alkaline soils with poorer drainage the Morrel (Eucalyptus longicornis F. Muell.) occurs, though this is nowhere common.

The total area of this formation is small. Mostly it occurs in narrow belts following alluvial soils along well defined drainage lines running east and west from the ridge.

More extensive areas occur on uncleared private land bordering the block particularly on the east side.

b) Low Open Forest. The highest parts of the ridge generally have small stands of White Mallet, Eucalyptus falcata Turcz. and Blue Mallet, Eucalyptus gardneri Maiden. These occur as small trees or "Marlocks" up to 10 m , growing closely together with a medium-dense projective foliage cover. Understorey is generally very sparse, the litter layer being well developed. Frequently associated with this formation is Eucalyptus incrassata Labill. and shrubs such as Melaleuca pungens Schau., Acacia ericifolia Benth., Hybanthus floribundus F. Muell., Leptospermum erubescens Schau. and Pimelea suaveolens Meisn.

This formation is scattered as small areas on gravelly rises, frequently near breakaways. Similar White and Blue Mallet formations occur throughout the Hyden district. Although a number of these have been set aside as small timber reserves the species is readily killed by fire and most Mallet stands have either vanished or have deteriorated.

2. Mallee and Scrub Formations

Mallee forming open to very open shrublands cover most of the Dragon Rocks reserve proposal. Four species of mallee are particularly common. These are Eucalyptus eremophila Maiden, E. redunca Schau., E. albida Maiden and Blakely, and E. foecunda Schau. Other mallees recorded are Eucalyptus ovularis Maiden and Blakely, E. brachycorys Blakely and E. calycogona Turcz.

These shrublands are particularly variable in density and floristic composition. They can be divided into three formations which are nowhere distinct because they are only separated on the density of the highest stratum. In the vegetation map (Fig. 2) they have been grouped together as one unit.

a) Open Scrub. This formation is characterised by mallees 2 to 8 m high and a medium-dense foliage cover so that trees are closely packed. Eucalyptus eremophila Maiden, is the most common mallee in this formation. Other eucalypts occur sporadically or form localised pure stands. Examples are E. redunca Schau. and E. foecunda Schau.

b) High Shrubland. In this formation the mallees are more scattered giving a sparse total foliage cover. Eucalyptus eremophila Maiden, E. redunca Schau. and E. albida Maiden and Blakely are also recorded in this formation.

The understorey is richer than the previous formation. Common species are Calytrix brachyphylla Turcz., Isopogon buxifolius R. Br., Gastrolobium spinosum Benth., and Leptospermum spinescens Endl.

c) High Open Shrubland. Where the mallees are very scattered so that the foliage cover is very sparse the formation is a high open shrubland with a well developed heath understorey. The mallees are mostly Eucalyptus eremophila Maiden, E.redunca Schau., and E. albida Maiden and Blakely.

3. Open Heath

This is a medium-dense heath of shrubs usually less than 2 m. high. Popularly known as "sandplain" this formation generally occurs on gravel or sandy gravel. It is by far the richest in species of

any formation in the area, containing possibly two thirds of the total number of species. It is this formation which shows the mixing of Eremean, central Wheat Belt and southern species. The species composition includes most of the low shrubs recorded for the Mallee and Scrub Formations. Small thickets of Casuarina spp., mainly Casuarina campestris Diels, up to 2 m high are common on gravelly and coarse sandy soils. Some of the species which have their main areas of distribution further south of Dragon Rocks are Calectasia cyanea R. Br., Chamelaucium megalopetalum Benth., and Isopogon teretifolius R. Br.

4. Lithic Complexes

Granitic outcrops form a substantial proportion of the ridge. Where an outcrop is subsurface a dense cover of Borya nitida Labill., grows in association with Verticordia preissii Schau., ephemeral species and various sedges. Exposed granitic sheets and low domes are usually surrounded by an apron of coarse sandy loam. Where the soil is sufficiently deep, thickets of Acacia lasiocalyx C. Andrews and Casuarina heugeliana Miq. are developed. Shrubs of this formation include Melaleuca elliptica Labill., Melaleuca radula Lindl., Calothamnus quadrifidus R. Br., and Phyllanthus calycinus Labill.

The other type of lithic complex developed is that of the breakaways. Some of these support small areas of Brown Mallet (Eucalyptus astringens Maiden). One shrub, Acrotriche ramiflora R. Br., from this formation is the most northerly record of this south coast species.

VIII FAUNA

A. MAMMALS

The intensive trapping programme was designed to cover all the important vegetation formations and soil types.

The 38 trap lines yielded a total effort of 2774 trap-nights. Four types of traps were used :

a)	cage traps (48 cm x 17 cm x 17 cm)	909 trap-nights
b)	Elliot traps (32 cm x 10 cm x 8 cm)	1206 trap-nights
c)	break-back traps ("rat" traps)	602 trap-nights
d)	pit traps (10 cm diameter plastic pipe)	57 trap-nights

Larger mammals were mostly observed while spotlighting at night. Such places as hollow logs and burrows were examined during the daytime.

The following list includes those mammals observed or captured within the proposed Wildlife Sanctuary.

1. Western Grey Kangaroo, Macropus fuliginosus

Kangaroos were common and occurred throughout the area, especially on adjacent paddocks where large numbers were observed.

2. Western Brush Wallaby, Macropus irma

This wallaby was plentiful throughout the area. It was observed both during daylight and during the nightly spotlighting traverses.

3. Brush-tailed Possum, Trichosurus vulpecula

Two possums were captured in cage traps set in salmon gum woodland. This widely distributed species of native mammal is uncommon in the more arid areas further east of the Dragon Rocks area.

4. South-western Pigmy Possum, Cercartetus concinnus

An adult female with six small pouch young was dug from a heap of mixed vegetation and soil left by a bulldozer. The vegetation was a transition between low open forest and high shrubland formations. The animals were in a nest 7 cm in diameter, situated about 0.3 m into the heap, and constructed from Eucalyptus leaves. In the south-west this species is known eastward as far as Coolgardie and Esperance.

5. Honey Possum, Tarsipes spencerae

Plate 11 illustrates the open heath formation in which an adult female was captured. Unlike the other mammals in this list it was captured in a pit trap. This species is unique to the south-west and its most eastern record is at Salmon Gums on the road between Esperance and Norseman.

6. Red-tailed Wambenger, Phascolgale calura (Plate 15)

An adult female with eight small pouch young was captured in an Elliot trap in mixed open scrub and salmon gum woodland (Plate 1).

This animal is included in the "Red Book" of rare species produced by the International Union for the Conservation of Nature and Natural Resources (I.U.C.N.). It has also been declared "rare and likely to become extinct" under the Fauna Conservation Act. It has a wide distribution in Australia but is nowhere common and little is known about it.

7. Common Dunnart, Sminthopsis murina (Plate 16)

A comparatively large specimen of this small marsupial carnivore was captured in an open heath formation dominated by Casuarina campestris. The unusually large size and short tail of this specimen is a typical of the species and is similar to one recently captured on the Tarin Rock Wildlife Sanctuary.

8. Fat-tailed Dunnart, Sminthopsis crassicaudata

Mr. R. Lane collected two specimens from fence post holes adjacent to the western side of the Dragon Rocks area. The first was captured in January 1967 and the other in April 1973. This relatively common species has a wide distribution in the semi-arid parts of Australia.

9. Wuhl-wuhl, Antechinomys spenceri

In 1967 a specimen was collected from a fence post hole on the western side of the area by Mr. R. Lane. It was not seen or trapped during our survey. The species is distributed in the arid parts of southern Australia and this locality is at the south-western extremity of its range.

10. Mitchell's Hopping Mouse, Notomys mitchellii (Plate 17)

Nine specimens were captured, comprising two males, six females and a juvenile. They were captured in both Elliot and breakback traps.

The vegetation formations were :

a) a transition woodland and open scrub - 3 animals;

b) transition open scrub and high shrubland - 4 animals;

c) open scrub - 1 animal;

d) transition lithic complex and high open shrubland - 1 animal.

These notes indicate that the animals' habitat is centred in mallee and scrub formations.

The species is distributed throughout the drier parts of the wheat-belt of W.A. and is still relatively common.

11. Western Mouse, Pseudomys occidentalis (Plate 18)

Two adult males were captured, one in an Elliot trap and the other in a breakback. Both were captured on gravelly soils; one from an area of sandy gravel on ironstone and the other from a slope of loam with gravel just below a breakaway. In both cases the vegetation was

a high open shrubland formation.

The Western Mouse is recognised as a rare and threatened species by the House of Representatives Select Committee on Wildlife Conservation in their 1972 report, and by the Australian Fauna Authorities Conference. It has been declared "rare and likely to become extinct" under the Fauna Conservation Act.

Little is known of the species. All specimens have come from the southern and south-eastern wheatbelt.

12. Lesser Long-eared Bat, Nyctophilus geoffroyi

A specimen was collected from under the bark of a Casuarina heugaliana tree in a lithic complex. This bat is quite common in the south-west.

13. Little Bat, Eptesicus pumilis

A specimen was shot at dusk while it was flying at an altitude of about 7 m in a woodland formation. This is a common species.

14. Gould's Wattled Bat, Chalinolobus gouldii

Two specimens were shot at dusk while flying in a woodland formation. This bat is also common.

15. Echidna, Tachyglossus aculeatus

Echidna spines were found inside a hollow Salmon Gum log and in the faeces of a fox. Diggings were common in many parts of the area. The echidna is widely distributed in Australia.

16. House Mouse, Mus musculus

This introduced rodent was captured in a variety of situations including lithic complexes, shrubland, scrub, and open heath formations.

17. Fox, Vulpes vulpes

Signs of foxes were found throughout the area.

18. Cat, Felis catus

Signs of cats were also evident in some parts of the area.

19. Rabbits, Oryctolagus cuniculus

Rabbits were frequent along the edges of the area and on adjoining farms but were largely absent from the undisturbed bush.

Conversations with adjoining landholders suggest that three additional species occur in the Dragon Rocks area.

1. Short-nosed Bandicoot, Isoodon obesulus

A specimen from the Hyden area was lodged at the Western Australian Museum in 1965. We were told it occurs within the Dragon Rocks area.

2. Western Native Cat, Dasyurus geoffroii

A specimen of this animal from the Hyden area was lodged at the Museum in 1943. Farmers report that it still occurs in the Dragon Rocks area.

3. Numbat, Myrmecobius fasciatus

We were told that numbats inhabited the low open forest (mallet) formation. There is little likelihood of observers confusing this animal with any other. If the observations can be confirmed they will provide an eastern extension of the known range of the numbat in this part of the State.

There are two other animals which might occur within the area. Shortridge's Native Mouse (Pseudomys shortridgei) has been recorded from Lake Biddy, 16 km south-south-west of the Dragon Rocks area. In 1931 two specimens were lodged in the Western Australian Museum. This species has been rarely collected in Western Australia. Another species, the Dingo (Canis familiaris), probably still occurs in the district.

The Dragon Rocks area is exceptionally rich in mammals, having twelve confirmed native terrestrial species and a possibility of three others. This diversity contrasts most favourably with existing major wildlife sanctuaries in the eastern and south eastern wheatbelt (Appendix 1). The mammals are predominantly representative of the wetter parts of the south west; the only exception, Antechinomys spenceri, is an inland species.

B. BIRDS

The following species of birds were recorded. Where identification was uncertain, specimens were collected. The nocturnal birds were observed during the spot-lighting runs.

Names are from an "Index of Australian Bird Names" (Anon, 1969).

Dromaius novaehollandiae	Emu
Tadorna tadornoides	Mountain Duck
Chenonetta jubata	Wood Duck
Lophoictinia isura	Square-tailed Kite
Haliastur sphenurus	Whistling Eagle
Aquila audax	Wedge-tailed Eagle
Falco cenchroides	Nankeen Kestrel
Falco berigora	Brown Hawk
Leipoa ocellata	Mallee Fowl
Eupodotis australis	Australian Bustard
Phaps chalcoptera	Common Bronzewing
Ocyphaps lophotes	Crested Pigeon
Glossopsitta porphyrocephala	Purple-crowned Lorikeet
Calyptorhynchus baudini	White-tailed Black Cockatoo
Cacatua roseicapilla	Galah
Polytelis anthopeplus	Regent Parrot
Platycercus icterotis	Western Rosella
Barnardius zonarius semitorquatus	Twenty-eight Parrot
Neophema elegans	Elegant Parrot
Cuculus pallidus	Pallid Cuckoo
Cacomantis pyrrhophanus	Fan-tailld Cuckoo
Ninox novaeseelandiae	Boobook Owl
Podargus strigoides	Tawny Frogmouth
Petrochelidon nigricans	Tree Martin
Anthus novaeseelandiae	Australian Pipit
Coracina novaehollandiae	Black-faced Cuckoo Shrike
Pomatostomus superciliosus	White-browed Babbler
Malurus lamberti	Variegated Wren
Smicrornis brevirostris	Weebill
Acanthiza pusilla	Brown Thornbill
Epthianura albifrons	White-fronted Chat
Eopsaltria griseogularis	Western Yellow Robin
Rhipidura fuliginosa	Grey Fantail
Rhipidura leucophrys	Willie Wagtail
Seisura inquieta	Restless Flycatcher
Colluricincla rufiventris	Western Shrike-thrush
Oreoica gutturalis	Crested Bell-bird
Climacteris rufa	Rufous Tree-creeper
Dicaeum hirundinaceum	Mistletoe Bird
Pardalotus substriatus	Striated Pardalote
Zosterops gouldi	Western Silvereye
Lichmera indistincta	Brown Honeyeater
Meliphaga virescens	Singing Honeyeater
Meliphaga cratitia	Purple-gaped Honeyeater
Meliphaga ornata	Yellow-plumed Honeyeater
Meliphaga leucotis	White-eared Honeyeater
Melithreptus brevirostris	Brown-headed Honeyeater

Phylidonyris niger	White-cheeked Honeyeater
Gliciphila melanops	Tawny-crowned Honeyeater
Manorina flavigula	Yellow-throated Miner
Anthochaera chrysoptera	Little Wattle-bird
Anthochaera carunculata	Red Wattle-bird
Grallina cyanoleuca	Magpie Lark
Artamus cinereus	Black-faced Wood-Swallow
Artamus cyanopterus	Dusky Wood-Swallow
Strepera versicolor	Grey Currawong
Cracticus torquatus	Grey Butcher-bird
Gymnorhina dorsalis	Western Magpie
Corvus coronoides	Australian Raven

This comprehensive list of 59 species reflects the diversity and size of the Dragon Rocks area. Some notes of special interest are :

(i) the honeyeaters present were a mixture of dry country and forest species;

(ii) the Purple-gaped Honeyeater and Little Wattle-bird are at the eastern limit of their range;

(iii) the Fan-tailed Cuckoo observed during the third visit was probably a migrant;

(iv) two species, the Galah and the Crested Pigeon, are invading the south-west from the more arid parts of the state following agricultural development;

(v) Mallee-fowl are common throughout the area;

(vi) the Square-tailed Kite is one of the rarer hawks;

(vii) examination of a Wedge-tailed Eagle's nest on an adjacent property showed that its food was 100% rabbits;

(viii) the stomach of a Brown Hawk, which was collected, yielded an agamid lizard (Amphibolurus adelaidensis), a cockroach, a centipede and a grasshopper.

Appendix No. 2 which compares the birds of Dragon Rocks area with adjacent existing reserves, does not provide a completely accurate comparison because the surveys were undertaken in different seasons. At the present time it seems that :

(i) 38 species were common to Lake Magenta, Lake Barker and Dragon Rocks;

(ii) 11 species were on Lake Magenta and Lake Barker but not on Dragon Rocks;

(iii) 7 species were on Dragon Rocks but were not recorded on the others.

It appears that Lake Barker has a more diverse bird fauna, having all the species found on Dragon Rocks and Lake Magenta plus many arid zone species not found on either of these reserves.

In general the birds recorded in the Dragon Rocks area are representative of that part of the State. However, the list is surprisingly large considering the short duration of the survey and the time of the year. This reflects the diversity and condition of the country.

C. REPTILES

The following species were collected.

GEKKONIDAE - (Geckoes)

Gehyra sp. (similar appearance to G. variegata)
Phyllurus milii
Crenadactylus ocellatus
Diplodactylus spinigerus
Diplodactylus vittatus
Oedura reticulata

PYGOPODIDAE - (Legless Lizards)

Lialis burtonis
Delma fraseri
Delma sp. (D. australis, Kluge, In Press)

AGAMIDAE - (Dragon Lizards)

Amphibolurus ornatus
Amphibolurus adelaidensis

SCINCIDAE - (Skinks)

Egernia nitida
E. multiscutata bos
Cryptoblepharus plagiocephalus
Morethia obscura
Lerista distinguenda
Tiligua rugosa

ELAPIDAE - (Snakes)

Denisonia gouldii

TYPHLOPIDAE - (Blind Snakes)

Rhamphotyphlops australis

Appendix No. 3 is a comparison of the reptiles from Dragon Rocks with those known from other large reserves in the region. Although the specimens were collected at different seasons of the year and the lists are no doubt incomplete, the reptiles of Dragon Rocks area seem to be representative of the wetter half of the "Wheat Belt" and include some coastal species extending to their inland limits. For example, Diplodactylus spinigerus is generally a coastal species while Amphibolurus adelaidensis is at the inland limit of its range.

D. AMPHIBIANS

A range of frogs were collected in a variety of habitats. The list is quite short and reflects the general high level of the landscape in the area under consideration.

HYLIDAE

Litoria cyclorhynchus

LEPTODACTYLIDAE

Myobatrachus gouldii
Pseudophyrne guentheri
Crinia pseudinsignifera

Two species are of particular interest. The Turtle Frog (Myobatrachus gouldii), illustrated in Plate 19, is little known subterranean species which generally inhabits sandy soils away from water. It is significant that this specimen was caught in a pit trap in a formation of open heath on deep sand after a night of heavy rain. This record is close to the inland limits of its range. Litoria cyclorhynchus has been generally regarded as a south coastal animal (Main, 1965). It has not previously been captured so far north.

Pseudophyrne guentheri is a species distributed mainly in areas of reliable winter rainfall (it has a south-west distribution). Further inland it is replaced by Pseudophyrne occidentalis which is found in areas of unreliable and mainly summer rainfall. Appendix No. 4 shows that P. occidentalis is found on Lake Barker Reserve whereas P. guentheri is found on the others.

PLATES 1–19

FIGURES 1&2

PLATE 1
Mixed Open Scrub and Woodland

PLATE 2
Mixed Open Scrub and Woodland

PLATE 3
Mixed Open Scrub and Woodland

PLATE 4
Low Open Forest

PLATE 5
Woodland—High Open Shrubland Boundary

PLATE 6
High Shrubland

PLATE 7
High Shrubland

PLATE 8
High Open Shrubland

PLATE 9
Open Heath, High Shrubland Background

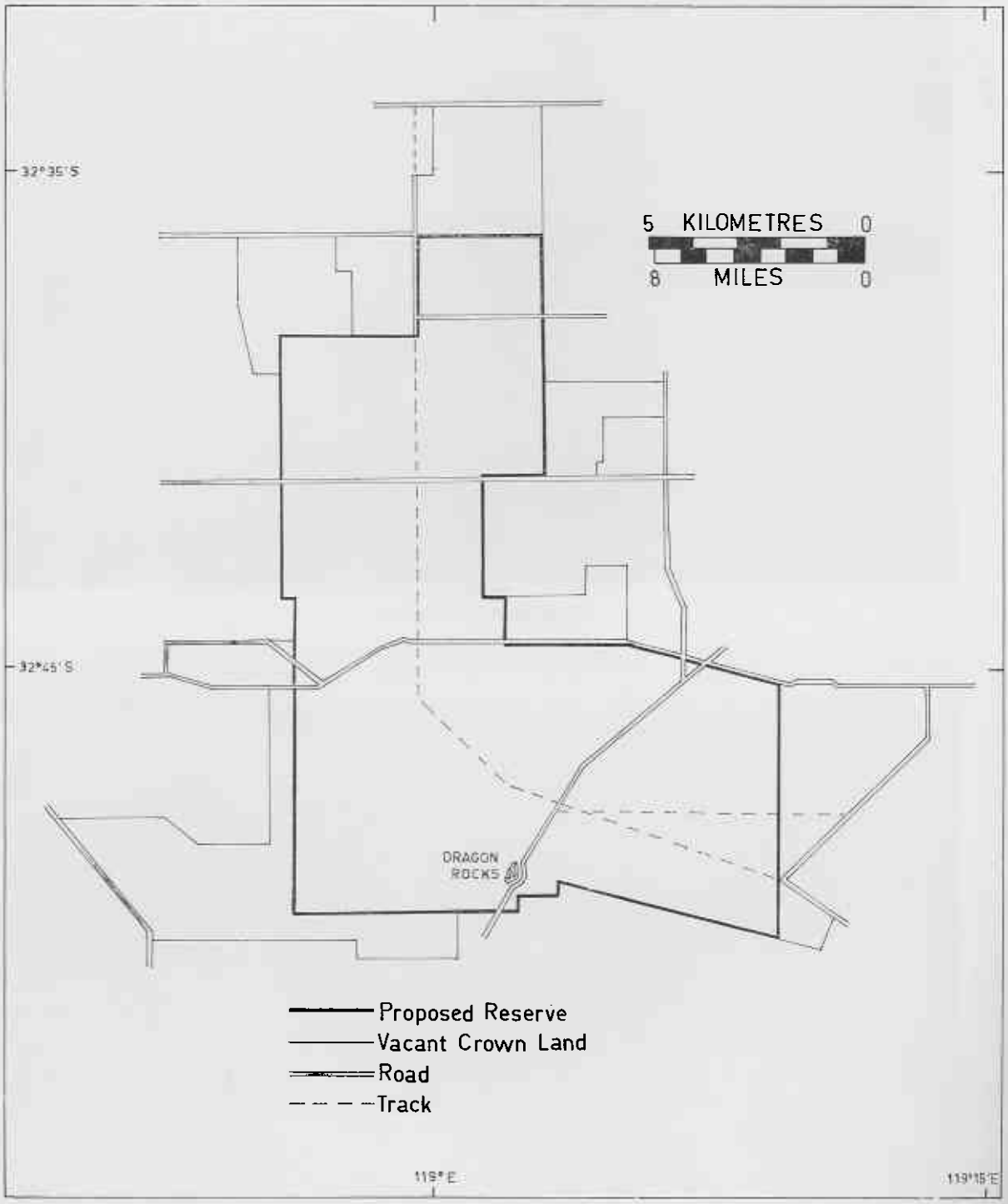

FIG 1
Dragon Rocks Area

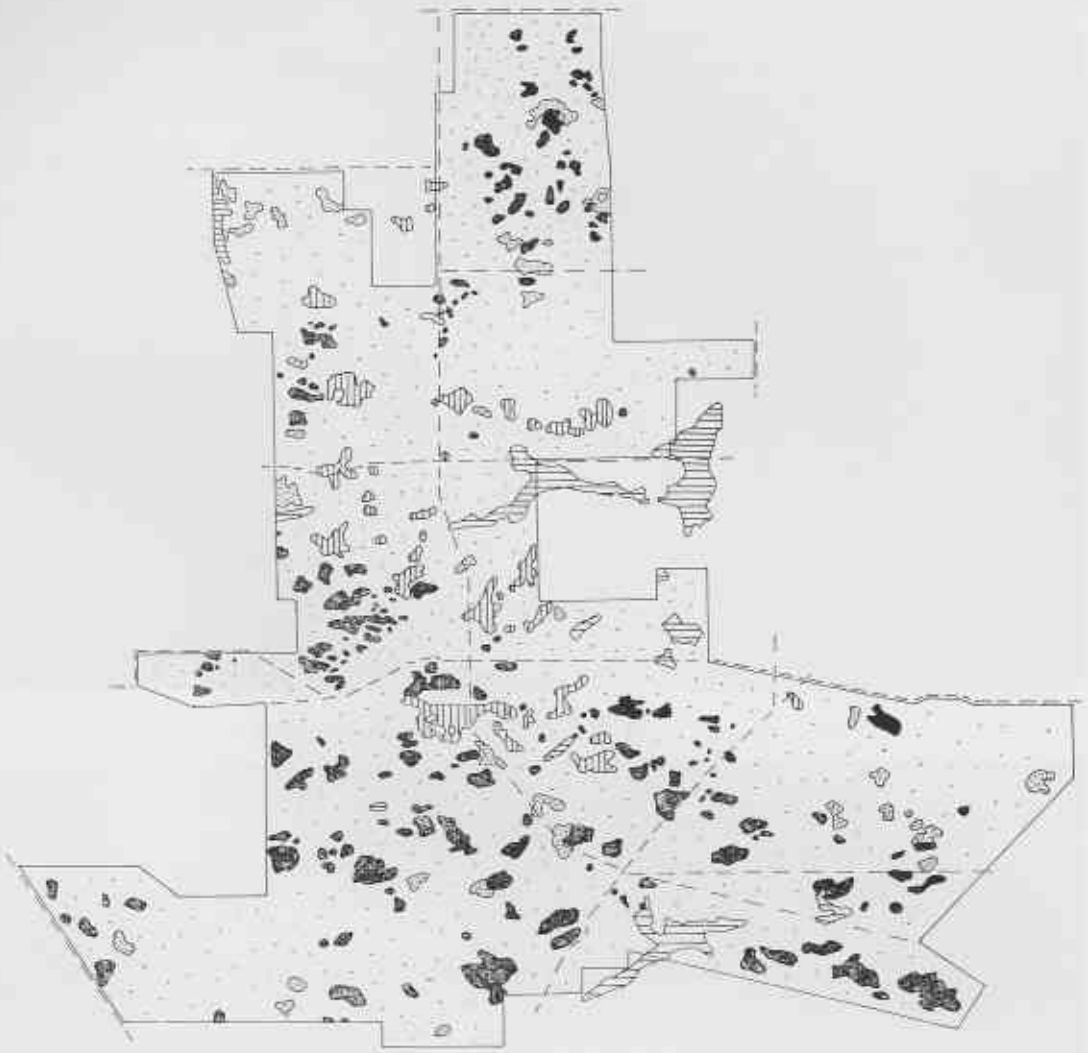

FIG 2
Vegetation Map

PLATE 10
Open Heath on Laterite

PLATE 11
Open Heath on Sand

PLATE 12
Lithic Complex—Foreground High Shrubland—Background

PLATE 13
Lithic Complex

PLATE 14
Lithic Complex

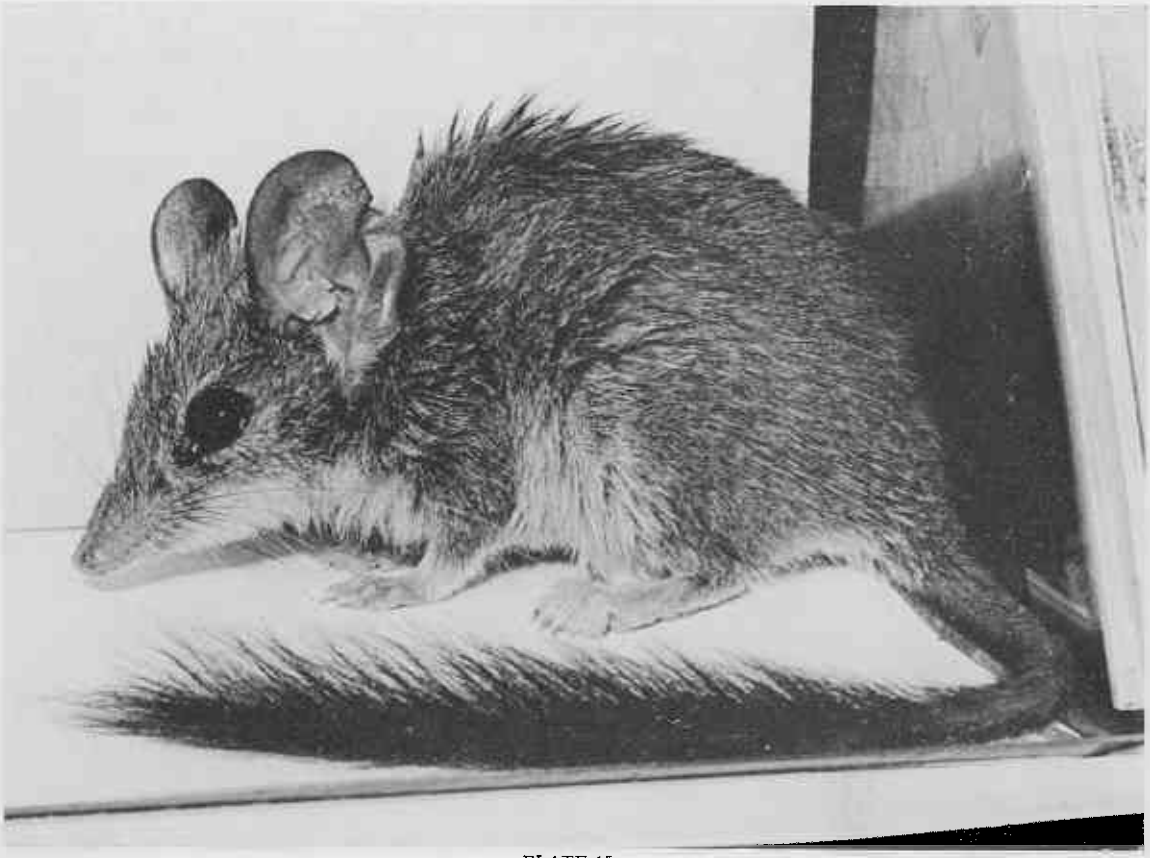

PLATE 15
Red-tailed Wambenger (*Phascogale calura*)

PLATE 16

Common Dunnart *(Sminthopsis murina)*

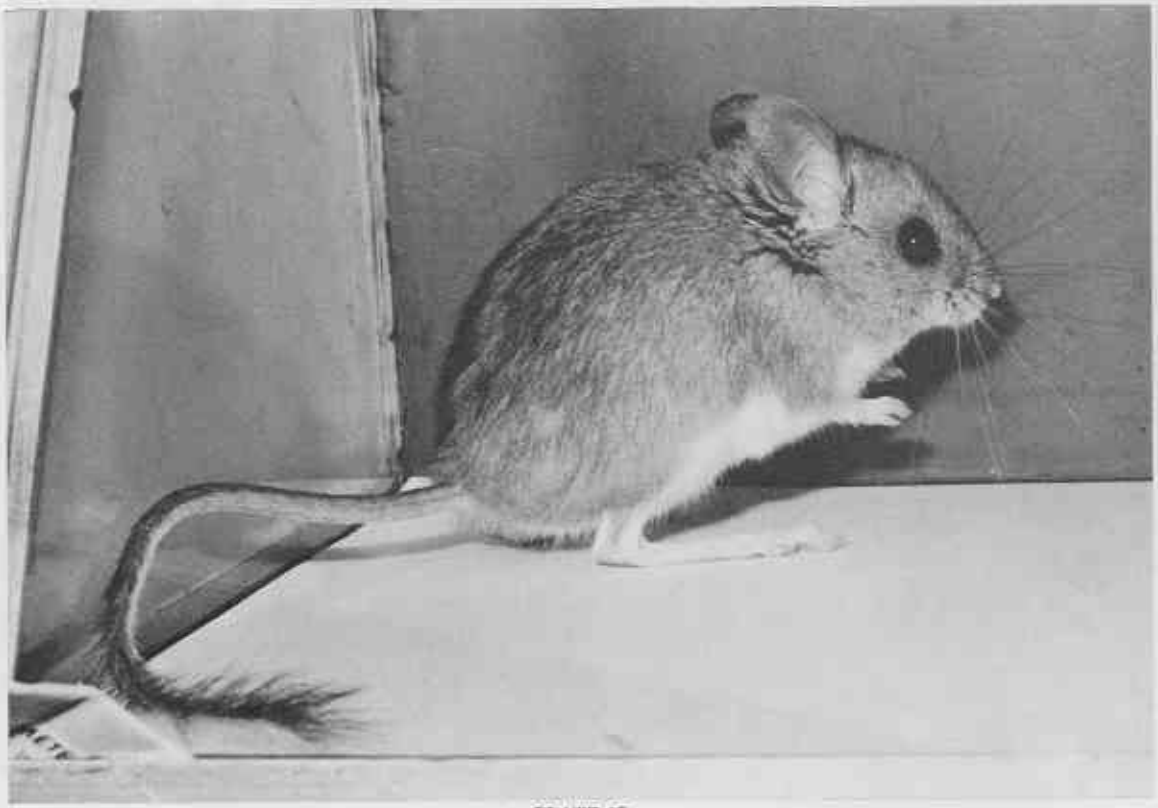

PLATE 17

Mitchell's Hopping Mouse *(Notomys mitchellii)*

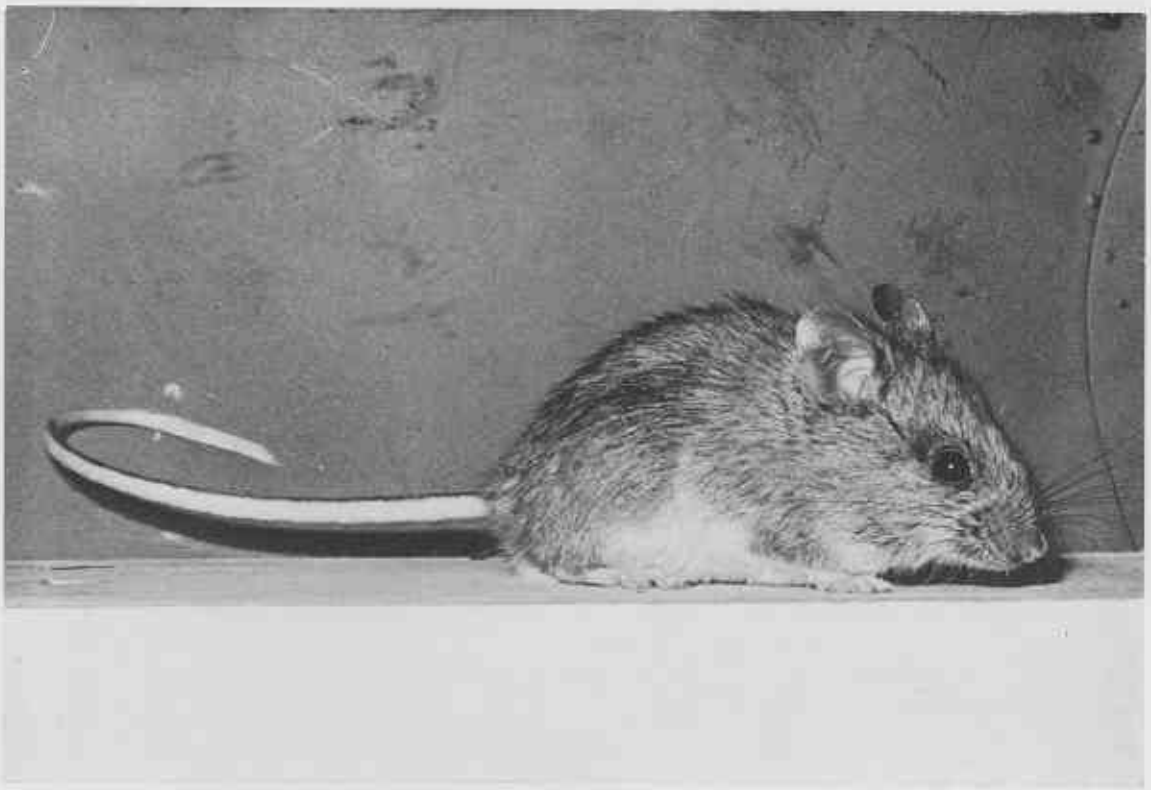

PLATE 18
Western Mouse *(Pseudomys occidentalis)*

PLATE 19
Turtle Frog *(Myobatrachus gouldii)*

Crinia pseudinsignifera is also a south-western species (Main, 1965) and is found in the region of reliable winter rainfall.

It is apparent that the Dragon Rocks amphibians have south coastal and south-western affinities.

IX DISCUSSION AND CONCLUSIONS

The Dragon Rocks area has a diverse and interesting flora and fauna.

The extent of the rich vegetation formations combined with the diversity of species present make the area of considerable botanical interest. Many of the plant species are not known on existing reserves. Three undescribed species occur on the area. One of these, a Grevillea, has not been found outside the Dragon Rocks area despite an intense search.

As well as being in a region of mixing of diverse floral elements the Dragon Rocks area has its own characteristic flora. For example, it includes an extensive heath of a previously known but undescribed species of Dryandra.

The area has largely south-western faunal affinities. It supports a fauna typical of much of the drier parts of the southern wheatbelt including a number of species of special interest because of their rarity. Outstanding among these are Western Mouse and the Red-tailed Wambenger. The Wuhl-wuhl is also a little known species which, to our knowledge, does not occur on any reserve.

Other species are at the limits of their known distribution. Examples include Diplodactylus spinigerus and Litoria cyclorhynchus which are at their northern limits, and the Purple-gaped Honeyeater and Little Wattle-bird which are at the eastern limit of their range. The Numbat (if its occurrence is confirmed) is also at the eastern edge of its distribution. The habitat of the Numbat in this area (mallet forest) is quite different from that where the Numbat still occurs further to the west (wandoo forest) and this makes the protection of the area important.

The animal species found on the Dragon Rocks area occupy a wide variety of habitats. Considerably more study would be necessary to state exactly what each species requires from the environment but it is evident that some have distinct habitats, for example :

(i) Salmon Gum woodland - Red-tailed Wambenger and Brush-tailed Possum;

(ii) mallee and scrub on heavy soils - Mitchell's Hopping Mouse;

(iii) mallee and scrub on gravelly soils - Western Mouse;

(iv) open heath - Honey Possum;

(v) low open mallet forest - Numbat.

Thus, in order to retain the full diversity of fauna, all vegetation formations must be adequately represented in any reserve. The greatest problem in this case is to retain sufficient Salmon Gum woodland. There is little of this vegetation formation on the area since most of it has been included in the adjoining farms.

Comparisons between the fauna of the Dragon Rocks area and other major reserves in this part of the state have been made in the Appendices. It is clear that Dragon Rocks complements, rather than duplicates, the other areas. This is especially so in the case of mammals, where the two large existing reserves (Lake Barker and Lake Magenta Wildlife Sanctuaries) do not contain the diversity of small mammals which occurs on the Dragon Rocks area. Some of these mammals are known only from much smaller wildlife sanctuaries in the area, e.g. Tarin Rock and Chinocup, but their long term persistence on small reserves must be in doubt.

The diversity and quality of the flora and fauna of the Dragon Rocks area makes it potentially one of the most valuable wildlife sanctuaries in Australia.

To fulfil its function adequately a regional reserve as considered here should :

(i) have an area greater than 20,000 hectares (Main and Yadav, 1971);

(ii) contain a full cross section of the regional landscape with adequate areas of all soil surfaces;

(iii) contain adequate areas of all vegetation formations, and thus the fauna which inhabit them;

(iv) be of reasonable shape for efficient management.

The reserve boundaries recommended (Fig. 1) encompass an area of about 30,000 hectares. This is somewhat larger than the minimum figure suggested by Main and Yadav because :

(i) a close examiniation of the soil and vegetation maps allied with information on animal habitats shows that an adequate area of all formations cannot be reserved in one reasonably shaped block of land of less than this area. Even so, the amount of Salmon Gum woodland is too small;

(ii) Main and Yadav's figure was worked out on the basis of comparing the size of offshore islands with the diversity of their biota. Mainland areas, we believe, must be significantly larger than this minimum figure because of the added pressures which are not present on islands, e.g. introduced predators and more frequent fires.

We emphasise that we would like to see an even larger reserve than the one recommended if this were possible. However, we believe that the recommended boundaries are a reasonable compromise between the needs of nature conservation and the development of agriculture in this region.

X RECOMMENDATIONS

1. That a reserve of at least 30,000 hectares, as delineated in Figure 1, be set aside.

2. That the reserve be for the purpose of "Conservation of Flora and Fauna" and that it be vested in the Western Australian Wild Life Authority.

3. That, because of the great importance of the area as a wildlife sanctuary, the reserve should be of Class "A".

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APPENDIX 1

Comparison of the Mammal Records of Various Reserves in the Region

Species	Dragon Rocks	Tarin Rock North	Tarin Rock South	Lake Magenta	Chinocup & Lk Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
Megaleia rufa								X
Macropus fuliginosus	X	X	X	X	X	X	X	X
Macropus robustus								X
Macropus irma	X	X	?	X	X	X	X	
Macropus eugenii		X	?		?			
Trichosurus vulpecula	X		X		X			
Cercartetus concinnus	X		??	?				??
Tarsipes spencerae	X	X	X	X		?		
Isoodon obesulus	?		??					
Dasyurus geoffroi	?							
Phascogale calura	X		?					
Sminthopsis murina	X	X						
Sminthopsis crassicaudata	X				X	X		??
Antechinomys spenceri	X							
Myrmecobius fasciatus	?				?			
Leporillus sp.								?
Notomys mitchellii	X			X	X			
Pseudomys occidentalis	X				X			
Pseudomys shortridgei	??							
Tadarida australis								X
Tadarida planiceps								X
Nyctophilis geoffroyi	X		X					
Eptesicus pumilis	X	X	X	X	X			X
Chalinolobus gouldii	X	X			X	?	?	X
Tachyglossus aculeatus	X	?	X	?	X	?	?	X
Canis familiaris	??			?	?			X

KEY: X - Confirmed identification of collected specimen.

? - Reported observation or indirect evidence such as nest or diggings.

?? - Identified outside, but within 30 km of the edge of the area.

APPENDIX 2

Comparison of the Bird Faunas of Various Reserves Near the Dragon Rocks Area

Bird Name	Dragon Rocks	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
Emu	X	X		X	X	X
Little Grebe			X		X	X
Pelican			X			
White-necked Heron						X
White-faced Heron			X	X	X	
Mountain Duck	X	X	X	X	X	X
Black Swan			X	X	X	
Black Duck			X	X	X	X
White-eyed Duck					X	
Wood Duck	X					
Grey Teal			X	X	X	X
Blue-winged Shoveller						X
Pink-eared Duck			X			X
Maned Goose			X	X	X	X
Square-tailed Kite						X
Whistling Eagle	X	X			X	X
Australian Goshawk		X	X	X	X	X
Australian Little Eagle		X				
Wedge-tailed Eagle	X	X	X	X	X	X
Spotted Harrier						X
Little Falcon			X		X	X
Brown Hawk	X	X	X	X	X	X
Nankeen Kestrel	X	X	X	X	X	X
Bustard	X	X				X
Mallee Fowl	X	X	X			X
Brown Quail						X
Little Quail		X			X	

Bird Name	Dragon Rocks	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
Coot			X		X	X
Dusky Moorhen			X			
Banded Plover			X	X		X
Red-capped Dotterel		X				
Black-fronted Dotterel					X	X
Southern Stone-Curlew						X
Avocet			X			
Common Bronzewing	X	X	X		X	X
Brush Bronzewing					X	
Crested Pigeon	X					X
Purple-Crowned Lorikeet	X	X	X	X	X	X
White-tailed Black Cockatoo	X					
Galah	X		X			X
Regent Parrot	X	X		X	X	X
Western Rosella	X	X	X		X	X
Port-Lincoln Parrot	X	X	X	X	X	X
Mulga Parrot						X
Elegant Parrot	X		X		X	X
Pallid Cuckoo	X					X
Fan-tailed Cuckoo	X			X		
Black-eared Cuckoo						X
Narrow-billed Bronze Cuckoo						X
Boobook Owl	X	X	X			X
Barn Owl						X
Tawny Frogmouth	X	X	X	X	X	X
Owlet Nightjar			X			X
Spotted Nightjar			X			X
Sacred Kingfisher						X
Red-backed Kingfisher						X
Rainbow Bee-eater	X	X	X	X	X	X

Bird Name	Dragon Rocks	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
White-backed Kingfisher						X
Welcome Swallow			X			
Tree Martin	X	X	X	X	X	X
Australian Pipit	X		X	X	X	X
Ground Cuckoo-Shrike						X
Black-faced Cuckoo-Shrike	X	X	X	X	X	X
White-winged Triller						X
Southern Scrub Robin		X	X		X	X
Chestnut Quail-Thrush						X
White-browed Babbler	X	X	X	X	X	X
Rufous Songlark						X
Variegated Wren	X					X
Blue-breasted Wren		X				
Broad-tailed Thornbill		X	X	X	X	X
Western Thornbill			X			
Chestnut-tailed Thornbill		X			X	X
Yellow-tailed Thornbill		X	X	X	X	X
Brown Thornbill	X		X			
Spotted Scrub-Wren		X	X	X	X	X
Redthroat						X
Western Warbler			X	X	X	
Weebill	X	X	X		X	X
Shy Ground-Wren		X			X	X
Field Wren		X	X	X	X	
White-fronted Chat	X		X	X	X	X
Brown Flycatcher		X		X	X	X
Red-capped Robin		X		X	X	X
Hooded Robin				X		X

Bird Name	Dragon Rocks	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
Western Yellow Robin	X	X			X	X
Grey Fantail	X	X	X	X	X	X
Willy Wagtail	X		X	X	X	X
Restless Flycatcher	X			X	X	X
Golden Whistler		X	X		X	X
Rufous Whistler		X			X	X
Gilbert Whistler				X	X	X
Western Shrike-Thrush	X	X				X
Crested Bellbird	X	X				X
Black-capped Sittella			X	X	X	X
Rufous Tree-creeper	X	X			X	X
White-browed Tree-creeper						X
Mistletoe-bird	X				X	X
Striated Pardalote	X	X	X	X	X	X
Western Silvereye	X		X	X	X	X
Brown Honeyeater	X	X	X			X
Singing Honeyeater	X		X			
Yellow-plumed Honeyeater	X	X	X			X
Purple-gaped Honeyeater	X	X	X		X	X
White-eared Honeyeater	X	X	X	X	X	X
Brown-headed Honeyeater	X	X	X		X	X
New-Holland Honeyeater				X		
White-cheeked Honeyeater	X		X			
Tawny-crowned Honeyeater	X	X	X		X	X
White-fronted Honeyeater			X	X		X
Yellow-throated Miner	X	X	X	X	X	X
Red Wattle-bird	X	X			X	X

Bird Name	Dragon Rocks	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Lake Barker
Little Wattle-bird	X		X			
Spiny-cheeked Honeyeater				X	X	X
Zebra Finch						X
Magpie Lark	X		X		X	X
Masked Wood-Swallow						X
Black-faced Wood-Swallow	X				X	X
Dusky Wood-Swallow	X	X	X	X	X	X
Grey Currawong	X	X	X	X	X	X
Grey Butcher-bird	X	X	X	X	X	X
Pied Butcher-bird						X
Western Magpie	X	X	X		X	X
Australian Raven	X	X	X	X	X	X
Crow					X(?)	X
Little Crow						X

APPENDIX 3

Comparison of the Reptile Faunas of Various Reserves Near the Dragon Rocks

Species	Area								
	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Tarin Rock North	Tarin Rock South	Lake Barker	DRAGON ROCKS
GEKKONIDAE								
Diplodactylus vittatus	X				X		X	X
Diplodactylus maini	X						X	
Diplodactylus spinigerus	X							X
Gehyra variegata							X	
Gehyra sp.								X
Oedura reticulata					X	X	X	X
Phyllodactylus marmoratus	X	X						
Crenadactylus ocellatus	X	X		X	X	X	X	X
Phyllurus milii	X				X		X	X
Heteronotia binoei							X	
PYGOPODIDAE								
Delma fraseri	X	?		X	X	X	X	X
Delma sp.					X	X		
Delma sp.(D. australis Kluge, In Press)								X
Lialis burtonis		X						X
Pygopus lepidopodus					X			
Aprasia repens	X							
AGAMIDAE								
Amphibolurus barbatus	X	X			X		X	
Amphibolurus scutulatus							X	
Amphibolurus maculatus		X	X	X				
Amphibolurus maculatus griseus	X	X					X	
Amphibolurus salinarum	X							
Amphibolurus cristatus	X			X			X	
Amphibolurus ornatus							X	X
Amphibolurus reticulatus							X	
Amphibolurus adelaidensis		X						X
Tymphanocryptus cephala							X	
Moloch horridus							X	

Species	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Tarin Rock North	Tarin Rock South	Lake Barker	DRAGON ROCKS
SCINCIDAE								
Egernia multiscutata bos	X							X
Egernia inornata							X	
Egernia nitida	X	X			X		X	X
Ctenotus labillardieri	X							
Ctenotus sp. nov. (as in schomburgkii)	X							
Ctenotus uber							X	
Ctenotus pantherinus							X	
Ctenotus sp.							X	
Ctenotus impar	X							
Hemiergis peroni	X	X	X					
Hemiergis initialis	X							
Morethia obscura								X
Morethia anomala	X				X			
Morethia lineoocellata							X	
Morethia butleri		X	X	?			X	
Tiliqua rugosa	X	X	X	X		X	X	X
Tiliqua occipitalis occipitalis						X		
Minertia greyi	X	X						
Lerista distinguenda	X	X						X
Cryptoblepharus plagiocephalus	X	X	X	X		X	X	X
Omolepida branchiale							X	
VARANIDAE								
Varanus gouldii	X						X	
Varanus gouldii rosenbergii		X	X	X				
Varanus tristis							X	
TYPHLOPIDAE								
Rhamphotyphlops australis	X							X
Typhlops bituberculatis							X	
ELAPIDAE								
Demansia nuchalis affinis	X	?	X	X			X	
Demansia modesta	X	?	X	X			X	
Pseudechis australis							X	
Brachyaspis curta	X				X			
Vermicella bertholdi bertholdi		X				X		
Denisonia gouldii	X	X			X	X		X
Denisonia curta		X						

APPENDIX 4

Comparison of the Amphibia Faunas of Various Reserves Near the Dragon Rocks Area

Species	Lake Magenta	Chinocup & L. Chinocup	Lake Cairlocup	Lake Bryde	Tarin Rock North	Tarin Rock South	Lake Barker	DRAGON ROCKS
HYLIDAE								
Litoria cyclorhynchus	X	X		X				X
LEPTODACTYLIDAE								
Neobatrachus pelobatoides							X	
Neobatrachus sp.					X			
Neobatrachus sp.	X							
Pseudophryne guentheri	X				X	X		X
Pseudophryne occidentalis							X	
Crinia subinsignifera							X	
Crinia pseudinsignifera	X						X	X
Heleioporus albopunctatus	X	?		?				
Heleioporus sp.	X							
Limnodynastes dorsalis	X			X				
Myobatrachus gouldii					X			X