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WILDLIFE OF THE EDGAR RANGES AREA, SOUTH-WEST KIMBERLEY, WESTERN AUSTRALIA

EDITED BY

N. L. McKenzie

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WILDLIFE RESEARCH CENTRE
DEPARTMENT OF FISHERIES AND WILDLIFE
PERTH, WESTERN AUSTRALIA

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Wildl. Res. Bull. West. Aust. 1981, No. **10**, 1-71.

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WILDLIFE OF THE EDGAR RANGES AREA, SOUTH-WEST KIMBERLEY, WESTERN AUSTRALIA.

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ABSTRACT

An area of land centred on the Edgar Ranges in the Kimberley of Western Australia was examined as a potential nature reserve.

Climatically, geographically and geomorphologically the area lies within the interzone between the sub humid North Kimberley and the arid Great Sandy Desert. The wildlife of the area reflects this transition; the 213 plant, 24 mammal, 121 bird, 40 reptile, 6 amphibian and 949 insect species known are a depauperate selection of both Kimberley and desert elements. Annotated check lists of the plants and animals recorded during field surveys of the area are presented and discussed.

The surfaces and biotic communities of the Phanerozoic South-west Kimberley are not adequately represented in existing reserve systems; less than 0.4 per cent of the district is currently included in reserves. Its natural communities are under considerable pressure from an intensive pastoral industry.

A nature reserve totalling 807 000 ha is proposed, one of a series necessary if the variety of wildlife communities typical of the district is to be conserved.

PART I

BACKGROUND

by N. L. McKenzie[1] and K. F. Kenneally[2]

INTRODUCTION

Since 1971 the Department of Fisheries and Wildlife, Western Australia, has organised biological surveys of areas in the Kimberley of Western Australia. The object of this series of surveys (Miles and Burbidge 1975; Kabay and Burbidge 1977; Burbidge and McKenzie 1978) is to improve knowledge of the wildlife of the Kimberley so that a system of conservation reserves can be recommended which will include as complete a cross-section of the wildlife as possible.

In 1976, as a continuation of this survey work, it was decided to shift the emphasis away from the rugged, high rainfall, upland areas of the North Kimberley (comprising the Precambrian Kimberley Basin and Halls Creek Province) and to investigate areas in the lower lying, less rugged, and more arid Phanerozoic South-west Kimberley (Figure 1).

The two main Phanerozoic sedimentary basins represented in the Kimberley are the Canning Basin, which intrudes into its south western corner as the South-west Kimberley, and the Ord Basin of the eastern Kimberley. Kimberley portions of both basins have been subjected to intensive pastoral usage for more than 70 years. Speck (1964) and Speck, Fitzgerald and Perry (1964) describe important vegetational changes caused by overgrazing in the Fitzroy River Basin of the South-west Kimberley. The effect that these changes have had on the native fauna is not known, although in the Ord Basin, Kitchener (1978) documented a marked difference between the suite of mammals occurring as skeletal material in aboriginal sites considered contemporary with first European settlement and the extant mammal fauna of the Ord River area. He suggests that this is due to grazing and burning effects.

Evidence that a similar situation may exist in the Fitzroy River basin is presented by Smith and Johnstone (1977) who have shown that although early bird collectors such as J. P. Rogers, T. H. Bowyer-Bower and J. F. Kilgour recorded the Purple-crowned Wren (*Malurus coronatus*) and Buff-sided Robin (*Poecilodryas superciliosa*) as common along the Ord and Fitzroy drainage systems at the beginning of the century, today they are rare. They attribute this decline in numbers and area of distribution to the destruction of riverine habitat caused by the activities of the pastoral industry.

The site chosen for the 1976 survey was a large area (more than 1 000 000 ha) of vacant Crown Land on the far south-western margin of the Kimberley. It includes the Edgar Ranges (Fig. 2, inside rear cover), an outlying scarp of the Fitzroy Trough surrounded by sand dune and sandplain country. Watercourses running northward from the foot of the scarp constitute the headwaters of Geegully Creek, a tributary of the Fitzroy River. The ranges were named in 1887 by the surveyor G. W. Leeming and in April 1897 were traversed by L. A.

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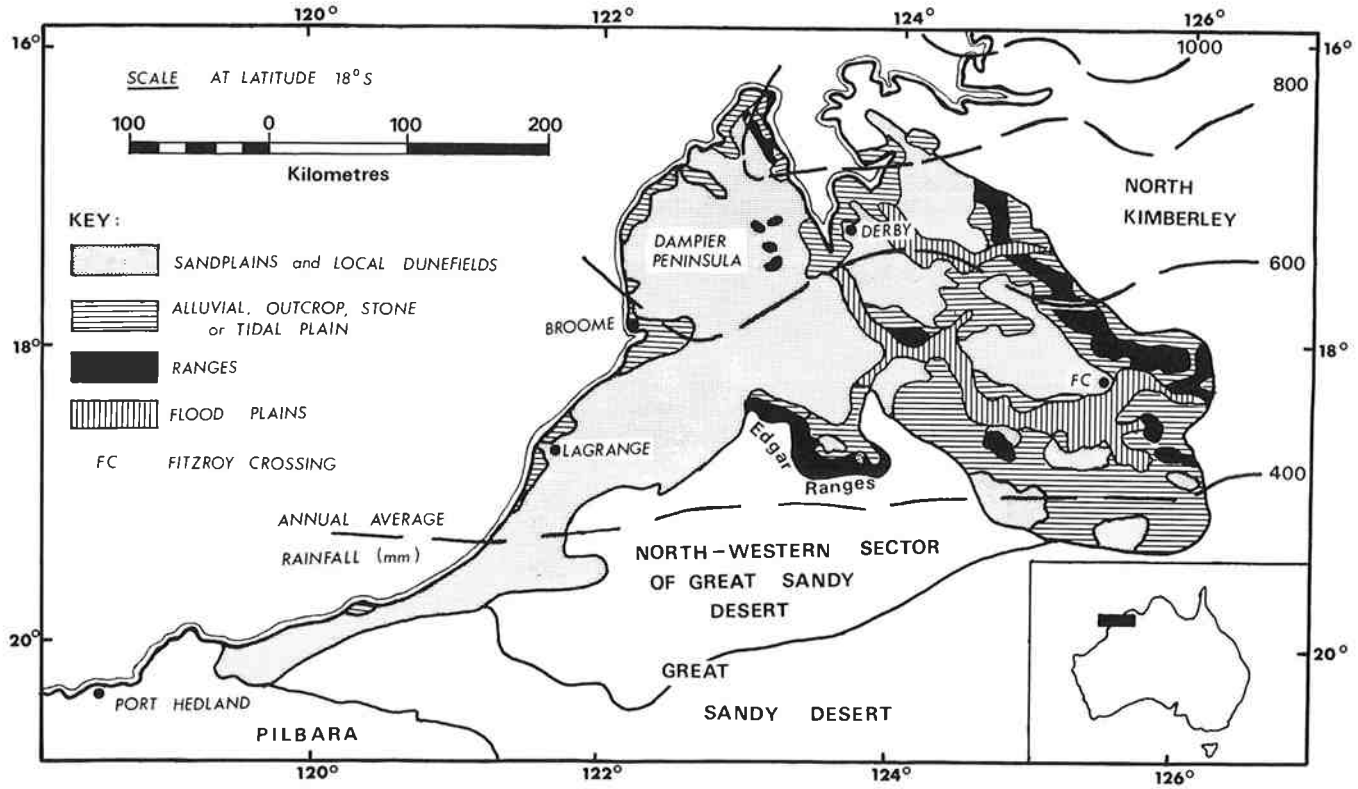

FIGURE 1: Geomorphological surfaces of the Phanerozoic South-west Kimberley—adapted from the land system map accompanying Speck *et al.*, (1964). The southern boundaries of the South-west Kimberley and the north-western sector of the Great Sandy Desert were drawn from Beard (1967) and Beard (1974) respectively.

Wells and the naturalist G. A. Keartland in search of survivors of their ill-fated Calvert Scientific Expedition across the Great Sandy Desert. J. P. Rogers collected birds in the area in 1911 and Dr E. Mjöberg's Swedish Scientific Expedition visited the Edgar Ranges in 1910, again mainly collecting birds (Söderberg 1918).

Although the pastoral value of both the ranges and the surrounding sandplain and sand dune country is poor (Speck and Lazarides 1964) three pastoral stations (Fig. 2) were "taken up" nearby. All are adjacent to the foot of the scarp where areas of alluvial soil occur and water is available throughout the year both from bores and from a few permanent spring-fed pools. The earliest of these stations "Ardjorie", was taken up by William Henry Logue on 8 February 1908 and by 1910 comprised four leases totalling 47 413 ha, all within the boundaries of the current Ardjorie Pastoral Station (135 910 ha). The Mjöberg Expedition worked on William Henry Logue's property which they referred to as "Mowla Downs". The leases owned by Logue between 1908 and 1920 are all included in Ardjorie Station. In 1954 Dampier Downs Station began operations and in 1959 its eastern end was excised as Mowla Bluff Station. Ardjorie Station was forfeited to the Crown for non-payment of rent in August 1976. It is only marginally viable as a pastoral station and has been cancelled or surrendered to the Crown on three previous occasions. In fact, the lease has lain vacant for 33 years of the 69 years it has existed.

In 1977 the Conservation Through Reserves Committee of the Environmental Protection Authority, Western Australia, recommended (C.T.R.C. 1977, p. 37) that after compilation of the data collected during the biological surveys coordinated by the Department of Fisheries and Wildlife in the South-west Kimberley, the Environmental Protection Authority decide whether the Point Coulomb Reserve on the Dampier Peninsula be extended or whether two other areas, one of these being the vacant Crown Land in the Edgar Ranges Area (Fig. 2), should be reserved. They further recommended that if this vacant Crown Land is reserved, then the area formerly occupied by Ardjorie Station should be included within the proposed reserve, subject to agreement by the Pastoral Appraisement Board.

THE EXPEDITION

Following a reconnaissance of the Edgar Ranges Area (21-26 April 1976) by N. L. McKenzie and R. E. Johnstone, Mr P. De Long of Dampier Downs Station was contracted to upgrade an overgrown access track running along the western and southern rims of the scarp. From an examination of available geological maps and an aerial survey undertaken during the reconnaissance, six accessible campsites (and three additional collecting sites) were selected from which the geomorphological variation of the Area could be conveniently reached either on foot or by vehicle.

The biological survey of the Edgar Ranges Area was undertaken between 2 and 22 August 1976. Two Landrovers, a trailer and a four-wheel drive truck provided transportation for the equipment and personnel. The survey party consisted of: K. F. Kenneally and J. Lewis—plants; W. K. Youngson, J. Henry and N. L. McKenzie—vertebrates, especially mammals; R. E. Johnstone and P. J. Fuller—vertebrates, especially birds; L. A. Smith—vertebrates, especially reptiles and frogs; I. F. B. Common—insects. N. L. McKenzie was responsible for overall co-ordination.

N. L. McKenzie and R. E Johnstone camped at Sites R1, D1 and P1 (see Fig. 2 and Table 1); W. K. Youngson, P. J. Fuller and L. A. Smith at R2, D2 and P2; I. F. B. Common, J. Henry, K. F. Kenneally and J. Lewis spent approximately three days at all six sites. Collections were also made at Logues Spring (18°25′S; 123°05 E) and Duffers Yard (18°28 S; 123°41 E) on Dampier Downs Station and at a claypan (18°17′S; 123°04′E) north of McHughes Bore. Even though the first two of these three additional sites are within station country not available for reservation, they were sampled because of their similarity to inaccessible sites within available land elsewhere in the ranges and in the headwaters of Geegully Creek.

During September 1978 a further visit was made to the Edgar Ranges to collect mammals on the alluvial (yellow earth) plains below the scarp. These plains, referable to the Fitzroy Plains Province (see Fig. 1), provide habitats not represented elsewhere in the vacant Crown Land of the Edgar Ranges Area and were not examined during the 1976 work because, at that time, they were confined to pastoral leases not available for reservation. When the Ardjorie Lease was forfeited however, it became possible to include areas of yellow earth and alluvial plains country in the proposed conservation reserve. To this end N. L. McKenzie, J. K. Rolfe and K. E. Cashin worked these plains at Sites A1 and A2 from 11 to 14 September 1978.

It was not until September 1980 that the sandridge country in the south-western corner of the area could be sampled for vertebrates and plants. Access was gained using exploration tracks (Fig. 2) cut by oil companies earlier in the year. During this visit the D3 traplines, and additional lines at P1, were set (Table 1). This, the final session of sampling, was carried out by N. L. McKenzie, J. K. Rolfe, S. D. Hopper and R. E. S. Sokolowski.

CLIMATE

The following account is drawn from a climatic description of the Kimberley region compiled by the Bureau of Meteorology (Anon. 1975).

TABLE 1

CAMPSITES AND DATES — EDGAR RANGES AREA

Site	Location	Dates
R1	18°55′S, 123°27′E	3-9 August 1976
R2	18°49′S, 123°17′E	3-9 August 1976
D1	18°53′S, 123°43′E	9-14 August 1976
D2	18°55′S, 123°14′E	9-14 August 1976
D3	18°54′S, 123°02′E	23-29 September 1980
P1	18°28′S, 123°03′E	14-20 August 1976 23-29 September 1980
P2	18°25′S, 122°53′E	14-21 August 1976
A1*	18°32′S, 123°26′E	11-14 September 1978
A2*	18°26′S, 123°15′E	12-14 September 1978

*A1 and A2 are actually mammal collection sites, not campsites. The mammal party stayed at Dampier Downs Homestead for the period in question.

The Edgar Range Area has a tropical climate with two distinct seasons; a "dry season" characterized by dry easterly winds and cloud-free skies lasting from May to October and a "wet season" lasting from December to March during which the wind directions are variable but mainly from west to north-west.

It receives a mean annual rainfall of about 500 mm, most of the total falling during the wet season when thunderstorms and associated heavy falls of rain are common (Table 2). Occasional tropical cyclones which enter or pass near the Kimberley region during this period also produce some heavy falls. Extreme falls of 206 mm in 24 hours from Bohemia Downs and 299 mm in 24 hours from Yeeda give some indication of maximum rainfall intensity.

Relevant mean monthly temperatures are included in Table 2. Highest daily maximum temperatures occur in the three months preceding the wet season (October—December). Available information suggests that the area is frost-free. Evaporation and humidity figures for relevant stations are also presented in Table 2.

TABLE 2

CLIMATIC DATA FROM SELECTED STATIONS

(from Anon. 1975).

Station (No. of Years)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
MEAN MONTHLY RAINFALLS (mm)													
Broome (31)	158	144	101	30	21	23	4	3	1	1	13	77	567
Fitzroy Crossing (80)	148	132	77	17	11	9	7	1	1	5	24	87	520
La Grange (74)	116	116	87	27	25	23	8	2	1	1	8	56	474
AVERAGE MAXIMUM AND MINIMUM TEMPERATURES (°C)													
Broome Aerodrome	33.3	32.9	33.9	34.4	31.3	29.2	28.5	30.0	31.8	32.9	33.6	33.9	32.1
	26.2	26.0	25.5	22.8	18.5	15.5	13.6	14.8	18.3	22.1	25.0	26.6	21.2
Fitzroy Crossing	37.9	37.1	37.3	36.8	32.5	30.3	29.8	32.5	36.6	39.9	41.1	40.2	36.0
	27.2	24.3	23.4	19.9	15.9	12.4	10.5	12.5	17.0	21.6	24.4	25.3	19.3
9 a.m. and 3 p.m. RELATIVE HUMIDITIES (Percent)													
Broome Aerodrome	68	73	67	54	47	48	46	43	46	51	56	62	55
	62	65	57	42	37	36	32	31	40	51	55	59	47
Fitzroy Crossing	57	61	55	39	36	38	31	28	27	27	31	43	39
	36	40	34	25	26	26	21	19	18	16	18	25	25
EVAPORATION TOTALS (mm)													
Broome (7)	268	208	228	233	205	187	212	239	278	303	299	306	2965

GEOLOGY AND GEOMORPHOLOGY

The geology of the Kimberley is described in Trendall (1975). Briefly, the Kimberley of Western Australia includes both Precambrian and Phanerozoic rocks. The central and northern portions of the Kimberley are occupied by the Kimberley Plateau, an area of Precambrian rocks comprising the Kimberley Basin and Halls Creek Province. To the east, the Kimberley Plateau is flanked by the Phanerozoic "Ord" and "Bonaparte Gulf" Basins, to the south-east by the Precambrian "Victoria River Basin", and to the south-west by the Phanerozoic "Canning Basin".

Brunnschweiler (1957) suggests that, in the northern (Kimberley) portion of the Canning Basin, Miocene tilting around a coastal hinge line caused the Dampier Peninsula (Fig. 1) to upwarp and the King Sound area to downwarp. Wright (1964) believes that the topographical difference between the Late Jurassic and Early Cretaceous rocks in the Edgar Ranges area and the main level of the land to the north (the Fitzroy Trough, which today includes the Fitzroy River Basin and King Sound, and is about 100m lower) was caused by the same event.

Crowe, Towner and Gibson (1978) provide a detailed discussion of the geological history of the Edgar Ranges and surrounding areas. They also provide descriptions of the rock strata exposed in the Ranges (Table 3).

Wright (1964, pp. 111-113) discusses the land systems of the two geomorphological provinces he recognised in the Kimberley part of the Canning Basin, herein referred to as the South-west Kimberley. He distinguishes:

(i) the "Fitzroy Plains Province" comprising the plains country and local dune fields of the Fitzroy Plains, the floodplains of the Fitzroy and Lennard Rivers and, skirting the southern edge of the Fitzroy Upland Province, Devonian reef complexes. Widespread sandplains, stoneplains, banded outcrop plains, deposits of alluvium and extensive black-soil plains occur in this province.

(ii) the "Sandplain Province" in which the dunes in the far north-western (seaward) margin of the Canning Basin, including those on its northern extensions into the Dampier Peninsula, have been partly eroded giving rise to extensive red-brown sandplains.

Figure 1 shows that the district can be treated as a mozaic of sandy, outcrop and alluvial surfaces.

The rest of the Canning Basin belongs to the "Sand Ridge Division" which can be recognised today as a desert characterised by numerous fixed parallel seif dunes (6 to 14 m high) orientated west to west-north-west and broken only by scattered claypans and occasional outcrops such as the McLarty Hills.

The Edgar Ranges Area lies across the interface of Wright's (1964) Sand Ridge Division and Sandplain Province. Guppy *et al.* (1958) describe the Edgar Ranges as an outlying scarp of the Fitzroy Valley formed by wind erosion and the cutting back of the headwaters of Geegully Creek (a tributary of the Fitzroy River) into the Jurassic sediments of the Canning Basin. An isolated apron of Fitzroy Plains Province alluvium, incised by the headwaters of Geegully Creek, occurs downslope of the Ranges—this surface is almost entirely within the Dampier Downs and Ardjorie Pastoral Leases and is not significantly represented in the vacant Crown Land (Figs 1 and 2). Notable relief in the vicinity of the Edgar Ranges is confined to scattered small hills, buttes and mesas, relicts of the former land surface. These include Goorda Tower, Twin Buttes and Outpost Hill. The watercourses which eventually form Geegully Creek, and several other small creeks running away from the scarp, are entrenched in the deeply filled alluvial valleys below the scarp although degradation is continuing in their upper reaches.

The land available for reservation in the Edgar Ranges Area includes much of the scarp, small areas of alluvium, extensive areas of sand dune country typical of the desert, and areas where the fixed seif dunes of the desert are partly eroded giving rise to extensive undulating red sandplains. A variety of strata are exposed (Table 3).

TABLE 3

SEQUENTIAL LISTING OF THE EXPOSED STRATA RECOGNISED WITHIN THE EDGAR RANGES AREA.

(Described by Crowe *et al.* 1978)

Jurassic	Jurgurra Sandstone	Rock bars in creek channels and low rises of Geegully Creek and its tributaries.
Jurassic	Alexander Formation	Isolated buttes and low hills in the Edgar Ranges.
Jurassic	Jarlemai Siltstone	Mesas, buttes and tableland of the Edgar Ranges.
Jurassic	Mowla Sandstone	Small outcrops south of Mowla Bluff, overlies Jarlemai formation. Capping on low hills.
Tertiary	Lateritic Ironstone	Shallow layer over Mesozoic sediments. Recognised overlying Jarlemai at 18°40'S, 123°27'E.
Quaternary	Sand, Sand Dunes	Red-brown loamy sand areas of low topography. Aeolian sands form seif dunes.
Quaternary	Sandplains (pindan soils)	"Sandplains" of sand, silt, minor gravel throughout the area. May be preserved over all formations below the scarp and, in places, above the scarp. Aeolian and alluvial.
Quaternary	Alluvium	Heavier soils of floodplains, drainage lines and claypans below the scarp. Sand, silt, clay; alluvial and lacustrine.

SITE DESCRIPTIONS

It was pointed out earlier that the seven campsites (Table 1) and six additional collecting sites were selected so that the geomorphological variation of the area could be conveniently sampled for plants and animals. In this section the environmental mosaics sampled at each site are described in terms of physiography, substrate, vegetation formation and structurally dominant floristics. For consistency with previous Kimberley publications in this series, the formations have been classified according to Specht (1970) and Beard (1967 and 1979). The density figures quoted are estimates of canopy cover.

The Kimberley vegetation has been mapped by Beard (1979) who comments that vegetation patterns become complex in the broken country along the Edgar Ranges, which forms the southern boundary to the Northern Botanical Province. The scarp itself and the dissected sandstone country are covered by a tree steppe of *Eucalyptus brevifolia* and *Triodia*. At the foot of the scarp there is a form of pindan on alluvial flats with clumps of *Acacia eriopoda* and *A. monticola* set in a short grassland of *Aristida browniana*. The physiognomy of pindan vegetation has been described by Beard (1967) as follows:

> "Essentially the pindan is a grassland wooded by a sparse upper layer of trees and a dense, thicket-forming middle layer of unarmed, phyllodal *Acacia*. It has, however, many aspects, being subject to fire which destroys the ground layer and the middle *Acacia* layer leaving the trees intact. The grasses regenerate from seed or rhizomes, the *Acacia* from seed. The grasses are quickly re-established and for the first season or two after fire the pindan has the aspect, according to local rainfall, of a tree steppe, tree savanna or savanna woodland. Gradually the *Acacia* shrubs regenerate, grow taller and become dominant, suppressing the grasses, forbs and small woody plants. After a certain number of years the aspect is three-layered, with scattered trees, a shrub thicket and a sparse ground layer. Later still the *Acacia* individuals reach the height of the trees, which disappear from view giving the aspect of a tall thicket or low forest of *Acacia*. At minimal rainfall the pindan merges into tree/shrub steppe by attenuation of the *Acacia* layer."

Plate 1.—
A typical interdunal swale near the D1 campsite, less than 100 m south of the scarp of the Edgar Ranges which can be seen in the background.

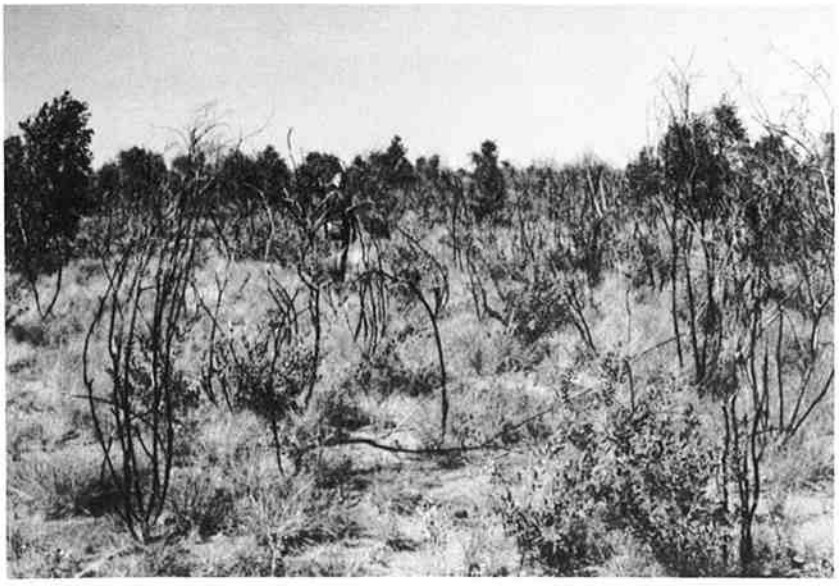

Plate 2.—
A thicket of *Acacia stipuligera* regenerating from suckers following a recent burn.

Plate 3.—
Eucalyptus zygophylla and the grass *Plectrachne schinzii* are common on the dune soils.

The Edgar Ranges Area is subjected to frequent fires which have superimposed a secondary pattern on the vegetation formation/s associated with each substrate. In places, regenerating areas within a substrate were themselves a mosaic—presumably a result of differences in such factors as the number of years since the burn and the intensity of the fire. Such a comparison is shown in Colour Plates 6 and 7 (centre pages).

The D1 campsite (Figure 2) was situated in a patch of *Eucalyptus zygophylla* and *E. brevifolia* on a typical interdune swale adjacent to a Quaternary red-brown sand dune, less than 100 m south of the rim of the scarp of the Edgar Ranges (Plate 1).

D1.1 The vegetation of the swale was a closed shrubland which has been subjected to a series of burns the most recent being about a year old. The resulting formation was a mosaic of regenerating thickets of *Acacia* (2 m), particularly *A. stipuligera*, over the grasses *Eriachne obtusa*, *Amphipogon carinatus* and the hummock grass *Plectrachne schinzii* (Plate 2). Patches of *Eucalyptus brevifolia* and *E. zygophylla*, and a mallee *E. odontocarpa*, are emergents.

D1.2 On the slopes of a dune adjacent to the campsite were scattered *E. zygophylla* (2 m) and regenerating *Acacia* spp., *Grevillea* spp. over the sub-shrubs *Cassia curvistyla*, *Cyanostegia cyanocalyx*, *Jacksonia aculeata*, *Keraudrenia integrifolia*, *Newcastelia cladotricha*, the herb *Velleia panduriformis* and the grasses *Amphipogon carinatus* and *Plectrachne schinzii* (Plate 3). Nearby dunes were examined and found to support a similar suite of species with the density varying depending on the recent fire history.

D1.3 The deeply incised valleys of the scarp near the camp expose Alexander Formation as sandstone screes and cliffs. On patches of Quaternary alluvial soils along the seasonal watercourses and nearby slopes of these valleys were fringing formations of *Eucalyptus brevifolia*, *E. camaldulensis* and *E.* sp. "bloodwood" (6 m) with a shrub understorey of tall *Acacia* spp. (*A. gonoclada*, *A. jensenii* and *A. monticola*) as well as *Grevillea refracta*, *G. wickhamii* the herbs *Waltheria indica*, *Abutilon leucopetalum*, *Vernonia cinerea*, *Ptilotus kenneallyanus* and the grasses *Cymbopogon procerus*, *Eragrostis speciosa* and *Setaria apiculata* which were dominated by the hummock grass *Triodia pungens* (Plate 4).

Plate 4.—
The alluvial soils of the deeply incised valleys of the scarp support fringing formations of *Eucalyptus camaldulensis* and *E. brevifolia* with a dense *Acacia* understorey.

D1.4 The scree slopes of the valleys supported almost pure stands of *Triodia pungens* (0.5 m, 60%) with the occasional *Ficus platypoda, F. opposita* var. *indecora* (2 m) and *Sarcostemma australe.*

The D2 campsite (Figure 2) was on a swale between two parallel dunes of Quaternary red brown loamy sand, a landscape typical of the north-western corner of the Great Sandy Desert.

D2.1 Vegetation of the swale included patches of low open-woodland of *Eucalyptus brevifolia* and *E. setosa* (6 m) over *Acacia* spp. Seasonally wetter areas of the swale supported patches of *Melaleuca lasiandra* (1.5 m), with *Mirbelia viminalis* forming dense thickets (Plate 5). Small ephemeral species such as *Stylidium desertorum, S. multiscapum, Drosera petiolaris, Byblis liniflora, Blumea integrifolia* and *Mimulus* sp. occurred in the more open areas between the hummocks of *Plectrachne schinzii* and a species of *Sorghum.* The dominant vegetation of the swale was the hummock grass *Plectrachne schinzii* with scattered emergent shrub species to 1 m.

D2.2 The adjacent dunes supported an open heath of *Grevillea* aff. *eriostachya, Cyanostegia cyanocalyx, Brunonia australis, Acacia anaticeps, A. laccata* and *A. monticola, Burtonia simplicifolia, Trichodesma zeylanicum* with the grasses *Aristida browniana, Sorghum plumosum* and *Triodia pungens* (Plate 6).

The D3 campsite was to one side of a swale plain between two of the parallel dunes of red-brown Quaternary loamy sand. These interdune plains are 0.5 to 3 kilometres wide and support a variable assemblage of plants whose structure and floristics vary with fire history, distance from the nearest dune and local variations in soil.

D3.1 The most widespread formation in September 1980 comprised low open-woodlands of *Eucalyptus zygophylla* and *Gardenia* sp. (4-6 m, 5% or less), often with *Grevillea refracta, G. wickhamii* or *G.* aff. *eriostachya* (2-4 m, 10% or less). Taller shrubs included *Acacia stipuligera, A. drepanocarpa* or *A. ancistrocarpa* (more than 2 m, 2-10%) over *Acacia tumida* (1-2 m, less than 30%) and such lower shrubs as *Jacksonia aculeata,*

Plate 5.—
Low lying areas in the interdunal swale support dense thickets of *Melaleuca lasiandra* and the hummock grass *Plectrachne schinzii.*

Plate 6.—
The dune areas support an open heath of *Grevillea* aff. *eriostachya* and numerous other shrubs. The grasses include *Aristida browniana, Sorghum plumosum* and *Triodia pungens.*

Plate 7.—
Another interdune red-brown sandplain. *Eucalyptus* sp., *Grevillea refracta*, *Acacia stipuligera*, *A. ancistrocarpa* are the sparse tree and taller shrub species.

Keraudrenia integrifolia, *Cyanostegia cyanocalyx* and/or *Erythrophleum chlorostachys* (0.5-1 m, 10-30%) and *Ptilotus calostachyus Brunonia australis*, *Newcastelia cladotricha*, *Dampiera cinerea* and/or *Calytrix longifora* (0.1-0.5 m, 10-30%). Various tussock grasses (0.2-1 m, 2-30%) and the hummock grass *Plectrachne schinzii* (0.2-1 m, 2-30%) were ubiquitous (Plate 7 and Colour Plates 6 and 7).

D3.2 Areas which had not been burned for several years included extensive thickets of *A. platycarpa* (2 m, 60%) over tussock grasses and *Plectrachne schinzii* (Plate 8).

D3.3 Similar formations were found on the adjacent dunes, although tree canopy cover was less than 2 per cent (Plate 9).

The R1 campsite was on a narrow band of shallow lateritic gravel, overlying Jarlemai Siltstone, on the rim of the scarp (Figure 2).

R1.1 The camp was under an isolated clump of *Eucalyptus brevifolia* (6 m). Scattered *Acacia hilliana* (0.5 m), *A. adoxa* var. *adoxa*, *A. ancistrocarpa* (1 m) and the hummock grass *Triodia pungens* (0.5 m) were the typical cover of the gravelly surfaces with *T. pungens* being the most prominent element (Plates 10 and 11). Clumps of *Melaleuca lasiandra* and *Mirbelia viminalis* to 2 m appeared confined to the small pockets of alluvium in depressions and shallow gullies.

R1.2 Between the gravelly rim of the scarp and the sand dune country to the south is a broad band (2-3 km wide) of red Quaternary sandplain which supported a very stunted form of pindan. The principal species included the shrubs *Acacia stipulgera*, *A. monticola* and *A. holosericea* (to 2 m), *Eucalyptus brevifolia* and *E. setosa* were scattered emergents to 6 m and *Triodia pungens* was the dominant grass (Plate 12). Where pockets of deeper sand occur, *Melaleuca lasiandra* and *Mirbelia viminalis* formed dense thickets (Plate 13).

Plate 8.—
Acacia platycarpa thicket on interdune swale.

Plate 9.—
Top of dune near campsite D3. Taller shrubs include *Grevillea wickhamii*; lower shrubs include *Cyanostegia cyanocalyx* and *Burtonia simplicifolia.*

Plate 10.—
The shallow lateritic gravel on the rim of the scarp supports isolated clumps of *Eucalyptus brevifolia* and scattered *Acacia* spp. and the hummock grass *Triodia pungens.*

Plate 11.—
A hummock grassland of *Triodia pungens* commonly occurs on the lateritic gravel slopes.

Plate 12.—
A stunted form of pindan (*Acacia* spp.) occurs on the red Quaternary sandplain between the gravelly rim of the plateau and the dune country.

R1.3 Along the northern edge of the sandplain was a stand of mallee (*Eucalyptus odontocarpa*) shrubland with occasional *Hakea macrocarpa* over *Jacksonia anomala, Dampiera candicans, Halgania* aff. *solanacea* and open-hummock grass (*Triodia pungens*) (Plate 14).

R1.4 Alexander Formation is exposed on the slopes and foothills of the scarp at R1 and as cliffs and screes where valleys deeply incise its rim (Plate 15). The scree slopes of the gullies supported scattered *Ficus opposita* var. *indecora* and *F. platypoda, Sarcostemma australe* (to 2m), and the ferns *Cheilanthes tenuifolia* and *C. vellea* amongst the dense hummock grass *Triodia pungens.* On a seepage area the fern *Lindsaea ensifolia* was recorded (Plates 16 and 17).

R1.5 Patches of Quaternary gravelly sandplain and alluvia occur in gullies, and as floodplains, below the scarp (Plate 18). The gullies supported a fringing formation of *Eucalyptus brevifolia* and *E. confertiflora* over the shrub species *Acacia bivenosa, A. monticola, A. jensenii, A. retivenia* and *A. gonoclada.* Other shrubs included *Grevillea refracta, Dodonaea pedunculata, D. viscosa* and *Solanum* sp. Grasses recorded include *Themeda australis, Eragrostis* sp., *Cymbopogon procerus* and *Triodia pungens.*

On 8 August 1976 a vegetation transect was carried out between the R1 and R2 campsites, a track distance of 30 kilometres. A brief description of the vegetation encountered follows:—

0 km R1 Campsite

1 km Red sandplain. Patches of *Eucalyptus odontocarpa* (R1.3) replaced by belt of *Melaleuca lasiandra* to 2 m and dense thickets of *Mirbelia viminalis.*

3 km Red sandplain. Smaller patches *Mirbelia viminalis.*

9 km Red sandplain. *Eucalyptus brevifolia* with *some E. odontocarpa* and dense patches of *Acacia stipuligera* and *Plectrachne schinzii* (Plate 19).

13 km Red sandplain. *Eucalyptus brevifolia* and *E. setosa* to 5 m with a shrub layer to 3 m of *Acacia holosericea* and *Santalum lanceolatum.*

Plate 13.—
Where deep pockets of sand occur, *Mirbelia viminalis* and *Melaleuca lasiandra* form dense thickets. This area is regenerating after a recent fire.

Plate 14.—
A mallee (*Eucalyptus odontocarpa*) shrubland over a hummock grassland of *Triodia pungens* occurs on the sandplain.

Plate 15.—
Alexander Formation is exposed in the slopes and foothills of the scarp at site R1 and as cliffs and screes where valleys deeply incise its rim.

Plate 16.—
Patches of Quaternary gravelly sandplain and alluvia occur in the gullies below the scarp and these support scattered *Eucalyptus brevifolia* over hummock grasses.

Plate 17.—
A gully below the scarp showing fringing *Eucalyptus brevifolia* and *E. camaldulensis* over *Acacia* spp. and hummock grasses.

Plate 18.—
The alluvium of the valley support a dense stand of *Eucalyptus brevifolia* and *E. camaldulensis.*

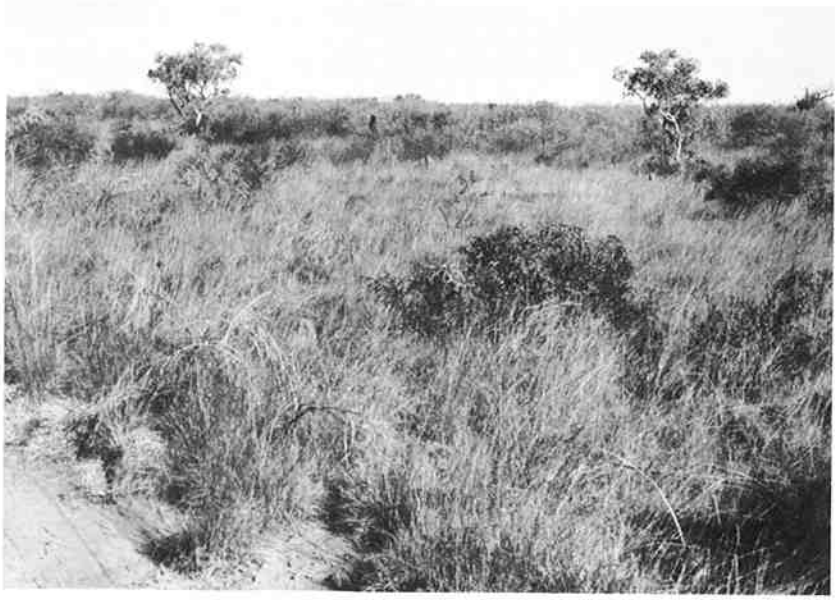

Plate 19.—
Transect between R1 and R2 campsites. Scattered *Eucalyptus brevifolia* over hummock grass *Plectrachne schinzii.*

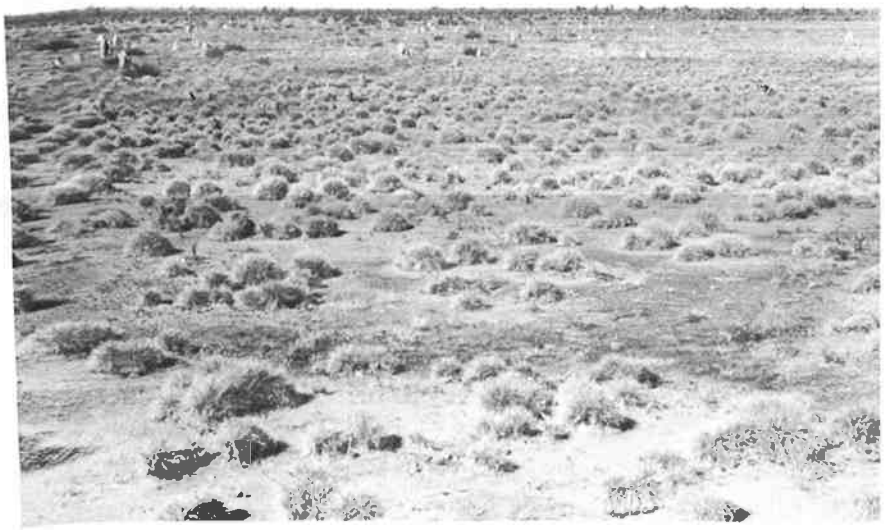

Plate 20.—
Transect between R1 and R2 campsites. Hummock grassland on light red sandplain.

Plate 21.—
Transect between R1 and R2 campsites. *Acacia stipuligera* regenerating after fire.

Plate 22.—
Transect between R1 and R2 campsites. Scattered *Eucalyptus brevifolia* and *E.* sp. "bloodwood" regenerating after fire.

Plate 23.—
Transect between R1 and R2 campsites. Scattered *Eucalyptus brevifolia* on yellow-brown sandplain with *Acacia* spp. regenerating.

Plate 24.—
A regenerating area of *Eucalyptus* spp. and *Acacia* spp. on Quaternary red sandplain burnt 18 months to 2 years prior to our visit.

Plate 25.—
A dense thicket of *Acacia stipuligera* and *A. orthocarpa* on red sandplain.

Plate 26.—
Superficial laterite overlays the Jarlemai siltstone which is exposed on the upper slopes of the nearby scarp.

15 km Red sandplain. Dense thicket of *Acacia stipuligera, Grevillea refracta, G. wickhamii, Acacia adoxa* and *Eucalyptus odontocarpa.*

19 km Red sandplain. Patches of *Grevillea wickhamii, Acacia hilliana* and *A. adoxa;* hummock grassland.

20 km Red sandplain. Patches *Eucalyptus brevifolia.*

21 km Firm light red sandplain. Open area with numerous ant mounds. Patches of *Acacia hilliana.* This appears to be a depression that holds water during the wet season (Plate 20).

22 km Firm light red sandplain becoming yellow-grey in patches. Ant mounds very common. Vegetation mainly regenerating *Acacia stipuligera* and *Triodia pungens* (Plate 21).

25 km Red sandplain. Area still burnt. Some *Eucalyptus brevifolia* but mainly *E.* sp. "bloodwood". Dense patches of *Velleia panduriformis* with *Halgania* aff. *solanacea, Tephrosia* sp. and *Triodia pungens* (Plate 22).

27 km Red sandplain. Thickets of regenerating *Acacia stipuligera.*

29 km Change of sandplain from red to yellow-brown. Area of regenerating *Acacia* spp. with some scattered *Eucalyptus brevifolia.* Shrubs mainly *Scaevola* sp., *Velleia panduriformis, Cassia* spp. and *Triodia pungens* (Plate 23).

30 km R2 Campsite.

The R2 campsite, R2.1 (Figure 2), was situated on a Quaternary red sandplain in an area regenerating after being severely burned 18 months to two years prior to our visit. The vegetation was a low woodland of *Eucalyptus setosa* and *E.* sp. "bloodwood" with patches of *Acacia stipuligera, A. coriacea, A. orthocarpa, A. adoxa* var. *adoxa* and *Santalum lanceolatum* to 2 m over the grasses *Amphipogon caricinus* and *Triodia pungens* (Plates 24 and 25).

R2.2 Jarlemai Siltstone is exposed on the upper slopes of the nearby scarp where it is sometimes overlain by superficial laterite (Plate 26). On lower slopes of the scarp Alexander Formation is exposed and areas of

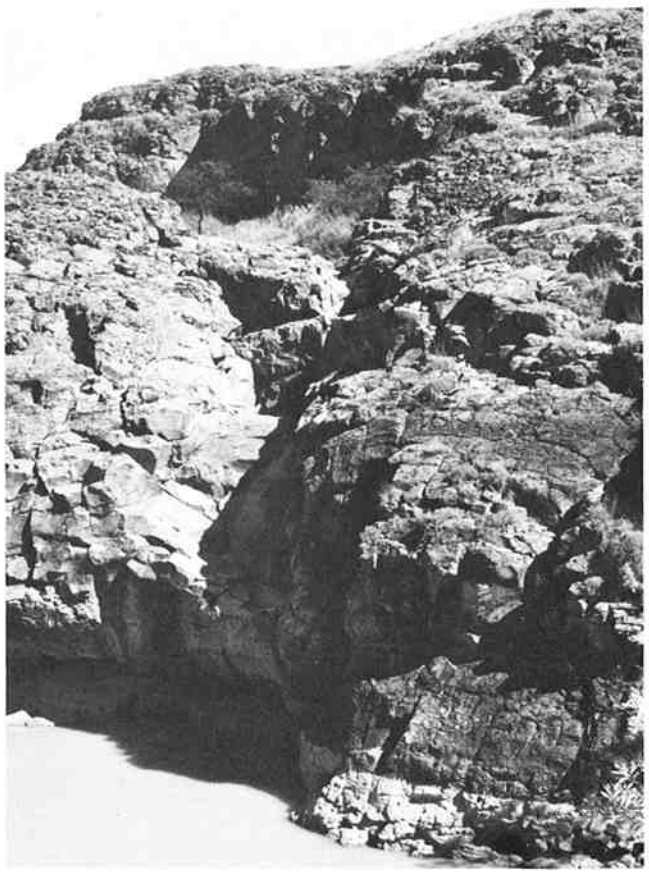

Plate 27.—
A seasonal watercourse, on the lower slopes of the scarp, showing a rock hole containing water.

Quaternary sandy alluvium occur along and between seasonal watercourses (Plate 27). Vegetation was limited to a few scattered hummocks of *Triodia pungens* and, sometimes, ephemeral species (Plate 28).

Three extra sites near R2 were described in September 1980.

Plate 28.—
Vegetation along the seasonal watercourses, on the lower slopes of the scarp near R2, is restricted mainly to a few scattered hummocks of *Triodia pungens*.

R2.3 The pale brown colluvial plains below the scarp on the western end of Ardjorie Station supported a low open-woodland of *Eucalyptus brevifolia* (8 m) over a tall open-shrubland of *Grevillea refracta* (2-3 m) and *Acacia monticola* (1.5-2 m), the sparse dwarf shrub *Acacia adoxa*, and a dense hummock grass (60%) (Plate 29).

R2.4 These plains are interrupted by abrupt mesas, reflecting the strata of the scarp itself, with gravelly scree slopes that supported a hummock grassland of *Triodia pungens* (0.3 m, 60%) with occasional *Acacia gonoclada* (2 m) and thickets of *Grevillea refracta* and *G. wickhamii* (2-2.5 m) (Plate 30). In washes and narrow creek lines incising the plains were fringing thickets of *Acacia monticola* and occasional *Eucalyptus camaldulensis*.

R2.5 The main watercourse of Geegully Creek at 18°48′S; 123°23′E on Ardjorie Station had occasional pools (in September 1980) under sheltered cliffs incised into the underlying sandstone. The sandy bed averaged 20 metres wide and was devoid of vegetation. On the steep sandy alluvial banks were fringing formations of *Eucalyptus camaldulensis* and (a few) *E. microtheca* trees to 12 m over *Acacia holosericea* (3-5 m), shrubs and dense hummock grass (*Triodia pungens*) (Plate 31).

The P1 campsite, P1.1 (Figure 2) was on a red Quaternary earthy sandplain 8 km south of McHughes Bore. In August 1976 the vegetation had been heavily trampled by cattle and consisted of a low open-woodland of *Eucalyptus zygophylla* and *Ehretia saligna* with a mixed assemblage of understorey species such as *Grevillea refracta*, *G. wickhamii*, *Lysiphyllum cunninghamii*, *Jacksonia aculeata*, *Acacia adoxa*, *A. drepanocarpa*, *A. holosericea* and *Melhania oblongifolia*; *Plectrachne schinzii* was the common grass (Plate 32). In some areas *Acacia eriopoda* formed dense thickets (Plate 33).

When the P1 campsite was revisited in September 1980, the vegetation showed no evidence of being trampled by cattle.

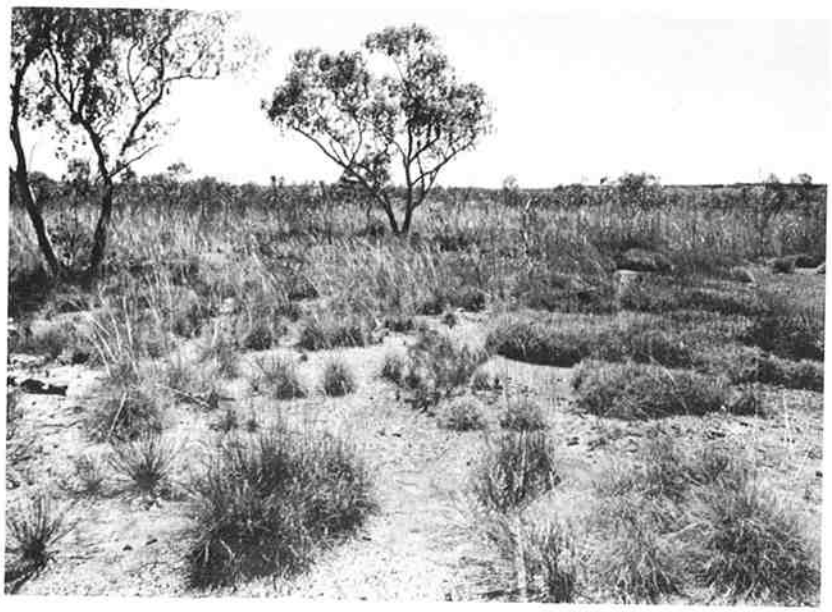

Plate 29.—
Colluvial plains below the scarp on Ardjorie.

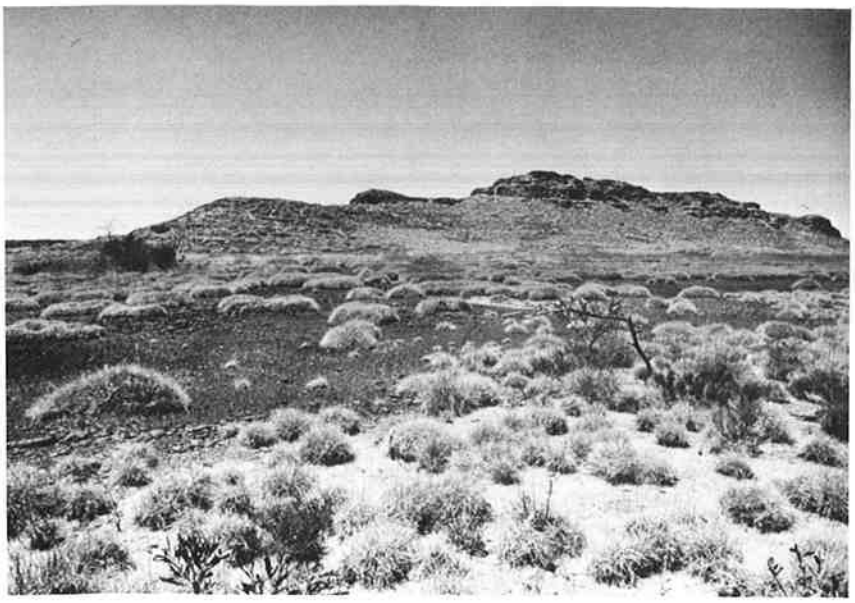

Plate 30.—
Gravel slopes with *Triodia pungens*.

Plate 31.—
Main course of Geegully Creek on Ardjorie. Photo by S. Hopper.

Plate 32.—
Pindan as a low open-woodland of *Eucalyptus zygophylla* and *Ehretia saligna*, with a mixed shrub understorey, occurs on the red Quarternary sandplain south of McHughes Bore.

Plate 33.—
Pindan as a dense thicket of *Acacia eriopoda*, *Grevillea refracta* and *G. wickhamii* on red Quarternary sandplain.

P1.2 (0.4 kilometres north of P1.1) was on firm red-brown clayey sandplain supporting a low open woodland of *Eucalyptus* sp. "bloodwood" *Ehretia saligna* and *Dolichandrone heterophylla* (7-12 m, 5-10%), and *Eucalyptus zygophylla* and *Acacia holosericea* (3-4 m, 5-10%) over the tall shrubs *Acacia monticola*, *A. eriopoda* and *Grevillea pyramidalis* (2-3 m, 5-10%) and the grasses, *Plectrachne schinzii* and *Amphipogon carinatus*, described in Pl.3 (Plate 34).

P1.3 (1.5 kilometres north of P1.1) had red-brown sandy soil supporting a low open-woodland of *Eucalyptus zygophylla*, *Gardenia* sp. *Grevillea wickhamii* and *G. refracta* (2.5-5 m, 10-15%) over the shrubs *Acacia eriopoda* (2.5m, 10%), *Jacksonia aculeata* (1-5 m, 10-30%), and a grassland (1 m, 60%) comprising cane grasses, low tussock grasses, and the hummock grass *Plectrachne schinzii*.

The P2 campsite, P2.1 (Figure 2) was also on red Quaternary earthy sandplain. The vegetation in August 1976 was of greater density than at P1 — the area had not been as heavily trampled by cattle and did not appear as frequently burnt. The vegetation was a low open-woodland of *Eucalyptus setosa*, *E. zygophylla* and *E.* sp. "bloodwood" with a mixed tall shrubland of *Acacia holosericea*, *A. eriopoda*, *Grevillea refracta*, *Ehretia saligna* and *Codonocarpus cotinifolius*. The grasses *Triodia pungens* and *Amphipogon carinatus* were dominant, the former occurring in the more sandy patches (Plates 35 and 36).

Five additional collecting sites were visited during the course of the survey.

Sites A1 and A2 are on Dampier Downs Station (Figure 2) and were chosen to represent the Quaternary yellow sandy earth-plains, with occasional very low dunes (virtually just sandy patches), typical of the alluvial flats below the scarp of the range on the central part and eastern end of the abandoned Ardjorie pastoral lease. These sections of Ardjorie were not readily accessible. Vegetation was a mixed hummock and tussock grassland (0.5 m, 30%) with an upper storey ranging from scattered *Grevillea pyramidalis* and *Acacia holosericea* (2-3 m) at A1, to a high shrubland of these species with the tree *Lysiphyllum cunninghamii* to 4 m (Plate 37) at A2.

Plate 34.—
Low open-woodland of *Eucalyptus* sp. and *E. zygophylla* with mixed *Acacia* spp. and *Grevillea refracta*; note pit-fence.

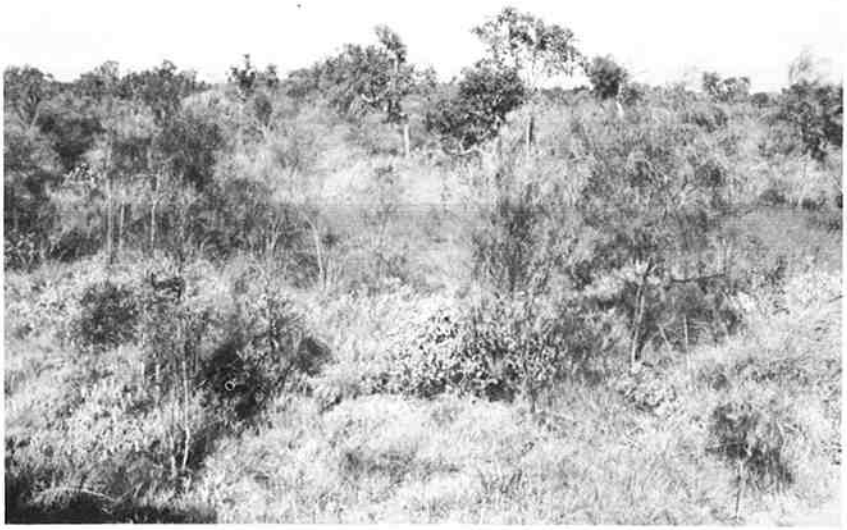

Plate 35.—
A low open-woodland of *Eucalyptus setosa*, *E. zygophylla* and *E.* sp. "bloodwood" with a mixed *Acacia* spp. and *Grevillea* spp. understorey.

Plate 36.—
A disturbed area near Wapets Thangoo No. 2 bore abandoned in June 1973.

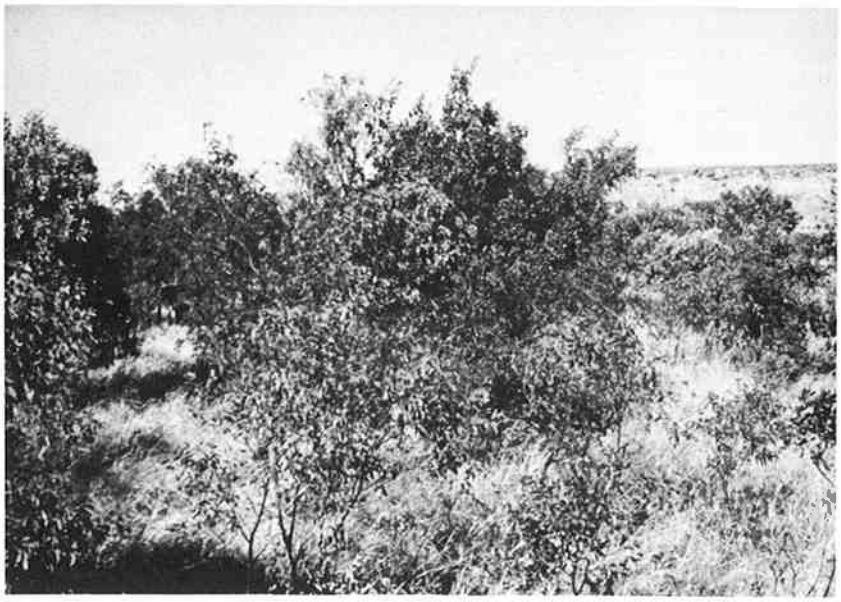

Plate 37.—
Site of the A2 trapline.

Plate 38.—
Eucalyptus camaldulensis fringing a dry watercourse at the entrance to Logues Spring on Dampier Downs Station.

Logues Spring (**LS**) (Figure 2), also on Dampier Downs Station, is at the head of a deeply incised gully in Jarlemai sandstone.

LS1 At the entrance to the gully is a Quaternary alluvial flat across which a line of *Eucalyptus camaldulensis* to 15 m followed the seasonal watercourse (Plate 38).

LS2 The gully narrows further into the range; below its sheer sandstone walls were scree slopes supporting scattered *Ficus platypoda* var *indecora* and *F. platypoda* over *Triodia pungens* hummock grassland.

LS3 The narrow rocky watercourse enclosed by sheer cliffs, supported *Pandanus spiralis* var. *flammeus* (5 m), *Eucalyptus papuana* (7 m), *Acacia holosericea* (3 m), *Atalaya hemiglauca* (4 m), *Clerodendrum* sp. (3 m) as a dense fringing formation. A series of waterholes occur along this seasonal watercourse in the dry season, fed by a permanent spring (Logues Spring) at the head of the valley (Plates 39 and 40).

Because the plunge pool at the head of the gorge is one of the few permanent waterholes in the Edgar Ranges, the gorge and entrance are heavily trampled and grazed by cattle, especially late in the dry season (Plate 41). The alluvial flat at the entrance to the gorge is also used as a trapping and holding yard for cattle which has resulted in the elimination of the shrub layer and extensive damage to the *Pandanus* (Plate 42). Because the colony of this variety of *Pandanus* was so small and isolated, it was possible to map every dead and alive individual to provide a baseline for future monitoring. (Figure 3).

Plate 39.—
Logues Spring, on Dampier Downs Station is at the head of a deeply incised sandstone gully. *Pandanus spiralis* var. *flammeus* fringes the rock pools and *Eucalyptus papuana* occurs on the scree slopes.

Claypan (**C**) Thirteen kilometres north of McHughes Bore is a lake-bed of Quaternary alluvium approximately one kilometre in diameter. It is surrounded by a Quaternary red sandplain and weak dunes supporting pindan vegetation which had been severely burnt less than one month prior to our visit in August 1976 (Plates 43 and 44).

C1 The claypan itself is flat and featureless. During the March reconnaissance trip it was full of fresh water and formed a habitat for numerous species of waterbirds. By August 1976 it was dry with a cracking surface and supported the bunch grasses *Diplachne fusca* and *Xerochloa laniflora* (0.5 m, 70%) (Plate 45).

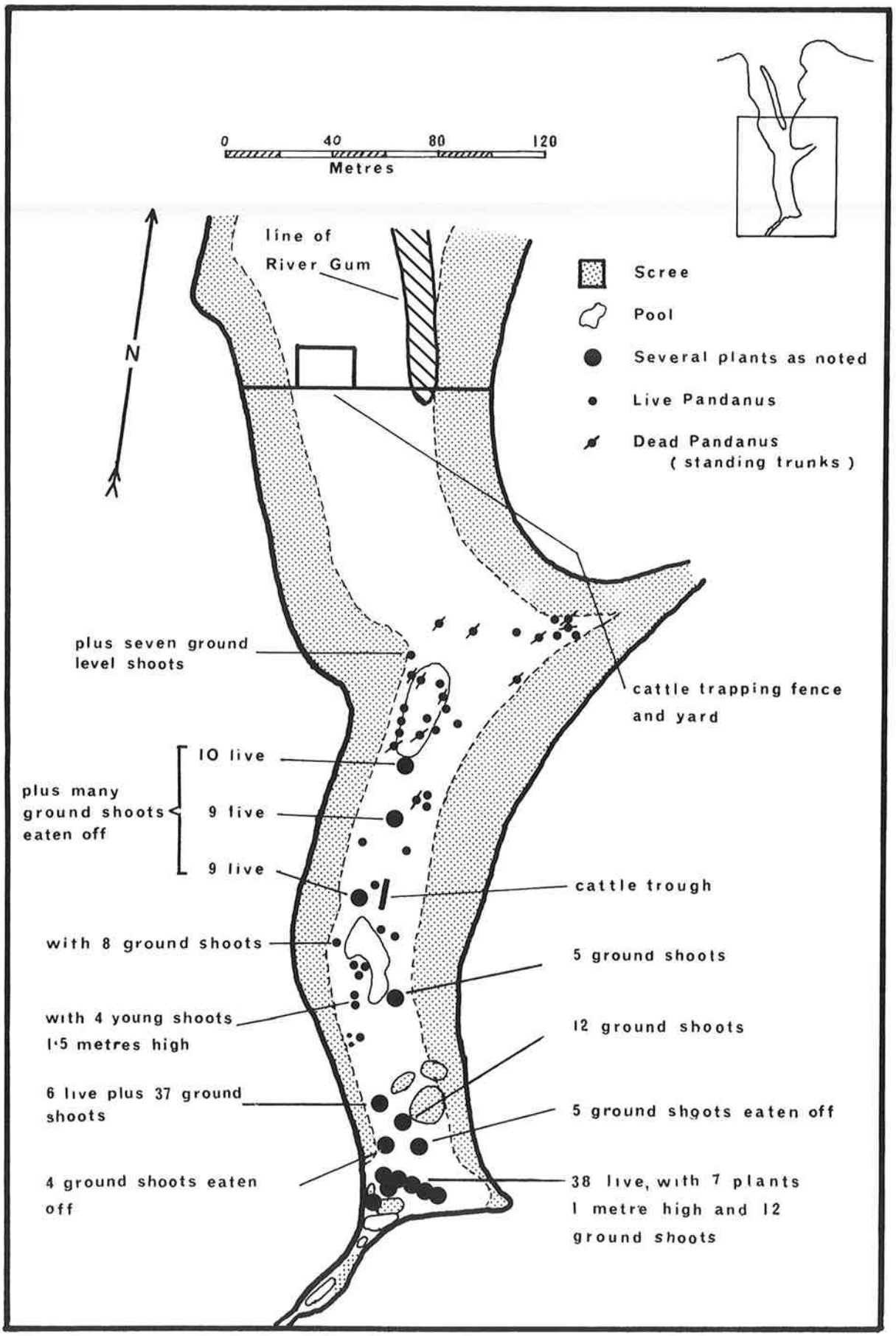

FIGURE 3. Schematic diagram of the *Pandanus spiralis* var. *flammeus* population at Logues Spring in September 1980.

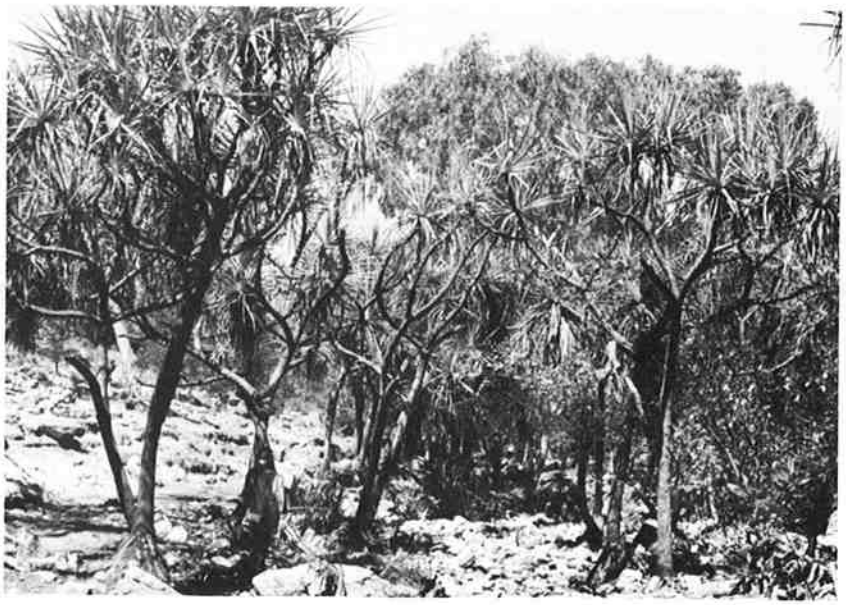

Plate 40.—
Pandanus spiralis var. *flammeus* and *Eucalyptus camaldulensis* fringing a rock pool below Logues Spring on Dampier Downs Station.

Plate 41.—
Young *Pandanus* grazed by cattle at Logues Spring in September 1980.

Plate 42.—
The alluvial flat at the entrance to Logues Spring is used as a holding yard for cattle which has resulted in the elimination of the shrub layer and extensive damage to the *Pandanus*.

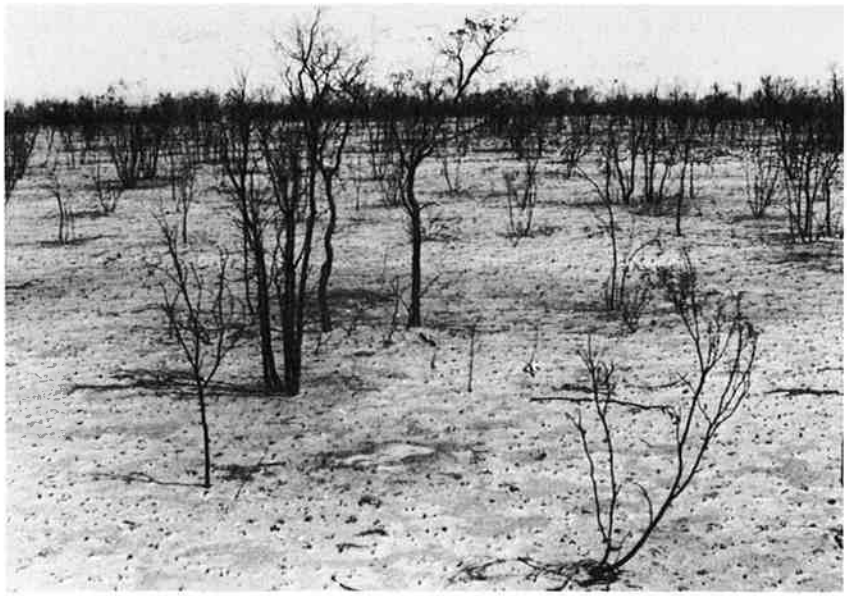

Plate 43.—
North of McHughes Bore a red sandplain supporting pindan (*Acacia* spp.) vegetation had been severely burnt by a fire less than one month prior to our visit.

Plate 44.—
A claypan 13 km north of McHughes Bore supported the grasses *Diplachne fusca* and *Xerochloa laniflora*.

Plate 45.—
An almost pure stand of the grass *Diplachne fusca* in the centre of the claypan shown in Plate 36.

Plate 46.—
Duffers Yard north of Dampier Downs Homestead is sited on a claypan which supports a stand of *Melaleuca acacioides* and the samphires *Halosarcia indica* ssp. *leiostachya* and *H. halocnemoides* ssp. *tenuis*.

Plate 47.—
A general view across Duffers Yard claypan showing the samphires and fringing *Melaleuca acacioides*.

C2 In the small patches of unburnt pindan surrounding the claypan the shrubs *Acacia drepanocarpa* (1.5 m) and *A. translucens* (1 m) were recorded with an understorey which included the herbs *Blumea diffusa, Epaltes australis, Pterocaulon serrulatum* var. *velutinum* and *Ptilotus exaltatus* and the hummock grass *Triodia pungens*.

Duffers Yard (Figure 2), a windmill and cattle watering site, is located 24 km north-east of Dampier Downs Homestead. The bore is sited on a claypan which supported a stand of *Melaleuca acacioides* (8 m) with occasional shrubs of *Acacia ampliceps* and *Pterigeron* sp. (Plate 46). The samphires *Halosarcia indica* ssp. *leiostachya, H. halocnemoides* ssp. *tenuis* and the halophyte *Neobassia astrocarpa* formed the main ground cover but had been severely trampled by cattle (Plate 47). During the March 1976 visit the claypans were flooded with fresh water.

ACKNOWLEDGEMENTS

On behalf of all members of the expedition the authors express appreciation for the hospitality and assistance given by Pete and Margret De Long and family of Dampier Downs Station. We appeciate the co-operation of Mr Ray Beard and Mr John Looby (Fisheries Inspectors, Broome) and also thank Mr A. Mangini and Mr R. Heckler for assistance with the loading and driving of the truck between Perth and Broome. T. Carleton and R. Hamilton of the Department of Lands and Surveys provided historical data on the Ardjorie Pastoral Station.

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PART II

FLORA

by K. F. Kenneally[1]

INTRODUCTION

The Edgar Ranges Area is shown by Beard (1979) to lie on the border between the Northern Botanical Province (the tropical portion of the State north of the 19th parallel of latitude—the Kimberley) and the Eremaean Botanical Province (the central portion of the State which includes the deserts). Because of its intermediate location between the two botanical provinces the flora possesses elements of both type but includes a component which appears endemic to the general area.

Typical Kimberley elements which occur in the area include *Pandanus, Terminalia, Opilia* and *Atalaya.* Those genera which are considered eremaean and south-western include *Halgania, Dicrastylis, Newcastelia, Pityrodia,* and *Cyanostegia.* Species which appear endemic to the vicinity of the Edgar Ranges Area include *Pandanus spiralis* var. *flammeus* (known only from the type locality of Logues Springs; Stone 1978), *Ptilotus kenneallyanus* (type locality Edgar Ranges; Benl 1979) and *Pityrodia ovata* (type locality McLarty Hills just to the south of the Edgar Ranges; Munir 1979). *Pityrodia chorisepala* was previously thought to be endemic to the Northern Territory (Munir 1979).

A biogeographical study of *Acacia* in Western Australia defines the area in which the Edgar Ranges occurs as 'South Kimberley' (Hnatiuk & Maslin—pers. comm.). It includes portions of Beard's Dampier, Fitzgerald and Hall Districts in the Northern Botanical Province as well as parts of the Canning, Mueller and Fortescue Districts in the Eremaean Botanical Province. The *Acacia* species of the 'South Kimberley' are characterised by a strong tropical element (e.g. *Acacia holosericea, A. platycarpa* and *A. tumida*) but also include a number of widespread, common eremaean species (e.g. *Acacia ancistrocarpa* and *A. hilliana*). This supports the description of the Edgar Ranges as transitional between the Northern and Eremaean Botanical Provinces.

NOTES ON THE COLLECTION

The following list contains all the taxa so far identified. It totals 221 species, in which there are 2 fungi, 3 ferns, and 216 flowering plants (20 monocots and 196 dicots). The monocots belong to 16 genera in 4 families, and the dicots to 111 genera in 51 families. Voucher specimens for each taxon are housed in the Western Australian Herbarium (PERTH).

The Mimosoideae is represented by the largest number of species collected, followed by the Poaceae, Myrtaceae and Papilionoideae. Table 1 lists the number of taxa in the larger families.

ARRANGEMENT OF THE LIST OF SPECIES

The fungi are arranged alphabetically. The ferns, monocots and dicots are arranged alphabetically within families or subfamilies, which are themselves alphabetical in each section. New records for the State are marked by a dagger (†). Uncertain determinations are followed by a collector's number, for easy reference.

TABLE 1

NUMBER OF SPECIES IN THE LARGER FAMILIES COLLECTED ON THE EDGAR RANGES SURVEY.

Mimosoideae	24 (*Acacia* 23)
Poaceae	16
Myrtaceae	16 (*Eucalyptus* 10)
Papilionoideae	14
Goodeniaceae	11

LIST OF PLANT SPECIES

FUNGI

Phellinus setulosus (Lloyd) Imazeki
On *Melaleuca* sp., common.
Phellinus sp. KFK 5457
On *Eucalyptus* sp.

PTERIDOPHYTA

LINDSAEACEAE
Lindsaea ensifolia Swartz
Fern. On seepage area.

SINOPTERIDACEAE
Cheilanthes tenuifolia (N. L. Burman) Swartz
Caespitose fern. On alluvial seepage area amongst spinifex.
Cheilanthes vellea (R.Br.) F. Muell.
Caespitose fern. On gorge wall.

MONOCOTYLEDONAE

CYPERACEAE
Fimbristylis squarrulosa F. Muell.
Sedge. In red soil of dune.
Scirpus humillimus Benth.
Sedge. On seepage area near base of dry waterfall at Logues Spring.

LILIACEAE
Corynotheca aff. *micrantha* (Lindl.) Macbride
KFK 5655
Herb. In red dune sand.

PANDANACEAE
†*Pandanus spiralis* R.Br. var. *flammeus* B. C. Stone
Thin screw-pine to 5 m; fruits red.

POACEAE
Amphipogon caricinus F. Muell.
Caespitose grass. In red soil.
Aristida browniana Henrard
Grass. On inundated flat.
Aristida sp. KFK 5747
Caespitose grass. In red soil.
Cymbopogon procerus (R.Br.) Domin
Caespitose grass. In crevices of gully and in alluvial sand of creek bed in gorge.

[1]Western Australian Herbarium, Jarrah Road, South Perth, W.A. 6151.

Diplachne fusca (L.) Beauv.
Caespitose grass. Pure stand on claypan, very common.
Eragrostis elongata (Willd.) J. F. Jacq.
Grass (dead). On white alluvial sand of creek.
Eragrostis speciosa (Roemer & Schultes) Steud.
Caespitose grass. In alluvial soil of creek bed.
Eriachne obtusa R.Br.
Caespitose grass. In red dune soil with spinifex.
Plectrachne schinzii Henrard
Grass. In red dune soil. Very common.
Setaria apiculata (Lambs.-Scribn & Merr.) K. Schum.
Caespitose grass. In alluvial sand of creek bed.
Setaria surgens Stapf
Grass. On dried claypan.
Sorghum plumosum Beauv. ex Roemer & Schultes
Tufted grass. In red soil with spinifex.
Sorghum sp. KFK 5593
Caespitose grass. In red soil near inundated area.
Themeda australis (R.Br.) Stapf
Tussock grass. On sandy alluvium of gorge.
Triodia pungens R.Br.
Hummock grass. On red soil.
Xerochloa laniflora (F. Muell.) Benth.
Grass. On edge of claypan.

DICOTYLEDONAE

AIZOACEAE
Trianthema pilosa F. Muell.
Ground cover; flowers pink. In red soil.

AMARANTHACEAE
Achyranthes aspera L.
Herb. In gorge on alluvial sand.
Amaranthus pallidiflorus F. Muell.
Herb. On siltstone scree ledges in gorge.
Gomphrena cunninghamii (Moq.) Druce
Herb; flowers pink. In crevices on side of creek gorge; area burnt within last 2 months, severely trampled by cattle.
Gomphrena flaccida R.Br.
Herb. In red soil.
Ptilotus arthrolasius F. Muell.
Dense, compact shrub to 0.75 m; flowers reddish. In red dune soils.
Ptilotus astrolasius F. Muell.
Woody, compact herb; flowers whitish. In red soil of pindan trapline; common.
Ptilotus calostachyus (F. Muell.) F. Muell. var. *calostachyus*
Herb. In crevice of gully; not common.
Ptilotus exaltatus Nees var. *exaltatus*
Erect herb; flowers pink, leaves lime green. On edge of claypan and in gravelly soil.
†*Ptilotus kenneallyanus* Benl
Densely-branched sub-shrub; flowers deep pink. Growing in red gravelly soil amongst spinifex.
Ptilotus polystachyus (Gaud.) F. Muell. var. *arthrotrichus* Benl
Straggly shrub to 0.5 m. On red soil near camp. Common.
Ptilotus polystachyus (Gaud.) F. Muell. f. *rubriflorus* (J. M. Black) Benl
Erect sub-shrub to 1.5 m; flowers reddish. On red soil.

APIACEAE
Trachymene oleracea (Domin) B. L. Burtt
Herb; flowers white, leaves opposite. On rock ledge.

APOCYNACEAE
Carissa lanceolata R.Br.
Spiny, virgate, tangled shrub to 1.5 m. On red soil; on edge of claypan and on scree slopes of ledge under siltstone breakaway.
Wrightia saligna (R.Br.) Benth.
Wispy tree to 3 m. At edge of gorge wall.

ASCLEPIADACEAE
Cynanchum sp. KFK 5623
Climber on *Ficus opposita* var. *indecora*. In narrow siltstone gorge.
Gymnema stenophyllum A. Gray
Spreading shrub to 0.5 m. In gully.
Sarcostemma australe R.Br.
Much-branched shrub. On pallid zone rock of lateritic gullies.

ASTERACEAE
Blumea diffusa R.Br. ex Benth.
Herb; flowers yellow. On edge of claypan.
Blumea integrifolia DC.
Ephemeral herb; flowers yellow. On seasonally inundated red clay area.
Blumea sp. KFK 5438, 5445
Straggly/erect herb. Near seepage line on pallid zone in gorge and on floor of gully.
Epaltes australis Less.
Herb. On edge of claypan.
Pluchea tetranthera F. Muell.
Sub-shrub to 0.5 m. On red soil.
Pluchea sp. KFK 5782
Sub-shrub; flowers light pink. On white clay.
Pterigeron macrocephalus (F. Muell.) Benth.
Shrub, aromatic, 0.5 m high. Flowers pink.
Pterigeron odorus (F. Muell.) Benth.
Dense bush to 0.5 m, very aromatic. On red soil.
Pterocaulon serrulatum (Montr.) Guill. var. *velutinum* (E. & P.) Guill.
Herb/spreading shrub 0.5-1.0 m; flowers white. On edge of gully, in narrow gorge on white siltstone and on edge of claypan.
Vernonia cinerea Less.
In gorge on white siltstone.

BIGNONIACEAE
Dolichandrone heterophylla (R.Br.) F. Muell.
Shrub/small tree to 2-3 m; bark fibrous. On pindan trapline and on red dune soil.

BORAGINACEAE
Ehretia saligna R.Br.
Willow-like tree to 5 m; bark rough; flowers cream/green.
Halgania solanacea F. Muell.
Much-branched shrub to 0.3 m; flowers blue; anther appendages long. On red soil.
Heliotropium ovalifolium Forsk.
Herb; flowers white. On edge of claypan.
Heliotropium aff. *tenuifolium* R.Br. KFK 5573
Erect shrub to 0.5 m; flowers white, corolla tube orange. On red soil.
Heliotropium sp. KFK 5789
Herb. On red soil.
Trichodesma zeylanicum (N. L. Burman) R.Br.
Shrub to 1.5 m; flowers pale blue. On red soil.

BYBLIDACEAE
Byblis liniflora Salisb.
Small herb; flowers mauve. On red soil.

CAESALPINIOIDEAE (LEGUMINOSAE)
Cassia curvistylis J. M. Black
Shrub; flowers yellow. On red inter-dunal area.
Cassia glutinosa DC.
Shrub to 2 m; flowers yellow. On alluvial red soil.
Cassia nemophila A. Cunn. ex Vogel var. *coriacea* (Benth.) D. E. Symon
Erect shrub to 2 m; flowers yellow. On red dune sand.
Cassia notabilis F. Muell.
Shrub to 1 m. On red sand. Common.
Cassia pumila Lamarck
Compact shrub to 0.5 m; flowers yellow. On red soil.
Cassia venusta F. Muell.
Erect herb/shrub 0.75-2 m; flowers yellow. On red soil. Common.
Erythrophleum chlorostachys (F. Muell.) Hennings ex Taub.
Low shrub, regrowth to 2 m; pods black. On red soil.
Lysiphyllum cunninghamii (Benth.) De Wit
Tree to 4 m; flowers scarlet-red.

CAPPARACEAE
Capparis umbonata Lindl.
Shrub to 3 m. Growing in red soil with *Acacia eriopoda*.

CARYOPHYLLACEAE
Polycarpaea corymbosa Lamarck
Herb. On red soil.
Polycarpaea sp. KFK 5587
Herb, dead. On red soil.

CHENOPODIACEAE
Halosarcia halocnemoides (Nees) P. G. Wilson
Samphire. On claypan.
Halosarcia indica (Willd.) P. G. Wilson ssp. *leiostachya* (Benth.) P. G. Wilson
Samphire. On claypan.
Neobassia astrocarpa (F. Muell.) A. J. Scott
Shrub. On white clay.
Salsola kali L.
Shrub. On pisolitic ironstone.

CHLOANTHACEAE
Dicrastylis cordifolia Munir
Low compact herb; leaves dark green on top, lighter green underneath, inflorescence pink-tinged.
Newcastelia cladotricha F. Muell.
Compact, erect shrub to 0.5-0.75 m; foliage grey, silvery, flowers mauve/blue. On red soil.
Newcastelia spodiotricha F. Muell.
Herb; much-branched. On top of dune.
Pityrodia chorisepala Munir
Spreading shrub; much-branched; flowers white with red spots in throat.
Pityrodia ovata Munir
Shrub to 0.5 m; much-branched; flowers white. On red soil with *Cyanostegia* sp.

COMBRETACEAE
Terminalia canescens (DC.) Radlk.
Shrub to 3 m; foliage silver. On alluvial flats with *Grevillea pyramidalis*.

CONVOLVULACEAE
Evolvulus alsinoides L.
Scrambling herb; flowers blue. On ground under *Acacia* sp. and on edge of claypan.
Ipomoea costata F. Muell. ex Benth.
Climber on *Eucalyptus* sp. On red soil. Very common.
Jacquemontia paniculata (N. L. Burman) H. Hallier
Climber on *Tristania*; flowers yellow. On edge of claypan.

CUCURBITACEAE
Mukia maderaspatana (L.) M. Roemer
Climber to 1.0 m, amongst grasses and shrubs; flowers yellow, fruit green with darker green lines.

DROSERACEAE
Drosera petiolaris R.Br.
Herb. On red clay area.

ELATINACEAE
Bergia trimera Fisch. & C. A. Meyer
Herb. On red soil and on flattened edge of claypan.

EUPHORBIACEAE
Mallotus nesophilus Muell. Arg.
Bush to 3 m. In gorge.
Phyllanthus maderaspatensis L.
Erect sub-shrub; fruit green. On pindan trapline.

GOODENIACEAE
Brunonia australis Smith
Dense caespitose herb; leaves grey, flowers blue. On red alluvium.
Dampiera candicans F. Muell.
Spindly herb; flowers deep purple; leaves dark green on top, white underneath. On scree slopes, common.
Dampiera cinerea Ewart & O. B. Davies
Compact shrub to 0.5 m; flowers deep purple/burgundy; leaves silvery.
Goodenia armitiana F. Muell.
Erect herb/shrub to 30 cm; flowers yellow. On red sand.
Goodenia? *armitiana* F. Muell. KFK 5548.
Dense, clumped herb. On red soil.
Goodenia azurea F. Muell.
Much-branched, viscid shrub to 0.5 m; flowers blue. On red dune soil.
Goodenia scaevolina F. Muell.
Erect shrub to 0.5 m; flowers blue; leaves large, tending to die off at base causing plant to sprawl. Common in gully.
Goodenia sepalosa F. Muell. ex Benth.
Small hispid herb; flowers yellow. On red soil.
Goodenia sp. KFK 5546
Much-branched shrub to 30 cm; flowers blue. On spinifex flat in red soil.
Scaevola parviflora Krause
Intricately branched sub-shrub; flowers mauve/blue. On red dune soil.
Velleia panduriformis A. Cunn. ex Benth.
Erect herb to 1 m; flowers orange/yellow, leaves glaucous, blue/green. On red dune soil.

GYROCARPACEAE
Gyrocarpus americanus Jacq.
Tree to 5 m; bark gnarled, whitish. On red soil.

GYROSTEMONACEAE
Codonocarpus cotinifolius (Desf.) F. Muell.
Shrub to 2 m. On red soil, scattered distribution.

Didymotheca tepperi F. Muell. ex H. Walter
Dense shrub 2-2.5 m; stigmas white/opaque; fruits greenish. On red soil.

HALORAGACEAE
Gonocarpus eremophilus Orchard
Herb to 50 cm. On red dune soil.

LAURACEAE
Cassytha filiformis L.
Parasite. Flowers white, fruits green becoming opaque with maturity, drying black.

LEGUMINOSAE (see MIMOSOIDEAE, CAESALPINIOIDEAE & PAPILIONOIDEAE)

LOBELIACEAE
Lobelia sp. KFK 5701
Small herb, flowers blue. On edge of claypan.

LORANTHACEAE
Amyema benthamii (Blakely) Danser
Hemi-parasite; flowers red, perianth tube inflated at end, slightly ribbed; leaves small. Growing with runner pegs on *Eucalyptus* sp., *Gardenia* sp. and *Acacia* sp. In low open woodland.
Amyema sanguineum (F. Muell.) Danser
Hemi-parasite with runner pegs on *Eucalyptus* sp.
Lysiana spathulata (Blakely) Barlow
Hemi-parasite; lower half of perianth tube orange, slightly yellow-tinged at base and at top, upper half of tube green; fruits ovoid. On *Acacia holosericea*.

LYTHRACEAE
Ammannia multiflora Roxb.
Herb; dead when collected. On edge of claypan.

MALVACEAE
Abutilon leucopetalum (F. Muell.) F. Muell. ex Benth.
Shrub to 1 m; flowers yellow. In gorge on siltstone, bleached white.
Gossypium australe F. Muell.
Regrowth to 0.75 m. On red soil.
Hibiscus geranioides A. Cunn. ex Benth.
Spindly shrub 1.5 m high; flowers yellow.
Hibiscus leptocladus Benth.
Sparsely-branched herb or spindly sub-shrub 1.5 m high; flowers blue. On red soil and on floor of gorge.
Hibiscus meraukensis Hochr.
Herb. On floor of gorge.
Sida ? fibulifera Lindl. KFK 5635
Shrub; flowers yellow. On siltstone.
Sida sp. KFK 5426, 5481, 5744
Erect herb/shrub to 1.5 m; flowers yellow. In crevices of gorge, on red soil.

MENISPERMACEAE
Tinospora smilacina Benth.
Climber on *Gardenia* sp. and *Eucalyptus* sp. In red soil.

MIMOSOIDEAE (LEGUMINOSAE)
Acacia aff. *adoxa* Pedley KFK 5516, 5640
Compact bush to 0.5 m; flowers yellow. On red soil.
Acacia adoxa Pedley var. *adoxa*
Dense clumped shrub to 50-60 cm; flowers yellow, pods sticky. On red soil and ironstone.
Acacia adoxa Pedley var. *subglabra* Pedley
Shrub to 0.5 m; flowers yellow. On red soil.
Acacia ampliceps Maslin
Tree to 3 m; single-stemmed with brown bark.
Acacia anaticeps Tindale
Shrub/tree to 2.5 m; single stem with rough bark. On red dune soils.
Acacia ancistrocarpa Maiden & Blakely
Tree to 2 m. On red alluvial soil, sometimes on interdunal swales.
Acacia bivenosa DC.
Compact shrub to 2 m; flowers yellow, globular, racemose; leaves slightly glaucous. On red soil and on alluvium in gully.
Acacia coriacea DC.
Tree to 4 m; moniliform pods; long phyllodes; thickish bark.
Acacia drepanocarpa F. Muell. ssp. *drepanocarpa*
Shrub to 2 m; flowers yellow. On red soil with *Eucalyptus* sp. "bloodwood".
Acacia eriopoda Maiden & Blakely
Shrub/wispy bush to 3 m. On red soil and on white sand of creek banks.
Acacia gonoclada F. Muell.
Shrub/spreading tree to 4 m; well developed canopy. On white soil of creek, in gorge and on edge of breakaway where the vegetation is regenerating after a severe burn.
Acacia hilliana Maiden
Dense, erect shrub to 0.5 m; fruit borne vertically in groups. Common in open areas with spinifex and on ironstone plateau.
Acacia holosericea A. Cunn. ex G. Don
Much-branched, single-stemmed shrub/tree 2.5-5 m; phyllodes grey-green, glaucous. On red soil and on edge of sand levee banks, sometimes forming a pure stand.
Acacia jensenii Maiden
Wispy much-branched tree to 4 m; bark smooth. In bottom of gully.
Acacia laccata Pedley
Erect shrub to 2.5 m. On red soil of tussock grassland with *Acacia monticola.*
Acacia monticola J. M. Black
Erect tree to 3 m; pods viscid; bark is "Minni Ritchi"
Acacia orthocarpa F. Muell.
Dense compact shrub to 1 m.
Acacia platycarpa F. Muell.
Low shrub to 2 m. On red soil.
Acacia retivenia F. Muell.
Shrub to 1 m; sterile. On floor of gully.
Acacia stipuligera F. Muell.
Erect, much-branded shrub/tree to 3 m; stem smooth; phyllodes with three prominent scurfy white veins. On sandbanks of creek and forming thicket on red soil.
Acacia translucens A. Cunn. ex Hooker
Dense compact bush/erect shrub 0.75-2 m high. On red soil and sandy alluvium on edge of claypan.
Acacia tumida F. Muell. ex Benth.
Much-branched shrub to 2.5 m. Forming thickets on lee side of red dune.
Acacia sp. KFK 5441, 5630, 5722
Shrub/wispy much-branched tree to 4 m; bark smooth. In bottom of gully.
Prosopis juliflora (Swartz) DC.
Bush to 4 m; flowers yellow.

MORACEAE

Ficus opposita Miq. var. *indecora* A. Cunn.
Small shrub/tree 3-5 m; bark rough; fruits small, green becoming maroon as they ripen. On gully wall and on siltstone in narrow gorges.

Ficus platypoda (Miq.) A. Cunn. ex Miq.
Tree; stems slightly grey; fruits greenish. Growing at base of gorge.

MYRTACEAE

Calytrix exstipulata DC.
Spindly shrub to 2 m. On sand of creek bed.

Calytrix longiflora (F. Muell.) Benth.
Dense shrub to 3 m; flowers pink. On red alluvium and on red dune soil.

Eucalyptus brevifolia F. Muell.
Spreading tree to 5 m; grey/white barked; leaves glaucous; flowers creamy white. On alluvium, red soil and ironstone flat.

Eucalyptus camaldulensis Dehnh.
Tree to 6 m; bark white. On alluvial soil of creek in siltstone gorge.

Eucalyptus confertiflora F. Muell.
Tree to 4 m; bark rough at base, smoother grey further up; fruits small, borne on ends of branches. In creek bed.

Eucalyptus grandifolia R.Br. ex Benth.
Tree to 7 m; bark grey.

Eucalyptus jensenii Maiden
Tree to 6 m; bark rough, platy fissured. On alluvial soil.

Eucalyptus odontocarpa F. Muell.
Mallee to 3 m; stems smooth; fruits angular. On red pindan soil and on ridge area regenerating after fire ± 2 years prior to survey.

Eucalyptus papuana F. Muell.
Tree to 7 m; bark white. In gorge and in red soil near camp.

Eucalyptus setosa Schauer
Tree to 5 m; bark fibrous; flowers cream. On red soil.

Eucalyptus zygophylla Blakely
Tree to 5 m; bark fibrous. On red soil and on recently burnt area of ridge in red soil.

Eucalyptus sp. "bloodwood" KFK 5477, 5591, 5659, 5723
Tree to 7 m; bark orange/white, flaky. On red soil.

Melaleuca acacioides F. Muell.
Paperbark to 7 m. On white clay.

Melaleuca lasiandra F. Muell.
Dense shrub to 3 m; slightly silvery foliage and papery bark; finished flowering. Growing on old run-off or wet areas with *Mirbelia viminalis.*

Melaleuca nervosa (Lindl.) Cheel
Paperbark to 2 m; flowers yellow/green. On red pindan soil.

Tristania grandiflora (Benth.) Cheel
Tree to 4 m; bark rough. On edge of claypan.

OLEACEAE

Jasminum lineare R.Br.
Creeper, climbing up tree to 2.5 m.

Olax sp. KFK 5619
Wispy, much-branched shrub; flowers white. On red dune soil.

OPILIACEAE

Opilia amentacea Roxb.
Shrub; leaves lime green. On edge of claypan.

PAPILIONOIDEAE (LEGUMINOSAE)

Atylosia sp. KFK 5421, 5601
Spindly herb/shrub to 1.5 m; foliage silver; flowers yellow on front, maroon-tinged on back. On red laterite over sandstone near dune.

Burtonia simplicifolia F. Muell. & Tate
Dense shrub to 0.5 m; flowers scarlet. On red dune soil.

Crotalaria crispata (F. Muell.) Benth.
Sub-shrub; flowers yellow. On red dune soil.

Crotalaria cunninghamii R.Br.
Erect shrub to 2 m; flowers greenish in colour. On red dune soil.

Indigofera monophylla DC.
Much-branched shrub to 1.5 m; flowers reddish. On red dune soil.

Isotropis atropurpurea F. Muell.
Shrub to 30 cm; flowers deep red/purple. On red soil.

Jacksonia aculeata W.V. Fitzg.
Dense compact shrub to 1 m; flowers orange/yellow. On red soil.

Leptosema anomalum (Ewart & Morrison) M.D. Crisp
Low shrub; flowers profuse at ground level. On red alluvium.

Mirbelia viminalis (A. Cunn.) C.A. Gardner
Shrub to 1.5 m; flowers orange. On red dune soil and sometimes forming dense thickets along old watercourses.

Psoralea sp. KFK 5494, 5652
Dense bush/shrub to 1.5 m; flowers white/green. On red dune soil, common.

Tephrosia rosea (F. Muell.) Benth.
Shrub to 1 m; foliage silver; flowers reddish/purple. On red soil.

Tephrosia ? uniovulata F. Muell. KFK 5535
Shrub to 0.5 m; foliage silvery and stems rusty gold in colour; flowers orange. On red dune sands.

Tephrosia sp. KFK 5461, 5599, 5679
Shrub; orange flowers. On red soil.

Zornia sp. KFK 5589
Herb. Growing on red soil.

PORTULACACEAE

Calandrinia sp. KFK 5703
Herb; flowers pink. On edge of claypan.

PROTEACEAE

Grevillea aff. *eriostachya* Lindl. KFK 5483, 5554
Spindly/erect shrub to 3 m; flowers orange on long stems. On red soil.

Grevillea pyramidalis A. Cunn.
Shrub to 3 m; flowers creamy white. On white alluvial flat.

Grevillea refracta R.Br.
Spindly shrub/tree to 3 m; flowers orange (variable). At base of gully in dry creek, and on red soil.

Grevillea wickhamii Meisn.
Spindly shrub to 2.5 m; flowers orange/red.

Hakea arborescens R.Br.
Tree to 4 m; bark heavily fissured, red underneath.

Hakea aff. *lorea* (R.Br.) R.Br. KFK 5448
Small tree to 3 m; bark corky; flowers lime green. On red alluvial soil.

Hakea macrocarpa A. Cunn. ex R.Br.
Gnarled shrub to 2 m; flowers yellowish green. On pindan trapline.

Plate 1
Scarp in the north-western section of the Edgar Ranges.

Plate 2
View northwards across the scarp at R1 towards the mesas and valleys that form the catchment of Geegully Creek.

Plate 3
Valley in the Edgar Ranges close to campsite R1.

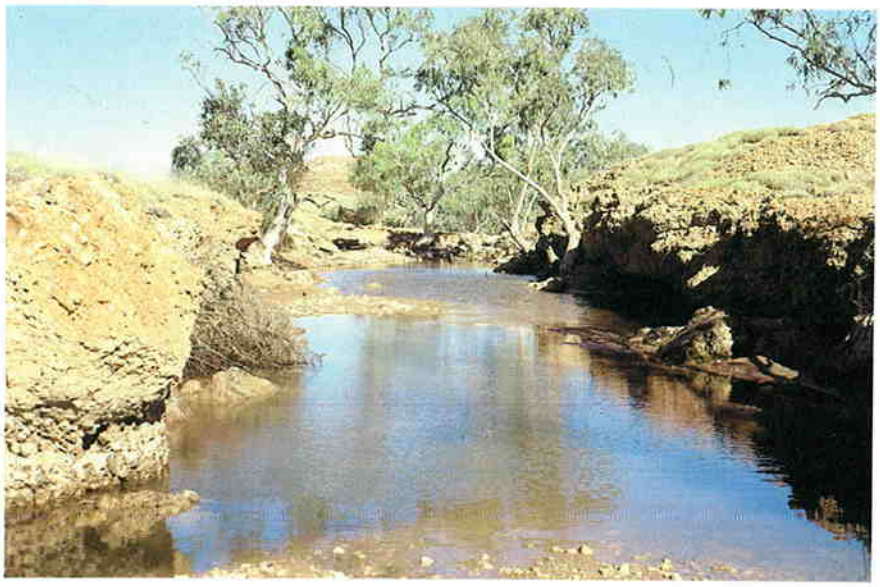

Plate 4
Pool in the western section of the Ardjorie Lease.

Plate 5
Exposed strata near campsite D1.

Plate 6
Typical interdune red-brown sandplain near D3. *Eucalyptus zygophylla* in foreground; *Gardenia* sp. and *Acacia* spp in background.

Plate 7
Regenerating interdune sandplain near D3.

Plate 8
Pindan vegetation near campsite P1.

Plate 9
Pindan vegetation near campsite P2.

Plate 10 The Dalgyte (*Macrotis lagotis*), resident in the proposed reserve. Photo by A.G. Wells.

Plate 11 *Sminthopsis* sp. nov., note similar external appearance to the Hairy-Footed Dunnart.

Persoonia falcata R.Br.
Shrub/small tree to 3 m; flowers yellow. On red soil.

RUBIACEAE
Borreria australiana Specht
Herb; flowers white. On red soil.
Borreria sp. KFK 5616.
Sterile herb. On red soil of dunes.
Gardenia sp. KFK 5522, 5581, 5602
Low shrub/tree to 4 m; bark grey and smooth. On red soil.

SANTALACEAE
Santalum lanceolatum R.Br.
Shrub/wispy tree to 3 m; flowers cream, slight odour. On red soil and on soil that had been burnt 12-18 months prior to survey.

SAPINDACEAE
Atalaya hemiglauca (F. Muell.) F. Muell. ex Benth.
Tree to 4 m; bark of trunk fissured; flowers white not perfumed, sepals greeny white. In narrow gorge with series of step-down water holes.
Distichostemon hispidulus (Endl.) Baill.
Compact shrub to 1.5 m; styles red; fruit maroon. On red soil.
Dodonaea coriacea (Ewart & O. B. Davies) D. McGillivray
Compact shrub to 1.5 m; leaves stiff; fruit pale pink. On scree slopes and red soil.
Dodonaea lanceolata F. Muell. var *lanceolata*
Erect shrub to 2 m; bark rough; wings purple.

SCROPHULARIACEAE
Mimulus sp. KFK 5594
Small herb; flowers mauve. Growing with *Stylidium* sp. and *Byblis linifolia.*
Stemodia sp. KFK 5700
Herb. Growing in cave.
Striga sp. KFK 5775
Erect, ? ephemeral herb; flowers white with slight pink tinge on bud. On white claypan.

SOLANACEAE
Solanum aff. *cunninghamii* Benth. KFK 5769
Many-stemmed male shrub to 1 m; flowers light blue.
Solanum dioicum W. V. Fitzg.
Male bush to 1 m; flowers light blue; calyx not spiny.
Solanum diversiflorum F. Muell.
Low shrub to 50 cm; leaves compound, crenate, with stellate hairs; corolla mauve, calyx spiny; seeds black. On red soil.
Solanum beaugleholei Symon
Spindly shrub to 1 m; mature fruits green; flowers blue; calyx spiny. In red soil.

STACKHOUSIACEAE
Stackhousia sp. KFK 5566
Herb; flowers yellow; (? immature) fruits green.

STERCULIACEAE
Brachychiton diversifolius R.Br.
Tree to 3 m. On red soil.
Keraudrenia integrifolia Steud.
Dense shrub to 1 m; leaves grey; flowers purplish. On pindan trapline and on red dune soil.
Melhania oblongifolia F. Muell.
Spindly shrub to 1 m; flowers yellow. On red soil.
Waltheria indica L.
Much-branched shrub to 1 m. On alluvium of creek in gorge.
Waltheria virgata Ewart & Cookson
Much-branched, compact shrub; flowers pink. On red soil of dunes with *Cyanostegia* sp.

STYLIDIACEAE
Stylidium desertorum Carlquist
Basally tufted herb; hairy scape, slightly tinged red; petals pink, lighter on reverse side, calyx green. On red soil of seepage area with *Melaleuca lasiandra* and *Mirbelia viminalis* and on seasonally inundated claypan.
Stylidium ? *floodii* F. Muell. KFK 5572
Herb; flowers pink. On seasonally inundated claypan.
Stylidium ? *multiscapum* Schwarz KFK 5569
Herb; leaves basally rosetted; flowers yellow in throat, petals paired laterally.
Stylidium sp. KFK 5777, 5562
Basally tufted herb; leaves green; petals pink, lighter on reverse side; calyx green, scape hairy, slightly tinged green. On white clay.

STYLOBASIACEAE
Stylobasium spathulatum Desf.
Dense, erect shrub to 2 m; fruits green. On red soil of interdune with *Eucalyptus odontocarpa*, not common.

THYMELAEACEAE
Pimelea ammocharis F. Muell.
Compact, much-branched shrub to 1.5 m; foliage silver; flowers orange/yellow. On red soil.

TILIACEAE
Corchorus sp. KFK 5758, 5733, 5536
Much-branched spindly shrub to 0.5 m; leaves greyish; flowers light yellow. On red soil, very common.
Grewia sp. KFK 5764
Shrub to 1.5 m. On red soil.
Triumfetta plumigera F. Muell.
Spindly herb to 1 m; most leaves dead. In bottom of gorge on sandy alluvial soil.
Triumfetta sp. KFK 5610
Erect, sparsely-branched shrub. On red soil, regenerating after a recent burn.

VERBENACEAE
Clerodendrum sp. KFK 5440, 5684, 5762
Shrub to 3 m; bark fibrous; mature fruits black. Growing in gorge and amongst clumps of *Ficus opposita* var. *indecora.*
Cyanostegia cyanocalyx (F. Muell.) C.A. Gardner
Much-branched shrub; flowers deep purple. On red soil.

VIOLACEAE
Hybanthus aurantiacus (F. Muell. ex Benth.) F. Muell.
Herb to 50 cm; flowers orange, lower lip large. On red dune soil.

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PART III

MAMMALS

by W.K. Youngson[1], J. Henry[2] and N. L. McKenzie[1].

INTRODUCTION

Available mammal records from the Phanerozoic Southwest Kimberley include collections made by Lönnberg (1913), Dahl (1897) and Butler (1971), as well as specimens in various Australian museums, especially the Western Australian Museum, and in the Chicago Field Museum of Natural History. Many of these records were made prior to the period of intensive pastoral activity which has characterized the last 70 years in this region. A number of authors have commented on environmental changes brought about in the southern and eastern Kimberley by these pastoral activities (see McKenzie and Kenneally, this publication) but their effect on the mammal fauna is poorly documented. Gooding and Harrison (1952), for instance, suggest that *Macropus agilis* has undergone an increase in numbers; Kitchener (1978) relates the apparent disappearance of certain mammals from the Ord Basin to the effects of pastoral development. McKenzie (1981) presents the most recent account, in which evidence is presented that a number of medium sized mammals have become either very rare or extinct.

The results presented here were mainly recorded during an 18-day biological survey in August 1976. Mammals were systematically collected from six sites (see Fig. 3 and Table 1 in McKenzie and Kenneally, this publication) representing the environmental variability of the Edgar Ranges Area. Techniques of mammal survey were similar to those described in McKenzie *et al.* (1978) and involved trapping, spotlighting traverses by vehicle, headtorching, floodlighting, mist-netting and opportunistic collecting. A total of 3 268 trap nights using four kinds of trap were set; approximately equal trapping effort, in proportion to relative areas, was made in each of the major types of habitat recognised in the area (Table 1.)

Additional collections were made at a claypan 11 km north of McHughes Bore, and in the valley at Logues Spring. The latter site was just outside the survey area (see Fig. 2, McKenzie and Kenneally this publication).

TABLE 1.

TRAPPING EFFORT, EDGAR RANGES AREA.

HABITAT CATEGORY	NUMBER OF TRAP NIGHTS	
	METAL TRAPS	PIT FENCES*
Pindan on sandplains	1 235 (Aug '76)	7 (Sept.'80)
Sand dunes & interdunes	970 (Aug '76)	23 (Sept. '80)
Ranges and associated watercourses	1 063 (Aug.'76)	
Alluvial plains below ranges	328 (Sept.'78)	
TOTAL	3 596	30

*Flywire fence 0.3 m high and 50 m long with six pit traps, each 125 mm (OD) and 0.6 m deep, spaced along it.

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It was similar to, and is assumed to be representative of, inaccessible valleys within the vacant Crown Land.

Specimens and data collected during a reconnaissance in March 1976 and during further South Kimberley work in September 1978 are included, as is material collected since November 1976 by P. de Long of Dampier Downs Station. Two additional sites (A1 and A2) were sampled (328 trap nights) during the September 1978 visit. D3, P1.2 and P1.3 were sampled during September 1980. The September 1980 work is not comparable to earlier visits because pit fences were used, a technique providing much higher trap returns than conventional metal traps.

In the annotated species list, data is presented in the following order:—

1. Species name.
2. Numbers recorded and collecting sites.
3. Brief habitat descriptions, including a code which can be expanded by referring to the site descriptions in McKenzie and Kenneally (this publication).
4. Breeding information.
5. Notes on behaviour, ecology and taxonomy.

Specimens have been lodged in the Western Australian Museum with accession numbers M15001—M15136, M15139, M14688—M14693, M18455—M18456. Specimen numbers prefixed "FW" "DL" and "MH" are field numbers yet to be accessed into the museum collection.

ANNOTATED SPECIES LIST

MARSUPIALIA

MACROPODIDAE

Macropus robustus Gould. **Euro.**

Sightings at R1, R2, D1 and at Logues Spring in August 1976. Restricted to the scarp, outlying mesas and associated valleys.

Sandstone cliffs and scree slopes supporting occasional *Ficus*, low shrubs and almost pure stands of hummock grass (R1.4, D1.4, LS2.).

Alluvial soils in associated valleys with: (i) fringing formations of *Eucalyptus* spp. over tall *Acacia* shrublands, *Grevillea* and hummock grass (R1.5, D1.3, LS3.); (ii) sparse spinifex and occasional ephemeral species (R2.2)

Megaleia rufa (Desmarest). **Red Kangaroo.**

1♀ collected at P2 in August 1976. Pick-up skeletal material from P2. Sightings throughout the proposal (except the scarp) in August 1976; Dampier Downs Homestead in Sept. 1978.

All formations on sandy and alluvial surfaces except those associated with the scarp and scree slopes of the range (D1.1, D1.2, D1.4, D2.1, D2.2, R1.1, R1.2, R1.3, R2.1, P1.1, P2.1, A1, A2, LS1, C1, C2.).

The female from P2 showed no signs of recent reproductive activity.

Occasionally seen during the day; mainly recorded at night feeding on patches of regenerating hummock grass and tussock grass in *Acacia* shrublands. Nowhere common.

Petrogale penicillata (Griffith). **Brush-tailed Rock-wallaby.**

2 (1♂, 1♀) from Logues Spring in March 1976; sightings at 18°51′45″S, 123°20′20″E and 18°38′51″S, 123°23′12″E in August 1976.

Restricted to the higher sandstone cliffs and scree slopes of the scarp, supporting occasional *Ficus*, scattered low shrubs and almost pure stands of hummock grass (LS2, LS3 and the other sites listed above).

The female from Logues Spring (24 April 1976) had one pouch young (♂, crown to rump 20 mm); two teats were elongated but only one was in use.

A skull was picked up by Mr J. Wilmott at 18°38′00″S, 123°24′00″E in 1961 (M4883).

PHALANGERIDAE

Trichosurus sp.

Hair tufts from several Dingo scats collected at D2 were sectioned and examined microscopically (Brunner and Coman 1974) and were found to be structurally consistent with *Trichosurus* sp.

On 21 October 1976 Mr Colin Code observed three "grey bushy-tailed possums" on the cliffs around Logues Spring (P. De Long, pers. comm.). Mr De Long also described a possum occasionally seen in the vicinity of Dampier Downs Homestead.

The geographic location of the Edgar Ranges suggests that these possums are *Trichosurus arnhemensis* rather than *T. vulpecula*.

THYLACOMYIDAE

Macrotis lagotis (Reid). **Dalgyte.** (Colour Plate)

On 24 October 1976 P. De Long retrieved the head of a Dalgyte from a recent Dingo kill 0.5 km west of McHughes Bore and in the same month recorded a sighting at 18°29′00″S, 123°26′00″E. The authors recorded burrows, tracks and scats from D1 and diggings, tracks and scats from D2 in August 1976. Another sighting was recorded 2.5 km north-east of P2 by P. De Long in November 1976.

Interdune swale with scattered *Eucalyptus* over closed *Acacia* shrubland and low shrubs. The more open areas support hummock grass and tussock grasses (D1.1, D2.1).

Dune slope with scattered *Eucalyptus*, regenerating *Acacia* and *Grevillea* shrubs over sub-shrubs, hummock grass and tussock grasses (D1.2.).

Red sandplains supporting a low open-woodland of *Eucalyptus* over a tall *Acacia* shrubland with a variable assemblage of other shrubs over hummock grass (near Mr Hughes Bore, P2.1).

DASYURIDAE

Planigale maculata (Gould).

1♂ from P1 in September 1980.

Red-brown clayey sandplain supporting a low open-woodland of *Eucalyptus, Ehretia* and *Dolichandrone* over a tall *Acacia* shrubland and a variable assemblage of other shrubs over hummock and tussock grasses (P1.2).

Sminthopsis macroura (Gould). **Larapinta.**

One specimen (cranium only) from a pit trap set at A1.

Sandy yellow earth supporting scattered *Grevillea* and *Acacia* to 3 m over hummock and tussock grasses (A1).

Sminthopsis sp. nov. (Colour Plate)

P1 (1♂, 1♀) and D3 (3♂, 2♀) in September 1980.

Red-brown earthy and clayey sandplains supporting a low open-woodland of *Eucalyptus, Ehretia, Dolichandrone* and *Lysiphyllum* over a tall *Acacia* shrubland and a variable assemblage of other shrubs over hummock and tussock grasses (P1.2, P1.3).

Interdune sandplains supporting a mixed hummock and tussock grassland with a tall open-shrubland of *Acacia* over a low open-shrubland of *Acacia, Jacksonia* and *Cyanostegia* with very sparse emergent *Eucalyptus, Gardenia* and *Grevillea* (D3.1).

Two of the females (FW 1499, FW 1492) collected in late September 1980 were pregnant and had all six mammae developed. A third (FW 1508) had six pouch young (crown to rump 13.3 mm ♂, 13.6 mm♂, 14.3mm♀, 15.2 mm♀, 12.9 mm♀, 13.4 mm♀). FW 1499 had a total of seven young in its uterine horns: crown to rump R.S. 3.4 mm, 3.5 mm 3.2 mm; L.S. 2.9 mm, 3.4 mm, 2.7 mm, 3.1 mm. Prior to dissection its uterine diameters were: R.S. 11.5 x 6.7 mm, L.S. 12.8 x 7.2 mm. The uteri of FW 1492 were not dissected; they measured R.S. 6.9 x 3.7 mm, L.S. 7.0 x 3.2 mm.

The species is currently being described.

RODENTIA

MURIDAE

Pseudomys nanus (Gould). **Western Chestnut Mouse.**

P1(2♀) and P2 (3♂, 2♀) in August 1976; A2 (3♀, 2 damaged) in September 1978; Dampier Downs Outcamp (1♀) and Dampier Downs Homestead (1♂, 1♀) in December 1976; P1 (1♀) in September 1980.

Red-brown earthy sandplain supporting a low open-woodland of *Eucalyptus* and *Grevillea* over a tall *Acacia* shrubland and a variable assemblage of other shrubs over hummock and tussock grasses (P1.1, P1.3, P2.1).

Sandy yellow earth with scattered *Grevillea, Acacia* and *Lysiphyllum* over hummock and tussock grasses (A2). Native grasses in cleared paddock. (Dampier Downs Homestead).

Two males collected in August 1976 had scrotal testes (14.4 mm and 11.6 mm long). Two August 1976 females had uterine striations and slight mammae development indicating recent parturition. A single male collected in December 1976 had one scrotal testis (15.1 mm long). A female from the same month showed uterine striations, mammae development and four implantation scars. Two females collected in September 1978, and one in September 1980, showed no evidence of reproductive activity. These observations agree with those of Kitchener *et al.* (1980) who suggests that the wet season is the period

of peak reproductive activity for this species with some indications that young are born through to the end of the dry season.

Pseudomys forresti (Thomas). **Short-tailed Mouse.**

2 (1♀, 1 cranium only) from a pit trap at A1 in September 1978.

Sandy yellow earth supporting scattered *Grevillea* and *Acacia* to 3 m over hummock and tussock grasses (A1).

The female trapped in September 1978 had enlarged mammae and elongated teats. Each uterine horn had two implantation scars and showed some thickening (R.S. 1.2 mm, L.S. 1.2 mm) indicating recent reproductive activity.

Pseudomys delicatulus (Gould). **Delicate Mouse.**

D2 (1♂), P1 (14♂, 9♀), P2 (5♂, 8♀, 1 damaged), R1 (1♀) and D1 (1♂), in August 1976; A1 (2♀) in September 1978; P1 (2♂, 1♀) and D3 (9♂, 3♀) in September 1980.

Red sandplain supporting a hummock grassland with low *Acacia* shrubland and emergent *Eucalyptus* (R1.2).

Interdune swale with scattered *Eucalyptus* over closed *Acacia* shrubland and low shrubs. The more open areas support hummock and tussock grasses (D1.1).

Dune slope with scattered *Eucalyptus*, regenerating *Acacia* and *Grevillea* shrubs over sub-shrubs, hummock and tussock grasses (D2.2).

Red earthy sandplains supporting a low open-woodland of *Eucalyptus* and *Grevillea* over a tall *Acacia* shrubland and a variable assemblage of other shrubs over tussock and hummock grasses (P1.1, P1.3, P2.1).

Sandy yellow earth supporting scattered *Grevillea* and *Acacia* to 3 m over hummock and tussock grasses (A1).

Dune and interdune supporting a hummock and tussock grassland with tall open shrubland of *Acacia* over a low open-shrubland of *Acacia*, *Jacksonia* and *Cyanostegia* with very sparse emergent *Eucalyptus Gardenia* and *Grevillea* (D3.1, D3.2, D3.3).

Two females were pregnant (18 August 1976, 14 September 1978). Each had two foetuses in the right uterine horn and one in the left. (Crown to rump *ca.* 1.3 mm and *ca.* 5.0 mm respectively). Four females collected in August 1976 showed evidence of recent reproductive activity (developed uteri and/or enlarged mammae), as did two further females trapped in September 1978, and one collected in September 1980.

Pseudomys hermannsburgensis (Waite). **Sandy Inland Mouse.**

1♂ trapped at D1 in August 1976.

Dune slope with scattered *Eucalyptus*, regenerating *Acacia* and *Grevillea* shrubs over sub-shrubs, hummock and tussock grasses (D1.2).

Maximum auditory bulla length is 5.25 mm.

Mus musculus Linnaeus. **House Mouse**

2♀ caught by hand at Dampier Downs Homestead, one in August 1976 and the other in September 1976.

Native grasses in cleared paddock (Dampier Downs Homestead).

The female collected in August had large strap-like uteri and developed mammae indicating recent parturition. The December female was a non-parous sub-adult.

LEPORIDAE

Oryctolagus cuniculus Lilljeborg. **Rabbit.**

No rabbits were seen on the proposal during the survey but their presence was confirmed by hair tufts found in Dingo scats from D2.

In October 1976, two rabbits were seen on new grass 10 km from Dampier Downs Homestead. (P. De Long, pers. comm.).

CHIROPTERA

PTEROPODIDAE

Pteropus scapulatus Peters. **Red Flying Fox**

Logues Spring (1♀) in March 1976; 18°08'20"S, 122°41'00"E (1♀) in September 1978; D3 (1♂) in September 1980. All collected in flight after dark.

Narrow watercourse enclosed by sheer cliffs with a dense fringing formation of *Eucalyptus, Pandanus, Acacia* and other shrubs (LS.3.).

Red sandplain with a low open-woodland of *Bauhinia, Acacia, Eucalyptus* and some *Grevillea* over *Sorghum* (18°08'20"S, 122°41'00"E).

Dune supporting mixed hummock and tussock grassland and sparse low woodland of *Eucalyptus* and *Gardenia* (D3.1).

No evidence of reproductive activity was detected (March 1976, September 1978).

Pteropus alecto Temminck. **Black Flying Fox.**

1♂ from its day roost at Logues Spring in September 1980.

Narrow watercourse enclosed by sheer cliffs with a dense fringing formation of *Eucalyptus, Pandanus, Acacia* and other shrubs (LS.3).

No evidence of reproductive activity was detected (September 1980).

One of three found roosting in the top of a *Pandanus* overhanging a pool (September 1980).

EMBALLONURIDAE

Taphozous flaviventris Peters. **Yellow-bellied Bat.**

In August 1976: R2(1♀); D2 (1♂, 1♀); P1 (1♀);18°24'06"S, 123°03'24"E ¼♂); 18°16'36"S, 123°03'24"E (1♂, 1♀); Logues Spring (2♂). Duffer's Yard (1♂, 3♀) in March 1976. Near Dampier Downs Homestead (1♂) in September 1978. 18°55'20"S 123°01'30"E (1♀);18°40'40"S, 123°09'20"E (1♂) in September 1980. All collected in flight after dark.

Red sandplain supporting a regenerating low-woodland of *Eucalyptus, Acacia* and *Santalum* over hummock and tussock grasses (R2.1).

Interdune swale with scattered *Eucalyptus* over closed *Acacia* shrubland and low shrubs. The more open areas support hummock and tussock grasses (D2.1, D3.1).

Red sandplain supporting a low open-woodland of *Eucalyptus* over a tall *Acacia* shrubland and a

variable assemblage of other shrubs and hummock and tussock grasses (P1.1; 2.5 km S. of McHughes Bore).

Dry claypan with bunch grass (C1).

Narrow watercourse enclosed by sheer cliffs with a dense fringing formation of *Eucalyptus, Pandanus, Acacia* and other shrubs (LS3).

Seasonal claypan with a fringe of *Melaleuca* (8 m) and occasional shrubs. The main ground cover is samphire (Duffer's Yard).

Sandy yellow earth plain with a low *Acacia* shrubland over native grasses (Dampier Downs Station).

All four females collected in August 1976 had significantly enlarged right uterine horns suggestive of proestrus or early pregnancy. No similar enlargement was detected in the three females collected in March 1976. A female collected in September 1980 had one foetus in the right uterine horn. (Crown to rump 13.5 mm).

Taphozous georgianus Thomas. **Common Sheath-tailed Bat.**

4♀ collected in flight at Logues Spring after dark—one in March 1976, two in August 1976 and one in September 1978.

Narrow watercourse enclosed by sheer cliffs with a dense fringing formation of *Eucalyptus, Pandanus, Acacia* and other shrubs (LS3).

One female collected in August 1976, and another collected in September 1978, had a foetus in their right uterine horns (Crown to rump 4 mm and 12 mm respectively). No evidence of reproductive activity was detected in the other females (March and August 1976).

MOLOSSIDAE

Tadarida cf. *beccarii* (Peters)

1♂ mist netted at R2 in August 1976.

Scattered *Eucalyptus* over sparse hummock grass and occasional ephemeral species (R2.2).

The taxonomy of the sub-genus *Mormopterus* in Western Australia is currently under review.

Tadarida jobensis (Miller). **Northern Mastiff Bat.**

R2 (1♂); P1 (5♂, 9♀); P2 (1♂, 4♀); 18°16'36"S, 123°03'24"E (3♂); 18°23'44"S, 123°05'28"E (1♂, 1♀); Logues Spring (6♂, 4♀) in August 1976. Duffers Yard (7♂, 4♀) in March 1976. 18°55'20"S, 123°01'30"E (1♀); 18°56'00"S, 123°01'00"E (1♀); 18°48'30"S, 123°21'30"E (1♀) in September 1980. All were collected in flight after dark. Two females were taken from a day roost at Logues Spring in September 1980.

Red sandplain supporting a regenerating low-woodland of *Eucalyptus, Acacia* and *Santalum* over hummock and tussock grasses (R2.1, 2 km south of Logues Spring).

Red sandplain supporting a low open-woodland of *Eucalyptus* over a tall *Acacia* shrubland and a variable assemblage of other shrubs (P1.1, P2.1).

Dry claypan with bunch grass (C1).

Narrow watercourse enclosed by sheer cliffs with a dense fringing formation of *Eucalyptus, Pandanus, Acacia* and other shrubs (LS3).

Seasonal claypan with a fringe of *Melaleuca* (8 m) and occasional shrubs. The main ground cover is samphire. (Duffers Yard).

Dune and interdune supporting a tall open-shrubland of *Acacia* over a mixed low open-shrubland with hummock and tussock grasses and sparse emergent *Gardenia, Grevillea* and *Eucalyptus* (D3.1, D3.2).

No females were obviously pregnant in March or August 1976. However, one of the four females collected in March 1976 had a slightly enlarged uterine horn and mammae which were distinctly larger than all of the other specimens. A further female collected in September 1980 was lactating. The right uterine horn was greatly enlarged and strap-like, indicating recent parturition.

At Logues Spring in September 1980, at least nine individuals were discovered roosting in a blind chimney 12 cm wide under an overhang 7 m from the ground. All eight bats examined were females. Loud squeaking from the roost led to their discovery. This was by far the most common bat observed during all trips. Groups of two or three individuals, in close formation, were often seen flying 5 to 20 m above the vehicles during night-time spotlighting runs.

VESPERTILIONIDAE

Eptesicus pumilis (Gray). **Little Bat.**

Collected from day roosts in Fairy Martin nests at R1 (1♂); R2 (1♂), D1 (3♂, 1♀) and mist netted at night over a pool at Logues Spring (2♂, 2♀) in August 1976. Found dead in a tank at Dampier Downs Homestead (1♂, 1♀) between September and October 1976.

Sandstone cliffs and scree slopes supporting occasional *Ficus*, low shrubs and almost pure stands of hummock grass (R1.4, D1.4, LS2).

Sandstone cliffs and screes with hummock grass and occasional ephemeral species (R2.2).

Low *Acacia* shrubland over native grasses (Dampier Downs Homestead).

Two of the three females collected in August 1976 had a single foetus in the left uterine horn (crown to rump: 14.1 and 6.6 mm). A single female caught some time between September and October 1976 was pregnant with two young (crown to rump 9.8 mm, 9.9 mm).

Chalinolobus gouldii (Grey). **Gould's Wattled Bat.**

Collected in flight after dark at Logues Spring (1♂, 1♀) in August 1976 and at Duffers Yard (1♂) in March 1976.

Sandstone cliffs and scree slopes supporting occasional *Ficus*, low shrubs and almost pure stands of hummock grass (LS2).

Seasonal claypan with a fringe of *Melaleuca* (8 m) and occasional shrubs. The main ground cover is samphire (Duffers Yard).

The female showed no evidence of reproductive activity.

Nycticeius balstoni (Gould). **Broad-nosed Bat.**

Collected after dark in flight at Logues Spring (2♀) and McHughes Bore (1♂) in August 1976; at 18°44'20"S, 123°07'30"E (1♀) in September 1980. Found dead in the tank at Dampier Downs Homestead (1♂, 1♀) between September and October 1977.

Over a small pool below sandstone cliffs and scree slopes supporting occasional *Ficus*, low shrubs and almost pure stands of spinifex (LS2).

Cleared Pindan (a cattle paddock at McHughes Bore).

Low *Acacia* shrubland over native grasses (Dampier Downs Homestead).

Interdune sandplain supporting a tall open-shrubland of *Acacia* over a mixed low open-shrubland, hummock and tussock grassland with sparse emergent *Eucalyptus* (D3.1).

The uterine horns of the female from Dampier Downs Homestead (between September and October 1977) appeared post-partum; all others, including the female collected in September 1980, showed no evidence of recent reproductive activity.

Nyctophilus geoffroyi Leach. **Lesser Long-eared Bat.**

Dampier Downs Homestead (1♂) in March 1979.

Sandy yellow earth supporting scattered *Grevillea* and *Acacia* to 3 m over hummock and tussock grasses (Dampier Downs Homestead).

Collected in the machinery shed at the homestead.

MONOTREMATA

TACHYGLOSSIDAE

Tachyglossus aculeatus (Shaw). **Echidna.**

Scats and scratchings on or near anthills at D2.

Interdune swale with scattered *Eucalyptus* over closed *Acacia* shrubland and low shrubs. The more open areas support hummock and tussock grasses. (D2.1).

CARNIVORA

CANIDAE

Canis familiaris dingo Meyer. **Dingo.**

Tracks throughout the area; scats from R2, D2, P2 and 18°16′36″S, 123°03′24″E. Sightings at Logues Spring in March 1976.

Hair tufts from Dingo scats were examined microscopically using the technique of Brunner and Coman (1974). Identifiable hairs from the following species were recorded: *Megaleia rufa, Trichosurus* sp. (probably *T. arnhemensis*), *Pseudomys nanus, Pseudomys delicatulus, Oryctolagus cuniculus* and *Canis familiaris* (grooming hair). Bird, reptile, insect and plant material were also found.

Vulpes vulpes Linnaeus. **European Fox.**

Sightings on Dampier Downs Station but rarely seen (P. De Long, pers. comm.).

FELIDAE

Felis catus Linnaeus. **Feral Cat.**

One female was shot 4 km north-west of Dampier Downs Homestead in September 1978. Sightings and tracks throughout the proposal, but nowhere common.

The female collected on 12 September 1978 was pregnant.

Stomach contents included *Pseudomys* sp. and reptile (Gecko) remains.

ARTIODACTYLA

BOVIDAE

Bos taurus Linnaeus. **Domestic Cattle.**

The most common exotic animal in the region. Seen everywhere except the sandridge country. Vegetation formations on the plains country north and west of the scarp were heavily grazed and trampled.

Bubalis bubalis Smith. **Water Buffalo.**

One animal occasionally sighted on Geegully Creek (P. De Long, pers. comm.).

EQUIDAE

Equus asinus Linnaeus. **Donkey.**

Heard at Logues Spring in September 1978. Seen occasionally on Dampier Downs Station (P. De Long, pers. comm.).

DISCUSSION

Twenty-four species of native mammal were recorded during the survey of the Edgar Ranges Area. Six of these (*Petrogale penicillata, Sminthopsis macroura, Pseudomys forresti, Pteropus alecto, Taphozous georgianus* and *Nyctophilus geoffroyi*) were not actually recorded in the land available for reservation although they are almost certainly there in the appropriate habitats and thus have been included in the annotation. Four other native species can confidently be expected on the basis of their available habitat and distribution data: *Macropus agilis* was reported along Geegully Creek by Gooding and Harrison (1952), near Yeeda (17°37′S, 123°40′E; 1975), and on Dampier Downs Station in 1976 (P. De Long, pers. comm.); *Onychogalea unguifera* (M15140) was recorded as a road kill (18°15′S, 122°25′E; 1976) 12 km from identical pindan country in the north-western portion of the Edgar Ranges Area; *Notoryctes typhlops* is likely to be extant in the sandridge country—it has been recorded recently by the authors in equivalent country 90 km to the south (*N. typhlops*, MH60, August 1977) and there is an older record, listed in Table 2, from the Phanerozoic South-west Kimberley near Wallal Downs; *Chalinolobus nigrogriseus* was recorded at Collins Pool (18°28′S, 120°43′E) on Geegully Creek in April 1977—similar sites occur in the headwaters of Geegully Creek adjacent to the Edgar Ranges.

Available mammal records from the Phanerozoic South-west Kimberley are presented in Table 2. On the basis of available data on their habitats, and current or previous distributions, a number of the earlier records would probably have occurred in the Edgar Ranges Area *ca.* 1900 A.D. but, due to the environmental changes referred to in McKenzie and Kenneally (this publication), may not still be there. Examples are *Lagorchestes conspicillatus, Bettongia lesueur, Petaurus breviceps* and *Isoodon auratus.*

Fifteen of the South-west Kimberley mammals listed in Table 2 would not be expected in or adjacent to the Edgar Ranges Area. *Petrogale brachyotis, Wyulda squamicaudata, Pseudocheirus dahli, Antechinus bilarni, Nyctophilus bifax, Miniopterus schreibersii, Eptesicus douglasi, Hipposideros ater, Rhinonicteris aurantius* and *Macroglossus minimus* are confined to more northern areas receiving much higher rainfall (at least 650 mm average annual rainfall) than the Edgar Range Area

(barely 500 mm). *Mesembriomys macrurus, Rattus tunneyi, Nyctophilus arnhemensis, Pipistrellus tenuis* and *Tadarida loriae* extend into areas of similarly low rainfall to the Edgar Ranges Area, but only in coastal habitats such as mangrove swamps. On the other hand it is possible that *Hydromys chrysogaster* may occur in the upper reaches of Geegully Creek. Despite extensive trapping in appropriate habitats, no evidence was found of *Zyzomys argurus*, a species normally easy to capture when it is present.

Only three species remain to be accounted for on the list in Table 2. *Phascogale tapoatafa* is of uncertain biological status in the Kimberley today. *Macroderma gigas* may occur in the Edgar Ranges, its distribution includes both sub-humid and arid areas. *Planigale ingrami* may also be present in the Edgar Ranges Area, it is a species of alluvial surfaces in the adjacent South-west Kimberley and Great Sandy Desert; unfortunately this surface was not thoroughly sampled because it is poorly represented (in terms of area) in the land available for reservation around the Edgar Ranges.

Geographically, climatically and vegetationally the South-west Kimberley is the interface between the sub-humid Kimberley Basin and the Great Sandy Desert. Its mammal fauna is also a mixture, including both sub-humid Kimberley and arid zone elements (McKenzie 1981). The mammal fauna found in the Edgar Ranges Area reflects the dry country extreme of this pattern: *Megaleia rufa, Sminthopsis macroura, Sminthopsis* sp., *Pseudomys hermannsburgensis* and *Macrotis lagotis* are arid or semi-arid zone species, our *P. hermannsburgensis* being the northern-most available record in Western Australia; *Macropus agilis, Onychogalea unguifera, Planigale maculata, Pseudomys delicatulus, Pteropus alecto* and *Chalinolobus nigrogriseus* are Torresian. In this region, the Edgar Ranges Area is probably the southern inland limit of the distribution of these Torresian species; only *Pseudomys delicatulus* was captured on the dune-interdune landscape at 19°00'S latitude (the southern limit of our sampling), that is characteristic of the country further south.

The Edgar Range survey has improved knowledge of the fauna of the South-west Kimberley by providing additional habitat, distributional and breeding data for various species and by confirming the presence of extant populations of *Macrotis lagotis*. Should the Edgar Range Area be conserved as a nature reserve, it will be the only reserve in Western Australia on which a population of this species is known to still be extant.

The survey, however, has not provided any positive data on the persistence of certain medium sized mammals such as *Bettongia lesueur, Isoodon auratus* and *Lagorchestes conspicillatus* which were recorded prior to, or during earlier stages of, the intensive pastoral exploitation to which the region has been subjected. Species such as these have become extinct elsewhere in Australia following similar environmental changes (Frith 1973, pp. 105-109). Our further records of the introduced mammals *Oryctologus cuniculus, Mus musculus, Vulpes vulpes* and *Bubalus bubalis*, in addition to *Felis catus, Equus asinus* and *Bos taurus* which are already known to be widespread in the Kimberley (McKenzie *et al.* 1975, 1977, Kitchener 1978), provide additional reason for concern. Further work is urgently needed to locate and conserve any remaining populations of the medium-sized native mammals in the South-west Kimberley.

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TABLE 2.
MAMMALS OF THE PHANEROZOIC SOUTH-WEST KIMBERLEY
(Adapted from McKenzie 1981)

SPECIES	YEAR*	SOURCE
Megaleia rufa		E
Macropus robustus		E
Macropus agilis	1976,	M15841
Onychogalea unquifera		E
Lagorchestes conspicillatus	1958,	M3383
Petrogale penicillata		E
Petrogale brachyotis	1977,	M15357
Bettongia lesueur	1895,	Dahl (1926)
Trichosurus arnhemensis		E
Wyulda squamicaudata		—†
Pseudocheirus dahli	1976,	M18158
Petaurus breviceps	1895,	Dahl (1926)
Isoodon auratus	1898,	M16078
Macrotis lagotis		E
Phascogale tapoatafa	1895,	Dahl (1926)
Antechinus bilarni	1976,	Keller (pers. comm.)
Planigale ingrami	1976,	M14438
Planigale maculata		E
Sminthopsis macroura		E
Sminthopsis sp. nov.		E
Notoryctes typhlops	1940,	M2521
Hydromys chrysogaster	1971,	Butler (1971)
Mesembriomys macrurus	1895,	Dahl (1926)
Zyzomys argurus	1966,	M7047
Rattus tunneyi	1899,	M16145
Pseudomys delicatulus		E
Pseudomys nanus		E
Pseudomys forresti		E
Pseudomys hermannsburgensis		E
Nyctophilus bifax	1977,	DL19
Nyctophilus arnhemensis	1977,	DL4
Nyctophilus geoffroyi		E
Miniopterus schreibersii	1975,	M14350
Chalinolobus gouldii		E
Chalinolobus nigrogriseus		E
Eptesicus douglasi	1965,	M14559
Eptesicus pumilis		E
Pipistrellus tenuis	1978,	FW671
Nycticeius balstoni		E
Hipposideros ater	1976,	Keller (pers. comm.)
Rhinonicteris aurantius	1976,	Keller (pers. comm.)
Tadarida jobensis		E
Tadarida loriae	1977,	DL24
Tadarida cf. *beccarii*		E
Taphozous georgianus		E
Taphozous flaviventris		E
Macroderma gigas	1975,	M14360
Pteropus scapulatus		E
Pteropus alecto		E
Macroglossus minimus	1911,	Lonnberg (1913)
Canis familiaris		E
Tachyglossus aculeatus		E

*Where a species was not recorded during the Edgar Ranges survey, the most recent record from elsewhere in the Phanerozoic South West Kimberley is listed.

Ride (1970, pp 17, 18) reports an observation of *Wyulda squamicaudata* from Broome.

E: Results of the Edgar Ranges Survey (1976 or more recent)
M: Western Australian Museum accession number.

Specimen numbers profixed by DL or FW represent specimens not yet accessed into the Western Australian Museum.

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PART IV

BIRDS

by R. E. Johnstone[1], L. A. Smith[1] and P. J. Fuller[2]

INTRODUCTION

This paper is based on data gathered during a biological survey of the Edgar Ranges Area (see Fig. 2, McKenzie and Kenneally, this publication) in August 1976. Johnstone worked from Camps R1 (3-9 August), D1 (9-14 August) and P1 (14-23 August); and Smith and Fuller R2 (3-9 August), D2 (9-14 August) and P2 (14-23 August). Both parties visited other localities in the Area and on Dampier Downs Station (especially Logues Springs, McHugh Bore and Duffers Yard).

Additional data are available from:

(1) A. G.Keartland's visit to Geegully Creek and the country east of it with the Calvert Expedition in 1897 (North, 1898);
(2) R. Söderberg's visit to Mowla Downs in November and December 1910 (Söderberg, 1918), the beginning of the wet season;
(3) J. P. Roger's visit to Mowla Downs in the dry season (winter) of 1911, and especially his observations at Mungi Rockhole, 13 km SE of Mt Alexander (notes extracted from Mathews (1910 to 1927);
(4) L. A. Smith and R. E. Johnstone's traverse of the McLarty Track (30-40 km south of the Area) on 13-14 April 1974;
(5) R. E. Johnstone's reconnaissance trip (with N. L. McKenzie) to Dampier Downs on 21-27 April 1976;
(6) R. E. Johnstone's visit (with N. L. McKenzie) to Dampier Downs and Mowla Bluff Stations on 1-2 May 1977;
(7) verbal notes from Mr P. De Long of Dampier Downs;
(8) Fisheries and Wildlife visit led by N. L. McKenzie to the sand dune country southwest of the Edgar Ranges on 23-29 September 1980.

The precise localities worked by Söderberg, and in some cases Rogers, are not known. The area referred to as Mowla Downs by Söderberg and Rogers was then owned by William Henry Logue and all falls within the current boundaries of the vacated Ardjorie lease. No doubt both these ornithologists also visited parts of the present Mowla Bluff Station which was then vacant Crown Land.

Herein the data are presented a little differently from our previous reports on Kimberley reserves (Storr *et al.*, 1975; Johnstone *et al.*, 1976). First, because we had vehicles, our observations were not limited to the vicinity of camps; hence few of our data are related to camp sites. Second, notes made on the adjoining cattle stations (Dampier Downs and Mowla Bluff) are placed in the body of the text within square brackets. The birds are listed under binomial headings. The nomenclature, classification and sequence follow Storr and Johnstone (1979).

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In the list of species we attempt to indicate the relative abundance of each species, size of groups, and habitat preferences. Where pertinent, notes are given on breeding and number of specimens collected (they are lodged in the Western Australian Museum under registered number A14564-8, 14574-623, 14653).

LIST OF SPECIES

CASUARIIDAE

Dromaius novaehollandiae (Latham) **Emu**

Moderately common, usually in ones and twos but one party of 7. Open country, both stony and sandy, but not seen in pindan. Evidently drinking at claypan 11 km north of McHugh Bore. Breeding at Mowla Downs (Söderberg).

PHALACROCORACIDAE

Anhinga melanogaster Pennant **Darter**

[A male observed on pool on Wooloonwarra Creek, 8 km SW of Mt Alexander, Mowla Bluff Station, by Johnstone in May 1977.]

ARDEIDAE

Ardea pacifica Latham **Pacific Heron**

Observed by Johnstone in ones and twos at pools near Mowla Bluff [and on Dampier Downs] in April 1976.

Ardea novaehollandiae Latham **White-faced Heron**

[One observed by Johnstone in May 1977 at Collins Pool on Geegully Creek, Luluigui Station.]

Egretta alba (Linnaeus) **Great Egret**

Remains of a dead bird found on claypan 11 km north of McHugh Bore.

Nycticorax caledonicus (Gmelin) **Rufous Night Heron**

A juvenile collected in dry creek below Edgar Ranges (a source of Geegully Creek).

CICONIIDAE

Ephippiorhynchus asiaticus (Latham) **Black-necked Stork**

[One observed by Johnstone in May 1977 at Collins Pool, Geegully Creek, on Luluigui Station.]

ANATIDAE

Dendrocygna arcuata (Horsfield) **Chestnut Whistling Duck**

Söderberg found it not infrequent on Mowla Downs after rains in November 1910.

Dendrocygna eytoni (Eyton) **Plumed Whistling Duck**

After the rains of November 1910 it appeared frequently near Mowla Downs and nested in grass in December (Söderberg).

Anas superciliosa Gmelin **Black Duck**

Common at Mowla Downs after rains of November 1910 (Söderberg). [More recently P. De Long has seen them on a billabong of Geegully Creek.]

Anas gibberifrons Müller **Grey Teal**

[In April 1976 Johnstone saw parties of 10 or more birds on filled claypans 26-27 km ENE of Dampier Downs HS.]

Aythya australis (Eyton) **Hardhead**

[In April 1976 Johnstone saw 2 birds on a filled claypan 27 km ENE of Dampier Downs HS.]

ACCIPITRIDAE

Elanus caeruleus (Desfontaines) **Black-shouldered Kite**

Scarce. Single birds observed in open pindan and open eucalypt woodland.

Hamirostra melanosternon (Gould) **Black-breasted Kite**

A juvenile noted at claypan 11 km north of McHugh Bore.

Accipiter fasciatus (Vigors & Horsfield) **Brown Goshawk**

Söderberg found it nesting on Mowla Downs in 1910.

Haliastur sphenurus (Vieillot) **Whistling Kite**

Single birds seen on three occasions. [Moderately common in adjacent pastoral country (Dampier Downs).]

Milvus migrans (Boddaert) **Black Kite**

Single bird noted on two occasions and a pair on one occasion. [It was only slightly more plentiful in adjacent pastoral country (Dampier Downs).]

Accipiter cirrocephalus (Vieillot) **Collared Sparrowhawk**

Single birds seen on three occasions.

Aquila audax (Latham) **Wedge-tailed Eagle**

Uncommon. An old nest found near Camp D2. [More plentiful in adjacent pastoral country (Dampier Downs).]

Circus assimilis Jardine & Selby **Spotted Harrier**

Moderately common in more open country (including open and burnt pindan).

FALCONIDAE

Falco peregrinus Tunstall **Peregrine Falcon**

W.K. Youngson found a pair nesting in a crevice in Edgar Ranges escarpment near Camp R2.

Falco longipennis Swainson **Australian Hobby**

A single bird noted on one occasion near Camp D2.

Falco hypoleucos Gould **Grey Falcon**

A single bird noted on several occasions near Camp P2.

Falco berigora Vigors & Horsfield **Brown Falcon**

Locally common, mostly singly but one party of 5. A very pale mummified specimen had the abdomen almost white.

Falco cenchroides Vigors & Horsfield **Australian Kestrel**

Uncommon to moderately common, in ones and twos. Favouring vicinity of escarpment. [Much more plentiful in adjacent pastoral country, especially the treeless Roebuck Plains.]

PHASIANIDAE

Coturnix ypsilophora Bosc **Brown Quail**

[Breeding recorded by Keartland (*in* North, 1898, p.183) in April 1897 on a Flinders grass plain near Mt Arthur, Nerrima Station.]

TURNICIDAE

Turnix velox (Gould) **Little Button-quail**

Small quail, occasionally flushed from spinifex and burnt country, almost certainly belonged to this species. One specimen (juvenile in spirit). The holotype of *T. v. vinotincta* Mathews was collected by Rogers at Mungi Rock-hole in July 1911.

GRUIDAE

Grus rubicundus (Perry) **Brolga**

Rare transient and visitor to claypans when filled. [More plentiful in adjacent pastoral country, especially the Roebuck Plains.]

RALLIDAE

Gallinula ventralis Gould **Black-tailed Native Hen**

Arrived at Mowla Downs on 25 November 1910 following rains (Söderberg).

OTIDIDAE

Otis australis Gray **Australian Bustard**

Uncommon; mostly ones and twos but one party of 3. Burnt pindan, stony spinifex flats and dune vegetation.

CHARADRIIDAE

Vanellus miles (Boddaert) **Masked Plover**

[Mr P. De Long has seen them on a billabong of Geegully Creek.]

Charadrius melanops Vieillot **Black-fronted Plover**

Scarce. [More plentiful in adjacent pastoral country (Dampier Downs and Mowla Bluff).]

Charadrius veredus Gould **Oriental Plover**

After the first rains (20 November) of summer 1910-11 Söderberg saw flocks near Mowla Downs.

SCOLOPACIDAE

Tringa hypoleucos Linnaeus **Common Sandpiper**

[One observed on 15 August 1976 at edge of small rock pool at Logues Springs, Dampier Downs.]

RECURVIROSTRIDAE

Himantopus himantopus (Linnaeus) **Black-winged Stilt**

Söderberg saw 4 at a pool on Mowla Downs on 15 December 1910. [P. De Long has seen them on claypans on Dampier Downs.]

BURHINIDAE

Burhinus grallarius (Latham) **Bush Stone-curlew**

Uncommon; usually heard at night, but one flushed from daytime shelter in wattle thicket. Söderberg found a nestling on Mowla Downs on 1 December 1910.

GLAREOLIDAE

Glareola maldivarum Forster **Oriental Pratincole**

In flocks at Mowla Downs at end of November 1910 after rains (Söderberg).

COLUMBIDAE

Geopelia striata (Linnaeus) **Peaceful Dove**

McKenzie saw one in a river gum on Geegully Creek in September 1980. [Locally common on Dampier Downs and Mowla Bluff.]

Geopelia cuneata (Latham) **Diamond Dove**

Very common on creeks below escarpment and in burnt areas on range with regenerating spinifex. Moderately common in dune country. Uncommon in pindan. Nesting in August.

Phaps chalcoptera (Latham) **Common Bronzewing**

Single birds observed on two occasions near Camp R1.

Phaps histrionica (Gould) **Flock Pigeon**

[Johnstone saw one coming in to drink at small dam near Dampier Downs HS in May 1977.]

Geophaps plumifera Gould **Spinifex Pigeon**

Common in Edgar Ranges, mostly in pairs but also in small flocks (up to 7 birds). Favouring narrow stony zone along top of escarpment; also descending to scree slopes and small pools in creeks. A nest and two eggs found on 5 August, one of the eggs hatching by the following day; the nest, *ca* 13 cm in diameter, was made of fine twigs and placed between two *Triodia* tussocks which partly shaded it.

Eight specimens (4 male, 4 female), belonging to the red-bellied form "*mungi*".

Ocyphaps lophotes (Temminck) **Crested Pigeon**

Scarce. Only seen in pindan of northwestern sector of Area. [Much more common in adjacent pastoral country (Dampier Downs and Mowla Bluff).]

PSITTACIDAE

Trichoglossus haematodus (Linnaeus) **Rainbow Lorikeet**

Two birds briefly seen and heard at Camp P2 may have belonged to this species. Rogers failed to see it at Mungi but was told that it became common on Mowla Downs when flowers were plentiful. [Observed by P. De Long on Dampier Downs during wet season of 1979-80.]

Trichoglossus versicolor Lear **Varied Lorikeet**

Scarce, only five parties (2-30 birds) recorded. Apparently confined to pindan of northwest of Area.

Aprosmictus erythropterus (Gmelin) **Red-winged Parrot**

Common in northwestern part of Area, mainly in ones and twos, but one flock of eight. Southeasternmost record: one at 38 km SSE of McHugh Bore. Favouring dense pindan dominated by the minnarichi, *Acacia grassbyi*, whose seeds they were extracting from the pods.

Polytelis alexandrae Gould **Princess Parrot**

Mr Logue, owner of Mowla Downs, told Söderberg in 1910 that he had seen this parrot on his station. Rogers met with it near Mungi in winter 1911.

Melopsittacus undulatus (Shaw) **Budgerigar**

Moderately common, usually in pairs and small parties but one flock of *ca* 100. Mainly in open or burnt pindan, along creeks below the escarpment, and in dunes.

Nymphicus hollandicus (Kerr) **Cockatiel**

Uncommon, in parties of 5-12 birds. In August only seen around the central and southeastern parts of the Edgar Ranges, but in April, Johnstone also saw them in the northwest of the Area.

Calyptorhynchus magnificus (Shaw) **Red-tailed Black Cockatoo**

Only observed once: a flock of 18 flying NW over the pindan at Camp P1. [Moderately common, especially about watercourses, on Dampier Downs.]

Cacatua roseicapilla Vieillot **Galah**

[In April 1976 Johnstone found them plentiful on Dampier Downs and Mowla Bluff in the vicinity of Geegully Creek, but none were seen in the following August. In May 1977 Johnstone again found them plentiful on Dampier Downs and Mowla Bluff.]

Cacatua sanguinea Gould **Little Corella**

Moderately common, including a flock of 55, but only observed around southeastern part of Edgar Ranges Area (near Camps R1 and D1). They apparently fed in the country south and west of the range and were mostly seen at dawn and dusk when flying northwards and northeastwards to drink in creeks below the escarpment. One specimen (female).

Cacatua leadbeateri (Vigors) **Major Mitchell's Cockatoo**

Only recorded at Camp D2 where they were seen flying northwards in ones, twos and threes early in mornings. [Near Logues Springs on Dampier Downs up to 15 birds were seen on several occasions in a large kurrajong, *Brachychiton diversifolium*, on whose seeds they were feeding; they rested nearby in tall eucalypts.] Two specimens (both male).

CUCULIDAE

Cuculus pallidus (Latham) **Pallid Cuckoo**

Single birds noted on two occasions near Camp R1.

Chrysococcyx basalis (Horsfield) **Horsfield's Bronze Cuckoo**

A single bird seen twice in open pindan at Camp P1. On 22 April one was being fed by a pair of *Malurus lamberti assimilis* in the northwest of the Area.

Centropus phasianinus (Latham) **Pheasant Coucal**

On 5 August Mr P. De Long reported one on the track 10-15 km south of McHugh Bore, the first he had seen in this area. Söderberg recorded it at Mowla Downs in 1910.

STRIGIDAE

Tyto alba (Scopoli) **Barn Owl**

[In April Johnstone saw one just outside the northwest corner of the Area.]

Ninox connivens (Latham) **Barking Owl**

In 1897 Keartland found it numerous along the course of Geegully Creek. Söderberg collected two specimens at Mowla Downs in December 1910.

Ninox novaeseelandiae (Gmelin) **Boobook Owl**

Heard on most nights. Two specimens (both male).

PODARGIDAE

Podargus strigoides (Latham) **Tawny Frogmouth**

One bird observed on one night at Camp P1. In December 1910 Söderberg collected a male brooding two eggs at Mowla Downs.

AEGOTHELIDAE

Aegotheles cristatus (White) **Australian Owlet-nightjar**

Moderately common in river gums below escarpment; scarce in pindan. One specimen (female), subspecies *leucogaster* Gould.

CAPRIMULGIDAE

Eurostopodus guttatus (Vigors & Horsfield) **Spotted Nightjar**

Moderately common. On 7 August a bird was flushed from a nearly hatched egg; the nest was on open stony ground below escarpment near headwaters of Geegully Creek.

APODIDAE

Apus pacificus (Latham) **Fork-tailed Swift**

Observed by Söderberg at Mowla Downs in December 1910.

ALCEDINIDAE

Dacelo leachii (Vigors & Horsfield) **Blue-winged Kookaburra**

[Moderately common on Dampier Downs in tall eucalypts along watercourses, including Logues Springs.]

Halcyon pyrrhopygia Gould **Red-backed Kingfisher**

Moderately common in open and burnt pindan around Camp P1 but generally scarce (probably because of scarcity of moderately tall eucalypts).

Halcyon sancta Vigors & Horsfield **Sacred Kingfisher**

Moderately common summer visitor to Mowla Downs, where Söderberg found a nest with young on 18 November 1910.

MEROPIDAE

Merops ornatus Latham **Rainbow Bee-eater**

Moderately common on small open sandy flats along creeks below escarpment; scarce elsewhere. One specimen (in spirit).

CORACIIDAE

Eurystomus orientalis (Linnaeus) **Dollar-bird**

Söderberg saw a few at Mowla Downs in December 1910.

ALAUDIDAE

Mirafra javanica Horsfield **Horsfield's Bushlark**

Specimen collected by Rogers at Mungi. [In April 1976 and May 1977 Johnstone observed it on Dampier Downs and Mowla Bluff.]

HIRUNDINIDAE

Cheramoeca leucosterna (Gould) **White-backed Swallow**

[A few birds, in ones and twos, observed by Smith and Johnstone in April 1974 along the McLarty Track 30-40 km south of the Area.]

Hirundo nigricans Vieillot **Tree Martin**

Probably occurring in Area as an autumn-winter visitor. [Recorded south of the Area (along the McLarty Track by Smith and Johnstone in April 1974), north of the Area (collected by Rogers on Manguel Creek in May 1911), and west of the Area (many observations on the Roebuck Plains).]

Hirundo ariel (Gould) **Fairy Martin**

Scarce (but possibly more plentiful in wet season) in vicinity of Edgar Ranges. Hundreds, perhaps thousands, of old nests in cliffs of escarpment. Breeding at Mowla Downs in December 1910 (Söderberg).

MOTACILLIDAE

Anthus novaeseelandiae (Gmelin) **Richard's Pipit**

Only one bird observed, on a burnt spinifex flat immediately south of the Edgar Ranges. One specimen (male).

CAMPEPHAGIDAE

Coracina maxima (Rüppell) **Ground Cuckoo-shrike**

Four seen in open pindan near Camp P1.

Coracina novaehollandiae (Gmelin) **Black-faced Cuckoo-shrike**

Uncommon to moderately common, usually in ones and twos but occasionally in small flocks (up to 9 birds). In all wooded habitats.

Lalage sueurii (Vieillot) **White-winged Triller**

Common, in ones, twos and small parties (up to *ca* 10 birds) and occasionally large parties (up to *ca* 60 birds), many birds immature. Mainly in pindan and dune vegetation at flowering shrubs and trees, including *Grevillea refracta, G. wickhami, G. eriostachya, Jacksonia*, eucalypts and acacias, often in company of Crimson Chats and Masked Woodswallows.

PACHYCEPHALIDAE

Microeca leucophaea (Latham) **Jacky Winter**

[Johnstone saw one in pindan 4km NW of north-west corner of the Edgar Ranges Area in May 1977.]

Petroica goodenovii (Vigors & Horsfield) **Red-capped Robin**

Scarce, in ones and twos, including a fully-plumaged male. Mainly in wattle thickets.

Petroica cucullata (Latham) **Hooded Robin**

One male observed near head of Geegully Creek (below Camp R2). Breeding at Mowla Downs in November 1910 (Söderberg).

Pachycephala rufiventris (Latham) **Rufous Whistler**

Moderately common in pindan of northwestern part of Area, but scarce around Edgar Ranges and none observed in dune country.

Colluricincla harmonica (Latham) **Grey Shrike-thrush**

Uncommon in northwestern part of Area; scarce in dune country; in ones and twos. Mainly pindan (dense, open and burnt). Three specimens (1 male, 2 female).

Oreoica gutturalis (Vigors & Horsfield) **Crested Bellbird**

Moderately common in pindan of northwestern part of Area in ones and twos. One specimen (male), when collected on 15 August it was sitting on two heavily incubated eggs in a nest 1.5m above ground in a *Gardenia*.

MONARCHIDAE

Rhipidura leucophrys (Latham) **Willie Wagtail**

Common at Camp P2 [and along watercourses on Dampier Downs], but generally uncommon to moderately common in the Area; in ones and twos.

Myiagra inquieta (Latham) **Restless Flycatcher**

[Observed in *Melaleuca* thickets at Duffers Bore, 24 km ENE of Dampier Downs HS.]

ORTHONYCHIDAE

Pomatostomus temporalis (Vigors & Horsfield) **Grey-crowned Babbler**

Uncommon in northwestern part of the Area in pindan and eucalypt woodland; elsewhere only observed near Camp D2 (one party and three old nests).

ACANTHIZIDAE

Gerygone fusca (Gould) **Western Flyeater**

The nominate race is probably a rare winter visitor to the Area; the only record is the specimen collected by Rogers at Mungi on 21 June 1911, it served Mathews as the type of *G. culicivora dendyi*. There is likewise only one record of the desert subspecies, *G. fusca mungi* Mathews; Rogers collected the type at Mungi.

Smicrornis brevirostris (Gould) **Weebill.**

Scarce; only observed on plateau immediately south of Edgar Ranges (at Camps R1 and R2). One specimen (female), a very yellow bird.

MALURIDAE

Malurus lamberti Vigors & Horsfield **Variegated Fairy-wren**

Scarce to moderately common, in pairs or small parties. Mainly wattle thickets, preferring isolated patches to the more continuous shrubbery of the pindan. Two specimens (1 male, 1 female), subspecies *M. l. assimilis* North.

Malurus melanocephalus (Latham) **Red-backed Fairy-wren**

Probably occurring in the Area (just outside of it a pair, including a nuptial male, were observed on Dampier Downs 1 km south of McHugh Bore). Breeding at Mowla Downs in December 1910 (Söderberg).

SYLVIIDAE

Eremiornis carteri North **Spinifex-bird**

Scarce. Spinifex on stony slopes and ridges and on alluvial flats about the headwaters of Geegully Creek. One specimen (male).

Cincloramphus mathewsi Iredale **Rufous Songlark**

Locally common (at Camp P1) but generally scarce or uncommon. Open pindan and open eucalypt woodland. One specimen.

Cincloramphus cruralis (Vigors & Horsfield) **Brown Songlark**

Scarce. Open spinifex flats, especially in stony country.

DAPHOENOSITTIDAE

Daphoenositta chrysoptera (Latham) **Australian Sittella**

Scarce. Bloodwoods and other eucalypts and open pindan. One specimen (female), subspecies *leucoptera* (Gould).

CLIMACTERIDAE

Climacteris melanura Gould **Black-tailed Tree-creeper**

In April a bird heard, but not seen, by Johnstone in pindan 23 km WNW of McHugh Bore. Several specimens collected by Söderberg at Mowla Downs in 1910.

DICAEIDAE

Dicaeum hirundinaceum (Shaw) **Mistletoebird**

Uncommon to moderately common in pindan of northwest of Area; scarce around the ranges.

PARDALOTIDAE

Pardalotus rubricatus Gould **Red-browed Pardalote**

Locally common (Camp R2) but generally uncommon; in ones and twos. Along small watercourses and in pindan. On 5 August a bird flushed from burrow with nest ready for eggs. One specimen (male).

Pardalotus striatus (Gmelin) **Striated Pardalote**

The subspecies *P. s. substriatus* Mathews is probably a rare winter visitor to the Area, it was collected by Rogers at Mungi.

MELIPHAGIDAE

Lichmera indistincta (Vigors & Horsfield) **Brown Honeyeater**

Common. All wooded habitats, but locally aggregating at flowering trees and shrubs, especially *Grevillea wickhami, G. refracta* and *G. eriostachya.*

Certhionyx niger (Gould) **Black Honeyeater**

Scarce; mostly single birds, including juveniles. Mainly in *Acacia, Grevillea, Gardenia* and *Eucalyptus* in open pindan. One juvenile was begging for food. [More plentiful, especially at flowering *Grevillea refracta,* on the McLarty Track in April 1974.]

Certhionyx variegatus Lesson **Pied Honeyeater**

Only one record: a party of six feeding with Brown and Singing Honeyeaters in flowering *Grevillea eriostachya* near escarpment at R2.

Meliphaga virescens (Vieillot) **Singing Honeyeater**

Common. Favouring pindan but occurring in all kinds of thickets and shrubbery. One juvenile, just able to fly, was accompanied by two adults.

Meliphaga keartlandi (North) **Grey-headed Honeyeater**

Moderately common. Favouring flowering *Grevillea refracta* and *G. wickhami,* but also seen in wattles and eucalypts.

Meliphaga penicillata Gould **White-plumed Honeyeater**

Moderately common in river gums on watercourses below the escarpment of the Edgar Ranges. Nesting on Mowla Downs in December 1910 (Söderberg).

Melithreptus gularis (Gould) **Black-chinned Honeyeater**

Uncommon in pindan; scarce or absent elsewhere. Only in eucalypts especially bloodwoods. The subspecies here is *laetior* Gould, the Golden-backed Honeyeater.

Philemon citreogularis (Gould) **Little Friarbird**

Rare visitor to Mungi (Rogers). [Rare on Dampier Downs (a male collected, one of three birds in tall eucalypts near Logues Spring).]

Phylidonyris albifrons (Gould) **White-fronted Honeyeater**

Scarce, in ones and twos in dune country. Attracted to flowering *Grevillea eriostachya.* One specimen (female).

Conopophila rufogularis (Gould) **Rufous-throated Honeyeater**

Scarce. Mainly in pindan of northwest of the Area and in eucalypt woodland. One specimen (female). Nesting at Mowla Downs in December 1910 (Söderberg). [In September 1980 several were seen at Logues Spring] and flocks up to 12 were feeding in flowering *Eucalyptus camaldulensis* and on insects from *Acacia holosericea* pods near headwaters of Geegully Creek on the western end of Ardjorie.

Manorina flavigula (Gould) **Yellow-throated Miner**

Common at Camp D2, but generally scarce. Eucalypt woodland.

Epthianura tricolor Gould **Crimson Chat**

Common in more open country; in ones, twos, small parties (3-10 birds), and flocks up to 50 birds, and occasionally in loose aggregations of up to 300 birds. Attracted to flowering *Grevillea eriostachya, G. wickhami, G. refracta* and *Hakea* sp.

PLOCEIDAE

Emblema pictum Gould **Painted Finch**

Uncommon; mostly in pairs, largest flock 8. Mainly among spinifex and rocks of Edgar Ranges, but occasionally in spinifex at foot of nearby dunes. A nest with three newly hatched young found in clump of spinifex on side of creek near Camp R1 on 7 August. One specimen (male).

Poephila guttata (Vieillot) **Zebra Finch**

Scarce in dune country but common about Edgar Ranges and in pindan; in pairs, small parties and flocks up to 80 birds. Many old nests found.

Poephila acuticauda (Gould) **Long-tailed Finch**

Very few at Mungi (Rogers).

Lonchura pectoralis (Gould) **Pictorella Finch**

A flock of 8 in belt of bloodwood/spinifex 38 km SSE of McHugh Bore.

GRALLINIDAE

Grallina cyanoleuca (Latham) **Magpie-lark**

One at old seismic camp 21 km SE of McHugh Bore in September 1980. [Common on Dampier Downs in vicinity of water.]

ARTAMIDAE

Artamus leucorhynchus (Linnaeus) **White-breasted Woodswallow**

Nesting at Mowla Downs in November and December 1910 (Söderberg).

Artamus personatus (Gould) **Masked Woodswallow**

Very common in pindan in noisy flocks of up to 500 birds; uncommon or scarce elsewhere. Attracted to flowering *Grevillea refracta, G. wickhami* and *Hakea pyramidalis.*

Artamus cinereus Vieillot **Black-faced Woodswallow**

Uncommon in dune country; moderately common elsewhere. Eucalypt woodland and open and burnt pindan; in dense pindan only where dead emergent eucalypts provide lookouts. One bird seen feeding in flowering *Grevillea wickhami.*

Artamus minor Vieillot **Little Woodswallow**

Only observed in and near Edgar Ranges, where it was scarce to moderately common in pairs or parties of up to 8 birds. Nesting at Mowla Downs in November and December 1910 (Söderberg).

CRACTICIDAE

Cracticus nigrogularis (Gould) **Pied Butcherbird**

Moderately common. Mainly in tall eucalypts in gullies of Edgar Ranges and in open eucalypt woodlands of plains and interdunes.

PARADISAEIDAE

Ptilonorhynchus nuchalis Jardine & Selby **Great Bowerbird**

Status in Area uncertain; two birds seen on 15 August flying westwards over the pindan at Camp P2. [Johnstone noted single birds in April on Dampier Downs at Logues Springs and Duffers Bore.]

CORVIDAE

Corvus bennetti North **Little Crow**

Scarce to common, in flocks of 10-70 birds. Several old nests in river gums along a creek north of Camp R1 were probably of this species. Two specimens (1 female and 1 in spirits).

DISCUSSION

One hundred and twenty-one species are recorded for the Edgar Ranges Area, or are believed to occur there from their occurrence nearby.

Although the main survey was short we were able to cover much of the Area by vehicle and we feel that most of the resident species were recorded; these include rare or interesting species like the Peregrine Falcon *(Falco peregrinus)*, Spinifex Pigeon *(Geophaps plumifera,* Major Mitchell's Cockatoo *(Cacatua leadbeateri)*, Grey-headed Honeyeater *(Meliphaga keartlandi)*, White-plumed Honeyeater *(Meliphaga penicillata)* and Little Woodswallow *(Artamus minor)*.

After heavy rains in November 1910 Söderberg recorded many waterfowl and waders, including Chestnut Whistling Duck *(Dendrocygna arcuata)*, Plumed Whistling Duck *(Dendrocygna eytoni)*, Black-tailed Native Hen *(Gallinula ventralis)*, Oriental Plover *(Charadrius veredus)*, Black-winged Stilt *(Himantopus himantopus)* and the Oriental Pratincole *(Glareola maldivarum)*, and many more wetland birds will no doubt be found to occur in the Area when visits are made after good rains. Little time has been spent in the eastern part of the Edgar Ranges (Ardjorie) which is much more dissected than the western end and contains many large creeks and pools forming the headwaters of Geegully Creek.

The Edgar Ranges are on the boundary between two major zoogeographic subregions, the Torresian in the north and the Eyrean in the south. The Fitzroy River drainage is close to the northern edge of the ranges and the dunes of the Great Sandy Desert are only a few kilometres to the south. Although situated just within the Kimberley Division, the Torresian element in the avifauna is small and comprises only 8 species, none of which reach the Pilbara: Red-collared Lorikeet *Trichoglossus haematodus*), Varied Lorikeet (*Trichoglossus versicolor), Red-winged Parrot (Aprosmictus erythropterus*), Little Friarbird (*Philemon citreogularis*) Rufous-throated Honeyeater (*Conopophila rufogularis*), Long-tailed Finch (*Poephila acuticauda*), Pictorella Finch (*Lonchura pectoralis*) and Great Bowerbird (*Ptilonorhynchus nuchalis*).

The Great Sandy Desert is a major barrier between the Kimberley and Pilbara regions; and many species have a broken distribution with a population in the Kimberley and one in the Pilbara or southern Western Australia. Species whose Kimberley population is at its southern limit in the Edgar Ranges Area comprise the Red-tailed Black Cockatoo *(Calyptorhynchus magnificus)*, Corella *(Cacatua sanguinea)*, Pheasant Coucal *(Centropus phasianinus)*, Barking Owl *(Ninox connivens)*, Tawny Frogmouth *(Podargus strigoides)*, Australian Owlet-nightjar *(Aegotheles cristatus)*, Blue-winged Kookaburra *(Dacelo leachii)*, Jacky Winter *(Microeca leucophaea)*, Restless Flycatcher *(Myiagra inquieta)*, Grey-crowned Babbler *(Pomatostomus temporalis)*, Weebill *(Smicrornis brevirostris)*, Australian Sittella *(Daphoenositta chrysoptera)* and the Black-tailed Tree-creeper *(Climacteris melanura)*.

Some arid-country species whose range is continuous across the Great Sandy Desert are at their northern limit in south-western Kimberley along or near the Edgar Ranges: these include Princess Parrot *(Polytelis alexandrae)*, Major Mitchell's Cockatoo *(Cacatua leadbeateri)*, White-backed Swallow *(Cheramoeca leucosterna)*, Western Flyeater *(Gerygone fusca mungi)*, Spinifex-bird *(Eremiornis carteri)*, White-fronted Honeyeater *(Phylidonyris albifrons)*, Grey-headed Honeyeater *(Meliphaga keartlandi)* and White-plumed Honeyeater *(Meliphaga penicillata)*.

The Area contains large tracts of pindan scrub which is especially dense on the hard country about the Edgar Ranges and in the western parts of the Area. To the south the vegetation falls away rapidly with the dunes only sparsely covered with stunted trees and shrubs and often with little ground cover. The pindan contains a profusion of flowering trees and shrubs (particularly grevilleas and acacias) and a good ground cover of soft grasses and spinifex; it attracts many wide-ranging and highly nomadic species, e.g. Budgerigar *(Melopsittacus undulatus)*, Cockatiel *(Nymphicus hollandicus)*, White-winged Triller *(Lalage sueurii)*, Black Honeyeater *(Certhionyx niger)*, Pied Honeyeater *(Certhionyx variegatus)*, White-fronted Honeyeater *(Phylidonyris albifrons)*, Crimson Chat *(Epthianura tricolor)*, Masked Woodswallow *(Artamus personatus)* and Black-faced Woodswallow *(Artamus cinereus)*.

The pindan and melaleuca scrubs form a narrow strip of well-wooded country between the Great Sandy Desert and the sea, and provide a north-south corridor between the Kimberley and the North-West Divisions. Three tropical species, the Great Bowerbird, Bar-shouldered Dove (*Geopelia humeralis*) and Red-winged Parrot, occur along this belt and the latter two have reached the North-West Division.

The rufous-bellied populations of the Spinifex Pigeon (*Geophaps plumifera "mungi"*) are confined, in Kimberley, to the Grant and Edgar Ranges and are separated from the white-bellied populations by the alluvial plains of the Fitzroy River (Johnstone 1981). It is interesting that the Grant and Edgar Ranges should have an appearance and vegetation more like those of the country south of the Kimberley. Another mainly arid-zone species, the White-plumed Honeyeater, occurs in the open vegetation along Geegully Creek to its junction with the Fitzroy River. The dense fringing forests of the Fitzroy are unsuitable habitat for this honeyeater and are dominated by the very similar Yellow-tinted Honeyeater (*Meliphaga flavescens*).

Non-breeding winter visitors to the area include the Pallid Cuckoo (*Cuculus pallidus*), Western Flyeater (*Gerygone fusca fusca*), Striated Pardalote (*Pardalotus striatus substriatus)* and Tree Martin (*Hirundo nigricans*). The Rainbow Bee-eater is probably a breeding visitor.

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PART V

AMPHIBIANS AND REPTILES

by G.M. Storr[1] and L.A. Smith[1]

INTRODUCTION

This paper is based mainly on collections and observations made during a biological survey of the Edgar Ranges Area, South-west Kimberley, Western Australia in August 1976. Data were gathered at two sites in and near the ranges (R1, R2) (see Fig. 2 and Site Descriptions in McKenzie and Kenneally, this publication), two sites in the sand dune country south of the ranges (D1, D2), and two sites in the pindan country west of the ranges (P1, P2). Visits were made to other parts of the Edgar Ranges Area and to Dampier Downs Station (especially McHugh Bore, Logues Spring and Duffers Yard). Additional information was obtained from:

(1) R. Söderberg's visit to Mowla Downs in November and December 1910; his amphibian specimens were reported on by Andersson (1913), and the reptiles by Lönnberg and Andersson (1913).

(2) L. A. Smith and R. E. Johnstone's traverse of the McLarty Track (30-40 km south of the Area).

(3) N. L. McKenzie and R. E. Johnstone's reconnaissance trip to Dampier Downs in April 1976.

(4) N. L. McKenzie and R. E. Johnstone's brief visit to Dampier Downs and Mowla Bluff in May 1977.

(5) N. L. McKenzie and J. Rolfe's survey of the desert country immediately west of the Edgar Ranges in late September 1980.

(6) Verbal notes from Mr P. De Long of Dampier Downs.

In the annotated list, the number of specimens collected is placed in brackets after each site, together with any assessment that could be made on habitat preferences. Where they throw light on the Area, data from the adjoining cattle stations are included in the body of the text in square brackets. Species found on these stations, but unlikely on ecological grounds to be found in the Edgar Ranges Area, are omitted from the list; they are the frogs *Limnodynastes ornatus* and *Litoria rothii* and the crocodile *Crocodylus johnstoni*.

LIST OF SPECIES

AMPHIBIA

LEPTODACTYLIDAE **Ground Frogs**

Cyclorana australis (Gray)

Recorded at 20 km W of McHugh Bore (1).

This specimen was found in a bulldozer scrape partly filled with water. [Plentiful on Dampier Downs and Mowla Bluff stations, at claypans and springs.]

Cyclorana longipes Tyler & Martin

[Probably occuring in the Area. It has been collected at a claypan on Dampier Downs and at Mt Phire in arid country southwest of the Area.]

Neobatrachus centralis (Parker)

At Mowla Downs in December 1910 Söderberg collected one of many specimens of "*Heleioporus pictus*" that appeared after two days of rain. Parker (1940 p. 35) believed that the specimen probably belonged to his new species *centralis*.

Notaden nichollsi Parker

Söderberg found it common on Mowla Downs after rain in December 1910. Five specimens were collected at Dampier Downs Homestead in April 1976 and May 1977.

Uperoleia sp.

[At least one species probably occurring in the Area. Three specimens of one species collected at Dampier Downs Homestead.]

HYLIDAE **Tree Frogs**

Litoria caerulea (White)

Recorded at R2 (4).

These specimens were collected at a small pool below the escarpment. [Common on Dampier Downs at edges of pools lined with *Pandanus*, *Eucalyptus* and *Acacia*.]

Litoria rubella (Gray)

Recorded at R1 (1) and R2 (2).

These specimens were collected at small pools below the escarpment. [Much more plentiful on Dampier Downs.]

REPTILIA

GEKKONIDAE **Geckos**

Diplodactylus ciliaris Boulenger

Recorded at R1 (2), R2 (9), D1 (17), 8 km SSW of D1 (4), D2 (1), P1 (4), P2 (1).

Mainly found at night on dead or burnt acacias and on stunted eucalypts. The specimens from R2 were noted as having pinkish mouths. (Lönnberg and Andersson (1913 p. 5) cite Mjöberg's field notes on the viscous exudate from this gecko's skin.)

Diplodactylus conspicillatus Lucas & Frost

Recorded at R2 (2) and in 18°50'S, 123°04'E (1), 18°54'S, 123°02'E (1) and 18°55'S, 123°27'E (1).

The specimens from R2 were found on reddish sand with regenerating eucalypt woodland. One of them behaved strangely: it played possum on the ground and in the hand for at least fifteen minutes after capture; it curled itself into a tight S. Another specimen was taken from the stomach of a Boobook Owl (*Ninox novaeseelandiae*).

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Diplodactylus elderi Stirling & Zietz

Recorded at B1 (1) and R2 (5).

In spinifex growing on sand or hard gravelly soil.

Diplodactylus stenodactylus Boulenger

Recorded at D1 (5), R2 (1), 13 km W of McHugh Bore (1), 20 km W of McHugh Bore (11) and in 18°54′S, 123°02′E (2).

Found at night on red sands and sandy loams with sparse or moderately dense vegetation (acacias, eucalypts, coarse grass etc.). On being discovered, the specimen at R2 ran very fast, like its southern relative *D. maini.*

Diplodactylus taeniatus (Lönnberg & Andersson)

Recorded at D1 (2) and in 18°41′S, 123°07′E (1).

One of the D1 specimens was collected in spinifex, the other in a *Calytrix* bush. This species is not confined to dune country in this area; it was collected in other grasses as well as spinifex on Dampier Downs.

Gehyra pilbara Mitchell

Recorded at R1 (12), R2 (9), head of Geegully Creek (1), D1 (11) and D2 (7).

Most specimens were taken from termitaria, including two hatchlings on 8 August. Many were collected in old mud nests of the Fairy Martin (*Hirundo ariel*). None were found in trees and shrubs, the habitat of *G. variegata.*

Gehyra sp. affin. *variegata* (Duméril & Bibron)

[Collected on the McLarty Track and probably occurring in the better wooded dunes in the south of the Area.]

Heteronotia binoei (Gray)

Recorded at R1 (4), R2 (2), D1 (1), 8 km SSW of D1 (2), D2 (10) and P2 (2).

This abundant and widespread species was equally at home in sandy and stony habitats. It was found in termitaria, in rotting logs and under rubbish.

Nephrurus laevissimus Mertens

Recorded at D1 (9).

This desert gecko was confined to sand dunes vegetated with spinifex, *Calytrix* and other bushes, and stunted eucalypts.

Nephrurus levis levis DeVis

Recorded in 18°54′S, 123°02′E (2)

This desert gecko was pit-trapped in brown sandy interdunal soil.

Oedura rhombifera Gray

[Almost certainly occurring in the Area. One taken from under a drum at Dampier Downs Homestead.]

Rhynchoedura ornata Günther

Recorded at D1 (2), 8 km W of D1 (3), D2 (1), 13 km W of McHugh Bore (1), 20 km W of McHugh Bore (8) and in 18°54′S, 123°02′E (1).

All specimens were collected on sandy soil, either in dune or pindan country. Several were found half-protruding from spider burrows.

PYGOPODIDAE **Legless Lizards**

Delma borea Kluge

Recorded at R2 (1).

This specimen was found in a spinifex tussock growing on hard gravelly ground.

Lialis burtonis Gray

Recorded at P1 (2).

Both specimens were obtained in pindan. [On Dampier Downs one was taken from a clump of spinifex.]

AGAMIDAE **Dragon Lizards**

Amphibolurus caudicinctus (Günther)

Recorded at R1 (9) and R2 (7).

Both in the Area and on Dampier Downs this lizard was confined to the rocks and stony ground of the Edgar Ranges and escarpment.

Amphibolurus inermis (DeVis)

Recorded at D1 (1) and P1 (2).

The first specimen was in a 20 cm long burrow in sand; the others were perched in a stunted eucalypt in pindan.

Amphibolurus isolepis isolepis (Fischer)

Recorded at R1 (6), R2 (8), D1 (3), D2 (7), P1 (2), P2 (2) and in 18°50′ S, 123°04′ E (1).

Mainly is red sandy soils with spinifex and soft grasses; also on stony ground with spinifex.

Amphibolurus mitchelli Badham

Recorded at D1 (1) and P1 (2).

Two of the specimens were perched in eucalypts.

Diporiphora pindan Storr

Recorded at P1 (1), P2 (12), Thangoo No. 2 (1), 37 km SSE of McHugh Bore (1) and in 18°49′ S, 123°05′ E (3) and 18°54′ S, 123°02′ E (2).

Most specimens were in pindan, a few were in lightly vegetated interdunes.

Diporiphora winneckei Lucas & Frost

Recorded at D1 (2) and D2 (1).

The first two specimens were found on dunes with *Acacia* and spinifex; the third was in a very open woodland over spinifex. [A specimen from the McLarty Track, 80 km SE of the Great Northern Highway, was found in spinifex growing on the crest of a dune.]

Lophognathus longirostris Boulenger

Recorded at P2 (2).

Both specimens were in pindan.

SCINCIDAE **Skinks**

Carlia triacantha (Mitchell)

Recorded at R2 (1).

This specimen was found inside a termitarium on the plateau above the escarpment.

Ctenotus grandis grandis Storr

Recorded at D2 (1) and in 18°53′ S, 123°02′ E (1).

The first specimen was obtained in very open woodland with spinifex, the other on a sparsely vegetated sand dune.

Ctenotus helenae Storr

[Almost certainly occurring in the southern part of the Area. It was collected on the McLarty Track, 26 km NE of McLarty Hills]

Ctenotus inornatus (Gray)

Recorded at P1 (1) and P2 (4).

These specimens were collected in pindan growing on red sandy soil. They and another eleven specimens from Dampier Downs were separated from *C. saxatilis* on coloration, especially the vertebral stripe, which was narrow, ill-defined and only occasionally pale-edged (the pale edge was never margined with black); number of supraciliaries varied from 8 to 10 (n=13 mean=8.5).

Ctenotus pantherinus ocellifer (Boulenger)

Recorded at R1 (1), R2 (6), D2 (7), P1 (1), 8 km S of McHugh Bore (1) and in 18°50′S, 123°04′E (1).

These specimens were obtained from a wide variety of soil and vegetation types; the common factor was the presence of spinifex, in which, indeed, many of the skinks had been sheltering.

Ctenotus piankai Storr

Recorded in 18°50′ S, 123°04′ E (1).

The specimen was pit-trapped on red loamy sand in an interdune with open shrubs, soft grasses and spinifex.

Ctenotus quattuordecimlineatus (Sternfeld)

Recorded in 18°53′ S, 123°02′ E (1).

The specimen was pit-trapped on a sparsely vegetated sand dune.

Ctenotus saxatilis Storr

Recorded at R1 (4), R2 (10).

All these specimens inhabitated stony ground covered with spinifex and most of them were actually found in tussocks of spinifex. They were separated from *C. inornatus* on coloration, especially the strong, white-edged, black vertebral stripe, the white edge itself margined with black; supraciliaries varied from 7 to 9 (n=14, mean=7.5).

Eremiascincus richardsonii (Gray)

Recorded at D2 (2).

Both specimens were in soft soil at the bottom of a termitarium.

Lerista bipes (Fischer)

Recorded at R1 (1), P1 (1), P2 (1) and in 18°54′S, 123°02′E (1).

The first three specimens were found on sandy tracks, the last in a sandy interdune.

Morethia ruficauda ruficauda (Lucas & Frost)

Recorded at R2 (1) and P2.

The specimen collected was found inside a termitarium on the plateau above the escarpment. Another specimen escaped from the burrow of a Red-browed Pardalote (*Pardalotus rubricatus*).

Proablepharus reginae (Glauert)

Recorded at R1 (3) and R2 (6).

The specimens from R1 were in spinifex growing on stony ground; those from R2 were in spinifex on fine silty ground just below the escarpment.

Sphenomorphus isolepis (Boulenger)

Recorded in 18°49′S, 123°05′E (1), 18°53′S, 123°02′E (2) and 18°54′S, 123°02′E (3).

All these specimens were obtained on two days (24-25 September 1980) in lightly vegetated dunes and interdunes.

Tiliqua mulitifasciata (Sternfeld)

Recorded at P2 (1).

VARANIDAE **Monitors**

Varanus acanthurus Boulenger

[Almost certainly occurring in the Area. Three specimens were collected near McHugh Bore on Dampier Downs.]

Varanus eremius Lucas & Frost

Recorded at D2 and in 18°53′S, 123°02′E (1).

The D2 monitor observed by L. A. Smith was in very open woodland over spinifex; it was chasing an *Amphibolurus i. isolepis*. The other monitor was obtained on a sparsely vegetated dune.

Varanus gilleni Lucas & Frost

Recorded at D2 (1) and R2 (1).

The first specimen was collected several metres up in a dead eucalypt; the other was inside a dead *Hakea lorea*.

Varanus gouldii (Gray)

One observed in dense pindan 29 km NW of McHugh Bore in May 1977.

Varanus tristis tristis (Schlegel)

Recorded at R1 (1) and P1 (1).

The first specimen was found in an old nest of the Fairy Martin (*Hirundo ariel*) in the overhang of a cliff; the second was trapped in pindan growing on red sandy soil.

TYPHLOPIDAE **Blind Snakes**

Ramphotyphlops diversus diversus (Waite)

Recorded at P2 (1).

This specimen was found in a rotting log.

Ramphotyphlops grypus (Waite)

The specimen of *'Typhlops affinis'* from Mallalah (Lönnberg & Andersson, 1913: 12) probably belonged to *R. grypus*, which at that time was not described.

BOIDAE **Pythons**

Aspidites melanocephalus (Krefft)

[Almost certainly occurring in the Area. Mr P. De Long of Dampier Downs obtained one from a termitarium.]

Liasis sp.

Recorded at R1 (1), D1 (1) and D2 (1).

All specimens were taken from termitaria.

ELAPIDAE **Front-fanged Snakes**

Acanthophis pyrrhus Boulenger

[Almost certainly occurring in the Area. Mr P. De Long (pers. comm.) has taken a death adder from a termitarium on Dampier Downs.]

Denisonia punctata Boulenger

[Almost certainly occurring in the Area. One specimen from within 4 km of Dampier Downs Homestead.]

Furina ornata (Gray)

[Almost certainly occurring in the Area. One was found under rubbish at McHugh Bore, Dampier Downs.]

Pseudechis australis (Gray)

Recorded at P2 (a sloughed skin).

Vermicella annulata multifasciata (Longman)

[Probably occurring in the Area. Mr P. De Long (pers. comm.) has taken one from a termitarium on Dampier Downs.]

DISCUSSION

Only 45 species of amphibians and reptiles are recorded for the Edgar Ranges Area. To these we can add nine species recorded from adjacent Dampier Downs and Mowla Bluff Stations and two species from the McLarty Track; suitable habitat exists for them in the Area, and the probability of their occurring there is high.

In the Edgar Ranges Area the dunes of the Great Sandy Desert approach to within a few kilometres of the Fitzroy River drainage; hence the juxtaposition of two distinct faunas, that of the Kimberley proper and that of the western deserts. The boundary between two pairs of closely related parapatric species passes through the Area, namely *Diporiphora pindan/winneckei* and *Ctenotus inornatus/saxatilis.*

In Table 1 we list the geckos, agamid lizards and skinks recorded for the Prince Regent Reserve (in subhumid northwest Kimberley), the Drysdale River National Park (in north Kimberley close to the boundary between the subhumid and semi-arid zones), the vicinity of Lake Argyle (in semi-arid east Kimberley), and in the Edgar Ranges Area (in arid southwest Kimberley). It will be seen that the Edgar Ranges Area is especially rich in species of such arid zone genera as *Diplodactylus, Amphibolurus* and *Ctenotus,* but it is weakly represented by genera that are well-developed in the subhumid and semiarid zones, e.g. *Diporiphora* and *Carlia.*

ACKNOWLEDGMENTS

We are grateful to Mr P. De Long for his observations and to Mr P. Griffin for unpublished data from the vicinity of Lake Argyle.

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TABLE 1

GECKOS, AGAMIDS AND SKINKS FROM FOUR KIMBERLEY LOCALITIES.

	Prince Regent Nature Reserve	Drysdale River National Park	Lake Argyle vicinity	Edgar Ranges Area
GEKKONIDAE				
Crenadactylus ocellatus			x	
Diplodactylus ciliaris		x	x	x
Diplodactylus conspicillatus			x	x
Diplodactylus elderi				x
Diplodactylus mcmillani		x		
Diplodactylus stenodactylus		x	x	x
Diplodactylus taeniatus			x	x
Gehyra australis		x	x	
Gehyra nana	x	x	x	
Gehyra pilbara			x	x
Gehyra sp. affin. *variegata*				x

TABLE 1—*continued*

	Prince Regent Nature Reserve	Drysdale River National Park	Lake Argyle vicinity	Edgar Ranges Area
GEKKONIDAE—*continued*				
Gehyra xenopus	x			
Heteronotia binoei	x	x	x	x
Heteronotia spelea	x	x	x	
Nephrurus asper	x	x	x	
Nephrurus laevissimus				x
Nephurus levis				x
Oedura rhombifera	x			
Oedura marmorata	x	x	x	
Pseudothecadactylus lindneri cavaticus	x			
Rhynchoedura ornata		x	x	x
AGAMIDAE				
Amphibolurus caudicinctus			x	x
Amphibolurus inermis			x	x
Amphibolurus isolepis isolepis			x	x
Amphibolurus microlepidotus	x			
Amphibolurus mitchelli		x		x
Chelosania brunnea	x		x	
Chlamydosaurus kingii	x		x	
Diporiphora albilabris albilabris	x			
Diporiphora arnhemica			x	
Diporiphora bennettii	x	x	x	
Diporiphora magna	x	x	x	
Diporiphora pindan				x
Diporiphora superba	x			
Diporiphora winneckei				x
Lophognathus gilberti gilberti	x	x	x	
Lophognathus longirostris				x
Tympanocryptis lineata			x	
SCINCIDAE				
Carlia amax	x	x	x	
Carlia foliorum	x	x	x	
Carlia johnstonei	x	x		
Carlia rufilatus			x	
Carlia triacantha	x	x	x	x
Cryptoblepharus megastictus		x	x	
Cryptoblepharus plagiocephalus	x	x	x	

TABLE 1—*continued*

	Prince Regent Nature Reserve	Drysdale River National Park	Lake Argyle vicinity	Edgar Ranges Area
SCINCIDAE—*continued*				
Ctenotus burbidgei	x			
Ctenotus decaneurus		x	x	
Ctenotus grandis grandis				x
Ctenotus helenae				x
Ctenotus inornatus	x	x	x	x
Ctenotus militaris			x	
Ctenotus pantherinus calx			x	
Ctenotus pantherinus ocellifer				x
Ctenotus piankai			x	x
Ctenotus quattuordecimlineatus				x
Ctenotus robustus	x	x	x	
Ctenotus saxatilis			x	x
Ctenotus schomburgkii			x	
Ctenotus tantillus			x	
Eremiascincus richardsonii			x	x
Lerista bipes			x	x
Lerista borealis			x	
Lerista walkeri	x			
Menetia greyii			x	
Menetia maini	x			
Morethia ruficauda ruficauda	x	x	x	x
Notoscincus ornatus wotjulum	x	x	x	
Omolepida branchialis			x	
Omolepida maxima	x			
Proablepharus reginae				x
Proablepharus tenuis	x		x	
Sphenomorphus brongersmai	x			
Sphenomorphus isolepis	x	x	x	x
Tiliqua multifasciata			x	x
Tiliqua scincoides	x	x	x	

PART VI

INSECTS

by I.F.B. Common[1]

INTRODUCTION

The insect collection, the subject of this report, was made in the Edgar Ranges Area in August 1976 (see Fig 2 in McKenzie and Kenneally, this publication). Few systematic collections of insects have been made previously in the Kimberley, Western Australia. In 1887-88 W. W. Froggatt made a small collection for the Macleay Museum at Derby, the Barrier Range, and the Lennard and Fitzroy Rivers (Froggatt 1934). In 1910-11 Mjöberg's Swedish Scientific Expedition to north-western Australia collected some insects at Broome, Derby, Noonkanbah and "the Kimberley district", accounts of which were published by several specialists in *Arkiv för Zoologi* between 1915 and 1933. Much more recently general insect collections have been made at Kunnunurra in East Kimberley (Richards 1968), and in the Prince Regent River Reserve (Bailey and Richards 1975) and the Drysdale River National Park (Common and Upton 1977) in North Kimberley. The largest of these collections was made in the Drysdale River area, which has about double the annual rainfall of the Edgar Ranges.

The Edgar Ranges receive an erratic rainfall of some 500 mm annually, most of which falls between December and March (see McKenzie and Kenneally, this publication). The insect collection was made largely in areas near the gravelly rim of the Edgar Ranges escarpment and in the nearby sandplain and sand dune country. This is an area without permanent surface water, with a relatively xerophytic vegetation ranging from low open-woodland in the north to patchy woodland, shrubland, heath and *Triodia* grassland farther south. At the south-eastern extremity the sand-dune country merges with the Great Sandy Desert. As the collection was made at the driest period of the year, it no doubt fails to include elements of the fauna which are active at other times of the year, especially during and after the rainy season.

METHODS

Insects were collected at the six campsites described by McKenzie and Kenneally (this publication) from 2 to 22 August, 1976, three days being spent at each site. The collecting sites were:

R2 (18°49′S, 123°17′E) 3-5 August
R1 (18°55′S, 123°27′E) 6-8 August
D1 (18°53′S, 123°43′E) 9-11 August
D2 (18°55′S, 123°14′E) 12-14 August
P2 (18°25′S, 122°53′E) 15-17 August
P1 (18°28′S, 123°03′E) 19-21 August

A small collection was also made on 18 August, 1976 at Logues Springs (18°25′S, 123°05′E), the only locality in the area surveyed where permanent fresh water was available. In addition three days (23-25 August, 1976) at the conclusion of the expedition were spent collecting insects within 12 km of Broome.

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Specialist attention was given to the Lepidoptera, but general collections were made in seven other insect Orders. The size and diversity of the fauna made it impracticable for one entomologist to collect all groups of insects adequately. To have done this would have required special collecting techniques in each Order, a requirement beyond the physical capabilities of one person. Collecting therefore had to be limited to hand collecting with nets or aspirators, by sweeping and beating foliage, and by capturing insects attracted to light at night. Most insects were killed in cyanide jars or tubes, or in 80 per cent ethyl alcohol. All Lepidoptera were pinned, the larger specimens directly into store-boxes; microlepidoptera were spread on balsa setting boards or partially spread on foam plastic in special shallow plastic boxes. The larger and more robust specimens of other Orders were also pinned in store-boxes, and many of the smaller specimens were layered between tissue in special layering boxes. Very small Dipera and other soft-bodied insects were preserved in boxes containing finely chopped tissue or "petal-pack". Ants and some other groups were preserved in ethyl alcohol. Specimens were protected from mould by the use of chlorocresol, and from ants and other pests by paradichlorobenzene and insect-repellent sprays.

The numbers of specimens collected at night far exceeded those collected during the day. Power was provided by a 300-watt Honda generator, operating a 160-watt Philips "blended" lamp (type 57502B/56) suspended in front of a vertical white cotton sheet. A 40-watt incandescent lamp was operated simultaneously at a small aluminium demountable table used for pinning and mounting specimens.

Situations for the operation of the light sheet were selected within a radius of about 500 metres of each of the six campsites to permit the most effective coverage of the slightly different habitats. Wherever possible the sheet was erected in positions sheltered from wind or, when shelter was not available, the sheet was oriented so that insects could approach the light up-wind on the sheltered side. The light was operated from dusk to about midnight each night at the six campsites and near Broome, but for a shorter period at Logues Springs.

LIST OF INSECTS COLLECTED

The collection contained more than 5 380 specimens belonging to eight insect Orders, representing 1 070 species. The large number involved has made it impracticable to include here lists of species in most Orders. However, tables are presented showing the number of species and specimens in each family. In some better known families of Lepidoptera, species lists are included, making it possible to compare the results directly with those obtained during similar surveys in northern Australia. In the Formicidae (ants) a generic list is given and in the Diptera some generic or specific breakdown of the collection was possible. The names of the specialists responsible for the information in each Order is shown.

	Species	Specimens
ORTHOPTEROID ORDERS (K. H. L. Key and J. Balderson)		
BLATTODEA	**14**	**14+**
Blattidae	4	
Blaberidae	1	
Blatellidae	9	
PHASMATODEA	**3**	**3+**
Phylliidae	2	
Phasmatidae	1	
MANTODEA	**9**	**9+**
Amorphoscelidae	3	
Mantidae	6	
DERMAPTERA	**3**	**3+**
ORTHOPTERA	**37**	**76+**
Tettigoniidae	7	
Gryllotalpidae	1	
Gryllidae	8	
Eumastacidae	4	
Geckomima gecko (Sjöst.)	1	23
Warramunga sp. PW28	1	7
Warramunga sp. PW29	1	2
Warramunga sp.	1	11
Pyrgomorphidae	1	
Acrididae	14	
Tetrigidae	1	
Tridactylidae	1	
HEMIPTERA (T. A. Weir)	**126**	**480**
HOMOPTERA	**65**	**278**
Eurybrachyidae	4	15
Fulgoridae	2	9
Issidae	1	1
Ricaniidae	3	23
Flatidae	11	91
Dictyopharidae	2	6
Nogodinidae	1	1
Machaerotidae	2	11
Cicadidae	1	2
Cicadellidae	36	116
Membracidae	1	1
Psyllidae	1	2
HETEROPTERA	**61**	**202**
Nabidae	1	1
Miridae	9	34
Reduviidae	8	28
Coreidae	6	10
Alydidae	3	11
Stenocephalidae	1	2
Lygaeidae	9	23
Largidae	1	7
Scutelleridae	2	8
Cydnidae	2	11
Pentatomidae	16	60
Notonectidae	2	6
Belastomatidae	1	1
NEUROPTERA (J.C. Cardale)	**35**	**191**
Coniopterygidae	1	2
Berothidae	3	13
Mantispidae	9	60
Chrysopidae	3	26
Myrmeleontidae	19	90
COLEOPTERA (E. B. Britton)	**110**	**593**
STREPSIPTERA (J. C. Cardale)	**?1**	**4**
(Present in stylopized wasps of family Eumenidae).		
DIPTERA (D. H. Colless)	**99**	**265**
Tipulidae	1	1
Chironomidae	9	26
Polypedilum nubifer (Skuse)		
Polypedilum watsoni Freeman		
Scatopsidae	1	2
Tabanidae	2	3
Ectenopsis (?new species)		
Therevidae	2	3
Asilidae	1	1
Leptogaster sp.		
Apioceridae	1	1
(Probable new species)		
Bombyliidae	14	30
Phthiria sp.		
Geron sp.		
Systoechus sp.		
Anthrax sp.		
Villa sp.		
Bombylius sp.		
Docidomyia sp.		
Ligyra sp.		
Exoprosopa sp.		
Dolichopodidae	2	3
Phoridae	2	8
Syrphidae	1	1
Baccha sp.		
Conopidae	1	1
Pyrgotidae	2	13
Tephritidae	1	1
(not *Dacus*)		
Sphaeroceridae	1	1
Leptocera sp.		
Chamaemyiidae	1	1
Sepsidae	1	2
Lonchaeidae	1	5
Lamprolonchaea sp.		
Ephydridae	3	5
Tethinidae	1	1
Fergusoninidae	1	1
Fergusonina sp.		
Chloropidae	3	4
Muscidae	5	28
Musca vetustissima Walker (bush fly)		
Musca terraereginae Johnston & Bancroft		
Lispe spp. (2)		
Haematobia exigua (De Meijere) (buffalo fly)		
Calliphoridae	4	15
Metallea sp.		
Chrysomya rufifacies (Macquart)		
Chrysomya saffranea (Bigot)		
Chrysomya varipes (Macquart)		
Sarcophagidae	4	5
Tricholioproctia sp.		
Miltogramma sp.		
Protomiltogramma sp.		
Tachinidae	33	102
Including species in *Ceracia* *Carcelia*		

	Species	Specimens
Phorocerostoma		
Palpostoma		
Hyalomyia		
Actia		
Deltomyza		
Anagonia		
Medinodexia		
?Family (new genus and species) (Known previously in the Kimberley and Northern Territory).	1	1
HYMENOPTERA (J.C. Cardale)	**88**	**269**
Ichneumonidae	6	11
Braconidae	15	24
Pteromalidae	1	9
Chrysididae	2	3
Bethylidae	2	2
Dryinidae	3	4
Pompilidae	4	6
Mutillidae	1	2
Tiphiidae	4	16
Eumenidae	6	23
Sphecidae	13	22
Colletidae	15	87
Halictidae	5	14
Megachilidae	5	20
Anthophoridae	5	7
Apidae	1	19
FORMICIDAE (R. W. Taylor)	**28**	**132**
Ponerinae	14	66
Rhytidoponera sp.	1	5
Odontomachus sp.	1	1
Myrmicinae		
Monomorium sp.	1	1
Crematogaster sp.	1	1
Dolichoderinae		
Iridomyrmex spp. (4)	4	42
Formicinae		
Camponotus spp. (3)	3	12
Polyrhachis spp. (2)	2	2
Calomyrmex sp.	1	2

	Edgar Ranges Area		Broome	
	Species	Specimens	Species	Specimens
LEPIDOPTERA (I. F. B. Common and E. D. Edwards)	517(30 †)	2898	179(88*)	442
Opostegidae	3	6	—	—
Cossidae	2	8	—	—
Tortricidae	13	109	6(5*)	28
Immidae	—	—	1*	6
Choreutidae	—	—	1*	2
Psychidae	1	8	1*	1
Tineidae	19(1 †)	101	14(4*)	32
Lyonetiidae	2	14	1	1
Gracillariidae	9	29	1	4
Yponomeutidae	6(1 †)	20	2(1*)	2
Coleophoridae	1 †	1	—	—
Stathmopodidae (Tinaegeriidae)	3	14	5*	6
Oecophoridae	91(3 †)	785	31(12*)	124
Ethmiidae	2	29	1	4
Lecithoceridae (Timyridae)	5	55	2(1*)	9
Cosmopterigidae	27(1 †)	74	17(14*)	31
Xyloryctidae	9(1 †)	21	3(1*)	6
Stenomatidae	4	51	1	2
Gelechiidae	65(3 †)	367	24(12*)	56
Alucitidae	1	1	—	—
Cyclotornidae	1	2	—	—
Epipyropidae	1	1	1	1
Limacodidae	4	11	3*	3
Thyrididae	1 †	1	—	—
Pyralidae	100(8 †)	387	22(11*)	35
Pterophoridae	3(1 †)	10	—	—
Papilionidae	1	3	—	—
Papilio demoleus sthenelus W. S. Macleay				
Pieridae	6	17	—	—
Catopsilia pomona pomona (Fabricius)				
Catopsilia scylla etesia (Hewitson)				
Eurema smilax (Donovan)				
Eurema herla (W. S. Macleay)				
Elodina padusa (Hewitson)				
Anaphaeis java teutonia (Fabricius)				

*Not recorded in the Edgar Range area.

† Taken only at Logues Springs.

	Edgar Ranges Area		Broome	
	Species	Specimens	Species	Specimens
LEPIDOPTERA—*continued*				
Nymphalidae	4(2 †)	6	—	—
Danaus chrysippus petilia (Stoll)				
Euploea core corinna (W. S. Macleay)				
Junonia villida calybe (Godart)				
Acraea andromacha andromacha (Fabricius)				
Lycaenidae	9	46	—	—
Hypochrysops ignitus erythrinus (Waterhouse & Lyell)				
Ogyris amaryllis parsonsi Angel				
Candalides erinus erinus (Fabricius)				
Zetona delospila (Waterhouse)				
Nacaduba biocellata biocellata (C. & R. Felder)				
Catopyrops florinda estrella (Waterhouse & Lyell)				
Theclinesthes miskini (T. P. Lucas)				
Lampides boeticus (L.)				
Famegana alsulus alsulus (Herrich-Schäffer)				
Geometridae	33(1 †)	247	14(7*)	27
Epiplemidae	1	3	—	—
Lasiocampidae	3	28	1*	1
Anthelidae	4	9	—	—
Sphingidae	4(1 †)	11	2(1*)	2
Psilogramma menephron (Cramer)				
Agrius convolvuli (L.)				
Nephele subvaria (Walker)				
Hippotion boerhaviae (Fabricius)				
Hippotion scrofa (Boisduval)				
Notodontidae	7	64	1	14
Lymantriidae	3	27	2(1*)	8
Arctiidae	2	6	3*	7
Hypsidae	1	6	1	1
Nolidae	3(1 †)	8	—	—
Noctuidae	63(4 †)	312	18(3*)	29

Heliothis assulta Guenée
Heliothis punctiger Wallengren
Agrotis munda Walker
"Leucania" scotti (Butler)
Meliana creugeri (Butler)
Mythimna loreyimima (Rungs)
Leucania abdominalis (Walker)
Platysenta dolorosa (Walker)
Platysenta illecta (Walker) (*Euplexia capensis* (Guenée))
Molvena guttalis Walker (*Thalatha guttalis* (Walker))
Spodoptera exigua (Hübner)
Hypoperigea tonsa (Guenée)
Acrapex sp.
Aegle hedychroa (Turner)
Athetis tenuis (Butler)
Amyna natalis (Walker)
Amyna octo (Guenée)
Tabomeeres dolera (Turner)
Epopsima fasciolata (Butler)
Catoblemma trigonographa Turner
Catoblemma sp.
Eublemma anachoresis (Wallengren)
Eublemma leucodesma (Lower)
Eublemma ? extorris (Warren)
Eublemma ? parva (Hübner)
Eublemma ? ragusana (Freyer)
Eublemma spp. (5)
Pseudozarba opella (Swinhoe)
Earias paralella Lucas
Earias ochrophylla Turner
Earias perhuegeli Holloway (*E. huegeli* Rogenhofer)
Armactica conchidia (Butler)
Armactica columbina Walker
Pataeta carbo (Guenée)
Mocis alterna (Walker)
Trigonodes hyppasia (Cramer) (*Chalciope hyppasia* (Cramer))
Grammodes ocellata Tepper
Grammodes oculicola Walker
Ophiusa parcemacula (Lucas) (*Anua parcemacula* (Lucas))
Donuca castalia (Fabricius)
Zophocroa melanica Turner
Antarchaea alopecodes (Meyrick)
Antarchaea laevis (Swinhoe)
Eporectis sp.
Plecoptera juba (Swinhoe)
Fodina gloriosa Lucas
Pantydia capistrata Lucas
Tathorhynchus exsiccata (Lederer)
Hopetounia sp.
**Crypsiprora* sp.
† *Lyncestis phaeocrossa* Turner
Pandesma submurina (Walker)
† *Polydesma* sp.
Aedia sp.
† *Olyssa calamitosa* Walker
Diatenes marmarinopa (Meyrick)
?Genus ?species (6)(2*,1 †)

*Not recorded in the Edgar Range area.

† Taken only at Logues Springs.

DISCUSSION

The relatively poor collections of insects in Orders other than Lepidoptera in the Edgar Ranges Area have made any attempted analysis of the fauna of those Orders unreliable. Most of the species belonging to the five Orthopteroid Orders are typical of the general region in which the survey area is located. However, two of the four Morabinae (Eumastacidae) are probably new species, although there is no evidence that they would be restricted to the Edgar Ranges Area. The Coleoptera included one new species in the Melolonthinae (Scarabaeidae) and one specimen of an African dung beetle, *Onitis alexis* Klug, introduced to Australia and liberated at Derby.

The lack of permanent surface water in most of the survey area meant that aquatic groups were almost entirely unrepresented, although a few species dependent on permanent water were collected at Logues Springs. These included nine species of water beetles, eight Dytiscidae and one Gyrinidae.

No attempt was made to collect termites (Isoptera), but it is of some interest to record the presence of an unusual termite, *Schedorhinotermes derosus* (Hill), in the survey area. This is one of the dry-wood termites, but in this species the workers, accompanied by soldiers, harvest fragments of grass and other vegetation in the open at night, carrying them back to their underground galleries (Watson 1969). If the foraging termites are disturbed they begin to stream back to their galleries, at the same time making a clearly audible rustling sound. The sound, thought to be an alarm signal, is produced by the soldiers rapidly tapping their heads against dry leaves and other objects in their path.

For practical reasons, the Lepidoptera collections had to be restricted to adult insects and, as they were made at the driest time of the year, must contain only those species with adults active during the dry season. However, as samples of Lepidoptera taken at the Prince Regent River (Bailey and Richards 1975) and at the Drysdale River (Common and Upton 1977) were also taken in August, they should be comparable with the present collection. It is indeed surprising that the adults of so many species are present in an arid area such as the Edgar Ranges at this time ot the year, an apparently unfavourable period for plant growth. As the Lepidoptera are an almost entirely phytophagous group, the size of the fauna is influenced to a large extent by the diversity of the flora. For an arid tropical area the Edgar Ranges flora is diverse, but it lacks many of the elements present in the flora of both the Prince Regent River and Drysdale River areas. It is not surprising therefore that the number of species of Lepidoptera taken at the Edgar Ranges Area (514) is considerably smaller than that recorded at the Drysdale River (961), where similar attention was given to both the larger Lepidoptera and the microlepidoptera. Even one evening's collection at Logues Springs, where the flora is more varied, included 30 species not recorded at any of the six Edgar Ranges campsites. And the small collection made over a period of three days within 12 km of Broome at the end of the Edgar Ranges expedition yielded 88 species not taken during the expedition.

Of the 39 families of Lepidoptera represented in the present collection, the Pyralidae (100 species), the Oecophoridae (91 species) and the Noctuidae (63 species) together represent 49 per cent of the total number of species. This is remarkably similar to the 48 per cent representation of these three families in the Drysdale River collection. However, whereas the proportion of Gelechiidae at Drysdale River (7.2 per cent) was considerably less than that of the Noctuidae (11.6 per cent) and the Geometridae (9.1 per cent), the proportion of Gelechiidae in the Edgar Ranges collection (12.6 per cent) exceeded that of the Noctuidae (12.3 per cent) and the Geometridae (6.4 per cent). Apparently under the more arid conditions of the Edgar Ranges Area the proportion of adult Gelechiidae in the dry season increases and the proportion of Geometridae decreases, whereas the proportion of Noctuidae is reasonably constant. It should be remembered, of course, that these proportions need not necessarily hold for the total fauna of each area.

It is clear from the Edgar Ranges collection, as well as those from the Drysdale River and from Arnhem Land in the Northern Territory (Common, in CSIRO 1973, Appendix 9), that the Pyralidae, Oecophoridae and Noctuidae are the dominant families in tropical Australia. It is interesting to note that whereas the ratio of Oecophoridae to Gelechiidae is 1.9:1 and 2.2:1 respectively in the dry season collections made at the Drysdale River and Arnhem Land, the ratio falls to 1.4:1 in the Edgar Ranges Area. This lower ratio may not be correlated with the greater aridity in the Edgar Ranges Area, because in an extensive early spring collection of Lepidoptera made recently by Mr. E. D. Edwards in the Alice Springs area of the Northern Territory the ratio of Oecophoridae to Gelechiidae was 1.8:1, a figure only slightly less than that at the Drysdale River.

The ratio of the larger Lepidoptera, including the Pyralidae, to the microlepidoptera decreased from 1.3:1 at the Drysdale River to 1.2:1 in Arnhem Land, 1.1:1 at the Edgar Ranges, and only 0.7:1 in the Alice Springs area, where the number of Oecophoridae and Noctuidae was well in excess of the Pyralidae.

Only 20 species of butterflies (Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperiidae) were collected at the Edgar Ranges, and this figure included no Hesperiidae. Thirty butterfly species were recorded at the Drysdale River and 36 at the Prince Regent River. Only 11 of the Edgar Ranges species were recorded at the Drysdale River and only 10 at the Prince Regent River. Aurivillius (1920) listed 19 species of butterflies from the Kimberley collected during the 1910-11 Mjöberg expedition, including 12 of those taken at Edgar Ranges. The Edgar Ranges list includes two species, *Hypochrysops ignitus* (Leach), represented by subspecies *erythrinus* Waterhouse & Lyell, and *Ogyris amaryllis* Hewitson, represented by subspecies *parsonsi* Angel (Fig. 1), not previously recorded from the Kimberley. *H. ignitus erythrinus* was known only from the Darwin area, although another subspecies, *olliffi* Miskin, occurs in the far south-west of Western Australia. *O. amaryllis parsonsi* was known to occur widely in the Northern Territory and northern South Australia. Including these two a total of 68 species is now known to occur in the Kimberley (Common and Waterhouse 1981) and no doubt further additions will be made.

Several examples of the rare butterfly *Zetona delospila* (Waterhouse) (Fig. 2) from the Edgar Ranges survey provide a considerable southern extension to its known distribution. The species was described in 1903 from a specimen in the Macleay Museum, now in the Australian National Insect Collection. It came from

north-western Australia, and may well have been collected by W. W. Froggatt during his 1887 expedition to Derby, the Barrier Range, and the Lennard and Fitzroy Rivers (Froggatt 1934). This small species has also been collected at the Ord River in East Kimberley, near Borroloola, Northern Territory, and west of Laura in northern Queensland.

Altogether 63 species of Noctuidae were collected in the Edgar Ranges Area compared with 57 at the Prince Regent River and 111 at the Drysdale River. The three collections together include approximately 160 species of which only nine are common to all three. The total noctuid fauna of the Kimberley must far exceed this number. About 20 per cent of the Edgar Ranges Noctuidae are probably undescribed, a figure closely comparable with that estimated for the Drysdale River collection.

Amongst the Geometridae three species were of outstanding interest. The original and only previously known specimen of *Bumetopon bicorne* Aurivillius (Fig. 3) was taken at Broome on the Mjöberg expedition in 1910-11. A further four specimens were collected at Logues Springs during the present survey. The type locality of *Lissomma minuta* (Swinhoe) (Fig. 4) is the Sherlock River in the Pilbara of Western Australia. Apart from the original six specimens in the British Museum (Natural History), the species is known only from two specimens taken by Mr. M. S. Upton in 1971 at the Cane River, also in the Pilbara, and four specimens collected at campsites P1 and P2 at Edgar Ranges. The third species of interest is *Lissomma cyanorrhoea* (Lower) (Fig. 5) which was based on a single specimen from Alice Springs in 1904. Two further specimens were taken at Ayers Rock and Tennant Creek, N.T. in 1967 by Mr. Upton, and an additional four specimens at campsite P1 at Edgar Ranges.

Of the four species of Anthelidae in the Edgar Ranges collection, *Anthela callixantha* (Lower) (Fig. 6) is of special interest since it was described in 1902 from a single specimen from Derby, Western Australia. Two further specimens were collected at campsite P1 at the Edgar Ranges.

Specimens of only one of the two Pyralidae described by Turner (1924), from the Mjöberg expedition collection, were taken during the Edgar Ranges survey. *Epicrocis poliochyta* Turner (Fig. 7) was based on a single specimen from the Kimberley district; a further six specimens of this species were taken at four campsites during the Edgar Ranges survey. It is of some interest that, despite the absence of surface water in the area surveyed, except at Logues Springs, four specimens of *Nymphula nitens* Butler, a widely distributed species in southern Australia with aquatic larvae, were taken at campsites R2, D1 and D2.

Well over 50 per cent of the microlepidoptera taken during the Edgar Ranges survey will prove to be undescribed, although some of these are already known from the Drysdale River, Arnhem Land and Alice Springs. Many of the species belong to genera that are best represented in the arid interior of Australia. Of special note is a series of specimens described as *Haereta inscripta* Turner (Fig. 8), based on a single specimen from Ooldea, South Australia. Only one other specimen, from Madura, Western Australia, was known previously, although more recently four more were taken near Alice Springs by Mr. E. D. Edwards. Apparently the species has a wide distribution in inland Australia. Similarly an inland distribution is indicated for two undescribed Tortricidae taken in numbers for the first time at Edgar Ranges, but since collected by Mr. Edwards near Alice Springs. The only species of Alucitidae represented in the Edgar Ranges collection is apparently undescribed; one specimen was taken at campsite P2. The only previous record of this species was from Silver Plains, Cape York Peninsula, in 1965, when it was reared from larvae forming galls in the branches of *Canthium* (Rubiaceae) collected by the late Mr. J. L. Wassell. This plant genus has been recorded from the Drysdale River and, although it is not included by Kenneally (this publication) in his list of plants from the Edgar Ranges Area, there is a strong probability that it occurs there. Two species of microlepidoptera described by Meyrick (1922) from specimens collected by the Mjöberg expedition were also collected during the Edgar Ranges survey. The type locality of one of these, *Pexicopia euryanthes* (Meyrick) (Gelechiidae)(Fig. 9) is Noonkanbah, and that of *Sisyrodonta ochrosidera* Meyrick (Lecithoceridae) (Fig. 10) is "the Kimberley district". The latter is now know to have a wide distribution in inland Australia, including the Northern Territory and north-western New South Wales.

Plates 1-10: Lepidoptera of special interest from the Edgar Ranges Survey.

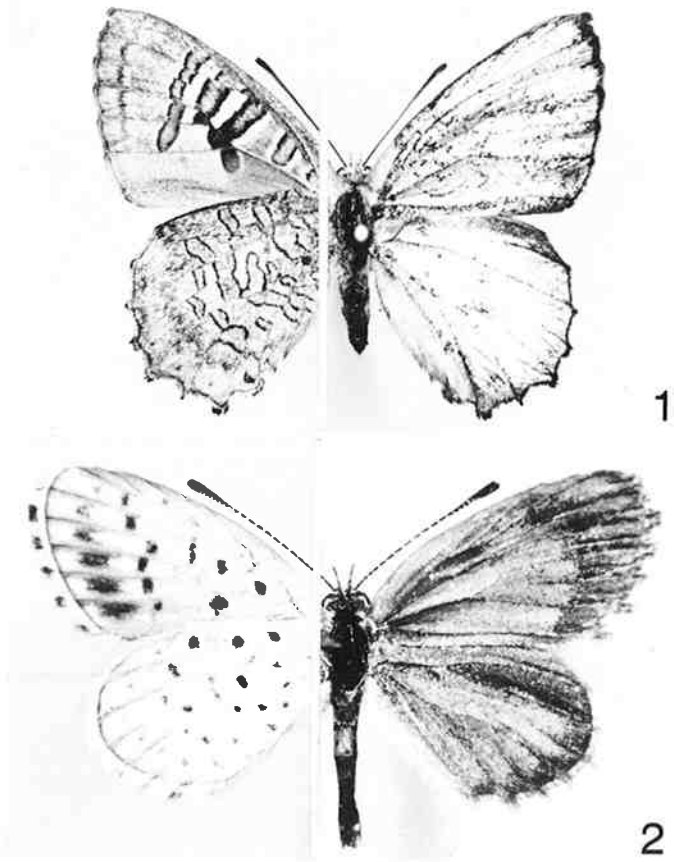
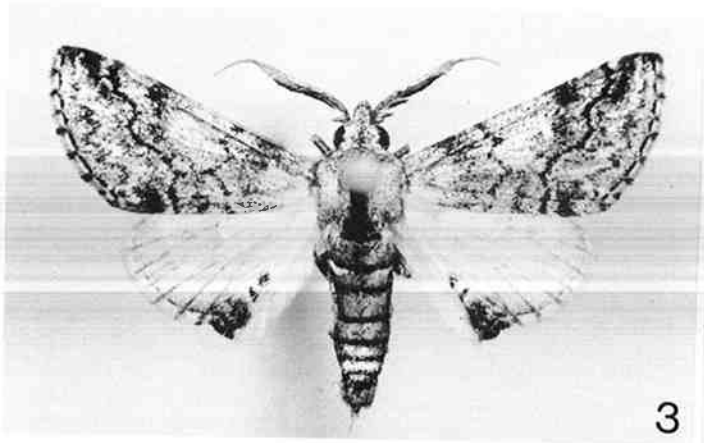
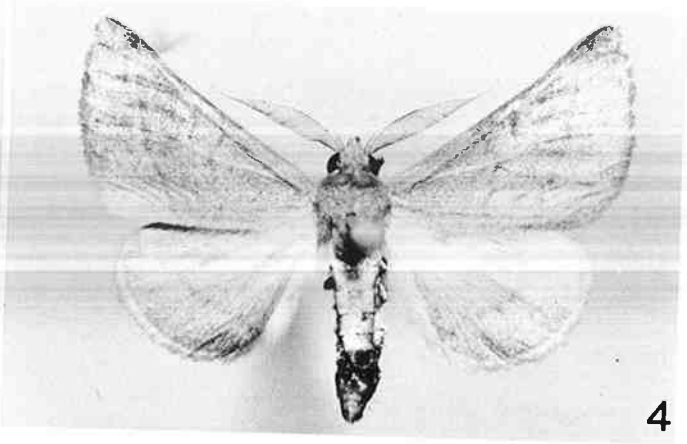
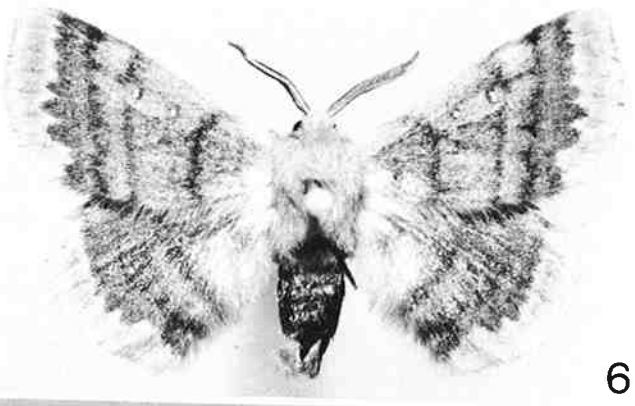


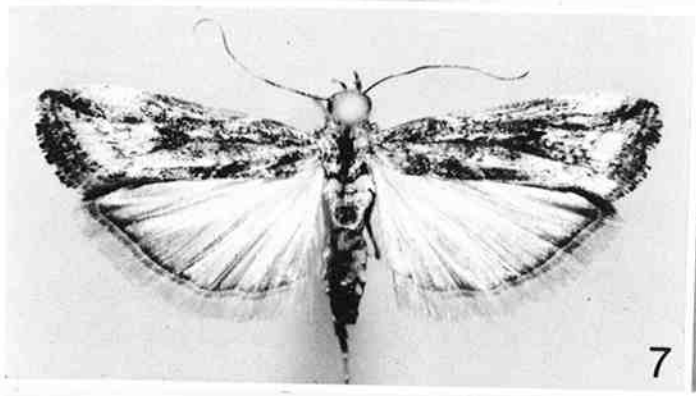
Plate 1 *Ogyris amaryllis parsonsi* Angel, male (wing-span 3.7 cm), Lycaenidae (upperside, right; underside, left).

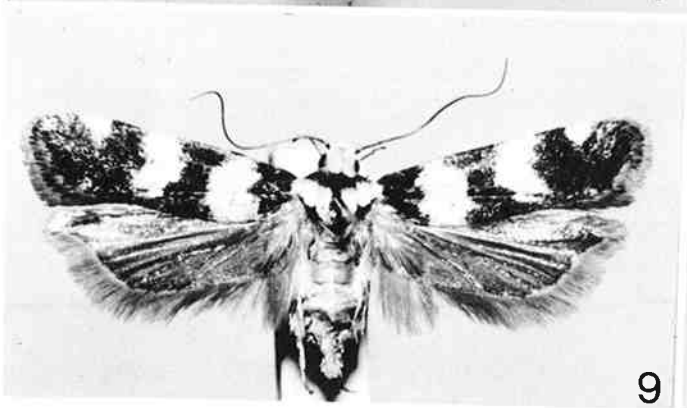
Plate 2 *Zetona delospila* (Waterhouse), male (wing-span 2.0 cm), Lycaenidae (upperside, right; underside, left).











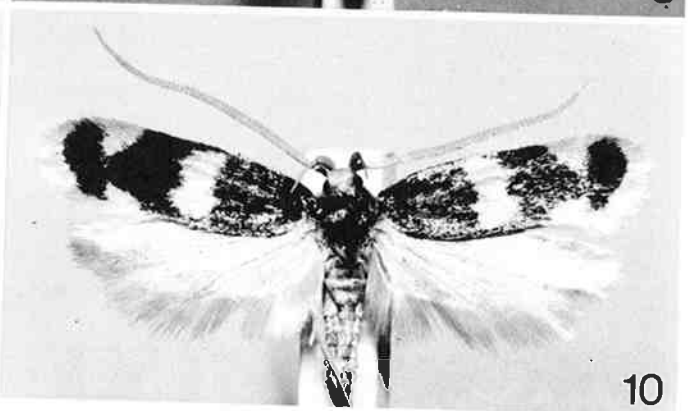


Plate 3 *Burnetopon bicorne* Aurivillius, male (wing-span 2.4 cm), Geometridae, Oenochromatinae.

Plate 4 *Lissomma minuta* (Swinhoe), male (wing-span 3.1 cm), Geometridae, Oenochromatinae.

Plate 5 *Lissomma cyanorrhoea* (Lower), male (wing-span 2.7 cm), Geometridae, Oenochromatinae.

Plate 6 *Anthela callixantha* (Lower), male (wing-span 3.5 cm), Anthelidae.

Plate 7 *Epicrocis poliochyta* Turner, female (wing-span 2.3 cm), Pyralidae.

Plate 8 *Haereta inscripta* Turner, male (wing-span 1.6 cm), Oecophoridae.

Plate 9 *Pexicopia euryanthes* (Meyrick), female (wing-span 2.1 cm), Gelechiidae.

Plate 10 *Sisyrodonta ochrosidera* Meyrick, male (wing-span 2.1 cm), Lecithoceridae.

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PART VII

CONCLUSIONS AND RECOMMENDATIONS

by N. L. McKenzie[1]

RELEVANCE TO CONSERVATION

Abrupt geological changes, dissection by a major river system arising in an adjacent region, rapid climatic gradients, and the presence of a large peninsula (with its coastal environments and oceanic influences) all conspire to make the South-west Kimberley environmentally complex. A system of reserves spread across the district, each carefully positioned to include a different array of its surfaces, is needed if a representative cross-section of the district's environments and wildlife is to be conserved. Unfortunately, most of the landsurface (86%) is already committed to an intensive pastoral industry.

There are only four conservation reserves in the South-west Kimberley—each of these conserves an array of relatively restricted environments rather than the more widespread landscapes of the district. The Coulomb Point Nature Reserve (28 300 ha) comprises coastal environments and certain high rainfall 'pindan' formations on 'through drained' sandplains of the Dampier Peninsula. The three others are National Parks and are all restricted to scenically attractive sites on the limestone Oscar and Napier Ranges on the northern edge of the district. Together, the Winjana Gorge, Tunnel Creek and Geikie Gorge National Parks include only 5 361 ha. None of these reserves duplicate environments in the Edgar Ranges Area.

The Edgar Ranges Area (1 012 600 ha) (Fig. 2 in McKenzie and Kenneally, this publication) lies across the boundary between the Kimberley and the inland deserts and is one of the few extensive areas of uncommitted land in the South-west Kimberley. It includes three relatively dry inland environments of the South-west Kimberley as well as a comparatively well watered version of a landscape belonging to the Great Sandy Desert. The ranges comprise a picturesque scarp, with outlying mesas, formed by the headwaters of Geegully Creek eroding the sandstone and mudstone strata underlying the Great Sandy Desert. Extensive tracts of sandplain and dunefield surround the ranges; heavier alluvial surfaces occur as outwash plains below the scarp.

Sandplains belonging to the Yeeda Land System of Speck *et al* (1964) dominate the western and north-western section of the Edgar Ranges Area and extend further inland, as a wide band adjacent to the rim of the scarp, to latitude 18° 45′ south. They total about 561 000 ha (55.4% of the Area) and support dry-country versions of the pindan vegetation endemic to the district—low woodlands to low open-woodlands structurally controlled by species of *Acacia*, *Eucalyptus* and *Grevillea* over mixed hummock and tussock grasslands. Torresian species are common in this formation (eg. *Ehretia saligna Lysiphyllum cunninghamii*, *Acacia holosericea* and *Dolichandrone heterophylla)*. Sandplains of the Yeeda Land System are an important component of the South-west Kimberley, occupying about 25 percent of its land surface. The pindan vegetation they support varies across the district. Sandplains in the Edgar Ranges Area, and similarly dry inland sandplains elsewhere in the district, support a vegetation distinct from their better watered equivalents on the Dampier Peninsula and near Derby.

The Edgar Ranges Area includes 78 000 ha (7.7%) of sedimentary ranges. These ranges surfaces support a variety of fairly sparse plant formations—open-woodlands of River Gums, *Eucalyptus brevifolia*, and *E. confertiflora* fringe the watercourses, and hummock grasslands with scattered *Acacia* thickets dominate the gravels and scree slopes. Isolated fig trees (*Ficus opposita*) cling to the sheer sandstone cliffs; perhaps the most striking find was a solitary colony of a new variety of the Screw Pine (*Pandanus spiralis* var. *flammeus*) at Logues Spring. Similar sedimentary ranges occur as isolated outcrops elsewhere in the South-west Kimberley, and occupy approximately 4 percent of its land surface.

Dunes and swale plains belonging to the Camelgooda Land System of Speck *et al.* (1964), and typical of the north-western margin of the Great Sandy Desert, occupy about 35.2% of the Area (356 000 ha). This surface supports shrub and grassland communities with occasional low trees, *Gardenia* aff. *pantoni* and *Eucalyptus zygophylla*. Shrub and grass species on the swale plains are a stunted and depauperate selection of plants from the pindan community (eg. *Acacia holosericea* and *Grevillea refracta*) with a greater percentage of desert species such as *Acacia anaticeps*, *A. ancistrocarpa*, *Newcastelia cladotricha* and *Plectrachne schinzii*. Although dunefields such as these dominate the landscape of the entire north-western sector of the Great Sandy Desert (see Fig.1 in McKenzie and Kenneally, this publication), small patches of eroded dunes are not infrequent in sandplain areas of central and southern parts of the South-west Kimberley. Available data suggests that, as a biological unit, this surface grades in a north-south axis from Kimberley to desert affinities.

The Edgar Ranges Area includes a few of the alluvial sand, earth, clay and loam surfaces associated with the drainage valleys of the Fitzroy and Lennard Rivers (see Fig. 2 in McKenzie and Kenneally, this publication); elsewhere in the South-west Kimberley these surfaces are totally (99.99%) committed to viable pastoral leases and are not available for conservation purposes in the foreseeable future unless a pastoral lease is purchased. The only substantial area (16 700 ha) of non-coastal colluvial or alluvial soils otherwise available to conservation in the South-west Kimberley belongs to the Cooangoody Land System of Speck *et al.* (1964) and occurs in the headwaters of Geegully Creek, on the Ardjorie Lease section of the Edgar Ranges Area (Coded as R2.3 and referred to in A1 and A2 in the site descriptions of McKenzie and Kenneally, this publication). It occupies 1.7% of the Area. Only relatively minute areas of heavy alluvial soils occur in the vacant Crown Land section of the Edgar Ranges Area; an example is the seasonal lake bed coded as C1 in the site descriptions referred to above.

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The central and western parts of Ardjorie include substantial areas of ranges country (84% of the 78 000 ha listed earlier) and most of the headwaters and upper reaches of the main bed of Geegully Creek. This creek is a major tributary of the Fitzroy River which arises in the North Kimberley. Fringing formations of River Gums along the Creek act as corridors connecting the much higher rainfall areas of the North Kimberley to the relatively arid Edgar Ranges and probably account for the presence of such species as the Hoary Bat (*Chalinolobus nigrogriseus)* and the Rufous Night Heron (*Nycticorax caledonicus*) so far into the semi-arid zone.

In addition to contributing **almost all** of the alluvial surfaces to the Edgar Ranges Area, the central and eastern parts of Ardjorie include Mowla Bluff and Mungi Rock Hole, sites important in the zoological history of the north of Western Australia. Bird records taken between 1910 and 1911 at these and other sites in Ardjorie provide an important baseline of information for monitoring changes in the fauna since the beginning of this century, when the pastoral industry was in its infancy.

The 213 species of plants recorded in the Edgar Ranges Area includes a mixture of Torresian (sub-humid Kimberley) and desert species; many are near either the southern or northern limits of their known ranges in Western Australia. Of particular interest in this context are the Torresion *Drosera petiolaris* and *Biblis liniflora* and the desert species *Cyanostegia cyanocalyx* and *Pityrodia chorisepala*. The coverage of the South-west Kimberley and Great Sandy Desert by conservation reserves is so poor (0.39 per cent and 2.7 per cent respectively) that many of these plant species, and all but a few of the communities they form, do not occur on reserves elsewhere in Western Australia.

The fauna of the Edgar Ranges Area is a mixture of Torresian (sub-humid Kimberley) and desert species. Twenty-four species of mammal were recorded during the survey; nearly half of the known mammal richness (52 species) of the district. Of particular significance is the presence of an outlying population of the Brush-tailed Rock Wallaby (*Petrogale penicillata*); the nearest known population is in the Pilbara on the other side of the Great Sandy Desert. The Rabbit-eared Bandicoot (*Macrotis lagotis*), Forrest's Mouse (*Pseudomys forresti*) and the bat *Tadarida* cf. *beccarii* are not known from conservation reserves in Western Australia. The first of these three species (Colour plate 10) is in urgent need of protection and study; its range through Australia has undergone a massive decline since the advent of European man.

One hundred and twenty-one species of bird were recorded, including three of special significance to conservation—Princess Parrot, Peregrine Falcon and Major Mitchell's Cockatoo. Resident populations of the last two were recorded in the Area during the 1976 survey. Recorded in 1910, the rare and vagrant Princess Parrot is probably only an intermittent visitor. Among the Torresian species recorded were the Red-collared and Varied Lorikeets, Rufous-throated Honeyeater and Pictorella Finch. Geomorphological changes make the presence of such species further south into the desert unlikely, even in the wet season. A larger component of arid zone birds has been recorded, including the Princess Parrot, White-fronted Honeyeater and Western Flyeater; many are on the north-western limit of their known ranges.

Five species of Amphibia and 40 species of reptile were recorded in the Edgar Ranges Area. Again, the fauna is a mixture of Kimberley and desert species; the presence of the dragon lizard *Diporiphora pindan* and the skink *Ctenotus inornatus* as well as their arid zone counterparts *D. winneckei* and *C. saxatilis* respectively, highlights this biogeographical characteristic of the Area's fauna. Because the Area is in relatively dry country, it is richer in desert rather than Kimberley birds and reptiles.

The insect collection from the Edgar Ranges Area contains 949 species (8 Orders); the additonal 31 species collected at Logues Spring almost certainly occur at pools elsewhere in the ranges. A wet season collection would vastly increase the list. Ian Common concentrated on the Order Lepidoptera (moths and butterflies), collecting 514 species. Considering how poorly the Kimberley insect fauna is known, it is not surprising that many of these records have extended the known range of species. For instance nearly 50 per cent of the microlepidoptera collected in the Edgar Ranges Area are undescribed.

RECOMMENDATIONS

As an entity the proposed Edgar Ranges Nature Reserve (807 000 ha) outlined in Figure 1 would substantially improve the coverage of both the Kimberley and desert systems of conservation reserves.

The inclusion of Ardjorie in the proposed Nature Reserve is considered essential, not only to provide a reasonable variety of habitats within the reserve, but also in the context of overall conservation of South-west Kimberley environments. So much land remains dedicated to purposes incompatible with conservation in the South-west Kimberley that even if the proposal outlined in Figure 1 is reserved, about 9.4 percent of the district's landsurface, only eight of the 28 distinct surfaces (land systems mapped by C.S.I.R.O. Division of Land Research) in the district would be represented on reserves.

The large area of relatively homogenous inland sandplain and dunefield communities in the western and north-western part of the Edgar Range Area (see Fig. 2 in McKenzie and Kenneally, this publication, and compare with Fig.1) is probably unnecessary; much of the western section has been deleted from the proposed reserve (Fig. 1) so that future consideration can be given to setting aside additional reserves in near-coastal sandplain environments on the Dampier Peninsula and near the Eighty Mile Beach further south, as well as the better watered inland sandplains in north-eastern parts of the South-west Kimberley. Such reserves would conserve a greater range of the environmental variability found in the sandplain environments that dominate the district than can be found in the vicinity of the Edgar Ranges.

In defining the boundaries of the proposed Edgar Ranges Nature Reserve it was necessary to provide for a road reserve, along the current track route between McHughes Bore and the Great Northern Highway just south of Roebuck Plains, so that Dampier Downs and Mowla Bluff Pastoral Stations continue to have direct access to Broome.

In view of the importance of the Edgar Ranges Area to conservation of Australia's wildlife, the area delineated in Figure 1 should be set aside as a Nature Reserve, given Class A status, and vested in the Western Australian Wildlife Authority.

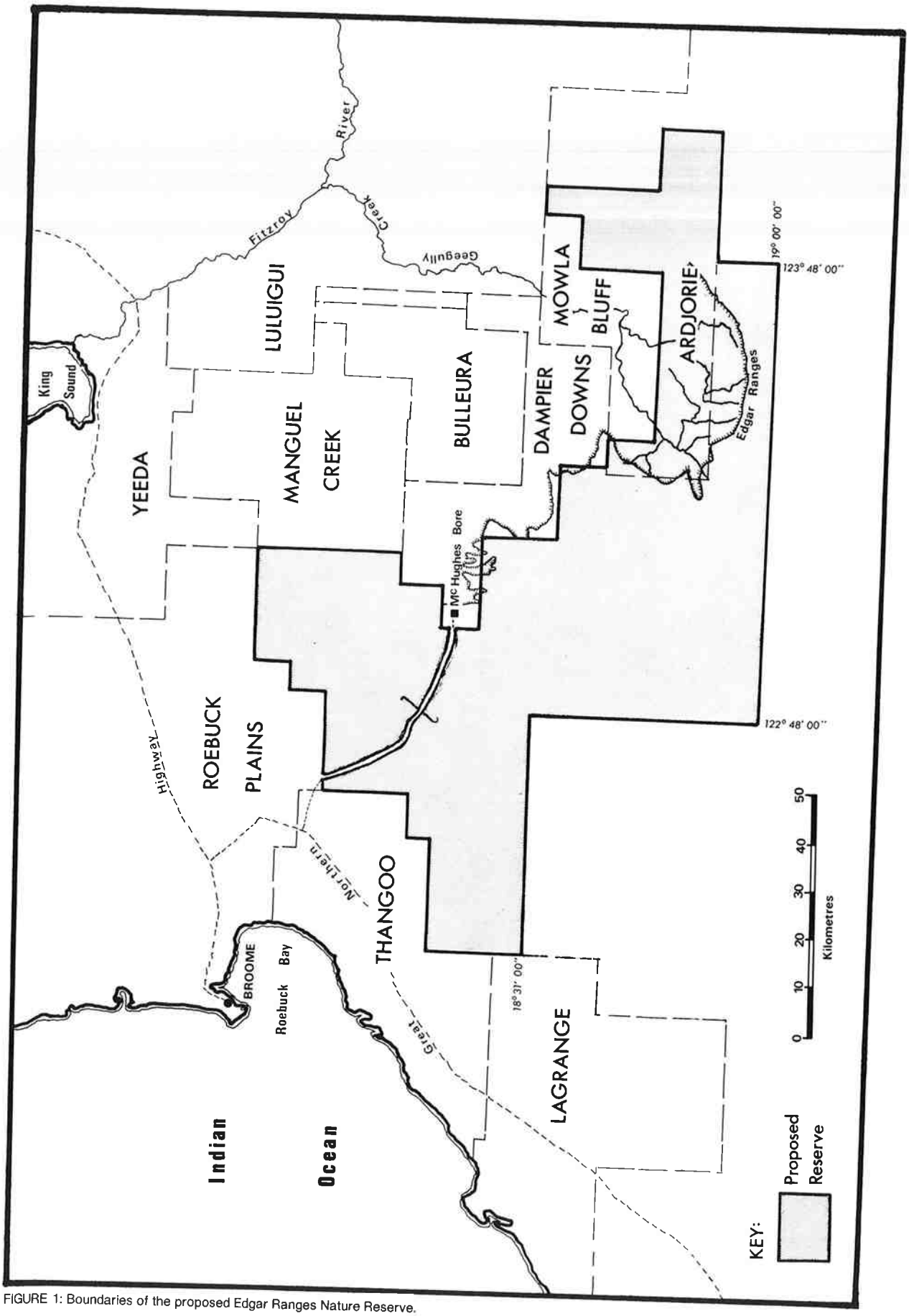

FIGURE 1: Boundaries of the proposed Edgar Ranges Nature Reserve.

MANAGEMENT CONSIDERATIONS

Certain observations are relevant to the management of the proposal for conservation.

The potentially dense plant communities on sandy and alluvial surfaces in the Edgar Ranges vicinity are burnt whenever they achieve sufficient density to carry a fire. The resulting formations on the sandplain and dunefield surfaces are a mosaic of differently aged burn patterns in which sparse cover by herbs and tussock grasses is prevalent, leaf litter is almost non-existent, shrubs and small trees are mostly regenerating from root-stock, and hummocks of spinifex *(Plectrachne)* are small and scabrous (Colour Plate 7). Occasional small patches that had escaped fire for a number of years were encountered in the dunes south of McHughes Bore and these supported quite dense shrublands of *Acacia,* much larger hummocks of spinifex, and reasonable cover by leaf litter (Plate 8 in McKenzie and Kenneally, this publication). The influence of fire throughout the proposal might be alleviated with a suitable system of firebreaks. Gravel surfaces in the range itself do not achieve sufficient plant cover to carry fire over large areas.

Damage to vegetation caused by cattle was noted on the sandplain surfaces near campsites P1 and P2 in August 1976. At that time the cattle industry was in recession and stock numbers throughout the district were very high. The seasonally arid nature of the district means that cattle concentrate around watering points late in the dry season (August to November) when conditions are most stressful for plants and animals alike. Few, if any, watering points are found in the proposal at this time of the year; even in the adjacent pastoral leases the only water available during the dry season on these sandy surfaces comes from bores.

The country in the ranges and along Geegully Creek presents a different picture. Wherever permanent water persists as pools along Geegully or springs in the ranges, the vegetation within 1 kilometre of the water is trampled, in some instances (Logues Spring) almost entirely denuded of lower vegetation strata (Plate 41 in McKenzie and Kenneally, this publication). In all cases such waterholes were muddy and virtually undrinkable by August and, by October, are usually so foul that cattle drinking from the pools in the valley at Logues Spring sicken (P. De Long, pers. comm.) The richness of the flora and fauna recorded at Logues Spring highlights the value of these permanent water sites to the wildlife of the proposal. Even though Logues Spring is not actually in the proposal, it would be desirable if arrangements could be made with the owner of Dampier Downs Station to provide a permanent supply of water at the mouth of the valley and to fence off its higher reaches from cattle.

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