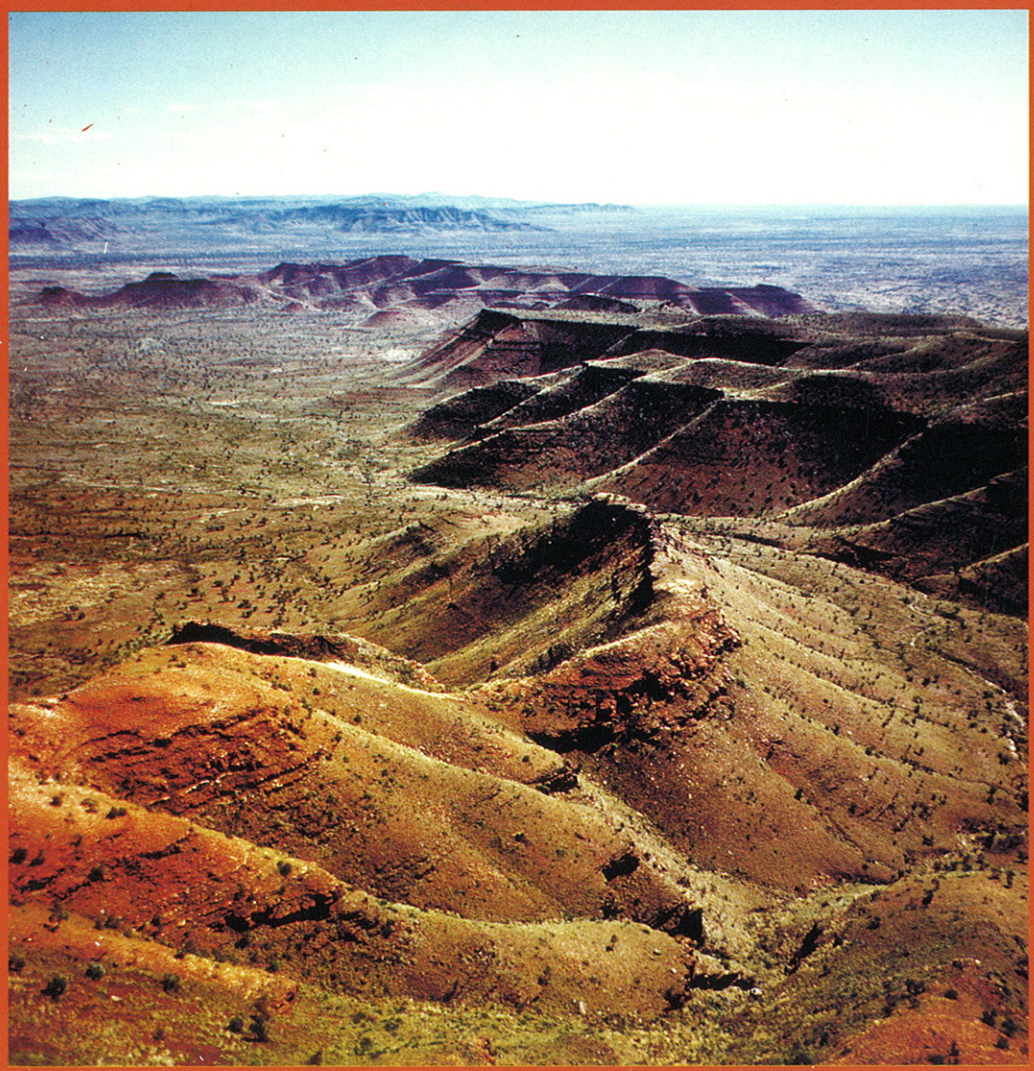
National Parks Authority
of Western Australia

A Fauna Survey of the Hamersley Range National Park Western Australia 1980

Bulletin No. 1



Comprising papers by:

C Dawe
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I R Pound
and M Sawle

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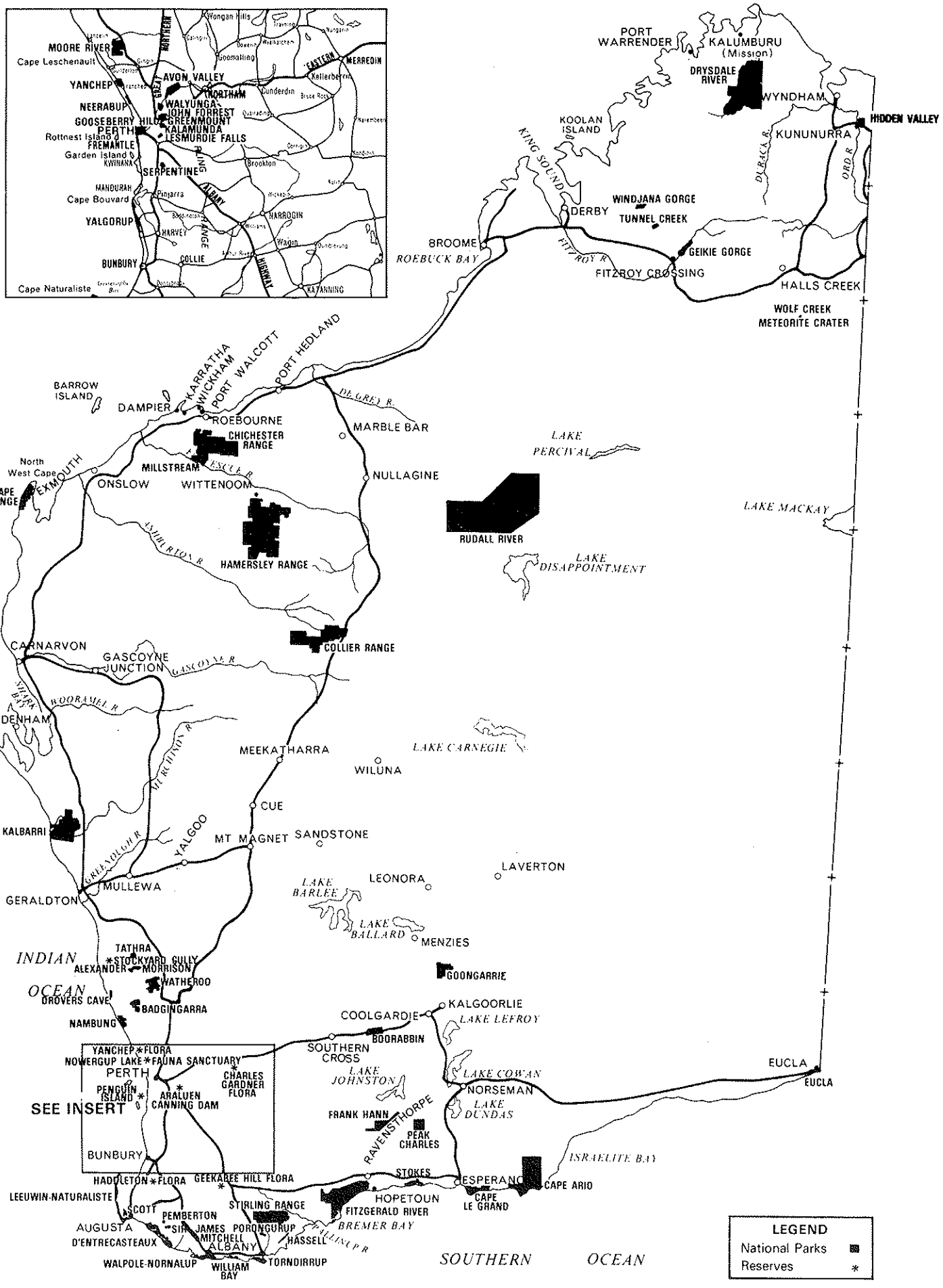
Perth 1983



Frontispiece.

Hamersley Range National Park its location and relationship to other National Parks in Western Australia.

Forward

The Biological Survey of the Hamersley Range National Park was undertaken by a group of biologists on their own initiative and expense, and thus demonstrates the keen interest and recognition of the value of National Parks, perceived by many people.

That value can only be maintained, and enhanced, by careful management. This management in turn, depends on a sound knowledge of a regions flora and fauna and their inter-relationship with the environment. For this reason, biological survey is a vital part of gathering that understanding. Collection of animal specimens for laboratory study may be distasteful to the purist, but information on breeding, food resources, taxonomy, behavior, physiology and many other aspects are often unattainable by any other means.

The information compiled in this report is therefore of immense value to the appropriate management of the Hamersley Range National Park; and it is in grateful appreciation that the report is published by the National Parks Authority on behalf of the researchers involved.

Colin C. Sanders
Director

Table of Contents

Front Cover Photograph Hamersley Range National Park. H. P. McNickle.

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Preface to the Survey

I.R. Pound and J.N. Dunlop.

Our interest in the biota of the Hamersley Range area developed whilst we were involved in ecological/environmental surveys in the region during 1978/79. From these surveys it quickly became apparent that the region was little known biologically. Late in 1979 we decided to undertake an exploratory biological survey of the Hamersley Range National Park primarily to provide some baseline information for environmental assessment purposes. A planning group was established representing interests from the Western Australian Museum, the Herbarium, Murdoch University and the Western Australian Institute of Technology including the Mulga Research Centre and the Western Australian National Parks Authority. Financial and logistic assistance was sought from mining companies operating in the Hamersley Iron Province and from State Government departments.

The planning group organised data collection and synthesis in those areas where there was an interest and expertise available. These areas were as follows:

Floristic Survey	data collection and synthesis by Mr. Malcolm Trudgen.
Acacia Survey	this project was organised by the Mulga Research Centre and Mr. Bruce Maslin of the W.A. Herbarium. Mr. Gary Marney collected *Acacia* specimens in the field.
Ant Survey	Dr Jonathan Majer of WAIT was responsible for this project. Field samples were collected by various members of the survey team.
Insect Survey	data collection and synthesis by Dr. Terry Houston, W.A. Museum.
Birds and Reptiles	data collection and synthesis by Mr. Ron Johnstone, W.A. Museum.
Small Mammals	data collection and synthesis by Mr. Nic. Dunlop of Murdoch University.

Mr. Ian Pound was responsible for the logistical organisation of the survey both during the planning phase and in the field. Ms. Pauline Duncan worked as a field assistant during the survey period.

The papers on the fauna of the park contributed in this publication are based on a biological survey conducted between 5 and 22 May, 1980. However in all cases data from localities outside the park boundaries and from other surveys have been included. The park is thus seen in the context of the biological region in which it is the principal conservation reserve. Results from the botanical survey will it is hoped ultimately be published in another volume in this series.

Acknowledgements

Many of the expenses of the biological survey were met by Mr. I.R. Pound. We also gratefully acknowledge the assistance of Cliffs International Inc., Texasgulf (Australia) Ltd., Hamersley Iron Pty. Ltd., The Mulga Research Centre Inc., Murdoch University and the Western Australian National Parks Authority. The contributors also wish to thank all members of the Pilbara Special Interest Group who supported the project. Mrs. J. Christian typed the final manuscript.

Introduction to Hamersley Range National Park

Introduction

*C Dawe and **J N Dunlop

The Hamersley Range National Park was proclaimed on 31 October 1969. It is an A class reserve (A.30082) under the control of the Western Australian National Parks Authority. Located in the central Hamersley Ranges between latitudes 22° 13′ and 23° 13′ south and longitudes 117° 24′ and 118° 36′ east (Figure 1), the reserve has an area of 617 606 ha. It lies between two major river systems; the Fortescue in the north and Ashburton in the south.

The Park centres on an area originally inhabited by the Bandjima Aborigines, (Tindale 1940). In 1861, F.T. Gregory became the first European to explore the area (Gregory 1884). During his visit he named Mt Bruce (Figure 1) after the commandant of the W.A. Garrison, Lieutenant Colonel John Bruce.

Spectacular deep gorges, such as Yampire, Kalamina and Hamersley, dissect the northern section of the Hamersley plateau, and Mt Bruce (1235m), the highest point in the reserve (and the second highest mountain in Western Australia) are the park's major tourist attractions. Most visitors come in the cooler, drier months between May and early October. Wittenoom Gorge on the northern edge of the park and in the heart of the gorge country is accessible by road from Wittenoom. Elsewhere in the reserve access is limited to graded gravel roads or to rough four-wheel drive tracks. Roads become impassable for extended periods in most summers after heavy rain. A ranger's station is located in the park close to the major tourist areas (Figure 1).

The southern sections of the park also provide some magnificent scenery but these areas are more inaccessible. A system of ridges run east-west including scenic peaks such as Mt Barricade and Mt Trevarton (Figure 1). The area is dissected by the Turee Creek system which, as it passes through the ranges, has formed some small but beautiful gorges and rock pools. Coppin pool is one of the more popular features of Turee Creek.

Climate

The National Park lies just inside the tropic in a semi-desert region. Very high maximum daytime temperatures are experienced during the summer. The hottest month at Marandoo is January with an average daily maximum of 38°C. Wittenoom, just north of the park, experiences similar temperatures. Winters are mild, the coolest month at Marandoo being July with an average daily minimum temperature of 8.5°C. On two or three days in each winter, zero or sub-zero minima are recorded. From eight years of records, mean annual rainfall at Marandoo is around 330mm. Most of this rain results from summer (December-March) cyclones or thunderstorm activity.

Although clearly seasonal in occurrence the amount of rainfall recorded each year is extremely variable. Falls resulting from summer thunderstorms are also very patchy, and the mountain ranges themselves create pockets of relatively high rainfall and rain shadows. It appears that the northern section of the park is marginally wetter than the southern areas. During most years the winters are dry. Significant rainfall is not infrequently recorded in May, June and July but rarely in August and September which are the driest months. Evaporation exceeds rainfall in all months except the occasional wet summer month, reaching a maximum of 310mm in January and a minimum of around 100mm in July. Over most of the year relative humidities are low since the area is mostly above 650m (MSL) and more than 230km from the coast. Dry easterly winds blowing from the Gibson and Great Sandy Deserts predominate. For a short period in summer, however, high relative humidities are recorded in association with cyclones and tropical low pressure systems.

Geology

The geological formations of the park are classified as the Fortescue and Hamersley Groups which form the Mt. Bruce Supergroup of Proterozoic age. The rocks are predominantly jaspilite, chert, dolomite, dolerite, quartz and shale. A stratigraphic column for the Mt. Bruce area is presented in Table 1.

Of particular scenic and economic importance are the Brockman and Marra Mamba Iron Formations of the Hamersley Group. The northern portion of the park is characterised by hills and mountains capped by the Brockman Iron Formation which in most cases have not been sufficiently enriched in iron to constitute ore bodies. However, the central area of the park is dissected by a system of low, often enriched, Marra Mamba ridges which can be traced in a south-easterly direction from Marandoo to Juna Downs (on the edge of the park) and then to the Mt. Meharry area outside the reserve. Higher ridges capped with Brockman Iron Formation often run parallel to the Marra Mamba hills.

The southern part of the park is dominated by the Milli Milli Anticline. Here Archaean porphyritic granite intrudes volcanics and schist of the Warrawoona Series. This is the only area of the reserve where Archaean rock outcrops. Between the Milli Milli Anticline and the Marra Mamba ridges the Fortescue Group surfaces, exposing the Jeerinah Formation immediately south of the Marra Mamba. The Jeerinah Formation is characterised by dolerite, shale, chert, quartzite and areas of calcrete. Grinding stones used by the Aborigines and scattered over much of the central plateau, are invariably of dolerite and originally from the Jerrinah area. Large tracts of sparse spinifex (hummock grassland) are characteristic of the Jeerinah.

The valleys between hills of the Hamersley Group contain colluvial fans and alluvial outwash plains. The scree material, or gibber, on the slopes of the hills and ridges is jaspilite from the Brockman Iron Formation and is rich in hematite and magnetite. This scree tends to cover the Mount McRae Shale which lie below the Brockman Formation.

* CRA Services
** Integrated Environmental Services

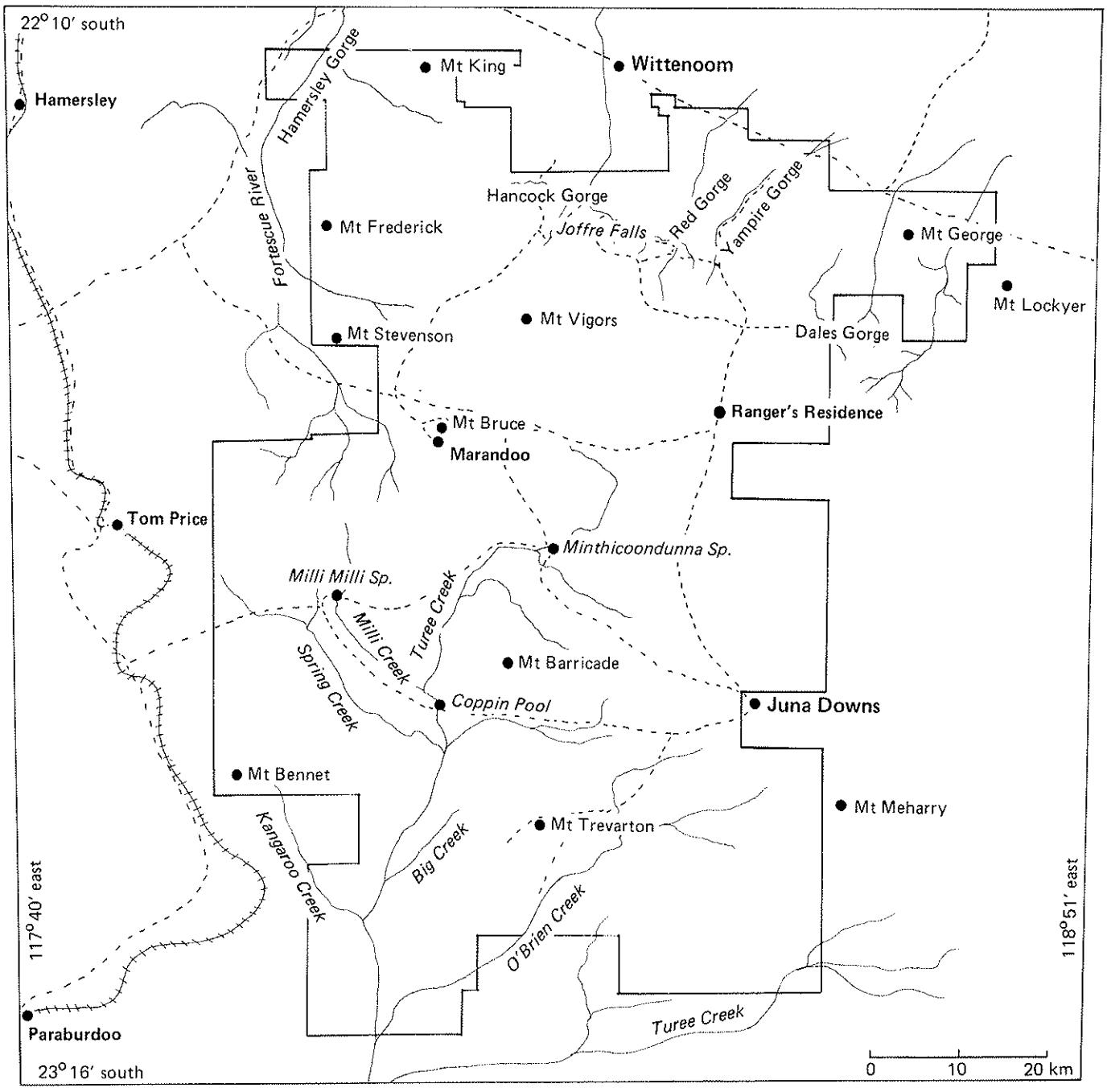


Figure 1
Map of the Hamersley Range National Park showing the location of access roads, creeks and major landmarks.

Maps
For the numerous locations mentioned in text and not shown on Figure 1, the reader is referred to National Topographic Map Series (1:100 000) sheets 2553, 2653, 2452, 2552, 2652, 2551 and 2657.

	Age	Group	Formation	Lithology
Cainozoic	Quatenary			Alluvium Colluvium
	Tertiary		Oakover Formation Robe Pisolite	Colluvium Limestone and opaline silica Limonitic deposits Hematite deposits Chert breccia
			Unconformity	
Proterozoic		Wyloo	Ashburton Formation Duck Creek Dolomite Mount McGrath Formation – Karlathundra Conglomerate Member Coolbye Shale Member Cheela Springs Basalt Member Nummana Member Beasley River Quartzite Turee Creek Formation	Shale and greywacke Dolomitic limestone and chert Conglomerate and sandstone Dark shale Amygdaloidal basalt Dark brown siltstone and quartzite White quartzite Greywacke, conglomerate, shale, and basalt
		Hamersley	Boolgeda Iron Formation Woongarra Volcanics Weeli Wolli Formation Brockman Iron Formation Mount McRae Formation Mount Sylvia Formation Wittenoom Dolomite Marra Mamba Iron Formation	Siltstone, ferruginous shale, and jaspilite Dacite, rhyolite, and pyroclastics Jaspilite, shale, and dolerite Jaspilite, chert, shale Shale, siltstone, dolomite, dolomitic shale, chert Thin jaspilite with shale Dolomite and dolomitic shale Chert, jaspilite
		Fortescue	Jerrinah Formation Mount Jope Volcanics Hardy Sandstone	Shale, chert, jaspilite, mudstone, quartzite, dolomite and dolerite Pillow lava and pyroclastics Sandstone, arkose, conglomerate, quartzite, basalt
			Unconformity	
Archaean				Granite and gneiss Talc-chlorite schist, volcanics, jaspilite

Table 1
Stratigraphical column of the Hamersley Range National Park. Explanatory Notes for Mount Bruce, Western Australia. Information from 1:250 000 Geological Series (de la Hunty 1965).

The Mount McRae Shale overlies the Mount Sylvia Formation which consists of three jaspilite beds with interbedded dolomite. The jaspilite beds form distinctive rock facies that can be followed for many kilometres. This can best be observed on the road from Red Gorge to the Ranger station.

Topography and Drainage

The Park is traversed by a series of hills and ridges running north-west to south-east. Many of the hills are over 1,000m (MSL) and often rise 300m above the valley floors. Almost all locations in the Park are above 550m MSL, the exceptions being on Turee Creek in the southern portion of the Park where altitude falls to 500m. The northern section of the Park is dominated by Mt. Vigors (1145m), the central Park by Mt. Bruce (1235m) and the southern portion by Mt. Barricade (1083m).

The drainage features of the Park provide many scenic attractions. The northern Hamersley Plateau is dissected by a series of deep and spectacular gorges which channel streams through the ranges onto the Fortescue Plains. The most popular of these gorges are Dales Gorge, Yampire Gorge, Kalamina Gorge, Knox Gorge, Joffre Falls and Red Gorge. Joffre Falls and Knox and Red Gorges feed Wittenoom Gorge which is a well known tourist attraction just outside the northern boundary of the Park. The larger gorges have deep pools all year round and provide relatively humid micro-climates for unique communities of plants and animals.

The central park area is the watershed between the South Fortescue River which ultimately feeds the Fortescue River to the north, and Turee Creek which is a tributary of the Ashburton River draining south and west.

Vegetation

The vegetation of the Hamersley Plateau is described and mapped at 1:1 000 000 by Beard (1975). At this scale, using the Beard-Webb classificatory system, two vegetation units are found in the Park area. Most is mapped as 'Mulga & spinifex' with a limited area of 'Mulga Woodland' in the south-eastern section. According to the 'Australian Biophysical Regions' maps, the ridges within the reserve are vegetated with *'Eucalyptus* woodland with an understorey of hummock grass'. Within the valleys a 'tall open shrubland of *Acacia* with a hummock grass lower stratum' occupies the higher ground whilst low lying areas hold a 'tall *Acacia* shrubland with an understory of forbs'.

In Table 2 the major vegetation units within the Park are described in relation to general landform and soil type using the classifactory system of Muir (1977). This system was adapted from the Beard-Webb approach and was chosen because it made description of animal habitats easier. Unfortunately, it was not possible in this

Landform	Soil Type	Vegetation Unit
High ridges or hills (ii) on protected slopes	Skeletal, shallow	i *Eucalyptus kingsmilli* open shrub mallee over mid-dense to open hummock grass. ii Clumps of *Callitris columellaris* low forest A or B.
Low ridges, or hills	Skeletal, shallow	i *Eucalyptus leucophloia* open low woodland over mid-dense *Triodia wiseana* or *T. basedowii* hummock grass. ii *Acacia maitlandii* or *A. umbellata* low scrub A over mid-dense hummock grass. iii Mid-dense *Triodia basedowii* hummock grassland.
Scree slopes	Gibber with pockets of skeletal neutral soil.	i *Acacia bivenosa, A. dictyophleba, A. rhodophloia, A. kempeana* or *A. pyrifolia* scrub over mid-dense *Triodia wiseana* or *T. basedowii* hummock grass. ii *Cassia* spp. low scrub B over *Triodia* spp. mid-dense hummock grass. iii *Eucalyptus gamophylla* open shrub mallee over *Triodia basedowii* mid-dense hummock grass. iv *Acacia hilliana* and *A. adoxa* dwarf scrub over *Triodia basedowii* or *T. wiseana* mid-dense hummock grass.
Valley Floor	Neutral to slightly acidic loam or sandy loam.	Very open woodland of *Eucalyptus dichromophloia, Acacia pruinocarpa* and *Hakea suberea* over *Plectrachne schinzii* hummock grass or mid-dense hummock grass.
Outwash plains	Neutral to slightly acid deep loams or clayey loams.	i *Acacia aneura* low woodland B over open low bunch grassland. Grasses include *Aristida spp., Enneapogon spp., Eragrostis spp., Themeda australis, Perotis rara* and *Paraneurachne meulleri.* ii *Eucalyptus coolabah* low woodland A over low bunch grassland. iii *Acacia aneura* scrub over *Triodia pungens* hummock grass.
Calcrete and Dolomite outcrops. Low hills and dissected flats.	Basic soils usually shallow loams or clays. Stony pavements and scree.	i Open shrub mallee of *Eucalyptus transcontinentalis* and *E. oleosa* over open *Acacia bivenosa, Cassia desolata* scrub over *Triodia longiceps* mid-dense hummock grass. ii *Melaleuca eleutherostachya* low scrub B over *Triodia longiceps* mid-dense hummock grass. iii Dense to mid-dense *Triodia longiceps, T. wiseana* hummock grass.
Minor (1° cycle) drainage (i) channels	Shallow sandy soils, ph depending on local geology	i Very open fringing woodland of *Eucalyptus dichromophloia, E. leucophloia* or *E. coolabah* over mixed scrub including *Grevillea wickhamii, Acacia maitlandii, A. tumida, A. dictyophleba, A. bivenosa* etc. over *Triodia pungens* hummock grass.
(ii) minor outwashes	Sandy loams of varying ph.	Open to very open *Acacia* scrub *A. tenuissima, A. ancistrocarpa, A. tumida, A. dictyophleba, A. ineaquilatera* over dense *Triodia pungens* hummock grass.
Major Creeks (Turee Creek Systems)	Heavy gravel in channels, sandy levee banks and islands.	i Open *Eucalyptus camaldulensis* woodland over scrub or thicket of *Acacia tumida, A. coriacea* or *Acacia citrinoviridis.* ii *Melaleuca glomerata* thickets on sandy banks and island.
Gorges	Exposed rock, gravel and sand.	*Melaleuca leucodendron* fringing forest.

Table 2

The major vegetation units of the Hamersley Range National Park described in relation to general landform and soil type using the system of Muir (1977).

survey to map the vegetation of the Park or to estimate the extent of the various plant communities. It is hoped that this task will be undertaken in the near future along with more detailed mapping of the surrounding region.

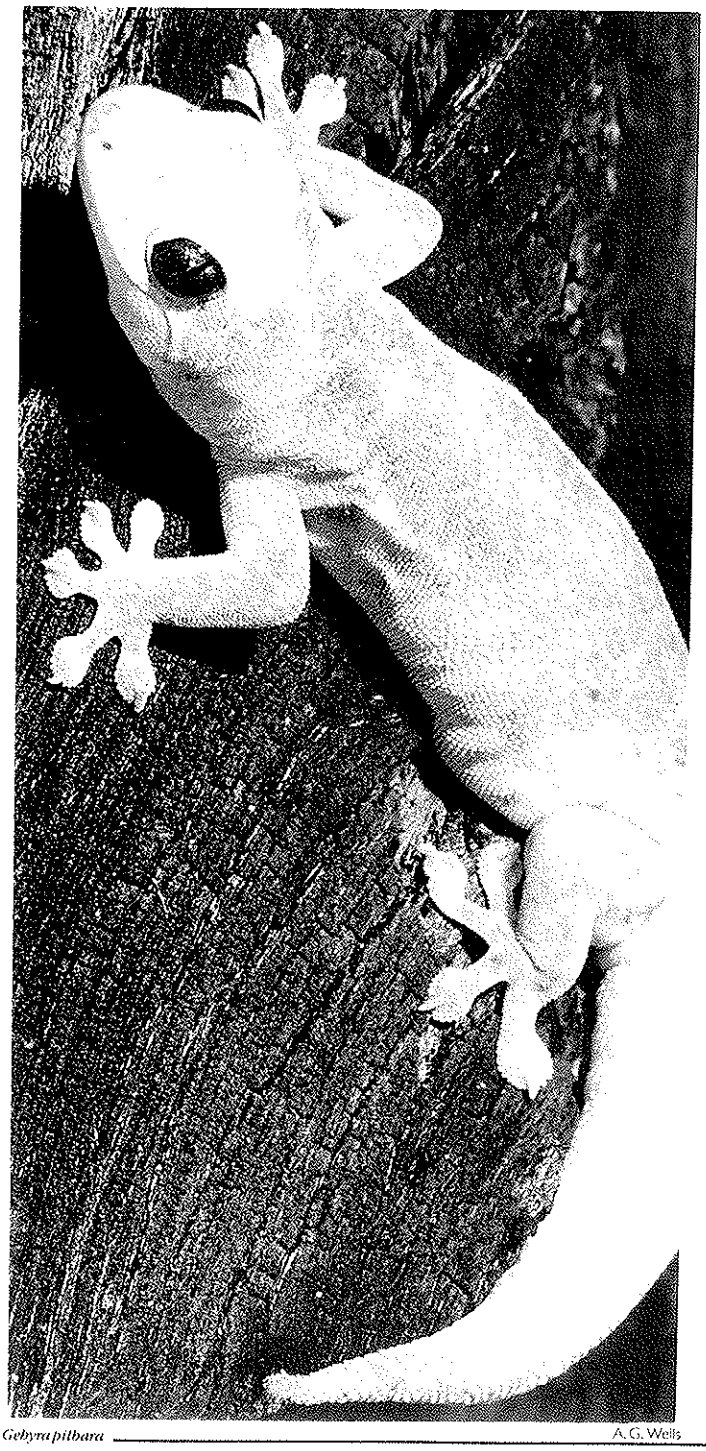
Most of the major plant communities of the eastern Pilbara were recorded within the Park boundaries although some units were better represented than others. The vegetation associated with the hills and ridges of the iron formations appeared to be adequately conserved within the reserve. Vast areas of the central and western sections of the Park were composed of calcrete outcrop on which the plant communities typical of a Pilbara basic soils alliance were well represented. The Mulga *Acacia aneura* dominated areas of the Park were scrub formations and not the woodlands of grove and intergrove Mulga typical of southern and south-eastern edges of the Hamersley Plateaux. Also absent were patches of bunch grassland on cracking clay which often form within large tracts of Mulga.

The northern section of the Park holds the best examples of gorge vegetation in the region. Among the typical plants of the sheer walls of the gorges were *Callitris columellaris, Ficus platypoda, Brachychiton* sp. and *Dodonaea* spp. There were several unique and insular plant species.

This description of vegetation has centred on the perennial plants. However, as in other Eremaen environments, there are many ephemerals. After summer rains, a community of annual grasses appears. Winter rain, which is not uncommon, favours the germination of annual herbs such as Asteraceae and certain Amaranthaceae. Flowering in the perennial flora is protracted throughout the year and strongly influenced by rainfall events. In years following good summer rains there is a peak in flowering from about July-October. Usually there is little flowering in perennials during the summer.

Herpetofauna of the Hamersley Range National Park Western Australia

*R E Johnstone



Gehyra pilbara A. G. Wells

Introduction

This paper is based mainly on specimens collected during a biological survey of the Hamersley Range National Park from 5 to 22 May 1980 by personnel from Integrated Environmental Services, the Western Australian Museum and the National Parks Authority of Western Australia. The expenses of this survey were largely met by Mr. I. Pound of Integrated Environmental Services.

Relevant data from Western Australian Museum catalogues are included. Species recorded from areas adjacent to the Park, but not yet found in the Park, are included in the body of the text in square brackets. The first major collections from the Park were made by Mr. W.H. Butler, who from 20 April to 1 May 1976 carried out a biological survey of the Marandoo area. Special mention must also be made of Mr. J. Burt and Mr. C. Dawe of Texasgulf Australia, who did intensive fieldwork in the Marandoo area from 1976 to 1980.

Collecting methods included shooting active reptiles with 0.22 calibre dust shot, searching litter, logs, rubbish and roadside spoil, and digging pit traps. Searching at night with head torches was also carried out.

Descriptions of climate, geology and vegetation are given by Dawe and Dunlop in the Introduction and enlarged where necessary in this paper. Where possible in the species accounts I assess relative abundance; however many species are only known from one or two specimens or from a single locality on the Park, making assessment of status impossible.

Other people whose specimens have contributed to this report are G.M. Storr, B.T. Clay, A.A. Burbidge, T. Evans, R. McKay, B. Harty, D.F. Anderson, C. Tideman, A.S. Robinson, C. Snell, M. De Graaf, J. James, T. Marshall, G. Harold, L.A. Smith, R.A. Steckis, J.R. Ford, members of the Christchurch Grammar School Expedition (May 1967) and members of the Hale School Expedition (May to July 1970).

All specimens collected are lodged in the Western Australian Museum.

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Annotated List

Frogs

Leptodactylidae

Limnodynastes spenceri Parker — One record: a specimen collected by Johnstone in an acacia thicket on red sandy soil at Coppin Pool on 11 May 1980.

Pseudophryne sp. — Four specimens, all collected by Johnstone under stones in Hancock Gorge on 15 May 1980.

Uperoleia sp. — Three collected under stones in creek bed at Coppin Pool on 10 May 1980 and six under trees in creek bed at Hancock Gorge on 15 May 1980.

Hylidae

Cyclorana maini Tyler & Martin — Common. Seventy-seven collected at Marandoo on 21 April 1976; one at same place in late August 1976; and two pit-trapped on a red loam flat with mulga and *Plectrachne* near NE side of Mt Bruce on 7 May 1980.

Cyclorana platycephala (Günther) — [Five specimens collected by Tideman and Robinson near Tom Price in November 1967 and January 1968.]

Litoria rubella (Gray) — Common along watercourses and at habitation. Collected at Marandoo, Hancock Gorge and Coppin Pool.

Tortoises

Cheluidae

Chelodina steindachneri Siebenrock — One observed in a muddy pool near Coppin Pool on 13 May 1980, and one collected from a pool in Hamersley Gorge on 19 May 1980.

Lizards

Gekkonidae

Diplodactylus ciliaris Boulenger — One record: a specimen collected by Johnstone at Marandoo on 14 May 1980. It was active at night on a stony flat with scattered acacia.

Diplodactylus conspicillatus Lucas & Frost — [One collected by Dawe on Mt Brockman Station on 17 December, 1979, and one collected by Dunlop 22 km SW of Marillana on 13 March 1981.]

Diplodactylus elderi Stirling & Zietz — Moderately common. Only one specimen has been collected from the Park but Burt and Dawe pit-trapped many around Marandoo. These were measured and released.

Diplodactylus pulcher (Steindachner) — [Five collected by Smith and Johnstone 11 km NNE of Mt Meharry on 27 November 1981.]

Diplodactylus savagei Kluge — [One collected by Dawe on Mt Brockman Station on 6 May 1979.]

Diplodactylus squarrosus Kluge — One record: a specimen collected by Butler near Marandoo on 20 April 1976.

Diplodactylus stenodactylus Boulenger — Three specimens collected by Johnstone near Marandoo in May 1980: one from a 20 cm vertical burrow which was also occupied by a scorpion; one active at night on a stony gibber flat; and one on road at night. One was also collected near Circular Pool by Smith and Johnstone on 21 November 1981.

Diplodactylus wombeyi Storr — [One collected by Harold 21 km WSW of Marillana on 10 November 1980; one collected by Smith and Johnstone 15 km S of Hooley on 20 November 1981; and another collected 10km SW of Rocklea Station on 24 November 1981.]

Diplodactylus taeniatus (Lönnberg & Andersson) — [One collected by Snell on Turee Creek Station on 18 March 1965, and one collected by Dunlop 25 km SW of Marillana on 21 March 1981.

Gehyra pilbara Mitchell — Four collected by Butler near Marandoo on 1 May 1976, and two collected by Johnstone from a termitarium near Hancock Gorge on 21 May 1980.

Gehyra punctata (Fry) — Moderately common throughout the Park. Under rocks and litter and in buildings.

Gehyra variegata (Duméril & Bibron) — Common throughout the Park. Collected under bark of dead trees, under rock and litter, and in buildings.

Heteronotia binoei (Gray) — Moderately common throughout the Park. Most specimens collected under *Triodia*.

Heteronotia spelea (Kluge) — Only two specimens: one collected at Marandoo on 6 December 1976; and another in a small cave 3 km SE of Mt Bruce on 8 May 1980. At least five were captured and released near Marandoo by Burt and Dawe.

Nephrurus wheeleri cinctus Storr — Moderately common around Marandoo, on open stony country with *Triodia*.

Oedura marmorata Gray — Three records: one collected by Dawe 10 km S of Marandoo on 6 December 1979, and two collected by Johnstone in a small cave on the NE side of Mt Bruce on 6 May 1980.

Rhynchoedura ornata Günther — [One collected 6 km N of Wittenoom by the Hale School Expedition on 3 June 1970, one collected by Harold 21 km WSW of Marillana on 11 November 1980, and one collected by Dunlop 22 km SW of Marillana on 18 March 1981.]

Pygopodidae

Delma borea Kluge — One record: a specimen collected by Burt at Marandoo on 13 January 1979.

Delma elegans Kluge	Two records: single specimens collected at Marandoo by Texas gulf personnel in late November 1976 and on 14 December 1978.
Delma nasuta Kluge	Moderately common, seven specimens. Mainly mallee or mulga and Mallee over *Triodia longiceps* and *Triodia wiseana* on red clay or loam soils.
Delma pax Kluge	[One collected by Snell on Turee Creek Station on 30 September 1963, and one collected by Dunlop 24 km SW of Marillana on 18 March 1981.]
Delma tincta DeVis	Two records: a specimen collected from the foot of Mt Bruce on 11 November 1975, and another pit-trapped on NE side of Mt Bruce in *Triodia wiseana* on red stony soil on 8 May 1980.
Lialis burtonis Gray	Moderately common. Only one specimen collected from the Park but many were captured around Marandoo and released.
Pygopus nigriceps (Fischer)	Moderately common. Only one specimen collected from the Park, but noted on many occasions around Marandoo.

Agamidae

Caimanops amphiboluroides (Lucas & Frost)	[One collected by Snell on Turee Creek Station in 1962, and one collected by Smith and Johnstone 11 km NNE of Mt Meharry in November 1981.]
Ctenophorus caudicinctus caudicinctus (Günther)	Very common throughout the Park. Mainly rocky and stony country with *Triodia*.
Ctenophorus isolepis isolepis (Fischer)	Uncommon, seven specimens. One collected by Butler near Marandoo on 20 April 1976; the rest collected by Johnstone on small sandy flats and gullies near Coppin Pool in May 1980.
Ctenophorus reticulatus (Gray)	Scarce, three specimens. All from near Mt Bruce in open mulga on red loam.
Diporiphora valens Storr	Moderately common, six specimens. All from vicinity of Marandoo and Mt Bruce.
Gemmatophora longirostris (Boulenger)	Very common along watercourses throughout the Park.
Pogona minor minor Sternfeld	Moderately common. Only one seen and collected during the May 1980 survey, but quite numerous and active about the ranges in August 1980.

Scincidae

Carlia foliorum (DeVis)	Moderately common throughout the Park. Eleven specimens. Mainly rocky country with dense *Triodia*, but also dense leaf litter at edge of creeks.
Carlia triacantha (Mitchell)	One collected by Smith and Johnstone at Circular Pool on 21 November 1981. Stony ground with *Triodia*.
Cryptoblepharus carnabyi Storr	Six specimens, all collected by Johnstone in Hancock Gorge on 15 May 1980. Active on rocks and cliffs.
Cryptoblepharus plagiocephalus (Cocteau)	Moderately common, nine specimens. Collected in Hamersley, Hancock, Weano and Yampire Gorges and at Marandoo and 14 km SE of Minthicoondunna Spring.
Ctenotus atlas Storr	[One collected by Snell on Turee Creek Station on 18 March 1965, and one collected by Tideman and Robinson near Tom Price between November 1967 and January 1968.]
Ctenotus duricola Storr	Common throughout the Park. Mainly rocky and stony country with *Triodia wiseana*, also mulga flats with *Triodia wiseana* and *Plectrachne* on red loam or clay.
Ctenotus helenae Storr	Common to moderately common, thirteen specimens. Mainly mulga woodlands with *Triodia* and *Plectrachne* on red loam or clay.
Ctenotus leonhardii (Sternfeld)	[One collected by Snell on Turee Creek Station on 18 March 1965, and one collected by Smith and Johnstone 15 km S of Hooley on 21 November 1981.]
Ctenotus pantherinus ocellifer (Boulenger)	Moderately common, fifteen specimens. Mainly rocky and stony country with *Triodia*, also mulga and mallee woodlands with *Triodia* and *Plectrachne* on red loam clay.
Ctenotus rubicundus Storr	Two specimens, both collected by Johnstone on a small rocky hill with *Triodia* near Coppin Pool in May 1980.
Ctenotus rutilans Storr	Uncommon to moderately common around Marandoo. In 1979 many were pit-trapped and released but seen less frequently since.
Ctenotus saxatilis Storr	Common, twenty-six specimens. Collected in Hancock, Weano, Dale and Yampire Gorges near Marandoo, and at 9 km WSW of Juna Downs and Coppin Pool. Mainly rocky country with *Triodia*.
Ctenotus schomburgkii (Peters)	Uncommon to moderately common, seven specimens. Mainly open mulga with *Plectrachne* on red sandy loam.
Ctenotus serventyi Storr	[Seven specimens collected by Dunlop 25 km SW of Marillana in March 1981.]
Egernia depressa (Günther)	[Three specimens, all collected by Snell on Turee Creek Station, one in 1962 and two in 1965.]
Egernia formosa Fry	Two records: one collected by Butler near Marandoo on 21 April 1976, and one collected by Dawe 18 km NW of Mt Bruce on 12 January 1981.

Eremiascincus richardsonii (Gray) — Uncommon to moderately common. One specimen collected at Marandoo by Texas Gulf personnel in late November 1976. Seen regularly around Marandoo.

Lerista frosti (Zietz) — Uncommon. Six specimens collected in Hancock Gorge and one at Marandoo. In Hancock Gorge most specimens were in crevices with litter and red soil and in leaf litter beneath *Ficus platypoda* trees.

Lerista muelleri (Fischer) — One record: a specimen collected by Butler near Marandoo on 22 April 1976.

Lerista neander Storr — [Two specimens collected by Dunlop 36 km SE of Mt Meharry on 7 December 1979 and one collected 31 km SE on 8 December 1979.]

Menetia greyii Gray — [One collected by Tideman and Robinson near Tom Price between November 1967 and January 1968.]

Menetia surda Storr — Uncommon. Five specimens collected at Coppin Pool, Mt Trevarton, and O'Brien Creek. Rocky or stony ground with *Triodia*.

Morethia ruficauda exquisita Storr — Moderately common. Mainly gorges and rocky or stony hills with *Triodia*.

Omolepida branchialis (Günther) — Common throughout the Park. All habitats with dense *Triodia* or *Plectrachne*.

Proablepharus reginae (Glauert) — One record: a specimen collected by Dawe on an acacia-spinifex scree slope near Marandoo on 24 January 1977.

Tiliqua multifasciata Sternfeld — Common. Single specimens collected at Dales Gorge at 10 km N of Mt Bruce and near Marandoo. Often seen on roads.

Varanidae

Varanus acanthurus Boulenger — Moderately common. A specimen collected by Butler near Marandoo on 26 April 1976 and one collected by Dawe near Mt Bruce on 12 December 1979. Many were pit-trapped around Marandoo and released.

Varanus brevicauda Boulenger — Moderately common: two specimens from Marandoo and one from the NE slope of Mt Bruce. The latter was from rocky country with *Eucalyptus gamophylla* over *Triodia wiseana*. Frequently pit-trapped around Marandoo and released.

Varanus caudolineatus Boulenger — Common: five specimens, all from Marandoo. Many captured around Marandoo and released.

Varanus giganteus (Gray) — An adult observed by Storr on road near Dales Gorge on 5 March 1962, also recorded at Marandoo.

Varanus gouldii (Gray) — One collected by Butler 32 km ESE of Wittenoom in 1958.

Varanus panoptes rubidus Storr — Several observed around Marandoo. One collected by Clay just outside the Park 11 km E of Wittenoom on 10 November 1961.

Varanus pilbarensis Storr — One collected by Storr on rim of Dales Gorge on 4 March 1962; one collected by James at Knox Gorge on 12 June 1980; and one observed by Johnstone catching grasshoppers at edge of a cliff in Hancock Gorge on 15 May 1980.

Varanus tristis tristis (Schlegel) — One observed by Johnstone in buffel grass at edge of Turee Creek near Coppin Pool on 10 May 1980.

Snakes

Typhlopidae

Ramphotyphlops diversus ammodytes (Montague) — One record: a specimen collected by the Hale School expedition in Hancock Gorge 24 July 1970.

Ramphotyphlops grypus (Waite) — Moderately common: one specimen collected by Burt at Marandoo on 9 June 1977, and about five others were pit-trapped around Marandoo and released.

Ramphotyphlops hamatus Storr — Five specimens, all from Marandoo.

Ramphotyphlops waitii (Boulenger) — Four specimens, all collected in vicinity of Marandoo.

Boidae

Aspidites melanocephalus (Krefft) — [One collected at Tom Price on 2 April 1974.]

Liasis 'childreni' Gray — One record: a specimen collected by Dawe from a Fairy Martin *Hirundo ariel* nest near Marandoo on 23 May 1979.

Liasis perthensis Stull — Two records: both single specimens collected at Marandoo.

Liasis olivaceus barroni L.A. Smith — A specimen collected by Burt at Marandoo on 1 September 1978. One 3.2 m long specimen seen and photographed by Muir near Dales Gorge on 17 May 1980.

Elapidae

Acanthophis pyrrhus Boulenger — One specimen collected at Marandoo in December 1976. Said to be common around Marandoo.

Demansia olivacea rufescens Storr — Common: one collected by Dawe at Marandoo on 5 February 1977. Frequently seen around Marandoo.

Demansia reticulata cupreiceps Storr — Uncommon. Two specimens, both collected by Butler near Marandoo in 1976. Not seen as frequently as the previous species.

Denisonia fasciata Rosén — Moderately common. A specimen collected by Texasgulf personnel at Marandoo on 9 June 1976, and one collected by Johnstone on stony ground with *Triodia* near Marandoo on 7 May 1980. Several sightings around Marandoo.

Denisonia monachus Storr	Moderately common. Four specimens from the vicinity of Mt Bruce, and one from 15 km SE of Minthicoondunna Spring. The latter was in mulga-eucalypt woodland at edge of a creek with *Triodia longiceps* and *Triodia wiseana*.
Denisonia punctata Boulenger	[One collected by Marshall at Wittenoom Gorge in September-October 1963].
Furina ornata (Gray)	Three specimens, all from Marandoo area.
Pseudechis australis (Gray)	Common. Two collected by Johnstone at Marandoo (both active around the camp at night) and one collected by Muir 32 km E of Mt Bruce in May 1980. Many sightings around Marandoo camp.
Pseudonaja modesta (Günther)	Two specimens, one from Hancock Gorge and one from Marandoo.
Pseudonaja nuchalis Günther	Three specimens, from near Marandoo, and one from 2 km NE of Mt Bruce.
Vermicella annulata snelli Storr	One record: a specimen collected by Texasgulf personnel at foot of Mt Bruce in October 1975.
Vermicella approximans (Glauert)	Five specimens all from Marandoo area. One from woodland with *Plectrachne* understory.

Discussion

To date 40 genera and 92 species of amphibians and reptiles have been recorded from the Hamersley Range National Park, or are believed to occur there from their occurrence nearby. The herpetofauna is distributed in ten families as follows:

Leptodactylidae	5 genera,	6 species
Cheluidae	1 genus,	1 species
Gekkonidae	6 genera,	17 species
Pygopodidae	3 genera,	7 species
Agamidae	4 genera,	7 species
Scincidae	11 genera,	26 species
Varanidae	1 genus,	8 species
Typhlopidae	1 genus,	4 species
Boidae	2 genera,	4 species
Elapidae	7 genera,	12 species

As one would expect, the fauna is characteristic of the Pilbara, Western Australia, an arid and predominantly rocky region. The list includes many interesting Pilbara endemics such as *Diplodactylus savagei, Diplodactylus wombeyi, Nephrurus wheeleri cinctus, Diporiphora valens, Ctenotus duricola, Ctenotus rubicundus, Ctenotus rutilans, Morethia ruficauda exquisita, Varanus pilbarensis, Ramphotyphiops diversus ammodytes, Liasis olivaceus barroni* and *Demansia olivacea rufescens.*

Three other Pilbara endemics possibly occur in the Park, namely *Pseudophryne douglasi* (collected at Tambrey 100 km NW of Wittenoom, *Ctenotus grandis titan* (collected at Tambrey and Woodstock) and *Egernia pilbarensis* (collected from Chichester Range). Noteworthy also from the Hamersley Range are isolated and slightly peculiar populations of *Lerista frosti, Egernia formosa* and *Denisonia monachus.*

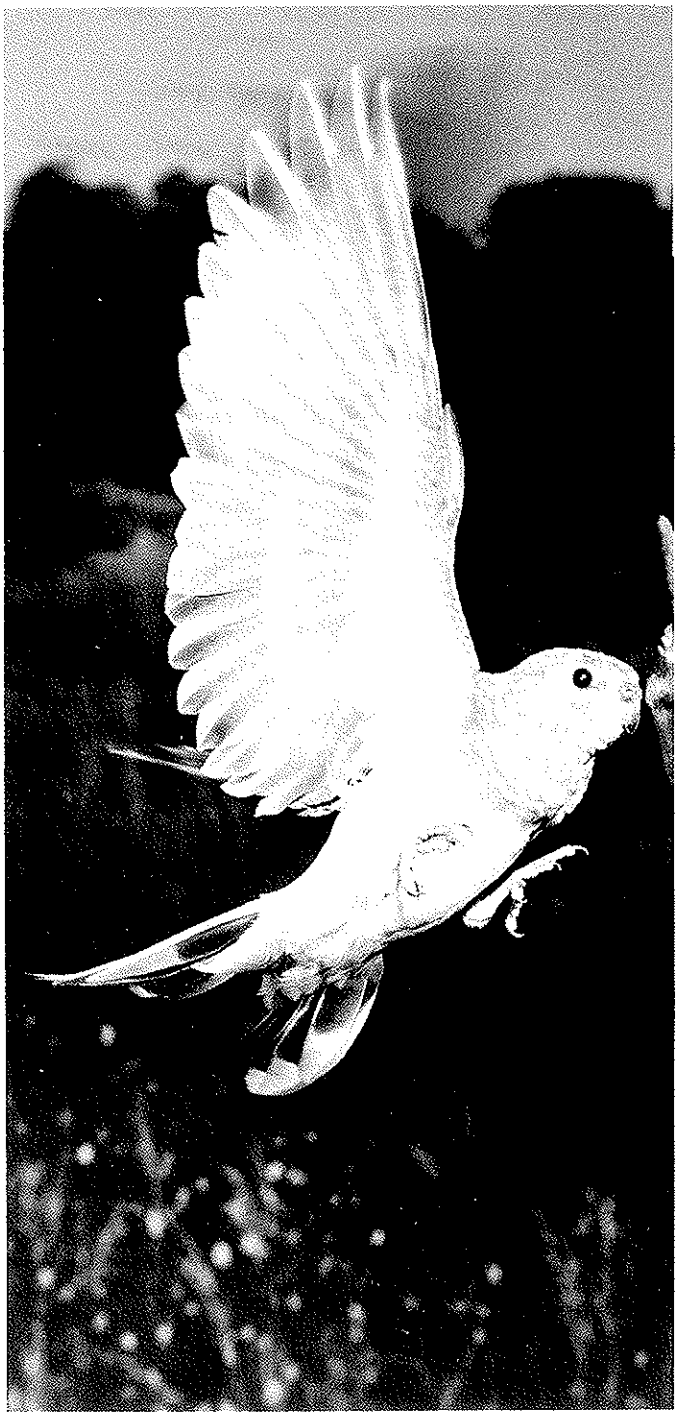
Two snakes, *Aspidites melanocephalus* and *Denisonia punctata,* are at their southern limit in the Hamersley Ranges.

There is a fairly large category of species that do not occur on the high Hamersley Plateau but have their northern limit just to the south of the Hamersley Range in the Ashburton drainage. These include *Tympanocryptis cephala, Ctenotus iapetus* and *Egernia striata.*

An indication of the diversity of the Hamersley Range National Park herpetofauna can be gauged; by a comparison with areas surveyed by Storr *et al:* Great Australian Bight 35 genera, 67 species; Zuytdorp Coast 39 genera, 83 species; Shark Bay 43 genera, 92 species; and Exmouth Gulf 49 genera, 114 species. When one considers that all of these areas are much larger than the Hamersley Range National Park and that the Shark Bay and Exmouth regions contain marine turtles and sea snakes, the richness of the Hamersley area can be appreciated.

Birds of the Hamersley Range National Park, Western Australia

*R E Johnstone



Neophema bourkii A. G. Wells

Introduction

Rising to over 1200 m and stretching for over 400 km across the Pilbara, the Hamersley Range is the highest and one of the most impressive natural features of Western Australia. The Hamersley Range National Park is situated near the eastern end of the Hamersley Range between latitudes 22° 13′ and 23° 13′ south, and longitudes 117° 24′ and 118° 36′ east (see fig. 1). It covers an area of 617 606 ha and lies between two major river systems the Fortescue in the north and the Ashburton in the south. The only larger National Park in Western Australia is the Rudall River National Park.

The Hamersley Range National Park includes many mountains, e.g. Mt Bruce 1235 m high, the second highest mountain in Western Australia (the highest Mt Meharry 1251 m lies just outside the southwest boundary of the Park) and Mounts King, Frederick, Stevenson, Vigors, George, Barricade, Bennett and Travarton. It also contains many deep gorges, such as Dales, Yampire, Kalamina, Knox, Red, Weano, Hancock, and Hamersley Gorges and the headwaters of Turee Creek. In all, the Park contains some of the most outstanding scenery in the State.

The climate is described as semi-desert tropical with about 300 mm of rain per annum. Most rain falls from January to March and is unusual between July and October. Tropical cyclones (mainly from January to March) provide much of the summer rain.

This paper is based on data gathered during a biological survey of the Hamersley Range National Park from 5 to 22 May 1980, by personnel from Integrated Environmental Services and the Western Australian Museum. The survey was organised and financed by Mr I. Pound of Integrated Environmental Services.

Most of the data are my own, but I am grateful for notes from other members of the survey team, namely Mr N. Dunlop, Mr I. Pound, Mr B. Muir and Miss P. Duncan, and for some notes from Mr I. Solomon, the resident Ranger.

Additional data are available from:

1. D.L. Serventy's notes mostly from Hamersley Station (just outside the Park) in 1952;
2. Western Australia Museum Expedition to the Hamersley Range in 1958 (Mees 1961);
3. G.M. Storr's visits to Yampire and Dales Gorges from 3 to 5 March 1962;
4. W.H. Butler's specimens and sight records from the Marandoo area from 21 April to 1 May 1976;
5. Marandoo Flora and Fauna, a report published by Texasgulf Australia Ltd. (1979);
6. L.A. and F. Smith's visit to Garden Pool (just outside the Park) from 2 to 4 May 1978;
7. P. Griffin's visit to Wittenoom Gorge (just outside the Park) from 26 to 28 September 1978;
8. M. Stranger's visit to Circular Pool, Yampire Gorge and Hamersley Gorge in August 1979;
9. R.E. and C. Johnstone's visit to the Park from 24 to 27 August 1980;
10. J.R. Ford's visit to the Tom Price area and the Park from 10 to 23 July 1981 and from 8 to 22 April 1982;
11. L.A. Smith's and R.E. Johnstone's visit to the Park from 21 to 24 and the 27 November 1981.

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For the purpose of this paper I recognise six major habitat types; they are briefly described below.

1 Ranges

The Ranges are predominantly of jaspilite and dolomite with some shale, siltstone and volcanics. The northern face forms an abrupt escarpment rising over 200 m from the Fortescue valley. To the south, the plateau landscape is one of more gently rounded hills dissected by valleys. Here the harder jaspilites stand out in the form of rugged mountain peaks with flats between. Such is the area around Marandoo which is dominated by Mt Bruce.

The ranges are mainly covered with an open eucalypt woodland of *Eucalyptus leucophloia* with a ground cover of *Triodia wiseana*. The mallee *Eucalyptus gamophylla* and other small trees and shrubs of *Acacia, Cassia, Dodonaea, Hakea* and *Grevillea wickhami* may also be present. On mountain peaks trees are replaced by the mallees *Eucalyptus kingsmillii* and *E. gamophylla*, and *Callitris columellaris* occurs in gullies along the ranges and on the north side of Mt Bruce. On the lower slopes of the ranges there are other eucalypts such as *E. dichromophloia* and *E. setosa* and tracts of *Triodia pungens*. Scattered patches of mulga *Acacia aneura* grow well up slopes and in gullies in the less mountainous country. Some of the low hills are clothed with *Triodia* and scattered *Acacia, Hakea, Grevillea* and *Eremophila*.

2 Gorges

Most of the gorges contain permanent water which is otherwise scarce in the Park. They vary from wide, open steep sided valleys like Yampire Gorge to narrow gorges with precipitous cliffs such as Dales and Hancock Gorges. The cliffs and slopes of these valleys are scantily clad with small trees and shrubs including *Acacia bivenosa, Brachychiton australis* and *Ficus platypoda*, and at Dales Gorge *Callitris columellaris* grows on the shady northern side. The bottoms of most gorges carry a woodland of *Eucalyptus camaldulensis, E. dichromophloia, E. microtheca, Melaleuca leucodendron, Eremophila* and *Acacia*. In some lush areas there are small thickets of *Ficus platypoda* and many ferns.

3 Mulga Woodlands

The *Acacia aneura* communities range from almost pure stands along creeks and gullies and on some valley plains, to open mulga and mulga-spinifex. In the areas of dense mulga other *Acacia* and *Eremophila* species also occur, and the ground is mostly covered with spinifex or soft grasses. Mixed mulga-eucalypt woodlands are found throughout the Park, the eucalypts being mainly *E. coolibah, E. leucophloia*, mallees and bloodwoods. Some mixed stands of mulga and minnerichie *Acacia cyperophylla* are found in southern parts of the Park. Open *Triodia* and *Ptilotus* flats with scattered mulga, other wattles, *Cassia, Eremophila* (especially *fraseri*), *Grevillea, Hakea* and some eucalyptus, are common throughout the National Park.

4 *Eucalyptus coolibah* woodland

There is a fairly large stand of open *Eucalyptus coolibah* on the plain immediately to the east of Mt Bruce. In some areas it is interspersed with pockets of mulga, and the ground cover is mainly soft grasses.

5 Creekside vegetation

Apart from the many small mulga-lined creeks which run out from the ranges to disappear on plains, there are three major water-courses in the Park; Turee Creek, O'Brien Creek and the headwaters of the South Fortescue River. Turee Creek contains permanent waters such as Minthicoondunna Spring, Milli Milli Spring and Coppin Pool. The vegetation along these larger creeks is mainly *Eucalyptus camaldulensis, E. coolibah, Acacia citrinoviridis* (often forming thickets), *Melaleuca* spp. and a ground cover of spinifex or soft grasses including buffel grass. Thickets of *Acacia farnesiana* grow along many of the small side creeks running into Turee Creek, especially in the Coppin Pool area.

6 Open Triodia Flats

Many of the small hills and stony flats are vegetated only with spinifex (mainly *Triodia pungens, T. basedowii,* and *T. wiseana*) and scattered *Acacia, Grevillea* and *Hakea*.

In the annotated list I summarise for each species its relative abundance and habitat preferences, and where available I give data on breeding and notes on taxonomy. The single specimen collected by G.F. Mees, the twenty-eight collected by W.H. Butler, the fourteen collected by J.R. Ford and the one-hundred and six collected by myself are lodged in the Western Australian Museum under registered numbers A8230, 14529-14556, 16424-16496, 16883-16886, 16888-16891, 17059-17061, 17067, 17071, 17078, 17092-17093, 17097-17098, 17197, 17236, 17240, 17254-17255, 17265-17277, 17283, 17286, 17293, 17306, 17352-17354, 17438, 17440, 17453-17454.

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I would like to thank Dr G. M. Storr of the Western Australian Museum for comments on a draft of the paper and access to his manuscript notes on Pilbara birds. I would also like to thank Texasgulf Australia Ltd. for their help and hospitality during the May 1980 survey.

The classification and nomenclature follows Storr & Johnstone (1979).

Annotated list

Casuariidae

Dromaius novaehollandiae (Latham)
Emu

Scarce or uncommon. Mostly single birds, occasionally in small groups (up to 9). An addled sun-bleached egg was found on a rocky flat with *Triodia* and low open mallee 19 km north-west of Juna Downs in May 1980.

Podicipedidae

Podiceps novaehollandiae novaehollandiae Stephens
Black-throated Grebe

Uncommon. Ones and twos in gorges with permanent water, also Marandoo sewage ponds. Breeding recorded above Joffre Falls, and just outside the Park at Tom Price.

Podiceps poliocephalus Jardine & Selby
Hoary-headed Grebe

Uncommon. Eight at Tom Price sewage ponds on 11 July 1981 and two on 23 July 1981.

Pelecanidae

Pelecanus conspicillatus Temminck
Australian Pelican

One at Marandoo in September 1976 and one just outside the Park at Wittenoom Gorge on 26 September 1978.

Phalacrocoracidae

Phalacrocorax carbo (Linnaeus)
Great Cormorant

Scarce. Single birds observed by Solomon in Joffre Gorge and at a pool 17 km east of Milli Milli Spring.

Phalacrocorax melanoleucos (Vieillot)
Little Pied Cormorant

Scarce. One recorded by Solomon in Dales Gorge in May 1979.

Anhinga melanogaster novaehollandiae (Gould)
Darter

Uncommon. Single birds observed at Joffre Gorge, Coppins Pool and 17 km east of Milli Milli Spring. One just outside the Park at Wittenoom Gorge on 26 September 1978.

Ardeidae

Ardea pacifica Latham
Pacific Heron

Uncommon to moderately common. Ones, twos, and threes at pools.

Ardea novaehollandiae Latham
White-faced Heron

Uncommon. Single birds observed at Joffre, Kalamina, Dales, Yampire and Wittenoom Gorges, also at Marandoo and 17 km east of Milli Milli Spring.

Egretta alba (Linnaeus)
Great Egret

Scarce. Single birds recorded at Dales Gorge, 14 km SW of Dales Gorge and just outside the Park at Wittenoom Gorge and Tom Price.

Nycticorax caledonicus hilli Mathews
Rufous Night Heron

Uncommon. Recorded 14 km SW of Dales Gorge and at Dales, Yampire and Joffre Gorges. One just outside the park at Wittenoom Gorge on 26 September 1978.

Threskiornithidae

Threskiornis spinicollis (Jameson)
Straw-necked Ibis

Uncommon. Small flocks (up to 8) and occasional larger flocks (up to 50). Most records are in December, January and February.

Anatidae

Cygnus atratus (Latham)
Black Swan

Scarce. Small flocks (up to 7) observed just outside the Park at Tom Price sewage ponds in November 1981 and April 1982.

Anas superciliosa Gmelin
Black Duck

Uncommon. Small flocks (up to 10) observed at Dales Gorge, 14 km SW of Dales Gorge, Joffre Gorge, 17 km east of Milli Milli Spring, and Coppin Pool. Breeding recorded in February and June at Tom Price.

Anas gibberifrons gracilis Buller
Grey Teal

Uncommon. Several records for Marandoo area including eight young on a water-filled pit in February 1976 and two on sewage ponds on 5 May 1980; also seen in Yampire and Joffre Gorges and at Coppin Pool. Flocks of up to fifty recorded just outside the Park at Tom Price. Breeding in June at Tom Price.

Malacorhynchus membranaceus (Latham)
Pink-eared Duck

Scarce. A flock of ten observed just outside the Park at Tom Price sewage ponds on 24 November 1981.

Aythya australis (Eyton)
Hardhead

Scarce. Small flocks (up to 6) observed just outside the Park at Tom Price sewage ponds.

Chenonetta jubata (Latham)
Wood Duck

Scarce. Two recorded by Solomon 14 km SW of Dales Gorge on 15 January 1981.

Accipitridae

Elanus caeruleus notatus Gould
Black-shouldered Kite

Uncommon, ones and twos. Recorded at Marandoo, Mt Bruce and over rocky hills near Coppin Pool.

Hamirostra melanosternon (Gould)
Black breasted Kite

Scarce, two single birds at Marandoo and two near Mt Bruce.

Haliastur sphenurus (Vieillot)
Whistling Kite

Uncommon to moderately common. Ones and twos, mainly along watercourses.

Milvus migrans affinis Gould
Black Kite

Uncommon to moderately common. Mainly attracted to habitation. Many sightings near Marandoo in June and July 1978; one near Marandoo on 17 May 1980; and several sightings just outside the Park including a flock of five at Juna Downs on 17 May 1980 and a flock of over forty at Tom Price on 23 July 1981.

Accipiter fasciatus fasciatus (Vigors & Horsfield)
Brown Goshawk

Uncommon. A large bird, probably a female, in tall mulga 2 km north of Mt Bruce on 7 May; one at edge of a creek with river gums 19 km north-west of Juna Downs on 16 May; one hunting over river gums along O'Brien Creek on 18 May 1980; and one at Milli Milli Spring on 15 April 1982.

Accipiter cirrocephalus cirrocephalus (Vieillot)
Collared Sparrowhawk

Moderately common along well-vegetated creeks and gullies and in mulga woodland. Observed at Marandoo, Hamersley Gorge, Yampire Gorge, Minthicoondunna Spring, Milli Milli Spring, Coppin Pool and Mt Trevarton. Two specimens (1 male, 1 female).

Aquila audax (Latham)
Wedge-tailed Eagle

Uncommon to moderately common. Many sightings around Marandoo, also seen at Hamersley Gorge, near Dales Gorge and near Coppin Pool.

Aquila morphnoides morphnoides Gould
Little Eagle

Scarce or uncommon. One recorded by Storr just outside the Park at Wittenoom Gorge on 20 May 1961, single birds observed by Solomon near Dales Gorge in late 1978 and early 1980; and one observed by Ford at Coppin Pool on 14 April 1982.

Circus assimilis Jardine & Selby
Spotted Harrier

Common, fifteen sightings in May 1980 (11 adult, 4 immature). Mainly open areas of spinifex or soft grass; also edges of creeks. Breeding recorded by Ford just outside the Park 29 km NE of Tom Price in April 1982.

Pandion haliaetus (Linnaeus)
Osprey

One observed by Ford just outside the Park at Magazine Pool on 15 July 1981.

Falconidae

Falco peregrinus macropus Swainson
Peregrine Falcon

Scarce or uncommon. One at Dales Gorge on 4 March 1982, one near Dales Gorge in mid 1978, and another on a gorge slope near Marandoo in 1978.

Falco longipennis longipennis Swainson
Australian Hobby

Uncommon. Two sightings near Marandoo in 1978: one over mallee-spinifex 10 km SE of Marandoo and another flying over Turee Creek on 16 May 1980; and one being attacked by a Pied Butcherbird 11 km SE of Minthicoondunna Spring on 19 May 1980. On 26 August 1980 one was sitting on the edge of a nest 24 m up in a river gum at Minthicoondunna Spring; it left its perch momentarily to attack an Australian Crow and then returned. Two were seen at Coppin Pool on 13 July 1981 and three on 27 November 1981. One specimen (unsexed). This bird had a complete *Turnix velox* in its stomach.

Falco berigora berigora Vigors & Horsfield
Brown Falcon

Common throughout the Park, e.g. 24 sightings in May 1980, mostly single birds, occasionally two together. Both dark and pale birds seen. Open mulga, eucalypt woodland, spinifex and soft grass flats, gorges, rocky hills and edges of creeks.

Falco cenchroides cenchroides Vigors & Horsfield
Australian Kestrel

Common throughout the Park, e.g. 38 sightings in May 1980, mostly ones and twos. Open mulga, rocky hills, gorges and open grassy flats.

Turnicidae

Turnix velox (Gould)
Little Button-quail

Moderately common, usually in pairs or small parties (up to 4). Mainly open and dense *Triodia* on stony ground; small creeks and wash areas with mulga and a ground cover of *Plectrachne* and low herbage; soft grass flats; buffel grass at edge of Turee Creek; and dense creekside vegetation of mostly *Cassia, Abutilon* and *Enneapogon*. Three specimens (2 females, 1 in spirit).

Rallidae

Gallirallus philippensis (Linnaeus)
Banded Land Rail

One observed by Ford just outside the Park at Tom Price sewage ponds on 23 July 1981.

Porzana fluminea Gould
Spotted Crake

Several observed by Ford at Tom Price sewage ponds on 23 July 1981.

Porzana tabuensis (Gmelin)
Spotless Crake

Moderately common on Tom Price sewage ponds.

Gallinula ventralis Gould
Black-tailed Native Hen

Scarce. Two sightings, both of three birds at edge of a ditch 11 km SW of Dales Gorge on 15 and 18 January 1981. Also recorded just outside the Park at Tom Price.

Fulica atra Linnaeus
Coot

Scarce. Observed at Kalamina Gorge, Milli Milli Spring and Coppin Pool. Common on Tom Price sewage ponds in November 1981.

Otididae

Otis australis Gray
Australian Bustard

Uncommon to moderately common in good seasons. Mainly spinifex and soft grass flats. In May 1980 several small groups (up to 5) were seen, including two adults and a juvenile near the southern boundary of the Park. On 24 August 1980 two were in open *Triodia* and *Acacia* near Mt Bruce, and on 27 November 1981 one was seen on a spinifex flat near Coppin Pool.

Charadriidae

Charadrius melanops Vieillot
Black-fronted Plover

Uncommon to moderately common. Observed at Joffre, Kalamina, Dales and Yampire Gorges, also at Marandoo and Milli Milli Spring and along Turee Creek at Minthicoondunna Spring and near Coppin Pool. In May 1980 four pairs were seen feeding at edges of pools and in the sandy and rocky creek bed near Coppin Pool. Flocks (up to 20) recorded just outside the Park at the Tom Price sewage ponds.

Charadrius cinctus (Gould)
Red-kneed Plover

Four observed just outside the Park on the Tom Price sewage ponds on 23 July 1981.

Scolopacidae

Tringa glareola Linnaeus
Wood Sandpiper

Two at Tom Price sewage ponds on 24 November 1981.

Tringa hypoleucos Linnaeus
Common Sandpiper

One at Tom Price sewage ponds on 24 November 1981.

Recurvirostridae

Himantopus himantopus (Linnaeus)
Black-winged Stilt

Three in a ditch near Dales Gorge on 15 January 1981, also seen on Marandoo sewage ponds and just outside the Park at Tom Price.

Burhinidae

Burhinus grallarius (Latham) Bush Stone-curlew	Scarce. Butler flushed one from a creek near Marandoo and heard another calling at mine site 3 km east of Marandoo in 1978.

Laridae

Sterna hybrida javanica Horsfield Whiskered Tern	Three observed just outside the Park at Tom Price sewage ponds on 22 July 1981.

Columbidae

Geopelia striata placida Gould Peaceful Dove	Uncommon. Several pairs in river gums and acacia thickets along Turee Creek near Coppin Pool, also recorded in Yampire Gorge and near Dales Gorge. Two sightings of single birds just outside the Park at Wittenoom Gorge and several seen near Tom Price. Two specimens (1 female and a wing from a bird found dead in creek bed).
Geopelia cuneata (Latham) Diamond Dove	Common throughout the Park in small flocks (up to 15). As often in dry situations as near water. Breeding recorded just outside the Park near Tom Price in March 1982.
Phaps chalcoptera (Latham) Common Bronzewing	Moderately common throughout the Park in ones, twos, threes and fours. Mainly dense vegetation along creeks and gorges including acacia thickets and thickets of *Melaleuca linophylla* and *M. glomerata*. Many sightings in May 1980 including two birds feeding on the black fruits of sandalwood trees near Mt Trevarton and another feeding on the seeds of *Cleome viscosa* on a track near O'Brien Creek. Two specimens (1 male, 1 female).
Phaps histrionica (Gould) Flock Pigeon	Several small flocks were seen in the Hamersley Range by the Western Australian Museum expedition in 1958; however their exact location is unknown.
Geophaps plumifera Gould Spinifex Pigeon	Moderately common in pairs and small flocks (up to 40). Favouring rough country in vicinity of water. Recorded at Yampire, Dales, Hancock, Hamersley and Wittenoom Gorges, near Marandoo and along Turee Creek near Coppin Pool. In May 1980 flocks of 6, 8, 10, 15 and 20 were seen drinking from pools along Turee Creek and feeding in rocky hills with *Triodia, Acacia* and *Eremophila fraseri*. Three specimens (2 male, 1 female).
Ocyphaps lophotes (Temminck) Crested Pigeon	Moderately common throughout the Park. Mostly small groups (up to 4) but one flock of 30 on an open grassy flat 5 km SSW of Juna Downs on 17 May 1980. In August 1980 several small flocks were seen feeding on a soft grass flat with *Eucalyptus coolibah* near Marandoo. One specimen (male).

Psittacidae

Platycercus zonarius zonarius (Shaw) Ring-necked Parrot	Common along major creeks and gorges with tall river gums; uncommon to moderately common in mulga-eucalypt woodland and rocky hills with scattered snappy gum. Two birds were displaying in a river gum at Minthicoondunna Spring on 9 May 1980. One specimen (? female).
Platycercus varius (Clark) Mulga Parrot	One recorded by Butler near Marandoo in 1978.
Neophema bourkii (Gould) Bourke Parrot	Uncommon. Two sightings by Butler near Marandoo in 1978; two birds, a flock of four and a single bird observed by I. Solomon the Park Ranger between January and April 1980; a flock of five seen by Johnstone feeding on bare ground in open mulga 5 km E of Mt Trevarton on 18 May 1980; a flock of twenty (including some immature birds) observed by Smith and Johnstone 22 km E of Coppin Pool on 27 November 1981; and a flock of twelve seen by Ford at Milli Milli Spring on 15 April 1982. A flock of ten recorded just outside the Park near Mt Meharry on 27 November 1981. One specimen (male).
Melopsittacus undulatus (Shaw) Budgerigar	Moderately common to common. Mainly small flocks (up to 15). Observed throughout the Park but often congregating near water.
Nymphicus hollandicus (Kerr) Cockatiel	Uncommon to moderately common, in flocks (up to 20). Mainly along major watercourses.
Calyptorhynchus magnificus (Shaw) Red-tailed Black Cockatoo	Recorded by Butler at Dales Gorge.
Cacatua roseicapilla Vieillot Galah	Uncommon. Mainly pairs and small flocks up to 5 but one flock of 30. Open mulga, mulga-eucalypt woodland and river gums. On 17 May 1980 four were feeding on the seeds of *Cleome viscosa* on a grassy flat 5 km SSW of Juna Downs, and near the same place on the 18 May a flock of 5 were feeding on the fruits of *Eremophila leucophylla* (damaging much of the small bushes as they fed). Seven specimens (4 male, 3 female).
Cacatua tenuirostris sanguinea Gould Corella	Moderately common along major watercourses in small flocks up to 30. Observed at Wittenoom Gorge, Yampire Gorge, Circular Pool, Minthicoondunna Spring, Milli Milli Spring, Coppin Pool and O'Brien Creek. Favouring areas with tall river gums but also on bare cliffs in gorges. Three specimens (1 male, 1 female and 1 unsexed).

Cuculidae

Cuculus pallidus (Latham)
Pallid Cuckoo

Moderately common in May and August with over 30 sightings throughout the Park. Though many birds were calling, most of them were probably passage migrants. There is only one breeding record from the Pilbara. Open and dense mulga, mulga-eucalypt woodland and creekside vegetation.

Chrysococcyx osculans (Gould)
Black-eared Cuckoo

Only one record, a female collected by Butler in open mulga along a creek near Marandoo on 24 April 1976.

Chrysococcyx basalis (Horsfield)
Horsfield's Bronze Cuckoo

Moderately common. In May 1980 observed in all mulga habitats, also acacia thickets and occasionally river gums along creeks and scattered acacia on open rocky hills. On 27 August 1980 one was calling from *Eucalyptus coolibah* woodland 10 km E Marandoo. On 18 April 1982 an unbarred immature was being fed by a male and four plain White-winged Fairy-wrens 24 km ESE of Tom Price.

Strigidae

Tyto alba delicatula (Gould)
Barn Owl

Two single birds recorded by Butler while spotlighting around Marandoo in 1976.

Ninox novaeseelandiae boobook (Latham)
Boobook Owl

Recorded by Butler as frequent at Marandoo mine and town sites in 1976. In May 1980 it was scarce and only recorded at Coppin Pool on Turee Creek. On 25 August 1980 two were calling at night from tall river gums along Turee Creek at Minthicoondunna Spring. On 15 April 1982 two were heard and one seen at Milli Milli Spring. On 28 November 1981 one was seen in dense mulga just outside the Park near Mt Meharry.

Ninox connivens connivens (Latham)
Barking Owl

One bird, possibly this species, calling from tall river gums at Minthicoondunna Spring on 25 August 1980.

Podargidae

Podargus strigoides (Latham)
Tawny Frogmouth

Scarce. Listed by Butler for Marandoo area as frequent at mine site and rare at townsite in 1976. Not recorded in May 1980. One calling at night from *Eucalyptus coolibah* woodland about 10 km E of Marandoo on 26 August 1980, and one in mulga, eucalypt woodland near Mt Bruce on 22 November 1981. There is an undated clutch of 2 eggs in the Western Australian Museum collection labelled Hamersley Range and another clutch of 2 eggs collected by C.L.E. Orton just outside the Park on Hamersley Station on 10 August 1907.

Aegothelidae

Aegotheles cristatus leucogaster Gould
Australian Owlet-nightjar

Scarce. Several flushed from dead tree spouts and cave ledges by Butler in 1976. One calling at night near Mt Trevarton on 17 May 1980, two calling at night 19 km NW of Juna Downs on 18 May 1980, three calling at night from *Eucalyptus coolibah* woodland 10 km E of Marandoo on 26 August 1980, and one observed at Milli Milli Spring on 15 April 1982.

Caprimulgidae

Eurostopodus argus Hartert
Spotted Nightjar

Common. Mainly seen on roads at night. On a 29 km run from the Mt Bruce-Wittenoom road to Marandoo on the evening of 15 May 1980 twelve single birds were counted sitting on the road.

Apodidae

Apus pacificus pacificus (Latham)
Fork-tailed Swift

Moderately common summer visitor. Listed in *Marandoo Flora & Fauna* occasionally seen in large numbers in February and March.

Alcedinidae

Dacelo leachii leachii Vigors & Horsfield
Blue-winged Kookaburra

Uncommon to moderately common. Mainly pairs. Recorded at Yampire Gorge, Dales Gorge, Minthicoondunna Spring, Milli Milli Spring and Coppin Pool. Tall river gums. One specimen (female).

Halcyon pyrrhopygia Gould
Red-backed Kingfisher

Moderately common throughout the Park. Sparsely vegetated areas with *Hakea, Acacia* and *Eremophila* over *Triodia*; also open mulga, open snappy gum woodland and occasionally edges of creeks with mulga or river gums. On 24 August 1980 an adult was flushed from a hollow in a snappy gum at Yampire Gorge; it returned to the hollow within a few minutes. On 26 August 1980, a nest tunnel was found 1 m down the side of a dry well near Mt Bruce. The adult bird flew from the tunnel, returned quickly, and did not come out again for over thirty minutes.

Halcyon sancta sancta Vigors & Horsfield
Sacred Kingfisher

Uncommon to moderately common. Seven sightings in May, none in August 1980, one in July 1981, one in November 1981 and three in April 1982. Only observed at Marandoo and along major watercourses. Turee Creek (Minthicoondunna Spring, Milli Milli Spring and Coppin Pool) and O'Brien Creek. Mainly in tall river gums. One specimen (unsexed).

Plate 1. Typical *Triodia* dominated habitat in Hamersley Range National Park. Depressions and low-lying country with scattered *Eucalyptus* spp. trees.

Plate 2. *Triodia* regeneration 2 years old after fire. Open-stoney areas with scattered clumps of spinifex provide refuge for fauna.

Plate 3. A deep, narrow gorge in the Ranges. These gulleys, although mostly dry, may support ferns and other specialised flora and fauna in their dark, cool, recesses.

Plate 4. Dales Gorge. In wider gorges of this type deep pools and abundant swamp vegetation may occur along the water's edge.

Plate 5. Band of Mulga *Acacia aneura* trees by-passed by fire. Lightning fires, together with European-caused wildfires in more recent times, have probably reduced the area of Mulga left intact.

Plate 6. A deep pool and waterfall in Dales Gorge. Note the sedgey creek margins. Pools such as this support a rich flora and fauna, and form the focus for survival of many animals in the region.

Plate 7. *Grevillea wickhamii*. This spectacular shrub up to 3 m tall is one of the attractive wildflowers abundant in the Hamersley Range. Although not generally considered an area rich in wildflowers, many species rival those of the south-west in appearance.

Plate 8. *Sarcostemma* sp. also known as Caustic-bush, was widely used by the Aborigines to treat warts, skin cancers and dermatitis. Its milky sap was applied to the skin either directly,or after mixing with ashes and other herbs.

Plate 9. *Diporiphora valens* an attractively coloured dragon-lizard common in the Hamersley Range National Park.

Plate 10. *Amphibolurus caudicinctus caudicinctus*, another dragon with reddish-brown colours suitable for camouflage on the rocky soils. Dragon-lizards are the most common lizards in the Park.

Plate 11. *Liasis divaceus barroni* the Olive Python. This species is common in the rocky gorges of the Park. Note the expanded stomach of the snake caused by a recently swallowed prey.

Plate 12. *Macroderma gigas*, the Ghost Bats a large, predatory bat which takes refuge in caves, mines and rock shelters of the Hamersley Ranges. It sometimes feeds on other smaller species of bats.

Plate 13. Biologist and survey leader Mr I. Pound collects pebbles from the burrow mound of *Pseudomys chapmani* the Pebble-mouse. The pebbles are remarkably consistant in size and are carefully selected by the animal.

Plate 14. *Ningaui timealeyi* the Pilbara Ningaui, a diminutive marsupial mouse, and the most common small mammal in the Park. This species was described in 1975 from specimens collected at Marandoo.

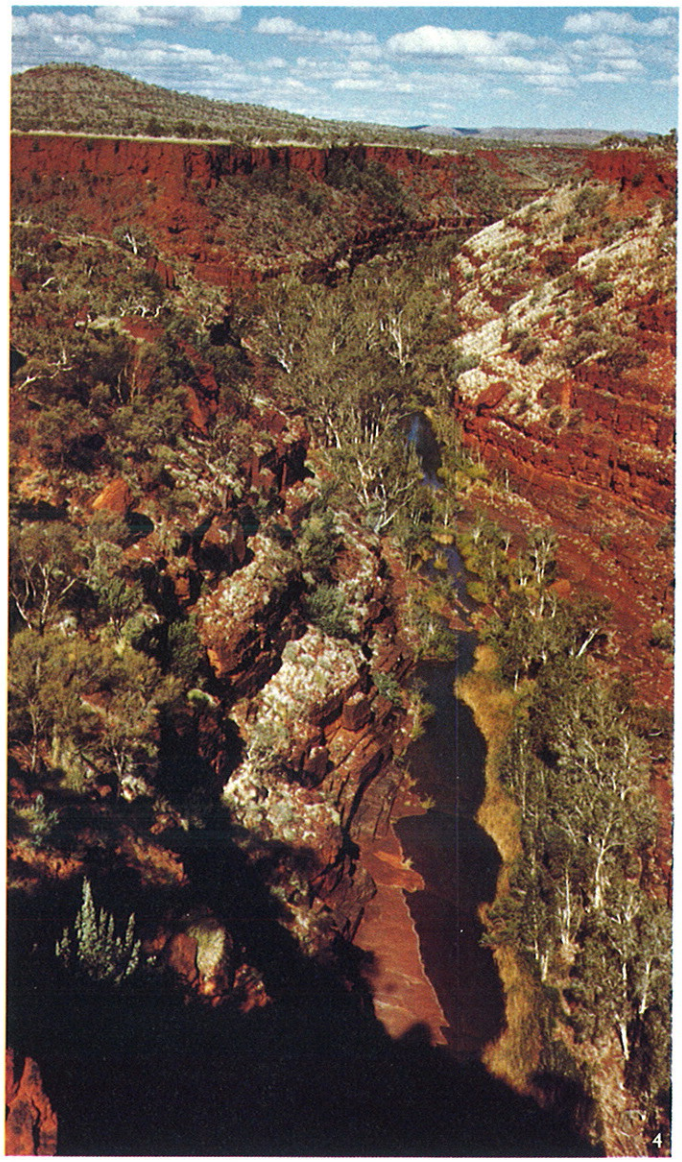
Plate 15. Emu & chicks on typical nest in open mulga section of the Park.

Plate 16. The Painted Finch, common throughout the Park, mostly in pairs & small flocks.

B. Muir

B. Muir

B. Muir



B. Muir

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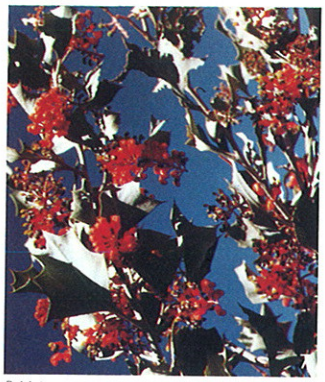

B. Muir

B. Muir

R. E. Johnstone

R. E. Johnstone

R. E. Johnstone

N. Dunlop

B. Muir

A. G. Wells

A. G. Wells

A. G. Wells

Meropidae

Merops ornatus Latham
Rainbow Bee-eater

Uncommon to common. In May 1980 and July 1981 only observed in small groups (up to 4) near pools along major watercourses. Seen in large numbers during migration in early and late summer.

Alaudidae

Mirafra javanica Horsfield
Horsfield's Bushlark

Scarce. One recorded by Butler near the top of Dales Gorge and one seen by Johnstone 9 km E of Mt Bruce on a large soft-grass flat surrounded with *Eucalyptus coolibah, Acacia aneura* and *Triodia* on 21 May 1980.

Hirundinidae

Hirundo nigricans nigricans Vieillot
Tree Martin

Uncommon to common. Mainly small flocks but occasionally larger flocks of over fifty are seen. In May and August 1980 small groups up to six were seen over water and circling river gums at Yampire Gorge, Hancock Gorge, Minthicoondunna Spring and Coppin Pool. On 25 August 1980 an adult was carrying food or mud into a hollow spout of a river gum at Minthicoondunna Spring.

Hirundo ariel (Gould)
Fairy Martin

Status uncertain, as the birds themselves have not been seen in the Park. In May 1980 two old nests were found under an overhang and another twenty at a cave entrance 5 km S of Mt Bruce. Several birds were seen at Wittenoom Gorge in September 1978, and breeding was recorded just outside the Park at Tom Price in August 1980.

Motacillidae

Anthus novaeseelandiae australis
Vieillot
Richard's Pipit

Scarce. A female was collected by Butler on a stony flat with *Triodia* and mulga near Mt Bruce on 27 April 1976. Four sightings in May 1980 and two in April 1982. Mainly open *Triodia* flats.

Campephagidae

Coracina maxima (Rüppell)
Ground Cuckoo Shrike

Scarce. Two observed 11 km NE of Tom Price and two 21 km NE in April, 1982.

Coracina novaehollandiae (Gmelin)
Black-faced Cuckoo-shrike

Common, often in small parties. Mainly along major watercourses with tall river gums and *Melaleuca*, also in open to dense mulga woodland with scattered eucalypts, and *Eucalyptus coolibah* woodland. In May 1980 several pairs were attending flying young, and in August 1980 two were attacking Australian Crows at Dales Gorge. Most birds observed were small and pale, and all three specimens collected (1 male, 2 females) belong to the resident race *subpallida*.

Lalage sueurii tricolor (Swainson)
White-winged Triller

Uncommon to common. Observed throughout the Park in small groups up to 4 and occasionally larger flocks up to 10. Mainly open mulga and eucalypt woodlands. Breeding recorded by Solomon.

Pachycephalidae

Petroica goodenovii (Vigors & Horsfield)
Red-capped Robin

Moderately common. Mainly dense mulga; occasionally open mulga, wattle thickets and open eucalypt woodland. In May 1980, many birds had paired and were defending territories. In August of the same year an adult male was observed feeding a female which indicated breeding, but no nest was found. One specimen (female).

Petroica cucullata (Latham)
Hooded Robin

Moderately common throughout the Park. Mainly mulga woodlands, especially dense mulga along creeks and gullies, also open eucalypt woodland *(Eucalyptus leucophloia* and *E. coolibah),* dense *Grevillea wickhami* and mulga-eucalypt woodlands. A nest with 2 eggs was found 11 km SW of Dales Gorge in February 1980.

Pachycephala rufiventris rufiventris (Latham)
Rufous Whistler

Common throughout the Park. Mainly open and dense mulga, also *Eucalyptus coolibah* woodland, and less frequently river gums and wattle thickets along creeks. A brownish immature with pale wing coverts seen in May 1980. Adult males calling continuously in August 1980.

Colluricincla harmonica (Latham)
Grey Shrike-thrush

Moderately common, especially about ranges and major watercourses. Mainly mulga woodland and vegetation along watercourses including river gums, melaleuca, and acacia thickets. One specimen (male).

Oreoica gutturalis (Vigors & Horsfield)
Crested Bellbird

Moderately common throughout the Park. Mainly mulga formations, also creekside thickets, acacia, melaleuca, and open eucalypt woodland. Heard most mornings in open acacia near Marandoo.

Monarchidae

Rhipidura fuliginosa (Sparrman)
Grey Fantail

Scarce migrant. Observed near Milli Milli Spring and near Mt Bruce. Mainly dense mulga but also a mixed woodland of mulga and *Eucalyptus coolibah.* A male collected on 27 August 1980 belongs to the race *alisteri* of south-eastern Australia; a female collected on 13 July 1981 belongs to the race *preissi* of south-western Australia; and a female and immature male collected on 23 November 1981 belong to the race *albicauda,* an inhabitant of the arid mulga country of southern Northern Territory and southern interior of Western Australia. The latter subspecies was also collected just outside the Park near Mt Meharry in November 1981.

Rhipidura leucophrys leucophrys (Latham)
Willie Wagtail

Moderately common in ones and twos throughout the Park. Favours edges of watercourses especially those with pools, also seen in mulga woodland and open melaleuca. One specimen (spirit).

Orthonychidae

Pomatostomus temporalis rubeculus (Gould)
Grey-crowned Babbler

Uncommon. Observed throughout the Park in small groups of 3 to 6. Mainly *Acacia* thickets along creeks and dense mulga. In May 1980 the following old nests were found: one in a mulga 9 km NW of Marandoo, one in a mulga 4 km E of Mt Bruce, six in a single river gum near Coppin Pool, one in a wattle 9 km SW of Juna Downs, and one in a river gum at O'Brien Creek. One specimen (male).

Acanthizidae

Gerygone fusca fusca (Gould)
Western Flyeater

Common throughout the Park in May and August 1980. Mainly mulga-eucalypt woodlands. Favours eucalypts especially *Eucalyptus coolibah, E. leucophloia* and bloodwoods: occasionally in acacias. Possibly breeding in autumn as birds were often noted in pairs and in full song; furthermore on 7 May 1980 an immature with a yellowish wash on the under-parts was seen begging for food from two adults. Nine specimens (2 males, 5 females, 1 ? female and 1 in spirit).

Gerygone fusca mungi Mathews
Desert Flyeater

Common. Resident. Mainly dense mulga but also mulga-eucalypt associations (snappy gum, coolibah, bloodwoods and mallee). In May and August 1980 birds were mainly in pairs and in full song (which is shorter, more chattering and not as melodious as in *G. f. fusca*). A fresh empty nest built 2.5 m up in a mulga and constructed of spider web and grass and lined with feathers was found near Mt Bruce on the 7 May 1980. Several immatures with a strong yellow wash on the throat and breast were seen (and collected) in May 1980. In August 1980 two were observed feeding by flicking the wings to flush insects in the canopy of a mulga. Recorded as common in November 1981 and April 1982. Twenty-five specimens (9 males, 12 females, 1 ? female, 2 unsexed immature and 1 in spirit).

Smicrornis brevirostris (Gould)
Weebill

Moderately common throughout the Park. Mainly river gums along watercourses; also open snappy gum woodland on ranges, bloodwoods and mulga-eucalypt woodlands.

Acanthiza apicalis Gould
Broad-tailed Thornbill

Moderately common. Mainly tall dense mulga, occasionally open mulga. On 20 May 1980 one was seen displaying with tail cocked and spread and moving slowly through the mulga to another bird nearby: both were calling. Six specimens (males).

Acanthiza robustirostris Milligan
Slaty-backed Thornbill

Scarce in small groups (up to 5). Occasionally in company with Chestnut-rumped Thornbills. Observed near Marandoo, 9 km ESE of Mt Bruce, 9 km WSW of Juna Downs and near Mt Trevarton. Mainly lush areas of tall open mulga. Most birds seen were feeding in the foliage of mulga trees. Four specimens (2 males, 2 females).

Acanthiza uropygialis Gould
Chestnut-rumped Thornbill

Common throughout the Park. Mainly in small flocks (up to 6). Mulga woodland (open and dense) mulga-eucalypt woodland, and acacia and eucalypt thickets along creeks. Occasionally in areas of dead mulga with stunted eucalypts and in burnt country still regenerating after fires as long ago as 1973. Pair building a nest in a dead hollow tree 1 m above the ground on May 18, 1980. The nest was almost complete and was constructed of fine bark, seeds, spider web, insect cocoons and plant fibre. Five specimens (4 males, 1 female).

Acanthiza chrysorrhoa (Quoy & Gaimard)
Yellow-rumped Thornbill

Scarce. Two in mulga-eucalypt woodland near Mt Bruce on 22 November 1981, also recorded 14 km SW of Dales Gorge. One specimen (female).

Pyrrholaemus brunneus Gould
Redthroat

Scarce: only recorded in May 1980 and April 1982. Two in open mulga at edge of a wash 9 km WSW of Juna Downs, two in acacia thicket with stunted eucalypts near O'Brien Creek, one in open mulga 6 km SSW of Juna Downs, one in mulga along a creek 19 km NW of Juna Downs, and two in low wattles along creek 29 km ESE of Tom Price. One specimen (male).

Maluridae

Amytornis striatus whitei Mathews
Striated Grasswren

Rare: only four sightings on the Park. Several near Joffre Gorge in late 1978; a group of four on a small rocky hill with dense *Triodia, Eremophila fraseri,* scattered mallee and dead shrubs near Coppin Pool on 11 May 1980; four near Red Gorge in December 1981, and three in spinifex on boulder-strewn ridge 21 km ESE of Tom Price on 18 April 1982. One specimen (male).

Malurus lamberti assimilis North
Variegated Fairy-wren

Common throughout the Park. Open and dense mulga; thickets of acacia; melaleuca and herbage along creeks, gullies and gorges; open *Acacia monticola* on stony ground; and stunted eucalypts including mallee. In May 1980 most parties contained an adult male in nuptial plumage, an adult female and several immatures.

Malurus leucopterus leuconotus Gould
White-winged Fairy-wren

Uncommon. Small groups of up to six birds seen near Mt Bruce, near Coppin Pool and 20 km east of Marandoo. Open *Triodia* flats. Several males in nuptial plumage observed in May, and a female was seen feeding flying young near Coppin Pool on 12 May 1980.

Stipiturus ruficeps ruficeps Campbell
Rufous-crowned Emu-wren

Uncommon. Two males and one female on a rocky hill with dense *Triodia* near Coppin Pool on 11 May 1980; two in dense *Triodia* and *Acacia* 4 km NW of Coppin Pool on 12 May 1980; several calling on open *Triodia* flat 23 km NW of Juna Downs on 16 May 1980, and a male in tall spinifex and low bushes 13 km NW of Coppin Pool on 14 April 1982. A party of five observed just outside the Park near Mt Meharry on 28 November 1981. Three specimens (all males).

Sylviidae

Acrocephalus stentoreus australis (Gould)
Clamorous Reed Warbler

Scarce. Only recorded at Dales Gorge, Coppin Pool and just outside the Park at Wittenoom Gorge and Tom Price.

Eremiornis carteri North
Spinifex-bird

Moderately common throughout the Park. Dense *Triodia, Triodia-Plectrachne, Triodia* and *Melaleuca,* and *Triodia,* soft grasses and herbage along edges of creeks. Three specimens (1 female, 1 ? female, and 1 unsexed).

Cincloramphus mathewsi Iredale
Rufous Songlark

Common in May and August 1980 and moderately common in April 1982. Listed in *Marandoo Flora and Fauna* as common in camp area during summer. Dense mulga with *Triodia, Plectrachne* and soft grass; *Acacia farnesiana* and buffel grass along watercourses; *Eucalyptus coolibah* and scattered mulga over soft grass; and acacia thickets. An immature with a yellow gape was seen in May and a chick just able to fly was observed in an acacia thicket 14 km S of Yampire Mine on 24 August 1980.

Cincloramphus cruralis (Vigors & Horsfield)
Brown Songlark

Uncommon. One on open grassy flat near Mt Bruce on 7 May 1980. A nest with 4 eggs was found 12 km SW of Dales Gorge on 18 February 1980, it contained 4 young on 24 February 1980.

Daphoenositidae

Daphoenositta chrysoptera pileata (Gould)
Australian Sittella

Moderately common throughout the Park in small groups (up to 10). Observed near Marandoo, Mt Bruce, Milli Milli Spring and Coppin Pool, and at 9 km WSW and 19 km NW of Juna Downs and O'Brien Creek. Mainly mulga including mulga-eucalypt woodland, but also acacia thickets and river gums. Four specimens (3 males, 1 female).

Climacteridae

Climacteris melanura wellsi Ogilvie-Grant
Black-tailed Tree-creeper

Moderately common along major watercourses with tall river gums; elsewhere scarce or uncommon. Recorded near Marandoo, Mt Bruce, Yampire Gorge, Minthicoondunna Spring and Coppin Pool. Two specimens (males).

Dicaeidae

Dicaeum hirundinaceum hirundinaceum (Shaw)
Mistletoebird

Moderately common about the ranges and along major watercourses; elsewhere less frequent.

Pardalotidae

Pardalotus rubricatus Gould
Red-browed Pardalote

Moderately common throughout the Park. Eucalypts, especially river gums along watercourses. Calling frequently in May 1980 along Turee Creek. F.L. Whitlock collected a clutch of two eggs in the Hamersley Range in September 1922. Two specimens (1 male, 1 female).

Pardalotus striatus (Gmelin)
Striated Pardalote

Common to moderately common throughout the Park. Mainly snappy gum woodland on slopes of hills and ranges; tall river gums along watercourses; *Eucalyptus coolibah* woodland; and mulga-eucalypt woodland along creeks. Breeding in May 1980: several birds observed going in and out of hollows, pair seen copulating in a river gum at Coppin Pool, and a male was collected as it flew from a completed nest in a hollow of a snappy gum near Coppin Pool on 11 May. Adults were making the full 'wik wik wik' call in both May and August 1980. An immature still at begging stage and with a pale greyish yellow head and pale bill was collected near Mt Bruce in *Eucalyptus coolibah* and *Acacia aneura* on 27 August 1980. Several observed in the Park in July 1981 but not recorded in November 1981. Common in April 1982 and breeding recorded just outside the Park at Tom Price in April 1982. Eight specimens (6 males, 2 ? female).

Meliphagidae

Lichmera indistincta indistincta (Vigors & Horsfield)
Brown Honeyeater

Moderately common. Mainly acacia thickets along small creeks running out of ranges; areas of open acacia with *Hakea* and *Eucalyptus; Melaleuca* along watercourses; and snappy gum-mulga woodland. Seen frequently around gardens at Marandoo. Observed feeding in flowering *Acacia, Grevillea wickhami, Cassia* and bloodwoods. Three specimens (1 male, 2 in spirit).

Certhionyx niger (Gould)
Black Honeyeater

Moderately common. Single birds seen on hillsides near Marandoo by Butler in 1976. In May 1980 they were observed in ones and twos throughout the Park. Mainly open mulga along creeks but also burnt mulga. Observed feeding in flowering acacia. A male was seen in a display fight 9 km SSW of Juna Downs on 14 May 1980. One specimen (male).

Certhionyx variegatus Lesson
Pied Honeyeater

Scarce. Recorded by Butler near Marandoo in 1976 and six were seen by Solomon 14 km SW of Dales Gorge in February 1981.

Meliphaga virescens (Vieillot)
Singing Honeyeater

Moderately common in open acacia and gardens around Marandoo; elsewhere uncommon. Away from Marandoo seen mainly in tall mulga, mulga-eucalypt woodland and flowering acacia with lush herbage. Two specimens (1 female, 1 in spirit).

Meliphaga keartlandi (North)
Grey-headed Honeyeater

Moderately common. Hills and ranges with open woodland of snappy gum; creeks with eucalypts (especially bloodwoods), flowering acacia and *Hakea*; and gorges and creeks with *Melaleuca*. One specimen (female).

Meliphaga penicillata Gould
White-plumed Honeyeater

Very common along major watercourses (Turee Creek, O'Brien Creek) with tall river gums; also gorges with tall *Melaleuca leucadendron* and river gums. Common around Marandoo and along some of the smaller creeks with mulga and eucalypts. Occasionally seen some distance from river gums in flowering trees and shrubs. Two adults were feeding a fledgling at Yampire Gorge on 25 August 1980. Three specimens (2 males, 1 in spirit).

Melithreptus gularis laetior Gould
Black-chinned Honeyeater

Uncommon to moderately common. Listed in *Marandoo Flora and Fauna* as occasional in flowering bloodwoods. Several were heard in river gums near Coppin Pool on 12 May 1980; about four were feeding in bloodwoods 36 km SSW of Hancock Gorge on 27 August 1980; two were feeding in river gums at Yampire Gorge on 21 November 1981; and six were observed in *Eucalyptus coolibah* woodland near Mt Bruce on 23 November 1981.

Phylidonyris albifrons (Gould)
White-fronted Honeyeater

Uncommon. A male was collected by Butler on an ironstone scree slope with *Triodia* and gidgee near Marandoo on April 28, 1976. One or two calling from a rocky hill with flowering *Eremophila fraseri* and *Acacia* near Coppin Pool on 11 May 1980. One specimen (male).

Lacustroica whitei North
Grey Honeyeater

Uncommon. One observed near Joffre Falls between October and December 1978, and another 14 km SW of Dales Gorge in December 1981. Recorded just outside the Park near Tom Price in July 1981 and April 1982 and on Hamersley Station and near Mt Meharry in November 1981.

Manorina flavigula (Gould)
Yellow-throated Miner

Moderately common in small flocks (up to 6). Mainly vegetation on ranges and in gorges; also dense vegetation along watercourses especially those with flowering trees and shrubs; and occasionally mulga-eucalypt woodland. Three specimens (2 females, 1 in spirit).

Acanthagenys rufogularis Gould
Spiny-cheeked Honeyeater

Common. Observed in nearly all wooded habitats: ranges, mulga, mulga-eucalypt woodlands and vegetation along watercourses. One specimen (female).

Epthianura aurifrons Gould
Orange Chat

Recorded by Solomon 14 km SW of Dales Gorge in early January 1981.

Epthianura tricolor Gould
Crimson Chat

Uncommon to common. Nomadic. Recorded by Butler as common in small flocks (up to 20) in the Marandoo area in 1976. Uncommon in May 1980, when a single bird and a flock of 10-15 were seen near Mt Bruce in open *Triodia* and on an open plain with soft grass and scattered mulga. Two seen near Mt Bruce on 22 November 1981.

Ploceidae

Emblema pictum Gould
Painted Finch

Common throughout the Park. Mostly in pairs and small flocks (up to 8); occasionally in larger flocks (up to 20). Favouring rocky hills with *Triodia*, edges of creeks with seeding *Plectrachne*, and buffel grass flats along watercourses. Often seen drinking at pools. Nest with 3 eggs (almost hatched) in a dense clump of *Triodia* at edge of creek near Coppin Pool on 31 May 1980; and a nest with 4 eggs in *Triodia wiseana* 14 km SE of Minthicoondunna Spring on 20 May 1980.

Neochmia ruficauda (Gould)
Star Finch

Common in pairs and small flocks (up to 8) along Turee Creek near Coppin Pool in May 1980 and at Milli Milli Spring in April 1982. Mainly in lush areas on side creeks with tall buffel grass and the prickly *Acacia farnesiana*. Nest with four heavily incubated eggs in large broken branch of a *Melaleuca glomerata* hanging over water on 13 May. The female was seen leaving the well-hidden nest to be fed by the male, she then quickly returned to the nest. A poorly constructed and unlined nest with one hatchling and two eggs was found in dense buffel grass and flood debris hanging over a steep-sided creek on 13 May. Three specimens (2 males, 1 female).

Poephila guttata castanotis (Gould)
Zebra Finch

Very common at Marandoo and along major watercourses, especially at permanent water; Minthicoondunna Spring, Coppin Pool, Yampire Gorge etc. Common on open soft-grass flats with mulga near Mt Bruce. Mostly in small flocks of up to 20, occasionally in larger flocks of 30 to 50. Nest with 4 eggs 2 m up in a mulga 19 km NW of Juna Downs on 16 May 1980; nest with 4 eggs in hollow of dead tree 20 km NW of Juna Downs on 16 May 1980; nest with 3 eggs and 1 hatchling in a mulga 19 km NW of Juna Downs on 19 May 1980; nest with 4 eggs in a hanging basket at Marandoo on 26 August 1980; and nest with 2 eggs 2 m up in a wattle 29 km ESE of Tom Price on 18 April 1982.

Grallinidae

Grallina cyanoleuca (Latham)
Magpie-lark

Uncommon to moderately common. Mainly in ones, twos, threes and fours. Only observed along major watercourses including gorges, and around habitation (Marandoo, Rangers Residence and Juna Downs). Breeding recorded at Marandoo and Rangers residence (14 km SW of Dales Gorge).

Artamidae

Artamus personatus (Gould)
Masked Woodswallow

Uncommon to common. Nomadic. Flocks of up to 1000 seen near Marandoo in 1976. Moderately common in flocks from 10 to 80 throughout the Park in May 1980. Attracted to flowering *Grevillea wickhami*.

Artamus cinereus Vieillot
Black-faced Woodswallow

Moderately common throughout the Park in pairs and small flocks (up to 10). Mainly edges of watercourses, open eucalypt woodland and open mulga.

Artamus minor Vieillot
Little Woodswallow

Moderately common over ranges and along major creeks, gullies and gorges. Mostly in small flocks (up to 5).

Cracticidae

Cracticus torquatus torquatus (Latham)
Grey Butcherbird

Moderately common. Dense mulga and mulga-eucalypt woodland.

Cracticus nigrogularis (Gould)
Pied Butcherbird

Moderately common. A little more plentiful than Grey Butcherbird. Mainly ranges, hills and gorges; also open poorly-vegetated *Triodia* flats with scattered acacia and eucalypts and open mulga-eucalypt woodland. One specimen (female).

Cracticus tibicen tibicen (Latham)
Australian Magpie

Uncommon to moderately common. Favouring mulga woodland, open mulga, eucalypt woodlands and open burnt areas. Recorded at Yampire Gorge, near Hancock Gorge, Mt Bruce, Marandoo, 14 km SW of Dales Gorge, Milli Milli Spring, Mt Trevarton and near Coppin Pool.

Paradisaeidae

Ptilonorhynchus maculatus guttatus (Gould)
Spotted Bowerbird

Locally moderately common but generally uncommon. Recorded at Mt Bruce, 11 km N of Mt Bruce, Marandoo, Yampire Gorge, Dales Gorge, 21 km ESE of Tom Price and near Mt Trevarton. Mainly dense mulga and thickets along watercourses including gullies and gorges, occasionally open woodland with fruiting trees and shrubs. Two birds were feeding on the black fruits of sandalwood trees near Mt Trevarton on 17 May 1980. On 4 March 1962 Storr found a bower under a *Ficus platypoda* which was growing on the rim of Dales Gorge. The bower was about 25 cm long, made of arched grass stems and had a heap of white water-worn stones at one end, which probably came from the bottom of the gorge. Bowers have also been recorded in Yampire Gorge. Two specimens (1 male, 1 unsexed).

Corvidae

Corvus orru salvadorii Finsch
Australian Crow

Moderately common in ones, twos and threes. Mainly along larger watercourses, in gorges, and around settlements (Marandoo, Juna Downs etc.) Nest with three feathered chicks about 2·4 m up in a river gum at Minthicoondunna Spring on 26 June 1980. One specimen (unsexed).

Corvus bennetti North
Little Crow

Status uncertain. A flock of six birds making the typical short 'ark ark' were seen at Minthicoondunna Spring on 9 May 1980. A flock of 23 5 km SSW of Juna Downs on 17 May 1980 giving the same short 'ark' call were probably this species. A flock of 30 seen by Butler near Marandoo in April 1976 were probably also Little Crows.

Discussion

A total of 135 species (74 non-passerine and 61 passerine) have been recorded from the area covered in this paper. Although the main survey was short, we were able to cover much of the area by vehicle and I feel that all of the resident species have been recorded. There are two possible exceptions, the Chestnut-breasted Quail-thrush *Cinclosoma castaneothorax* and the White-browed Babbler *Pomatostomus superciliosus*. The former has been recorded 30 km south of Tom Price and the White-browed Babbler has been collected near Rocklea. Few additional passerine species can be expected; however, visits after cyclonic rains or good seasons could add wetland non-passerines.

The Park is rich in diurnal birds of prey, and many rare and interesting birds occur in it. However because it lies within the Pilbara region the avifauna is generally depauperate compared to the Kimberley and southern Western Australia.

The ranges provide habitat for the Spinifex Pigeon *Geophaps plumifera*, Grey Shrike-thrush *Colluricincla harmonica*, Striated Pardalote *Pardalotus striatus*, Yellow-throated Miner *Manorina flavigula*, Little Woodswallow *Artamus minor* and Pied Butcherbird *Cracticus nigrogularis*. The Striated Pardalote is of considerable interest as it was not previously known to breed north of Yuna (near Geraldton).

Many of the gorges contain permanent water, but their steep sides and bare rocky edges are generally unsuitable for wetland birds. The Peregrine Falcon *Falco peregrinus* and Corella *Cacatua tenuirostris* perch on the steep walls of the gorges. The Grey-headed Honeyeater *Meliphaga keartlandi* and the Spotted Bowerbird *Ptilonorhynchus maculatus* favour the well-vegetated gorges.

The mulga woodlands in the Park are some of the best in the Pilbara. There are large stands of dense mulga immediately to the north of the National Park; however many of these areas have been degraded by grazing cattle and fires, and contain fewer birds. The mulga woodlands are important for the Red-capped Robin *Petroica goodenovii*, Hooded Robin *Petroica cucullata*, Crested Bellbird *Oreoica gutturalis*, Western Flyeater *Gerygone fusca fusca*, Desert Flyeater *Gerygone fusca mungi*, Broad-tailed Thornbill *Acanthiza apicalis*, Slaty-backed Thornbill *Acanthiza robustirostris*, Chestnut-rumped Thornbill *Acanthiza uropygialis*, and Redthroat *Pyrrholaemus brunneus*. The two flyeaters are especially interesting. The Desert Flyeater is presently treated as a subspecies of the Western Flyeater; but if both breed on the high Hamersley Plateau without hybridizing (as data here suggest) *G. f. mungi* will have to be treated as a full species. Further field work is planned for clarifying the status and breeding ranges of these flyeaters in the Pilbara. The Broad-tailed Thornbill, Yellow-rumped Thornbill *Acanthiza chrysorrhoa*, Redthroat and Grey Honeyeater *Lacustroica whitei* are all at their northern limit on the Park.

The *Eucalyptus coolibah* woodland near Mt Bruce harbours many Striated Pardalotes, and in May and August 1980 many Western and Desert Flyeaters were noted in it.

The creekside vegetation is important for the Peaceful Dove *Geopelia striata placida*, Ring-necked Parrot *Platycercus zonarius*, Corella *Cacatua tenuirostris*, Blue-winged Kookaburra *Dacelo leachii*, Black-faced Cuckoo-shrike *Coracina novaehollandiae subpallida*, Black-tailed Tree-creeper *Climacteris melanura wellsi*, Red-browed Pardalote *Pardalotus rubricatus*, White-plumed Honeyeater *Meliphaga penicillata* and Star Finch *Neochmia ruficauda*. The races *subpallida* (of the Black-faced Cuckoo-shrike) and *wellsi* (of the Black-tailed Tree-creeper) are endemic to the Pilbara.

The open hummock-grass flats are inhabited by the White-winged Fairy-wren *Malurus leucopterus*, Spinifex-bird *Eremiornis carteri* and the Striated Grass-wren *Amytornis striatus*, the latter being a scarce bird throughout the Pilbara region.

The list includes many nomads such as the Crimson Chat *Epthianura tricolor* and Masked Woodswallow *Artamus personatus* which wander over most of the Pilbara and Kimberley in search of flowering trees and shrubs. The Fork-tailed Swift *Apus pacificus* is a non-breeding summer visitor from the Palaearctic; and the Pallid Cuckoo *Cuculus pallidus* and Grey Fantail *Rhipidura fuliginosa* are non-breeding visitors from Southern Australia. Populations of some resident species, e.g. the Rainbow Bee-eater *Merops ornatus*, Willie Wagtail *Rhipidura leucophrys* and Magpie-lark *Grallina cyanoleuca*, are augmented by winter visitors from the south.

The 133 species recorded within Hamersley Range National Park can be compared with the 121 species recorded for the Edgar Ranges Reserve (south-west Kimberley); 128 for Drysdale River National Park (north Kimberley); 219 for the Mitchell Plateau area (north-west Kimberley); and 146 for the Cockleshell Gully Reserve (south-west Western Australia). Although the Mitchell Plateau area and the Cockleshell Gully Reserve both include coastal habitats and contain many seabirds, their faunas are still considerably larger than the Hamersley Range National Park.

The small mammals of the Eastern Pilbara and the Hamersley Range National Park

*J N Dunlop & **Maryanne Sawle

Smithopsis macroura A.G. Wells

Introduction

In the mid and late nineteen fifties, whilst conducting research on the biology of the Euro *Macropus robustus* at Woodstock and adjoining stations, W.H.M. Ealey carried out the first concerted collection of mammals in the eastern Pilbara. This worker contributed many of the earliest specimens of the region's characteristic small mammals including *Antechinus rosamondae* (Ride 1964) *Ningaui timealeyi* (Archer 1975) and *Pseudomys chapmani* (Kitchener 1980). Although originally collected in 1936, *A. rosamondae* was not recognised as a distinct species until 1964. Similarly the earliest specimen of *N. timealeyi* was taken in 1962 (Kitchener & Vicker 1981) but not described until 1975 and the original collection of *P. chapmani* was in 1956 but the species was not described until 1980. Much of the recent growth in knowledge of small mammals in the Pilbara has come as the result of biological surveys associated with environmental studies accompanying mineral exploration.

Faunistic surveys began at Marandoo (Figure 2) in 1975 and similar studies were conducted in three other mineral exploration localities (denoted as areas 4, 5 and 6 on Figure 2) between March 1979 and March 1981. In May 1980, a privately organised survey, partially supported by several mining companies, was conducted in the Hamersley Range National Park. Trapping was conducted in three areas surrounding survey base camps. These were Mt Bruce (location 1, Figure 2) 11 km south-east of Mindi Spring (location 2) and Coppin Pool (location 3). This paper presents the results of small mammal surveys conducted by the senior author between March 1979 and March 1981 at 6 localities in the eastern Pilbara, including the 3 sites within the Hamersley Range National Park. Some incidental records from other localities in the area are also presented.

Methods

Small ground-living mammals were surveyed at all six study areas using pitfall/drift traplines. These consisted of 10-12 lined pits (0.18 m diameter × 0.43 m deep) placed at 4 m intervals along, and on alternate sides of 35-50 m of flywire fence, 0.15 m high. Thus each pit had a minimal catching area of about 12 m of drift fence. During the study period trapping efforts using this technique totalled 6333 pit trap days with some sampling in all months except January, February and August. For details of the habitat coverage of pitfall and drift trapping see Table 2 in Dunlop & Sawle (in press). Earlier investigations with Elliott box traps had shown these to be ineffective in catching small mammals in the study area. Thereafter box traps were only used to supplement pitfall and drift trapping and were normally used in rocky habitats where pits could not be dug.

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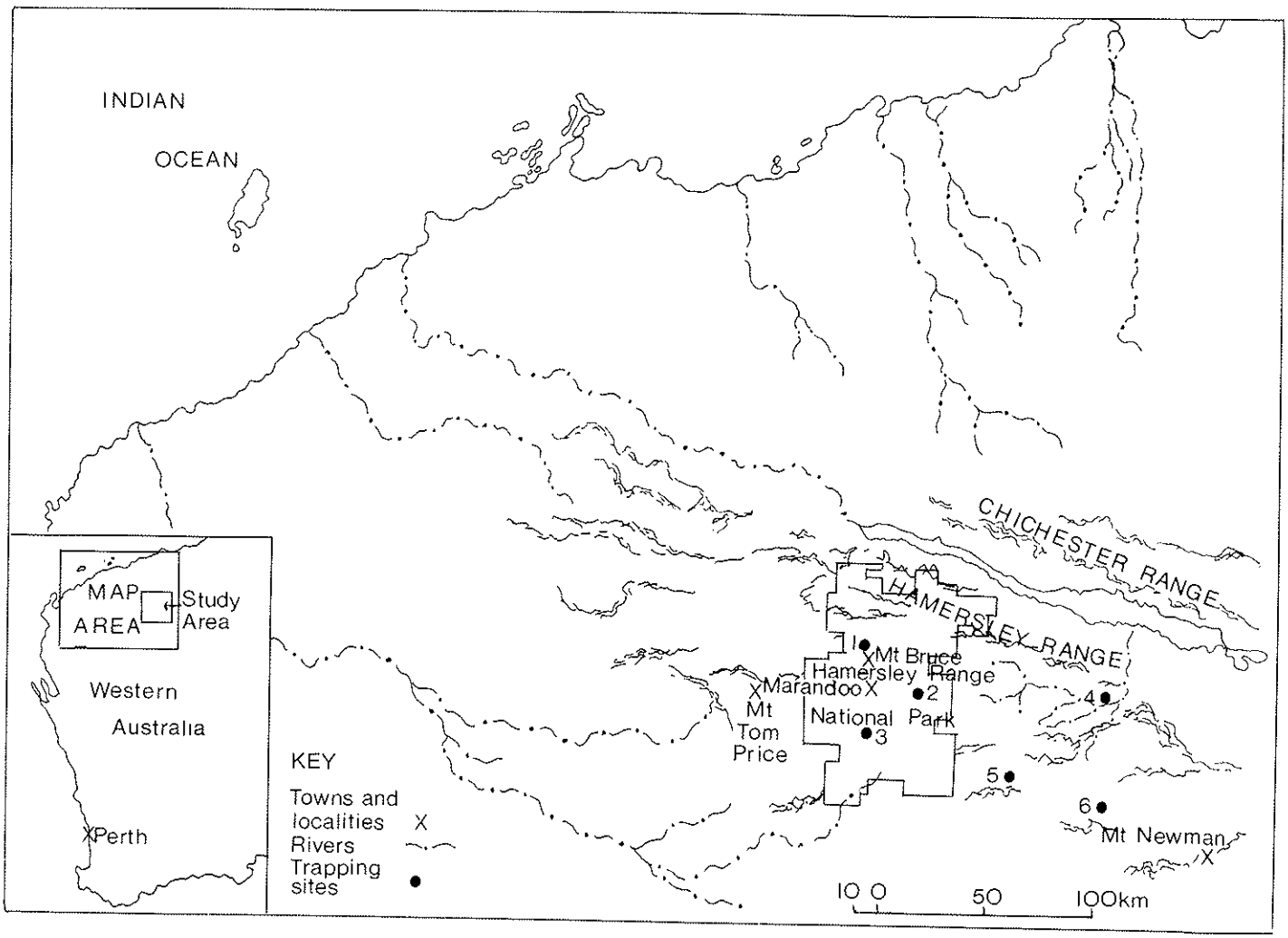


Figure 2
Map of the Eastern Pilbara showing the six localities at which small mammals were surveyed.

A limited amount of cage and break-back trapping was also conducted during the survey. Spotlight traverses were also carried out in all localities. Only a small proportion of the small ground living mammals captured were collected; the majority were marked for subsequent recognition by toe-clipping and released. All animals handled were examined for evidence of reproduction and selected measurements were taken, including weight, scrotum width (marsupials), and tail base diameter *Sminthopsis macroura, Zyzomys argurus.*

Bats were captured in mist nets (12.3 m × 2.8 m; 3.1 cm mesh) set over pools of water in creek channels and across apparent flyways in fringing woodland and forest. Small numbers were also shot at night with the aid of a spotlight and some cave bats were collected by hand.

As in the ground living mammals, most of the bats captured were released alive after being ringed on the forearm with CSIRO metal bat or bird bands for subsequent recognition. The sex, weight, forearm length and reproductive condition of each bat captured was recorded. Female specimens were dissected for breeding information. The crown-rump lengths (CRL) of any foetuses were measured.

The habitats in which small mammals were trapped were recorded. Vegetation structure was described using the life-form/density classes of Muir (1977) and this notation is used throughout.

Annotated list

Antechinus rosamondae
Little Red Antechinus

Twenty *A. rosamondae* (13 males, 7 females) were pitfall trapped during the survey period including captures from five localities (1, 3, 4, 5, 6). Trapping results indicated a preference for hummock grassland habitats with an upper stratum of sparse shrub-mallee and/or of open *Acacia* scrub. These habitats occurred most frequently on the lower slopes of hills and ridges. The species was not captured in the Mulga *Acacia aneura* woodland of the valley floors and was scarce on the ridges. It may be replaced in the rocky habitats by *Antechinus macdonnellensis*. No *A. rosamondae* were trapped during the summer (i.e. December). According to P. Woolley (pers. comm.) mating takes place in November and the males die shortly afterwards. Male mortality, and decreased activity in the breeding females, may explain the absence of captures during this period. In good seasons, growth was rapid and many animals quickly reached adult weight. Specimens collected in May at location 3 had attained 40.7g and 38.9g. However, their small scrotal size and absence of sternal glands indicated that they were immature. Several males captured in September had developed sternal glands.

Antechinus macdonnellensis
Red-eared Antechinus

One female was captured in an Elliott trap at location 6. The trap was set on the wall of a rocky gully dissecting a low hill vegetated with open hummock grass. This species is probably common on the hills and ridges of the eastern Pilbara although rarely trapped.

Ningaui timealeyi
Pilbara Ningaui

During the survey period, 156 *N. timealeyi* were captured. The habitat preferences and life history of this common species have been described in some detail (Dunlop & Sawle, in press). Pilbara ningauis occur in a wide range of hummock grassland habitats. However a preference exists for hummock grassland with an upper stratum of open mallee or scrub. Breeding takes place over the spring and summer months with pouch young present from September to about February. The species is short-lived with few, if any, adults surviving into a second breeding period.

Planigale maculata
Giant Planigale

Three giant planigales were pit-trapped, two males at location 5 and one female at location 4. These animals were captured in open scrub mallee and scrub over mid-dense hummock grass on lower scree slopes and in open scrub over dense hummock grass on a loamy wash plain. At Marandoo (C. Dawe pers. comm.) specimens have been collected from open scrub over mid-dense hummock grass on both ridge tops and lower slopes. Thus this animal, although naturally scarce, appears to inhabit a wide range of rocky and loamy hummock grassland habitats.

Planigale ingrami
Ingram's Planigale

One adult female was collected from dense, low bunch-grassland on cracking clay (crab-hole country) at location 6. This was the first specimen of this species collected from the Pilbara district. Significantly, this planigale is also associated with cracking soil substrates in the Kimberley district (G. Barron pers. comm.)

Sminthopsis macroura
Larapinta

Fifteen males and ten females were trapped during the survey, including captures from locations 1, 4, 5 and 6. The species has been captured in dense and mid-dense hummock grassland including habitats with upper strata of open shrub mallee, open scrub and scrub. It has also been trapped in mulga woodland and in some dense low bunch-grassland. Animals from the bunch-grassland habitat weighed from 10.2 to 17.2 g and had tail-based diameters of 6.5 to 8.8 mm. Those from all other habitats, including a number captured at the same time, were noticeably smaller and in poorer condition (weight 7.4-11.6 g, tail base diameter 3.5-7.00 mm). This may suggest that the bunch grassland constitutes an optimal habitat for this species in the study area and that the other areas in which it has been trapped are marginal habitats.

Sminthopsis ooldea
Ooldea Dunnart

A male and female were collected from Mulga scrub and open mallee over mid-dense hummock grass at location 5. At location 6, one male and two females were collected from mulga low woodland over open herbs and hummock grass, and a single female was trapped in open tree mallee over mixed *Acacia spp.* scrub over mid-dense hummock grass. The trapping results suggest that, at least in the study area, *S. ooldea* is an inhabitant of mulga and associated *Acacia* dominated scrub and woodland. The northern limit of this species may be the mulga line (Beard 1975) which intrudes into the south-eastern Hamersley Range near locations 5 and 6. Ooldea dunnarts have not been trapped at Marandoo (C. Dawe pers. comm.) or elsewhere in the national park, suggesting that the animal may be absent from the Hamersley plateau. Two females collected in March 1981 had well developed pouches and distended mammae indicating breeding in late summer.

Notomys alexis
Spinifex Hopping Mouse

A male was collected by hand in February 1981 at location 4. It was taken from a loamy wash plain vegetated with mid-dense hummock grass. Location 4 lies on the

edge of the Hamersley plateau and the valley habitats of the area are continuous with those of the Fortescue basin. Spinifex Hopping mice are probably absent from the essentially rocky habitats of the central plateau.

Mus musculus
House Mouse

During the survey period, 127 house mice were pitfall and box trapped in locations 1, 4, 5 and 6. Although normally scarce, this rodent, together with the Sandy Inland Mouse, was abundent after good seasons. In September 1980 at location 4, thirteen house mice were pitfall trapped per 100 trap-days. Numbers later subsided to the more normal levels of two per 100 trap-days in December and 1.8 per 100 trap-days in March. When numbers were high, house mice were trapped in all habitats sampled. However, when numbers were low, house mice were captured only in areas with friable substrates, including hummock grassland, bunch-grassland, low woodland and scrub. Burrows may be vital for the survival of house mice during harsh periods.

Pseudomys chapmani
Pebble-mound Mouse

Fifteen pebble mound mice were captured from locations 2, 4 and 5. The mounds or stone nests constructed by this rodent (Dunlop and Pound 1981) were observed at all the trapping locations and also on the slopes of Mt Stevenson and Mt Trevarton within the National Park. All animals were pitfall trapped on, or immediately adjacent to, scree slopes vegetated with mid-dense hummock grass with sparse emergent low shrubs, scrub, mallees or trees. The greatest densities of pebble mounds were observed on these scree slopes with smaller numbers present on the tops of the ridges.

A gravid female was trapped on May 19, 1980 at location 2 in the National Park. A litter of four young was born in captivity 5 days later (Dunlop & Pound 1981). Two young were trapped at location 5 during June.

Pseudomys hermannsburgensis
Sandy Inland Mouse

During the survey period 62 were captured from locations 1, 3, 4, 5 and 6. Numbers fluctuated, often in synchrony with *Mus musculus*. The habitat relationships of this species also appear to be similar to those of the introduced house mouse.

Zyzomys argurus
Common Rock Rat

Sixteen Rock Rats were captured during the survey from locations 1, 5 and 6. Those from location 5 and 6 were caught using Elliott and break-back traps in rocky gullies on low hills vegetated low open scrub A over mid-dense hummock grass. A single male collected from location 1 was caught by hand in open hummock grass on a regenerating mine scree pit. Among 14 animals trapped at location 6 in March 1981 were two gravid females and two others with distended mammae.

Chalinolobus gouldii
Gould's Wattled Bat

During the survey period 75 *C. gouldii* (23 males and 52 females) were handled, with specimens from locations 4, 5 and 6. Most of these were mist-netted over pools in creek beds fringed with *Eucalyptus coolibah* or *E. camaldulensis* woodland (4) or Mulga low woodland (6). A few were shot at night whilst flying along water courses or over other open areas. The species was apparently not active during the National Park survey in May 1980.

Lactating adult females were captured at location 4 in mid-September 1980. However, none of the females collected at this time had young *in utero*. Three adult females collected in December 1980 had involuted uterine horns. These observations suggest that the birth period in the areas during 1980 was in August or early September.

Eptesicus pumilis
Little Cave Eptesicus

This species was captured both in caves (7 males and 17 females) and in mist-nets set over pools in creek channels (9 males and 6 females), (habitat as for *C. gouldii*). Specimens were collected from localities 1, 4, 5 and 6 and from Yampire Gorge in the National Park. A maternity colony consisting predominantly of adult females, with a few adult males and free flying juveniles, was observed in an adit at location 6 in March 1981. A cluster from the roof of a cave at Marandoo was also made up predominantly of adult females. However the sex ratios of *Eptesicus* captured over water were not biased.

Nyctecieus greyi
Little Broad-nosed Bat

Eleven male and 23 female Little Broad-nosed Bats were mist-netted over pools in creek channels at locations 4 and 5. At location 4, the creeks were fringed with *Eucalyptus camaldulensis* woodland or with *Melaleuca leucodendron* forest. The pool over which the bats were captured at location 6 was in a channel meandering through mulga *Acacia aneura* low woodland.

One female collected in mid-December 1980 had twin young *in utero* (crown rump lengths 17.0 and 15.2 mm). Two other females examined at this time were lactating. A juvenile was mist-netted in early March 1981. These observations indicate that the birth period commences around the beginning of December.

Nyctophilus geoffroyi
Lesser Long-eared Bat

One was mist-netted at Weeli Wolli Springs (location 4) on 14 December 1980. It was captured over a pool in *Melaleuca leucodendron* forest.

Nyctophilus bifax
Queensland Long-eared Bat

One specimen was captured with a *N. geoffroyi* at Weeli Wolli Springs.

Tadarida australis
White-striped Mastiff Bat

One specimen was mist-netted over a pool in a narrow creek channel lined with *Eucalyptus coolibah* and *Acacia citrinoviridis* at location 2 in the National Park.

Tadarida cf *beccarii*
Beccarii's Mastiff Bat

Thirty-three males and 25 females were captured from locations 2, 3, 4 and 6. At location 5 *T.* cf *beccarii* remains were identified from a Ghost bat *Macroderma gigas* scat-midden (A. Baynes) pers. comm.) This species was mist-netted over pools of water in creek channels fringed with *Eucalyptus* woodland, *Melaleuca* forest and mulga low woodland. It was also shot over open hummock grassland. Three apparently gravid females were recorded amongst bats captured in December 1981.

Tadarida jobensis
Northern Mastiff Bat

One female was captured at location 2 in the National Park and 16 individuals were trapped at location 4. All the Northern Mastiff Bats were mist-netted over pools of water in creek channels lined with *Eucalyptus* woodland.

Taphazous flaviventris
White-bellied Sheath-tailed Bat

A female was shot over a bulk sample cutting at Marandoo in May 1980. At location 4, a male was shot whilst flying down a creek channel and 2 males and 2 females were mist-netted in fringing *Eucalyptus camaldulensis-Melaleuca leucadendron* woodland. This large bat was frequently observed in flight.

Taphazous georgianus
Common Sheath-tailed Bat

In May 1980, two females were collected from a rock shelter at Marandoo, and one female from a similar site in Yampire Gorge. At location 6 during March 1981, 9 adult females, 2 adult males and 4 juveniles were mist-netted at the mouth of an adit. Of the 9 females captured, 6 were lactating, one was mist-netted with suckling juvenile still attached, and at least one other possessed a well developed foetus. Evidently the adit was being used as a maternity site. No *T. hilli* were recorded from the adit.

Taphazous hilli
Western Sheath-tailed Bat

One *T. hilli* was collected from a rock shelter at Marandoo along with a specimen of *T. georgianus*. At location 5 a total of about 30 *T. hilli* were mist-netted at the mouth of a deep ascending cave. When the cave was netted in October, 14 females and 1 male were captured. Pregnant females were collected from this site in October (foetal crown rump length 10.3 mm) and December (foetal crown rump length 30.7 mm). Young were observed clinging to the roof of the cave during December. No *T. georgianus* were recorded from this cave.

Both *T. georgianus* and *T. hilli* form maternity colonies in deep, humid caves in the area. During the breeding period at least, these colonies consist predominantly of adult females and juveniles. Although both species are frequently recorded together in the smaller refuges, maternity sites may be exclusive.

Macroderma gigas
Ghost Bat

Ghost bats were recorded from caves and mine adits at localities 5 and 6 and in the gorges in the northern part of the National Park. The only maternity sites observed were in two deep caves within locality 5. These sites were characterised by deep middens (deposits of scats and prey remains) in the most humid, upper cave chambers. An adult female was mist-netted at the mouth of one of these caves in July 1979. It was one of several present in the cave at the time.

Discussion

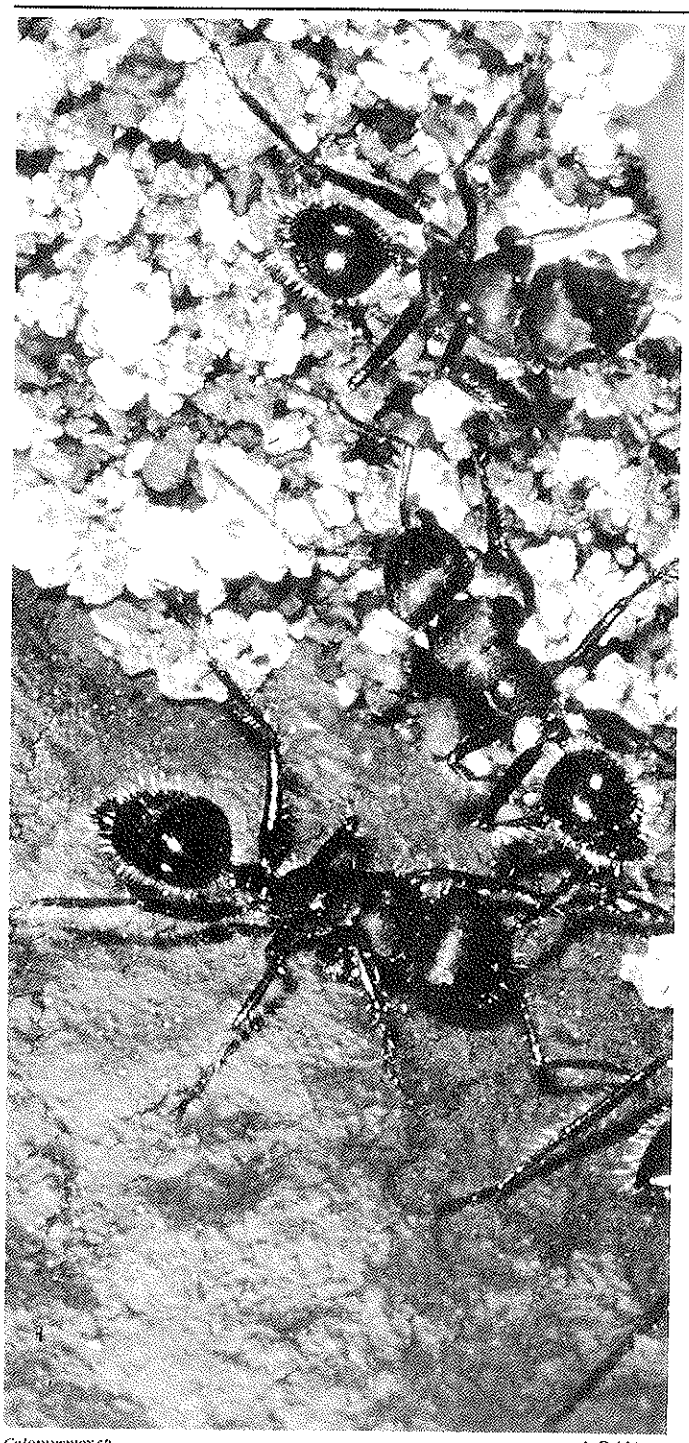
Faunistic surveys of the Marandoo area (Kitchener & Vicker 1981) and of other areas within the reserve have shown that at least 20 small mammal species are present within the Park. Included among these are 3 species which are more or less restricted to the Pilbara region, the Little Red Antechinus *Antechinus rosamondae* Pilbara Ningaui *Ningaui timealeyi* and Pebble-mound Mouse *Pseudomys chapmani*.

Four small mammals have recently been collected from areas adjacent to the reserve but have not been recorded from the park; these are the Red-eared Antechinus *Antechinus macdonnellensis*, Ingram's Planigale *Planigale ingrami*, Ooldea Dunnart *Sminthopsis ooldea* and Spinifex Hopping Mouse *Notomys alexis*. Populations of the Red-eared Antechinus almost certainly occur within the park boundaries. The habitats of *Sminthopsis ooldea* and *Planigale ingrami* are not well represented in the reserve and these species may be absent. The extension of park boundaries to include Mt Meharry, as proposed by the Conservation Through Reserves Committee (1978), would add significant areas of these habitats to the reserve. The distribution of *Notomys alexis* is unlikely to extend into the Hamersley Ranges.

Although knowledge of the small mammals of the eastern Pilbara is now fairly comprehensive, little is known about those of intermediate size. This group has suffered the most serious depredations in modern times. Species such as the Santenellus *Dasyurus hallacatus*, Mulgara *Dasycercus cristicauda* and Bilby *Macrotis lagotis* have all previously been recorded from the region but are rarely sighted today. Future mammal surveys in the area should be directed towards determining the distribution and status of these animals to enable effective conservation measures to be taken.

A Report on the ant (Hymenoptera: Formicidae) Fauna of the Hamersley Range National Park and the nearby West Angelas area

*J D Majer



Calomyrmex sp. A.G. Wells

Introduction

Ants, a numerically and ecologically important component of the fauna in arid Australia, were sampled and collected during May 1980, by various members of the Hamersley Range National Park survey team as a side-line activity to their main duties. A more intensive survey of the West Angelas area, about 20 km south-east of the eastern Park boundary, had been carried out in December 1979 as part of an environmental survey for that region. In contrast to the Park survey, the West Angelas ant samples were standardised at each collecting site in order to facilitate inter-site fauna comparison. For this reason, and also because the West Angelas ants almost certainly occur within the Park, both sets of data are presented here.

Collecting sites and methods

Seven 30 × 10 m plots were selected in the Park for pitfall trap sampling (Table 3). They represented six recognisable vegetation types the details being assessed by eye from 400 m² quadrats.

In mid-May 1980, pitfall traps, consisting of Pyrex test tubes, were sunk vertically at ground level. Each tube was 15 cm long, had an internal diameter of 1.8 cm and contained a 5 ml mixture of alcohol/glycerol (70/30 v/v). The number of tubes set and days of trapping are shown on Table 4.

During the course of routine entomological collecting and sampling at four sites during May 1980 (around Marandoo Camp, Mt Bruce, Coppin Pool and Hancock Gorge, Table 3) various ants were collected. These were extracted from the general entomological collections by Dr T. Houston and sent to the author for identification.

Eight 100 × 100 m plots were marked out in the West Angelas area in early December 1979. Plots represented three broad vegetation types as indicated in Table 3. Epigaeic ants were obtained by setting out twenty-five pitfall traps (same type as in Park survey) on 7-8 December 1979. Tubes were lifted on 12 December 1979 after their contents were flooded by heavy rains. A second set of five 5 cm diameter pitfall traps were run between 18 and 20 December 1979 during a relatively dry spell. Pitfall trap collections were augmented by hand collections within each plot. These collections involved detailed searches of the soil, ground surface, shrubs and trees and also the use of sweep and beat nets on the vegetation. Hand collections were carried out for three man-hours per plot during the daytime and one man-hour at night.

A summary of the sampling periods and intensities is given in Table 4.

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Table 3.
Summary of ant collecting and sampling sites.

Plot	Vegetation Type		Locality	Latitude & Longitude
Hamersley Range National Park				
03	*Plectrachne* hummock-grassland		–	22°36'S, 118°06'E
20	*Triodia wiseana* hummock-grassland		–	22°35'S, 118°08'E
05	*T. wiseana* hummock-grassland		–	22°34'S, 118°05'E
34	*T. wiseana/T. longiceps* hummock-grassland		–	22°48'S, 118°21'E
33	*T. longiceps* hummock-grassland		–	22°48'S, 118°20'E
35	*T. basedowii* hummock-grassland		–	22°48'S, 118°21'E
19	*Acacia aneura* low-woodland		–	22°35'S, 118°09'E
A		–	Marandoo Camp	22°38'S, 118°06'E
B		–	Mt Bruce	22°36'S, 118°08'E
C		–	Coppin Pool	22°52'S, 118°08'E
D		–	Hancock Gorge	22°21'S, 118°16'E
West Angelas Area				
A1	*T. wiseana* hummock-grassland		–	23°11'S, 118°47'E
A3	*T. wiseana* hummock-grassland		–	23°11'S, 118°47'E
A4	*T. basedowii* hummock-grassland		–	23°11'S, 118°47'E
A5	*T. basedowii* hummock-grassland		–	23°11'S, 118°47'E
A2	*Acacia aneura*	substrate a	–	23°11'S, 118°47'E
A6	low woodland	substrate b	–	23°11'S, 118°47'E
A7	overlying:	substrate c	–	23°11'S, 118°45'E
A8		substrate c	–	23°11'S, 118°45'E

Table 4.
Summary of ant sampling methods and intensities performed at the various sites (site codes are given in Table 3).

Plot	No. of pitfall traps set	Trap days	Man-hours of hand collecting
Hamersley Range National Park			
03	10	60	0
20	10	70	0
05	10	60	0
34	14	42	0
33	11	33	0
35	11	33	0
19	10	70	0
A	0	0	Several
B	0	0	Several
C	0	0	Several
D	0	0	Several
West Angelas Area			
A1	25 + 5	140	4
A3	25 + 5	140	4
A4	25 + 5	140	4
A5	25 + 5	140	4
A2	25 + 5	140	4
A6	25 + 5	140	4
A7	25 + 5	140	4
A8	25 + 5	140	4

Housing and Identification of Specimens

The collections and samples were sorted by hand to species level in the laboratory. Because the taxonomy of Australian ants is not well known, specimens which could not be identified to species level were given code numbers. Australian National Insect Collection (ANIC) codes were assigned to species which had been compared with voucher specimens in the ANIC. The remaining ants were given my J.D.M. codes corresponding to the Western Australian Institute of Technology (W.A.I.T.) reference collection. These specimens will ultimately be coded with ANIC numbers when adequate series are collected to enable comparisons with voucher specimens.

Some of the species names given in this paper apply only in a very broad sense and identify what are often species complexes. Therefore voucher specimens from this survey are retained at the W.A.I.T. for subsequent study. In addition, the ants collected from areas A, B, C and D (Table 3) are named and housed at the Western Australian Museum.

Results

The species of ants which were found in each plot or collecting area are shown in Table 5. This Table also shows the number of species obtained from each plot or area and also the frequency of occurrence of each species out of a maximum of 20 collecting units. Forty-two species of ants were found within the Park and 57 in the West Angelas area. The cumulative species count was 73 and represented 23 genera from 6 sub-families. This compares with 145 species and 24 genera at Kunnoth Paddock, N.T. (Greenslade, 1978) and 73 species from 25 genera at Wagerup, W.A. (Majer, 1980). On the basis of species obtained per unit collecting effort curves, these authors estimated species richness values of 200 and 125 for the respective localities. It is not possible to treat the data from this survey in a similar fashion in view of the lack of uniform collecting effort. However, had a greater range of vegetation types been sampled and more intensive collecting been performed, the species total would probably approach that predicted for Kunnoth Paddock.

All 26 species with J.D.M. codes numbering 459 onwards have not been collected before by this author. The ants of the Pilbara have not been extensively collected so it is not possible to say whether species are definitely localised in their distribution pattern. However, extensive collections by the author in the south-west of Western Australia have shown that ant faunas change over relatively short distances and that many species are confined to localised areas. Thus at least some of the species from this survey are likely to be of localised distribution.

Twenty-nine of the ants from this survey have already been collected by the author in the South-West Province of Gardner (see Gardner & Bennets, 1956), 16 in the Northern Province and 11 in the Eremean Province. This information alone should not be used as a measure of affinity between faunas of these Provinces as the intensity of collecting varies.

The composition of genera in the collection gives further information on faunal affinities. In common with the Kunnoth Paddock fauna, the ants in this survey are characterised by a relatively low number of genera and a prevalence of species that nest in soil and forage on the surface and on vegetation. This indicates that the ant fauna of this part of the Pilbara has much of its origin in southern Australia; a tropical fauna would contain many more genera and there would be a much greater vertical segregation of foraging activity (Greenslade, 1978). The prevalence of species of the genera *Camponotus* and *Iridomyrmex* is also indicative of southern arid faunas. Some species which have their origins in the northern tropics are also present; these include *Leptogenys, Odontomachus, Opisthopsis, Polyrachis* (Greenslade, 1979) and possibly *Platythyrea*. In summary then, the ant fauna from this survey is most characteristic of arid southern-Australia although a few tropical elements are also present.

The standardised sampling performed within the West Angelas plots enabled the influence of vegetation types on ant faunal composition to be looked at. Plots were compared in terms of their ant species composition by Mountford's similarity index (Southwood, 1966). A matrix of indices of similarity between sites was constructed using the following formula:

$$I = 2j/[2ab - (a + b)j]$$

where a is the number of species in site A, b is the number for site B and j is the number of species common to both sites. The pair of sites with greatest similarity was grouped, and the indices of similarity between this group and the remaining sites calculated. The process was repeated until all sites were combined so that a dendrogram could be produced which classified the areas in terms of their species similarity.

The resulting dendrogram is shown in Figure 3. Two sub-groups are apparent, the Hummock-Grassland group and that of the Low-Woodland sites. Low-Woodland overlying substrate **a** is included in the former group however. The dendrogram suggests that Low-Woodland overlying substrate **a** supports an ant fauna which is transitional between Hummock-Grassland and Low-Woodland. It is noteworthy that this plot supports slightly more ant species than any of the other plots (Table 5) which further suggests that it is a transitional habitat. The faunas of the *T. basedowii* and *T. wiseana* Hummock-Grasslands do not appear to be distinct from each other. Low-Woodlands over substrates **b** and **c** also do not appear to have detectably different ant faunas.

Vegetation type or area name	*Plectrachne* H.G.*	*Triodia wiseana* H.G.	*Triodia wiseana* H.G.	*Triodia wiseana*/ *T. longiceps* H.G.	*Triodia longiceps* H.G.	*Triodia basedowii* H.G.	*Acacia aneura* LW.*	Marandoo Camp locality	Mt Bruce locality	Coppin Pool locality	Hancock Gorge locality	*Triodia wiseana* H.G.		*Triodia basedowii* H.G.		*Acacia aneura* LW. overlying substrate specified				Misc. sites	Frequency
																a	b	c	c		
Plot code	03	20	05	34	33	35	19	A	B	C	D	A1	A3	A4	A5	A2	A6	A7	A8	--	
Hamersley Range National Park												West Angelas Area									
Myrmeciinae																					
Myrmecia sp. JDM 259								•	•	•											3
Ponerinae																					
Leptogenys sp. JDM 88																		•	•		2
Brachyponera lutea														•				•			2
Rhytidoponera inornata		•			•		•										•				4
Rhytidoponera sp. JDM 65				•	•		•	•				•	•	•	•	•	•	•	•	•	13
Rhytidoponera sp. JDM 248	•		•	•		•	•	•				•			•	•				•	10
Rhytidoponera sp. JDM 459																				•	1
Odontomachus sp. JDM 124								•			•										2
Platythyrea sp. JDM 460													•				•				2
Pseudomyrmecinae																					
Tetraponera sp. JDM 511									•												1
Myrmicinae																					
Monomorium sp. 1 (ANIC)		•	•	•	•	•	•					•	•			•		•		•	11
Monomorium sp. 2 (ANIC)	•		•	•								•	•	•			•			•	8
Monomorium sp. 3 (ANIC)		•																			1
Pheidole latigena				•			•														2
Podomyrma sp. JDM 512									•												1
Tetramorium sp. JDM 142		•	•	•	•	•		•				•	•				•	•		•	11
Tetramorium sp. JDM 461												•									1
Crematogaster sp. JDM 33																			•		1
Meranoplus rugosa															•			•		•	3
Meranoplus sp. 12 (ANIC)																•	•				2
Meranoplus sp. 13 (ANIC)		•	•																		2
Meranoplus sp. JDM 462															•						1
Dolichoderinae																					
Tapinoma sp. JDM 134	•												•						•		3
Iridomyrmex conifer																	•		•		2
I. purpureus				•	•			•	•	•										•	6
I. sp. 19 (ANIC)																	•	•	•		3
I. sp. JDM 9														•		•					2
I. sp. JDM 132				•											•						2
I. sp. JDM 133															•		•				2
I. sp. JDM 217	•	•	•	•	•	•															6
I. sp. JDM 311						•						•		•	•	•	•	•			7
I. sp. JDM 313		•						•								•	•			•	5
I. sp. JDM 351		•	•	•	•		•					•									6
I. sp. JDM 463		•										•	•			•	•				5
I. sp. JDM 464		•							•	•				•	•					•	6
I. sp. JDM 465												•	•	•		•					4
I. sp. JDM 466										•		•	•	•	•	•	•	•	•	•	10
I. sp. JDM 467		•																•			2
I. sp. JDM 468												•	•	•	•	•	•	•	•	•	9

Table 5
Checklist of ants sampled or collected in the Hamersley Range National Park and West Angelas area. This Table also shows the total species obtained from each area and the frequency of occurrence of each species out of the 20 collection areas.

	Hamersley Range National Park											West Angelas Area									
Vegetation type or area name	*Plectrachne* H.G.*	*Triodia wiseana* H.G.	*Triodia wiseana* H.G.	*Triodia wiseana*/ *T. longiceps* H.G.	*Triodia longiceps* H.G.	*Triodia basedowii* H.G.	*Acacia aneura* LW.*	Marandoo Camp locality	Mt Bruce locality	Coppin Pool locality	Hancock Gorge locality	*Triodia wiseana* H.G.		*Triodia basedowii* H.G.		*Acacia aneura* LW. overlying substrate specified				Misc. sites	Frequency
																a	b	c	c		
Plot code	03	20	05	34	33	35	19	A	B	C	D	A1	A3	A4	A5	A2	A6	A7	A8	–	
Formicinae																					
Camponotus sp. JDM 182											•								•		2
C. sp. JDM 184	•	•	•													•					4
C. sp. JDM 287				•																	1
C. sp. JDM 297								•													1
C. sp. JDM 298										•											1
C. sp. JDM 477													•	•	•						3
C. sp. JDM 478													•							•	2
C. sp. JDM 479											•							•			2
C. sp. JDM 480										•					•						2
C. sp. JDM 481								•										•			2
C. sp. JDM 482				•	•																2
Calomyrmex sp. JDM 190									•												1
C. sp. JDM 252										•	•										2
C. sp. JDM 510											•										1
Opisthopsis sp. JDM 303										•								•			2
Polyrachis sp. JDM 122									•		•					•			•		4
P. sp. JDM 301									•									•			2
Melophorus sp. 1 (ANIC)									•	•											2
M. sp. 3 (ANIC)															•		•		•		3
M. sp. JDM 24												•							•		2
M. sp. JDM 117	•	•	•	•		•	•					•	•			•		•	•	•	12
M. sp. sp. JDM 221																•	•	•	•		4
M. sp. JDM 302										•		•	•	•	•	•			•		7
M. sp. JDM 304												•						•			2
M. sp. JDM 472												•				•	•	•	•	•	6
M. sp. JDM 473																•					1
M. sp. JDM 474												•				•				•	3
Notoncus gilberti													•								1
Prolasius sp. JDM 469															•						1
P. sp. JDM 470																•		•			2
P. sp. JDM 471															•						1
Stigmaeros sp. JDM 188																				•	1
S. sp. JDM 475													•								1
S. sp. JDM 476																	•				1
Number of species from each plot	6	13	9	13	8	6	7	9	9	10	6	18	16	10	16	21	18	20	16	17	

* Hummock-grassland * Low-woodland

Table 5 (continued)

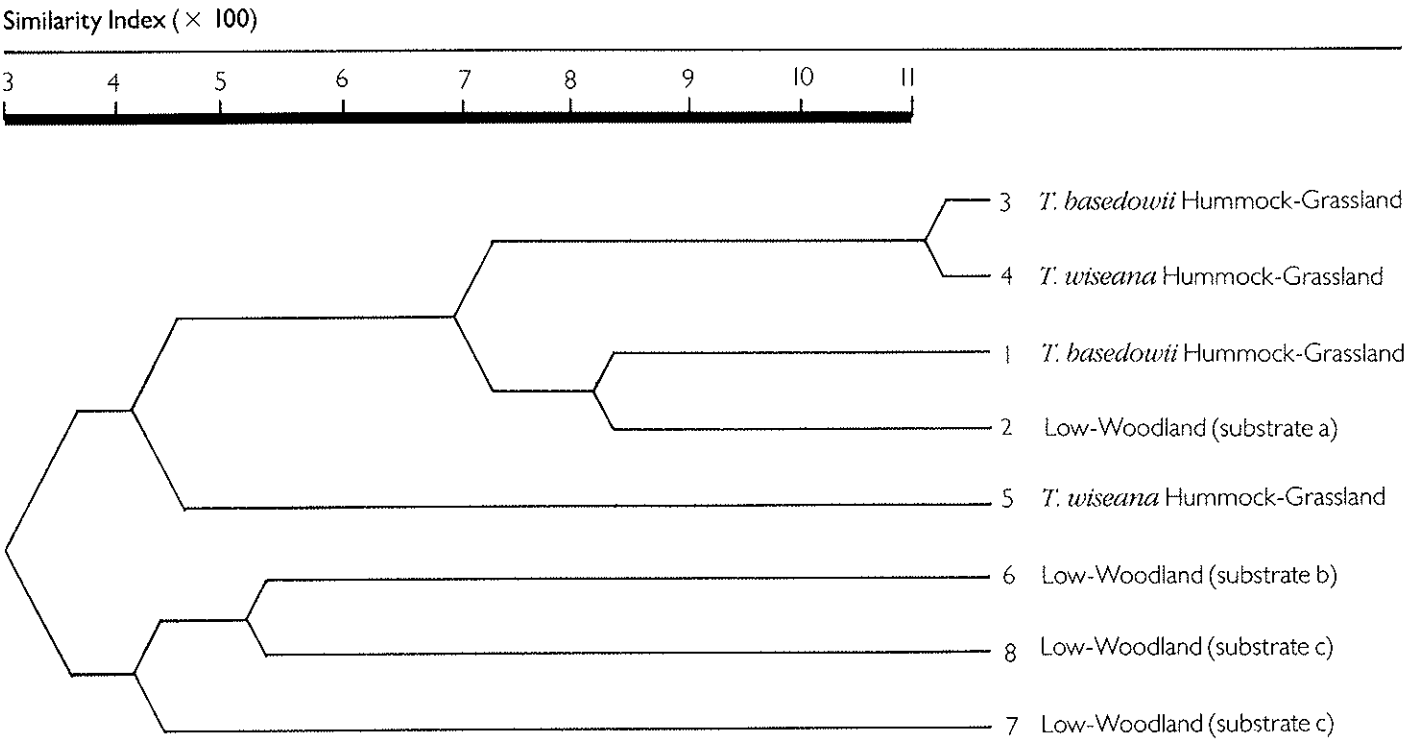

Figure 3.
Classification of the eight West Angelas plots in terms of ant species composition using Mountford's index of similarity.

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