

Aboriginal Knowledge of the Mammals of the Central Deserts of Australia

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Abstract

More than one-third of the terrestrial mammal species of the central deserts of Australia have vanished in the past 50 years. Few of these have been the subject of even preliminary scientific study, and data as basic as geographic range and preferred habitat are lacking for many species. Aborigines, many of whom lived traditionally in the central deserts until recently, still retain a profound knowledge of the mammals, but this knowledge, too, is fast disappearing. Aboriginal people living in communities scattered through and around the edges of the 1 645 000 km² of the study area, comprising the Great Sandy, Little Sandy, Tanami, Gibson and Great Victoria Deserts and the Central Ranges district, were shown museum skins and asked to provide information about local names, current and past status, and aspects of biology and ecology. Most species, including some thought to have become extinct early this century, persisted in the deserts until 30-50 years ago. New data are presented on former distribution and on the biology and ecology of many species. The mammal fauna of the central deserts was richer and more widespread than generally believed, but the area has suffered a massive and sudden loss of species, probably unparalleled in extent elsewhere in Australia.

Introduction

The Great Sandy, Little Sandy, Tanami, Gibson and Great Victoria Deserts, and the Central Ranges district (see Jessup 1981, map 2, for boundaries) comprise about 1 645 000 km² or about 21.5% of the Australian mainland, yet very little is known of their mammal fauna. These deserts include substantial portions of Western Australia, the Northern Territory and South Australia, but apart from peripheral pastoral leases, a few mines and some mineral and petroleum exploration leases, they are not used commercially and remain largely uninhabited by Europeans. Because of the remote and exceedingly dry and sandy nature of the region it was rarely visited by biologists until the 1960s, when suitable motor transport facilitated travel.

European exploration of central Australia began with the expeditions of John McDouall Stuart between 1858 and 1862. The naturalist J. W. Waterhouse accompanied him on his third and successful attempt to traverse the continent from south to north, but few collections, and even fewer biological descriptions, were made. Several other explorers kept records of the animals they saw (e.g. Giles 1889) but in many cases it is not possible to be definite about the species of mammals to which they were referring.

The most notable of the early biologists was Baldwin Spencer, who accompanied the Horn Expedition of 1894. He described and collected many mammals and, through the contacts he made at the time, received a steady flow of specimens from local Europeans for

many years thereafter. Spencer visited the eastern edge of our study area but some of his observations may be extrapolated to the area in general. He noted (Spencer 1896):

that the Common Brushtail, *Trichosurus vulpecula*, was 'ubiquitous' and '... everywhere amongst the eucalypts which border the river beds';

that the Greater Bilby, *Macrotis lagotis*, must have been extremely common judging by the number of tail tips worn as decoration by Aborigines;

the difficulty in acquiring specimens of the Lesser Stick-nest Rat, *Leporillus apicalis*, which led to the comment that it was evidently a rare form;

the apparent ease in acquiring specimens of the Spectacled Hare-wallaby, *Lagorchestes conspicillatus*, along the MacDonnell Ranges and the comment that it was '... far from uncommon'.

Two major expeditions were conducted in the early 1930s. The Canning Stock Route Expedition of 1930–31 was accompanied by Otto Lipfert, who collected for the Western Australian and South Australian Museums and greatly enriched their mammal collections (Glauert 1933; see McKenzie and Youngson 1983 for a copy of his report). Lipfert had difficulty in obtaining some species (he could not find *Leporillus*) but found others to be abundant. He had little trouble collecting the Rufous Hare-wallaby, *Lagorchestes hirsutus*, and commented that it was 'the most common animal'. Other species obtained included *Trichosurus vulpecula*, *Macrotis lagotis*, *Perameles eremiana*, *Isoodon auratus*, *Dasyurus geoffroyi*, *Dasyercus cristicauda* and *Phascogale calura*.

Between 1931 and 1935 H. H. Finlayson conducted a series of expeditions through central Australia as far west as the Rawlinson Range (Finlayson 1935). He collected widely and was among the first to use museum specimens as a focus for obtaining verbal data from the Aborigines to supplement his specimen-based information. There are no voucher specimens of the Brush-tailed Bettong, *Bettongia penicillata*, from central Australia, but he collected from Aborigines abundant testimony of its presence. During his subsequent expedition 20 years later he became alarmed because so many species had declined: bilbies that were once common in the Docker River area were absent or exceedingly rare; possums and Burrowing Bettongs, *B. lesueur*, had also become very rare (Finlayson 1961). Nevertheless, he held out hope that the various species might persist in the remote desert regions beyond the influence of Europeans, their livestock and the introduced Red Fox, *Vulpes vulpes*.

There followed a large gap between Finlayson's 1930s work and the next major expedition, although occasional specimens were provided to museums during and subsequent to World War II. The Australian Museum expedition of 1952, which travelled through central Australia via Ayers Rock and the Tanami Desert, collected a Golden Bandicoot, *Isoodon auratus*, and two Central Rock-rats, *Zyomys pedunculatus*, at The Granites, but few other mammals of significance.

Recent systematic mammal surveys of the region (Burbidge *et al.* 1976; Burbidge and Fuller 1979; McKenzie *et al.* 1979; McKenzie and Youngson 1983; Gibson 1986) have added greatly to our knowledge but a comparison of these data with the meagre information available from earlier work indicates an alarming number of extinctions and serious declines in range and abundance. Obviously the mammal fauna has been seriously depleted, and little opportunity now remains to document the distribution and ecology of many species.

Our primary concern is with the conservation of the biota. Some mammal species that occurred in the deserts appear to be extinct. Others, however, remain either in remnant populations in the arid zone, in better watered regions at the periphery of their former range, or on offshore islands. The conservation of these species would be greatly enhanced if they could be rehabilitated in, or reintroduced to, at least parts of their former range in the arid zone. Before we can begin such an initiative it is essential to have much more information than is currently available, not only to select suitable sites for rehabilitation or re-establishment but also to gain an understanding of the factors responsible for the massive declines and extinctions and to guide future management prescriptions. Very few data are

available on the former range, habitat or biology of most species in the arid zone, or the timing of their disappearance.

To Aborigines living in the deserts during the decline, the mammals were both a source of food and an integral part of their culture, and much information is available from verbal communication with elderly Aborigines still living in the deserts (Burbidge and Fuller 1979, 1984; Johnson and Roff 1982). We decided, therefore, that it was urgent that we document what desert people know about the mammals of their traditional lands, especially in relation to the extinct and rare species, before this information is lost through the death of the older people.

Methods

The Study Area

The vegetation of the study area has been described by Beard (1969, 1981), and a flora of the region is available (Jessup 1981). The landscape consists largely of low red sand dunes and swales trending east-west, although in the Gibson Desert there are extensive areas of lateritic surfaces and in others, such as the northern Tanami Desert, there are vast sandplains. Rocky outcrops, low hills and ranges are scattered throughout, but in the central east (the Central Ranges district) a series of large ranges occur, the Petermann and MacDonnell Ranges rising more than 1500 m above sea level. Salt lake systems occur throughout the region with some individual lakes covering large areas (e.g. Lake Mackay, 3000 km²). Many of these systems are the remains of occluded palaeorivers (van der Graaf *et al.* 1977).

None of the few active rivers reach the sea; instead they flood out into sandy areas, or occasionally into salt lakes, where the water is lost through percolation and evaporation. These watercourses carry huge volumes of water after the infrequent periods of heavy rainfall, but normally they are rivers of sand, lined with River Gums *Eucalyptus camaldulensis* and Coolibah *E. microtheca*.

The vegetation of the study area is almost entirely hummock grasslands of spinifex (*Triodia* and *Plectrachne* spp.) with a sparse overstorey of mostly low *Acacia* shrubs or small trees that rarely exceed 5 m in height. Mallee *Eucalyptus* occur as scattered patches in the north, becoming more common and extensive in the south-west. Taller eucalypts occur as isolates or in scattered pockets where the soil is suitable. Two species sometimes occur as open woodlands: *E. chippendalei* on dunes in the Great Sandy, Little Sandy and Gibson Deserts, and *E. gongylocarpa* on sandplains of the Great Victoria Desert. Desert Oaks *Allocasuarina decaisneana* grow to about 15 m and form extensive open woodlands in places, but unlike the eucalypts they rarely form hollows large enough to shelter medium-sized mammals. Patches of low woodland of Mulga, *Acacia aneura*, are found on loamy and rocky soils; in parts of the Tanami and Gibson Deserts mulga occurs as extensive patches.

As spinifex is the almost invariable feature of the study area, so too are termitaria. Although most are entirely below ground, some extend above the surface, such as those of *Nasutitermes triodiae*, which measure up to 4 m in height and 3 m in diameter.

Climatic conditions vary somewhat, as would be expected in a study area that extends from 17°30'S. to 30°S. and from 120° to 138°E., or more than 2600 by 1300 km. In general terms the northern part is influenced by the monsoons and receives predominantly summer rainfall. Rainfall becomes increasingly irregular as latitude increases, the more southerly areas being influenced by winter cold fronts. Mean annual rainfall varies from 343 mm at Balgo (20°09'S.) to 241 mm at Hermannsburg (23°57'S.), 251 mm at Giles (25°02'S.), 207 mm at Cundelee (30°43'S.) and 186 mm at Rawlinna (31°01'S.). Summers are hot, maximum temperatures regularly exceeding 40°C for many consecutive days, and during winter frosts at night are common.

Techniques of Interview

Finlayson (1961) learned much from Aborigines when he showed them the skins of specimens he was collecting. After learning that Aboriginal people did not relate well to photographs (Johnson and Roff 1982; Burbidge and Fuller 1984), we decided to repeat his technique.

During 1982-85 we visited many Aboriginal communities throughout the central deserts and surrounding regions. We talked to groups of old people, showing them the skins, asking questions, and recording the information received. Where possible we spoke to the people with the aid of an interpreter, but often none were available and we had to make do with a combination of their English

and our limited but growing knowledge of key words in Aboriginal dialects. Sometimes we were helped by younger Aborigines who had a good command of English.

There are now no living representatives of the Mirning, the Aboriginal people who lived on the Nullarbor Plain. Most of our information about this area was obtained from an elderly European, Mr George Carlisle, who lived and worked with Mirning people when he was a young man. Some Mirning mammal names were obtained from people of different dialects who live adjacent to the Nullarbor.

Aboriginal names for the mammals are presented below in the orthography of Mr Wilf Douglas (Glass 1975, see Table 1). Other orthographies are in use in the study area. Often they substitute *b* for *p*, *d* for *t*, *g* for *k* and *j* for *tj*. The language groups from the eastern side of our study area use sounds that vary from those on which Douglas's orthography is based, but in the interests of simplification and space-saving we have chosen to employ only the single system. Douglas's system, nevertheless, closely approximates pronunciation of the eastern language groups and we believe field workers would make themselves understood using the names presented in this paper. A few names are marked with a ? where we are not sure of the correct application.

Table 1. Pronunciation of Aboriginal names

After Glass (1975)

Sounds having English equivalents	Sounds without English equivalents
a as in <i>about</i>	Dentals (tongue between or against teeth)
i as in <i>radio</i>	tj as in <i>katja</i>
u as in <i>put</i>	ny as in <i>nyangu</i>
aa as <i>ar</i> in <i>cart</i>	ly as in <i>palya</i>
uu as <i>or</i> in <i>corner</i>	th as in <i>nantha</i> (not English <i>th</i> , more like <i>nant-ha</i>)
ii as <i>ee</i> in <i>seen</i>	
	Retroflex (tongue turned up to roof of mouth)
k as in <i>skate</i> not <i>Kate</i>	rt as in <i>warta</i>
l as in <i>let</i>	rn as in <i>parna</i>
m as in <i>mat</i>	rl as in <i>marlu</i>
n as in <i>nut</i>	
ng as in <i>singer</i>	
p as in <i>spike</i> not <i>pike</i>	
r as in <i>rake</i>	
rr as in Scottish <i>run</i> (alveolar)	
t as in <i>stake</i> not <i>take</i>	
w as in <i>wet</i>	
y as in <i>yet</i>	

Pronunciation varies somewhat between dialects, for example *tj* may be hard or soft, but these minor differences are quickly sorted out when visiting a new area. Tindale (1974) and Milliken (1976) give details of the areas occupied by people of the various dialects. Wangkatjungka is usually included in Kukatja by anthropologists, but the people themselves separate the dialects so we have kept them apart.

Central desert Aborigines did not count above three and have no method of recording dates or the age of a person. In the annotated list below, therefore, 'many' refers to a number greater than three. Where we give a number greater than three it came from people who have learned to count from Europeans. We were able to estimate the date when a person last saw an animal by relating it to an event, e.g. when a mission settlement was established, when a man first grew a beard or a woman first had children, or to World War II, when there was a lot of military activity in the deserts.

The distribution maps presented here show a species' present geographic range (●) and its range in living memory (×), according to our informants. The localities plotted are those where we were told that an animal occurred, not the location where the interview took place. Data have been filtered so that most overlapping points were removed. Although we concentrated on obtaining information about the mammals of the study area, we have presented data on adjacent regions where possible. Data are

presented for the larger species only, because, except for a few very distinctive mammals, Aborigines do not consistently recognise specific differences between the small dasyurids, rodents or bats.

Data are not presented here unless they were corroborated by two or more groups of people. Agreement by two or more people in one interview group was not taken as corroboration, because one person often dominated a group and others would often agree with him even if they were not sure in their own minds. In most cases we were told the same information many times. The information in the Annotated List is, except for *Discussion*, exactly what was told to us without any modification, other than conversion from the vernacular to formal English.

Scientific and English mammal names follow Strahan (1983).

The place-names mentioned in the text, and their coordinates, are as follows:

Alice Springs	23°42'S.,133°52'E.	MacDonnell Range	23°42'S.,132°30'E.
Amata	26°09'S.,131°09'E.	Mud Tank	22°58'S.,134°19'E.
Ayers Rock	25°21'S.,133°09'E.	Muranji Rockhole	23°43'S.,130°50'E.
Balgo	20°09'S.,127°58'E.	Murray Bore	26°20'S.,128°28'E.
Barrow Creek	21°32'S.,133°53'E.	Mt Farewell	22°00'S.,130°16'E.
Billiluna Station	19°33'S.,127°40'E.	Northam	31°39'S.,116°40'E.
Blackstone	25°59'S.,128°14'E.	Nyirripi	22°10'S.,130°34'E.
Calvert Range	23°29'S.,122°48'E.	Papunya	23°15'S.,131°54'E.
Canning Stock Route		Percival Lakes	21°20'S.,124°50'E.
Well 45	20°48'S.,126°11'E.	Petermann Range	25°04'S.,129°37'E.
Well 46	20°38'S.,126°17'E.	Pollock Hills	23°00'S.,127°27'E.
Charlotte Waters	25°55'S.,134°54'E.	Rabbit Flat	22°40'S.,133°18'E.
Chilla Well	21°31'S.,130°59'E.	Rawlinna	31°01'S.,125°20'E.
Christopher Lake	24°44'S.,127°32'E.	Rawlinson Range	25°00'S.,128°00'E.
Clutterbuck Hills	24°35'S.,126°17'E.	Ryans Well	22°43'S.,133°23'E.
Crown Point	25°43'S.,134°37'E.	Schwerin Mural Crescent	24°50'S.,128°31'E.
Cundeelee	30°43'S.,123°26'E.	Shay Gap	20°30'S.,120°09'E.
Diebil Spring	23°37'S.,122°22'E.	Shaw Creek	25°05'S.,129°42'E.
Giles	25°02'S.,128°18'E.	Sir Fowell Headland	23°41'S.,122°57'E.
Hermannsburg	23°57'S.,132°46'E.	Southesk Tablelands	20°40'S.,126°43'E.
Jupiter Well	22°53'S.,126°36'E.	Tanami Downs	20°34'S.,129°44'E.
Kintore	23°17'S.,129°23'E.	Tennant Creek	19°39'S.,134°11'E.
Kiwirrkurra	22°49'S.,127°47'E.	The Garden Station	23°17'S.,134°25'E.
Kutjurntari Rockhole	24°54'S.,128°46'E.	The Granites	20°34'S.,130°21'E.
Lajamanu	18°20'S.,130°38'E.	Tjintjinti	23°20'S.,128°32'E.
Lake Auld	22°25'S.,123°50'E.	Tjirrkarli	25°57'S.,125°32'E.
Lake Disappointment	23°30'S.,122°45'E.	Walter James Range	24°37'S.,128°43'E.
Lake Gregory	20°10'S.,127°30'E.	Warburton	26°08'S.,126°35'E.
Lake Macdonald	23°29'S.,129°01'E.	Willowra	21°15'S.,132°37'E.
Lake Mackay	22°15'S.,129°00'E.	Young Range	25°02'S.,125°03'E.

Annotated List of Species

Tachyglossus aculeatus, Short-beaked Echidna

Names. **Anmatjara:** inalinga/yinalingi, inapa; **Aranta, western:** yinarpa; **Aranta, eastern:** urlkurla, watjingarra, yinarpa/inapa; **Kaititja:** inapa; **Karatjari:** manganya; **Kartutjarra:** manganya, mingwuwa, muunikilka, tjilka, tjilkamarta; **Kukatja:** ngirnu, nyilimupu, pakawurru, parrarranypa, tjilkamarta, yunturangalku; **Mangala:** kanatjina, ngirnu, tjilka; **Manytjilytjarra:** manganya, mingwuwa, muunikilka, tjilka, tjilkamarta; **Mutpura:** kilyini; **Ngaanyatjarra:** puukipayinpa/kuukipayinpa, tjilkamarta; **Ngaatjarra:** ngirnu, puukipayinpa/kuukipayinpa, tjilkamarta, tjirilya, yunturangalku; **Nyamal:** manganya; **Nyangamarta:** manganya, minyari, tjiritjartini; **Nyiyapali:** manganya, mingwuwa, mungana, puntiwina; **Parti:** kamaraning; **Pintupi:** ngirnu, nyupitji, parrarranypa, tjilka, tjilkamarta, tjirilya, yinalingi, yunturangalku; **Pitjantjarra:** tjilkamarta, tjirilya; **Putitjarra:** manganya, muunikilka, tjilka, tjilkamarta; **Tjaru:** ilalingi, kinintji, pukawurra, tjungururu; **Tjinkili:** ninurta; **Wamatjari:** kinantji/kinatji, minatji, tjilkamarta, tjilkapanta; **Wangkatjungka:** minatji, ngirnu, parrarranypa, tjilkamarta, yunturangalku; **Warumungu:** watjingarra; **Waripiri:** pakawurru, putjalangi, tjilkamarta, yinalingi; **Warnman:** minyari.

Habitat. All habitats, including sandplains and dunes where shelter may be obtained in large termitaria; most common in rocky hills and ranges.

Shelter. Hollow logs, caves, holes in the ground, termitaria; may dig itself into the ground, especially under spinifex.

Food. Ants and termites.

Breeding. No data.

Status. Throughout the study area. No change in abundance or distribution.

Comments. Excellent meat with plenty of fat. The English name 'porkupine' has been widely adopted.

Discussion. Recognised by everyone, even small children. Still widely hunted and a favoured food item.

Dasyurus geoffroii, Western Quoll

Names. **Alyawarra:** tjilpa; **Anmatjara:** atjilpa; **Aranta, western:** tjilpa; **Aranta, eastern:** atjilpa; **Kaititja:** tjtjirti; **Karatjari:** parrtjita; **Kartutjarra:** kinkilpa, kitjikurna, kurninningka, parrtjarta/parrtjita, walyparti, wiminytji; **Kukatja:** kurninningka, maularurru, ngangnalpa, parrtjita, tjtjirti, walyparti, wiminytji/wimitji, wirrminytji; **Luritja:** kurninningka; **Mangala:** kingkin, ngarl-ngarl, parrtjita, tjtjirti, walyparti; **Manytjilytjarra:** kinkilpa, kitjikurna, kurninningka, ngal-ngal, parrtjarta, walyparti, wiminytji; **Mirning:** tjalpatu; **Mutpura:** tjapurti; **Ngaanyatjarra:** kurninningka/kuninningka, parrtjarta; **Ngaatjarra:** kurninningka/kuninningka, mulyutjilira, parrtjarta, **Nyangamarta:** parrtjarta, walyparti; **Nyiyapali:** ngur-ngur; **Pintupi:** kunatjilira, kurninningka/kuninningka, mulyutjilira, parrtjarta, tjtjirti, walyparti, wiminytji/wimitji, wirrminytji; **Pitjantjarra:** kurninningka/kuninningka, parrtjarta; **Putitjarra:** kinkilpa, kitjikurna, kurninningka, parrtjarta, walyparti; **Tjaru:** kurninningka, parrtjarta; **Tjinkilli:** tjapurti; **Walmatjari:** ngarl-ngarl, parrtjita, walyparti; **Wangkatjungka:** kurninningka, ngangnalpa, ngarl-ngarl, parrtjita, walyparti, wirrminytji; **Warlpiri:** kurninningka, parrtjarta, parrtjita, tjtjirti, wirl-wirliki; **Warnman:** parrtjarta, walyparti; **Yulparrja:** walyparti.

Habitat. All types of country.

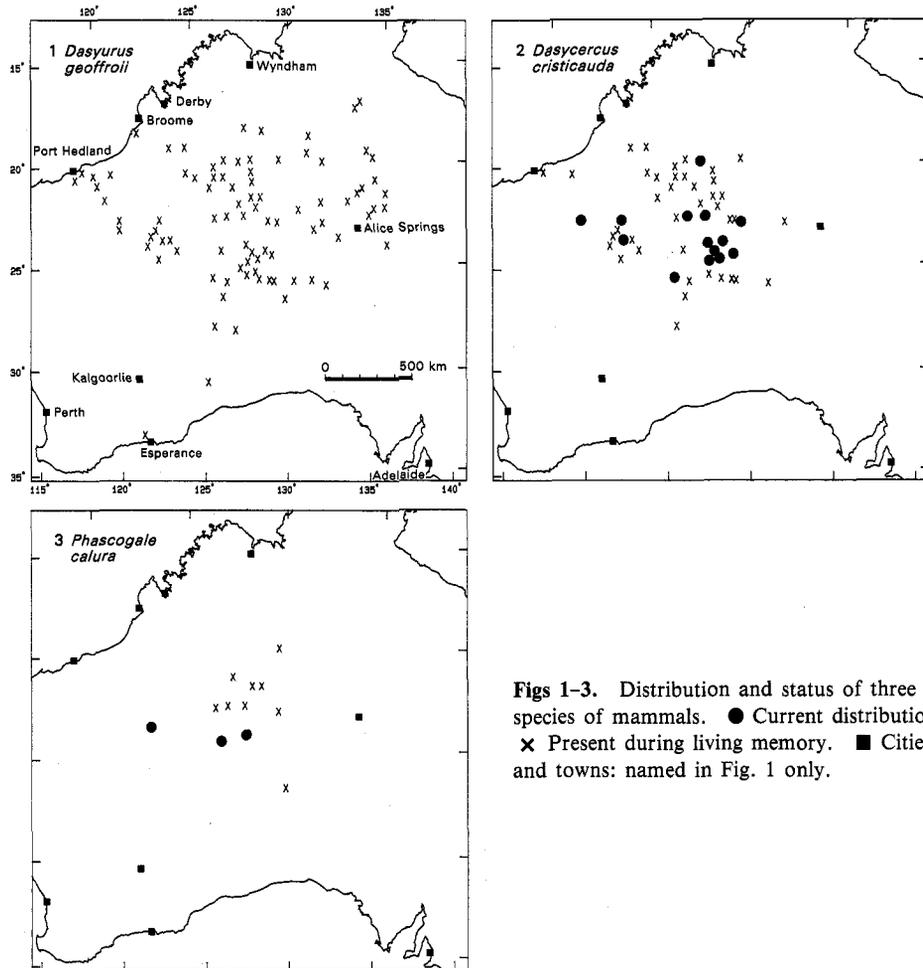
Shelter. Hollow logs and tree limbs, holes in ground (including *Bettongia lesueur* warrens and *Macrotis* burrows), in hollows in termitaria. Regarded as a 'loafer' that did not dig its own burrow but utilised those of other animals.

Food. A variety of live mammals (rabbits often mentioned), carrion, lizards, frogs and invertebrates.

Breeding. Many young.

Status. Fig. 1. Disappeared from study area about 30–40 years ago. Johnson and Roff (1982) have discussed the timing of the decline in different areas.

Discussion. As stated by Arnold (1983), Western Quolls were known to have occurred in the arid zone (although the map with the text incorrectly omits this former distribution). There are early records from this area including Canning Stock Route Well 46, Barrow Creek, Alice Springs and Crown Point (Parker 1973; McKenzie and Youngson 1983). One of us (P.J.F.) has collected skeletal material from a *Leporillus* nest at Young Range, and two of us (A.A.B., P.J.F.) have collected skeletal material from a *Bettongia* warren at Kiwirrkurra. Finlayson (1961) considered the species to have been formerly widespread throughout central Australia. It does not occur in the Kimberley or 'Top End' of the Northern Territory (Parker 1973; Kitchener and Vicker 1981).



Figs 1-3. Distribution and status of three species of mammals. ● Current distribution. × Present during living memory. ■ Cities and towns: named in Fig. 1 only.

Dasyercus cristicauda, Mulgara

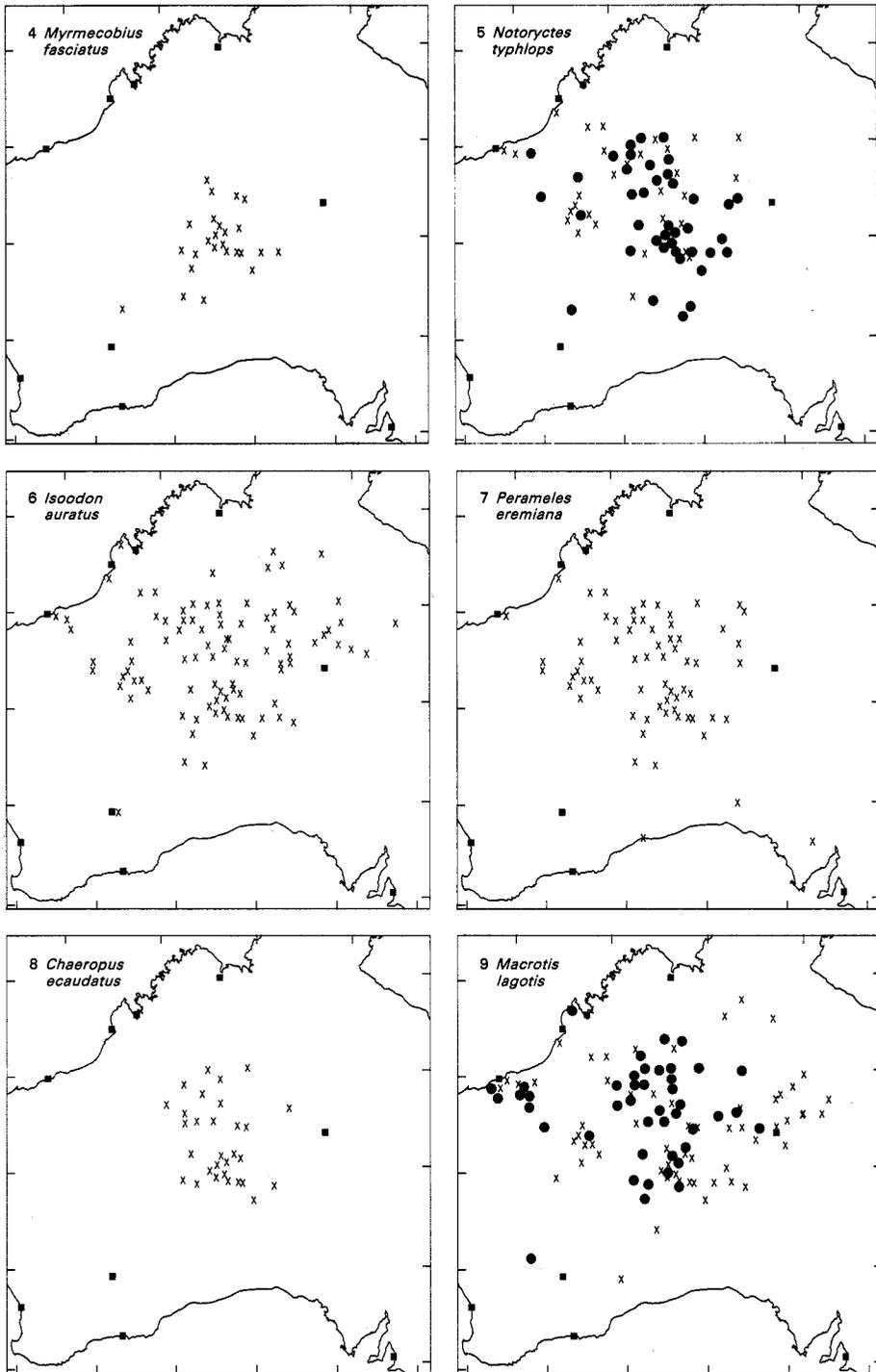
Names. **Aranta, eastern:** ampurta, atiyu; **Kartutjarra:** kakati, miniilka, minyi-minyi, papanytji; **Kukatja:** minyi-minyi, minyipurru, papanytji, putjapurru, talingkatawunpa; **Luritja:** murr tj a; **Mangala:** miniilka, minyi-minyi, tjatjalpi; **Manytjilytjarra:** kakati, minirly a, minyi-minyi, murr tj a, papanytji; **Ngaanyatjarra:** kakati, minyi-minyi, murr tj a, nyalurti/nyarlurti; **Ngaatjatjarra:** kakati, minyi-minyi, murr tj a, nyalurti/nyarlurti; **Pintupi:** kakati, kurralkura, minyi-minyi, minyipurru, murr tj a, nyalurti/nyarlurti, papanytji/papalytji, putjapurru, talingkatawunpa; **Pitjantjatjarra:** murr tj a, nyalurti/nyarlurti; **Putitjarra:** miniilka, minyi-minyi, murr tj a; **Wamatjari:** miniilka, minyipanta, tjatjalpi; **Wangkatjungka:** minirly a, minyipanta, munyantji/minyantji, papanytji, putjapurru; **Warlpiri:** murr tj a, nyalurti/nyarlurti, talingkatawunpa, tjatjina; **Warnman:** miniilka.

Habitat. Sandplains and dunes.

Shelter. Burrow, often several tunnels in one burrow system.

Food. Insects, ants often mentioned.

Breeding. 'Many' young.



Figs 4-9. Distribution and status of six species of mammals. Symbols as in Fig. 1.

Status. Fig. 2. Most people said it had disappeared. Some said it was still around and relatively common in certain areas.

Discussion. There are recent specimens and trap records from scattered localities throughout the study area, e.g. Warburton (1979), in 29°56'S., 123°46'E. in the Great Victoria Desert (1985), Ayers Rock (1974), Simpson Desert in 23°50'S., 137°15'E. (1985) and Tanami Desert (several recent specimens or records).

Phascogale calura, Red-tailed Phascogale

Names. **Kukatja:** ngintingkaparrtjilaralpa; **Pintupi:** ngintingkaparrtjilaralpa, papalakurntalpa/papatjakurntalpa; **Warlpiri:** tjatjinawaltunkurru?

Habitat. Sandhills, hilly country.

Shelter. Hollow limbs, especially in bloodwoods (*Eucalyptus chippendalei*).

Food. No data.

Breeding. No data.

Status. Fig. 3. Very few people recognised this species. Of those that did some said that it had disappeared, while others seemed to know it well and said it was still around.

Comments. Several people said it was not eaten, describing it as 'bad meat'.

Discussion. Museum specimens are from Alice Springs (1896), Barrow Creek and Tennant Creek (1901) and Canning Stock Route Well 44 (1931).

Myrmecobius fasciatus, Numbat

Names. **Manytjilytjarra:** walpurti; **Ngaanyatjarra:** walpurti; **Ngaatjatjarra:** mutjurarranypa, walpurti; **Pintupi:** karritjiti, mutjurarranypa, parrtjilaranypa, walpurti; **Pitjantjatjarra:** walpurti.

Habitat. Sandplains and lateritic plains, with mulga and spinifex or soft grasses; also dunes.

Shelter. Made nest in burrows, hollow logs and hollow trees.

Food. Most said termites and ants, a few said grass, fruits and grubs.

Breeding. We were commonly told that it had from two to four young, a few said 'many'.

Status. Fig. 4. All agreed that it had disappeared and most indicated times of between 25 and 30 years. Friend *et al.* (1982) had one report of the Numbat existing at Patjarr (Clutterbuck Hills) about 15 years before 1982.

Discussion. The former distribution and status have been discussed by Friend *et al.* (1982). We have extended the known range, but eliminated the possible record near Lake Gregory, having reinterviewed the same man. Reports to us concerning habitat, shelter, food (except for the references to grass, fruits and grubs), and breeding are consistent with data obtained in the south-west of Western Australia (Friend and Burrows 1983). Finlayson (personal communication) recollected seeing remains commonly around Aboriginal camp fires in the south-east of the study area during the 1930s.

Notoryctes typhlops, Marsupial Mole

Names. **Aranta, eastern:** arkutalana, urrkamata; **Kartutjarra:** kakarratul, mantanungnarl, mantararr; **Kukatja:** kakarratul, mantararrararra; **Luritja:** yitjarritjarri; **Mangala:** mantaraa,

tjalupantji; **Manytjilytjarra**: irtarrutju, kakaratut, kakarratulpa, mantanungnarl, mantararr; **Ngaanya-tjarra**: kakarrartuunpa, yirtarrutju; **Ngaatjatjarra**: kakarratulpa/kakarrartuunpa, yitjarritjarri, yirtarrutju; **Nyangamarta**: kakarratulpa; **Pintupi**: kakarratulpa, ngarrinatjulurru/ngarrinytjatjulurru, pikarnawarlartarri, tjilpirkuwakanytja, tjulyarrutju, yirtarrutju, yitjarritjarri; **Pitjantjatjarra**: itjarritjarri/itjarri-itjarri, itjarrutju; **Putitjarra**: irtarrutju, kakarratulpa, mantanungnarl, mantararr; **Walmartjari**: kakarratul, kalaputjaputja, mantararrararra; **Wangkatjungka**: kakarratul, mantararrararra; **Warlpiri**: kakarratul, mantawatjiwatji, putjurrputjurrpa; **Warnman**: kakarratulpa.

Habitat. Dunes and swales.

Shelter. Lives underground.

Food. Most people didn't know; a few said ants, especially honey-pot ants *Melophorus* or *Campanotus* spp.

Breeding. No data.

Status. Fig. 5. Everyone said it was still common in suitable areas.

Comments. Most said that it could occasionally be found on the surface at any time of the year; a few said it was more common after rains or in the 'windy season' (September–October). The habit of emerging onto the surface for a few metres and then disappearing underground again was often mentioned. Eaten during hard times but generally regarded with feeling as a poor old man who cannot see. Alluded to in some areas as 'pensioner'.

Discussion. Recent specimens from widespread places in study area, including Kintore, Chilla Well, Nyirripi, Ayers Rock and Balgo. Tracks seen by one of us (P.J.F.) at Lake Auld in the Great Sandy Desert in 1986.

Isoodon auratus, Golden Bandicoot

Names. **Alyawarra**: yiwura; **Anmatjara**: akwura; **Aranta, eastern**: akurra/akwura, yiwurra/iwurra; **Kaititja**: akwura, pakuru; **Karatjari**: mirtara, tjilpuku, tjirika; **Kartutjarra**: makurra, mingatjuru, wintarru/wirntarru; **Kukatja**: makurra, minawarrulpa, minganypa, mingatjuru/minantjuru, mulyatjuku, pakuru, piilkarra, tirinpa, tjurrungu, wintarru/wirntarru; **Kurintji**: murtjupantipanti, pakuru, yilpintji; **Luritja**: pakuru, wintarru/wirntarru; **Mangala**: manparri, mingatjuru, mirtara, mulyu, tjulpuku; **Manytjilytjarra**: makurra, mingatjuru, mirtara, tirkka, tjurrungu, wintarru/wirntarru, ulkaratja; **Mutpura**: kalwari; **Ngaanyatjarra**: makurra, minganypa, mingatjuru, nyurlu, wintarru/wirntarru; **Ngaatjatjarra**: makurra, mingatjuru, mulyatjuku, nyurlu, wintarru/wirntarru; **Nyangamarta**: mingatjuru, mirtara, tirkka; **Pintupi**: kantjalpa/kantjarpa, makurra, minganypa, mingatjuru, mulyatjuku/mulyatjuru, nyurlu, pakuru, parranpalyi, piilkarra, tjurrungu, wintarru/wirntarru; **Pitjantjatjarra**: makurra, nyurlu, wintarru/wirntarru; **Putitjarra**: makurra, mingatjuru, wintarru/wirntarru; **Tjaru**: manparri, mingatjuru, yurtupurru; **Walmartjari**: manparri/manpayarri, mingatjuru, mulyu; **Wangkatjungka**: makurra, minganypa, mingatjuru, mingawarrulpa, mulyatjuku, pakuru, piilkarra, tirinpa, tjurrungu, wintarru; **Warlpiri**: mingatjuru, pakuru, piilkarra, pika, tjurrungu, wintarru; **Warnman**: mingatjuru, tirkka.

Habitat. Sandplains, dunes and stony country with spinifex or soft grasses, also mulga and spinifex.

Shelter. In a nest, usually in a scrape; made by gathering spinifex and other grasses together. Nest placed under a spinifex hummock or amongst tussock grass, sometimes inside a hummock.

Food. Termites and ants, grass seeds.

Breeding. Two or three young, some said many.

Status. Fig. 6. Disappeared between 15 and 40 years ago, earlier in the south and later

in the north. Pintupi people living traditionally near Lake Mackay until 1984 said they had eaten it about 15–20 years ago.

Comments. A very important food item and very well known. The meat contained a lot of fat. Hunted by tracking to its nest, stamping on the nest and removing the animal by hand. Killed by breaking the neck or beating with a club. Also hunted by burning to flush from cover. Was one of the most abundant of the medium-sized mammals.

Discussion. The last specimen from the study area was from The Granites in 1952. George Lanagan, a drover who made many trips down the Canning Stock Route, told us that the cattle regularly flushed Golden Bandicoots from the Lake Disappointment area north to Well 45, up until the last full trip he made in 1940. The only remaining mainland population is in the north-west Kimberley (McKenzie 1983). Dick Kimber (personal communication) was shown a campsite at Jupiter Well that he estimated from information given to have been active between 1955 and 1962. He reported that the people regarded the Golden Bandicoot to have been common at that time.

Perameles eremiana, Desert Bandicoot

Names. **Karatjari:** karitjarri; **Kartutjarra:** kililpi, nganngarrpa, nyirni/nyinmi, walilya, watalyari; **Kutatja:** karl-karl, kililpi, nganngarrpa, nyirni/nyinmi, tjarlkarlpari?, walilya, watalyari; **Mangala:** karl-karl, kililpi, nganngarrpa, watalyari; **Manytjilytjarra:** kililpi, nganngarrpa, nyirni/nyinmi, walilya, watalyari; **Ngaanyatjarra:** walilya/warlilya; **Ngaatjarra:** kililpi, nyinmi/nyirni, walilya/warlilya; **Nyangamarta:** kililpi, watalyari; **Pintupi:** kililpi, mingii, miringinpa, nyinmi/nyirni, tjupirra, walilya/warlilya; **Pitjantjarra:** walilya/warlilya; **Putitjarra:** kililpi, walilya; **Walmatjari:** karl-karl, kililpi, narntuurpa, nganngarrpa, watalyari; **Wangkatjungka:** karl-karl, kililpi, nantuurpa, nganngarrpa, nyinmi, walilya, watalyari; **Warlpiri:** kililpi, warralyari/wartalyari; **Warnman:** walilya.

Habitat. Sandplains and dunes with spinifex, tussock grass flats. Often found with *I. auratus*.

Shelter. In a grass-lined nest in a scrape under litter, grass or a shrub. The nest had an entry and an exit hole.

Food. Termites and ants, especially honey-pot ants, beetle larvae.

Breeding. Most said two young, some said three, some said many.

Status. Fig. 7. Disappeared between 15 and 40 years ago, earlier in the south. Pintupi people living near Lake Mackay until 1984 said they had eaten it 15–20 years ago.

Comments. Hunted in a similar fashion to *Isoodon auratus*.

Discussion. Not having a specimen of *P. eremiana* we showed people a faded specimen of *P. bougainville* which lacked the distinctive stripes. When we had no specimen it was readily recognised as being similar to *I. auratus* but having longer ears. Gordon (1983) has discussed the little that has been documented about this species, and Freeman (1967) has delineated the taxonomic boundary between it and *P. bougainville*. The species must be presumed extinct. The localities mapped on the Nullarbor Plain probably refer to *P. bougainville*, since our informant referred to the animals as 'Zebra Rats'. When we showed him a specimen of *P. bougainville* with stripes he identified it as the species which occurred there.

Chaeropus ecaudatus, Pig-footed Bandicoot

Names. **Kartutjarra:** kanytjilpa; **Kukatja:** kalatawurru, parrtiriya, takanpa; **Mangala:** kalatawirri; **Manytjilytjarra:** kanytjilpa; **Ngaanyatjarra:** kanytjilpa; **Ngaatjarra:** kanytjilpa; **Pintupi:** kanytjilpa,

marakutju, takanpa; **Pitjantjatjarra**: kanytjilpa; **Walmartjari**: kalatawirri; **Wangkatjungka**: kantjilpa, marakutju; **Warlpiri**: takanpa, yirratji.

Habitat. Sandplains and dunes with spinifex and tussock grass, sometimes with a mulga overstorey.

Shelter. Most people said it lived in a grass-lined nest in a scrape (sometimes referred to as a 'bough shed' an allusion to a temporary shelter built by Aborigines); a few said it dug a short straight burrow with a nest at the end.

Food. Termites and ants, including honey-pot ants.

Breeding. No data.

Status. Fig. 8. Disappeared a long time ago in the south, probably about 60–70 years ago in South Australia. Better known in the north, Pintupi people know it well and said it was still around 30 years ago in their country. Only Warlpiri people in their 60s and 70s can recall seeing it.

Comments. We were told that the animal ran or scampered and did not hop. It ran too fast to catch. When chased by dogs it would often run into a hollow log.

Discussion. Aitken (1983a) has summarised available information on this species. Specimens from the study area include Ryans Well (1891), 64 km north-east of Charlotte Waters (1895), and Alice Springs (c. 1916). A 1906 report from Diebil Spring in the Little Sandy Desert has been discussed by McKenzie and Youngson (1983). Now extinct.

Macrotis lagotis, Greater Bilby

Names. **Alyawarra**: auta; **Aranta, eastern**: arrita/arita, arrtjurta, yinkaiya; **Aranta, western**: akwurra, ninu, tjalku; **Kaititja**: atnungwa, atnunka; **Karatjari**: ngakamiti, tjiratu; **Kartutjarra**: kulkawalu/kurkawalu, mankarrpa, marrura, tjilikun; **Kukatja**: kunatili?, kunatjupi, mankarrpa, marrura, ngunpi, ninu, nirlari, nyalku, partiri, pintitiri, tjapatu, walpatjirri, yawirliri?; **Kurintji**: tjika, witji, yalwirti/yalwari; **Luritja**: ninu/nirnu, tjalku; **Mangala**: mitulurtju, pintunkaratu; **Manytjilytjarra**: kulkawalu/kulkawalwal/kulkuwala/kurkuwal, mankarrpa/mankara, marrura, minyirrika, ninu/nirnu, yinpu; **Mirning**: nanakata; **Mutpura**: yariningi; **Ngaanyatjarra**: marrura, ninu; **Ngaatjarra**: marrura, ninu, tjalku; **Nyamal**: yinpu; **Nyangamarta**: kulkuwala/kurkuwalwa/kurkawaluwal, minyirrika, yinpu; **Niyapali**: kurkawalwal/kurkuwalu, puntikulu; **Parti**: kumatjin; **Pintupi**: kunatjalku, kunatjupi, marrura, nantalpa, ninu, nyalku, tjalku, walpatjirri; **Pitjantjatjarra**: marrura, naluwarra, nirnu/ninu, talku/tjalku; **Putitjarra**: marrura, tjilikun; **Tjaru**: nyalku, pintitiri, yalwirti; **Tjinkilli**: yalparini; **Walmartjari**: mitulurtju, nini, nyalku, yalwirti/yalwiti; **Wangkatjungka**: marrura, mitulurtju, nirlyari/nirlari/nilaru, nyalku, pintitiri, tjapatu; **Warumungu**: wartikiti; **Warlpiri**: kunatjupi, marrura, nilyari, ninu, pintitiri, pirntikari, walpatjiri/walpatjirri/walpatjirri; **Warnman**: kulkanula, minyirrika.

Habitat. All types of country except ranges.

Shelter. In deep burrow descending in a spiral, usually 'many' burrows scattered through an area of a few hectares.

Food. Obtained by digging; beetle larvae, termites, ants including honey-pot ants, 'bush onions' *Cyperus bulbosus*, seeds and roots. Witchetty grubs (large lepidopteran larvae) commonly referred to as the main food item.

Breeding. Two young; a few people said three.

Status. Fig. 9. Now absent from northern South Australia and Northern Territory south of 24°00'S., including the Simpson Desert; increasingly common to the north where scattered groups occur in the Tanami Desert. Now absent from the Great Victoria Desert

and areas to the south and south-west in Western Australia; still present in low numbers in the Gibson Desert, e.g. at Tjirrkarli; more common in and around the periphery of the Great Sandy Desert and in the northern Little Sandy Desert. Still present in south-west Queensland.

Comments. Hunted by digging out the burrow. Sometimes speared when near burrow entrance. Men wore the tails as ornaments in their beards, women wore them in their hair. An important food item; still eaten in some places.

Discussion. Extensive survey by one of us (R.I.S.) has shown that the species' range has continued to contract and fragment since 1970. Two of us (A.A.B. and P.J.F.) found extensive populations in the Great Sandy Desert in 1986.

Macrotis leucura, Lesser Bilby

Names. **Kartutjarra:** natukutiri/ngatukutiri/nutukutiri, ngatukutita, tjunpi; **Kukatja:** natukutiri/ngatukutiri, tjunpi; **Manytjilytjarra:** natukutiri/ngatukutiri, ngatukutita, tjunpi; **Ngaanyatjarra:** tjunpi; **Ngaatjatjarra:** tjunpi, nyunpi; **Pintupi:** nantakarra, nyunpi/nyumpi, tjunpi; **Putitjarra:** natukutiri/ngatukutiri; **Walmatjari:** wingnyil; **Wangkatjungka:** nantakarra/parntakarra, ngatukulirra, nyunpi, wingnyil; **Warlpiri:** nantakarra.

Habitat. Dunes and sandplains with spinifex, sometimes with mulga and/or tussock grass.

Shelter. Deep burrow descending in spiral, no nesting material at the end.

Food. Termites and ants, roots.

Breeding. No data.

Status. Fig. 10. Disappeared between 20 and 60 or more years ago. Some dates from informants who knew the species well are: Clutterbuck Hills, 20 years; north of Rawlinson Range, 35 years; Walter James Range, 30 years; Great Sandy Desert between Southesk Tablelands and Jupiter Well, 45 years; Murray Bore (south of Blackstone), 60 years.

Discussion. This species has previously been documented only in the Simpson Desert region, plus a doubtful record from Barrow Creek (Parker 1973) and has not been collected in the study area. We did not have a specimen to show our informants and only started to understand that it occurred in the study area when we were told two conflicting sets of information about our specimen of *Chaeropus*. After it became clear that *M. leucura* had been present, we had no difficulty discussing both species when looking at *Chaeropus*.

Trichosurus vulpecula, Common Brushtail Possum

Names. **Anmatjara:** antana, urrpampara; **Aranta, western:** intuna; **Aranta, eastern:** antina/antana, yimarra; **Kaititja:** wampara; **Karatjari:** langkurr, winkuma; **Kartutjarra:** nyalumpara, nyuwilpa, wayurta, winkuma; **Kukatja:** kitu, kuringka, marlalparra, ngarlumpa, nyuwilpa, tjampinti, tjanganpa, wartawirrka, wayurta, wina-wina; **Luritja:** nurnta, wayurta, yimurra; **Mangala:** langkurr, tjinapapi, winkuma; **Manytjilytjarra:** marlalparra, nyalumpara, nyuwilpa, partawirrka, wayurta, winkuma; **Mutpura:** tjanganpa; **Ngaanyatjarra:** mungawayurru, tjaparlapa/tjapalpa, tjiwangu, wayurta; **Ngaatjatjarra:** marliyara, mungawayurru, tjaparlapa/tjapalpa, wayurta; **Nyamal:** wanitjara, wantjinara; **Nyangamarta:** marlalparra, wanitjara, wantjinara, winkuma; **Nyiyapali:** kaparti, marlalparra, nyalumpara, turrumanta; **Parti:** langkarr/langkurr, walanpara?; **Pintupi:** katatjurta, marlalparra, marliyarra, mungawayurru, nyunta, parntawirrka, pirtikarra/pirtikarratja, tjanganpa, wayurta, wina-wina, yurltukarra/yurltukarratja; **Pitjantjatjarra:** mungawayurru, wayurta; **Putitjarra:** wayurta; **Tjaru:** tjanganpa; **Tjinkili:** tjakulaki, tjanganpa; **Walmatjari:** kitu, tatikarra, tjanpitjin, tjanpiyinti, winkuma, wayurta; **Wangkatjungka:** kitu, marlalparra, ngarlumpa, nyuwilpa, tatikarra/talikarra,

tjanganpa, wartawirrka, wayurta, wina-wina, winkuma; **Warumungu:** marrapun, tjangaynpa; **Warlpiri:** kinantji, kiripangarti, marlalparra, partawirrka, tjanganpa/tjangaynpa, wayurta, wilinpa, winankirri, wina-wina; **Warnman:** marlalparra, winkuma.

Habitat. Any area where trees were present, especially along creeks, also in ranges and other rocky areas. Also occurred in spinifex country among scattered eucalypts or large termitaria or in open country in association with *Bettongia lesueur* warrens.

Shelter. Hollow limbs and logs, in crevices in rockpiles, in holes in the ground, especially *Bettongia lesueur* warrens. In large termitaria of *Nasutitermes triodiae*.

Food. Flowers, leaves, fruits (including Quandong, *Santalum acuminatum*); one group said it ate yams (*Ipomoea* or *Vigna*).

Breeding. One young, carried on the back when large enough to leave the pouch.

Status. Fig. 11. Most people said it had disappeared about 20–30 years ago, but some said it was still around, mainly in the central ranges and the northern Tanami and Great Sandy Deserts. People living traditionally near Lake Mackay until 1984 said they were still eating it when they left. Records from the Pilbara and the south Kimberley probably refer to *T. arnhemensis*.

Comments. Often hunted after dark in bright moonlight, sometimes smoked or cut from hollow trees after being located by seeing of the scratches on the bark or being located by dogs. Many people commented on the animal's fierce disposition—it would scratch, bite and hiss when captured. The fur was spun into a string. A much favoured food item in the past.

Discussion. Once a very common animal throughout the study area. Its virtual disappearance from the arid zone runs counter to the common belief of its adaptability to European imposed conditions. There are recent confirmed records or evidence from Shaw Creek, 20 km west of Chilla Well, Mud Tank, Simpsons Gap National Park and The Garden Station in the Northern Territory. Areas where it persists have a diverse shrub layer.

Bettongia penicillata, Brush-tailed Bettong

Names. **Karatjari:** tjanpal; **Kartutjarra:** karrpitji, pututjurru, yurrpul; **Kukatja:** karrpitji, kurlkarri, maymirrka, pututjurru, tjampampa; **Luritja:** pututjurru; **Mangala:** pututjurru, tjampapa; **Manytjilytjarra:** karrpitji, puntikurryu, pututjurru, tjanpa, yurrpul; **Ngaanyatjarra:** karrpitji, purtutjurru/pututjurru; **Ngaatjatjarra:** karrpitji, kurtutjarri/purtutjarri, purtutjurru/pututjurru, tjurrma?; **Nyiyapali:** puntikurryu; **Pintupi:** karrpitji, kurlkarri/kulkarri, purtutjurru/pututjurru, tjurrma?, wartayirrtjalpa; **Pitjantjatjarra:** karrpitji, kurtutjarri, purtutjurru/pututjurru; **Putitjarra:** karrpitji, yurrpul; **Wamatjari:** miripi, pututjurru; **Wangkatjungka:** karrpitji, kurlkarri, maymirrka, pututjurru, tjampampa; **Warlpiri:** maymirrka, pututjurru; **Warnman:** tjanpa.

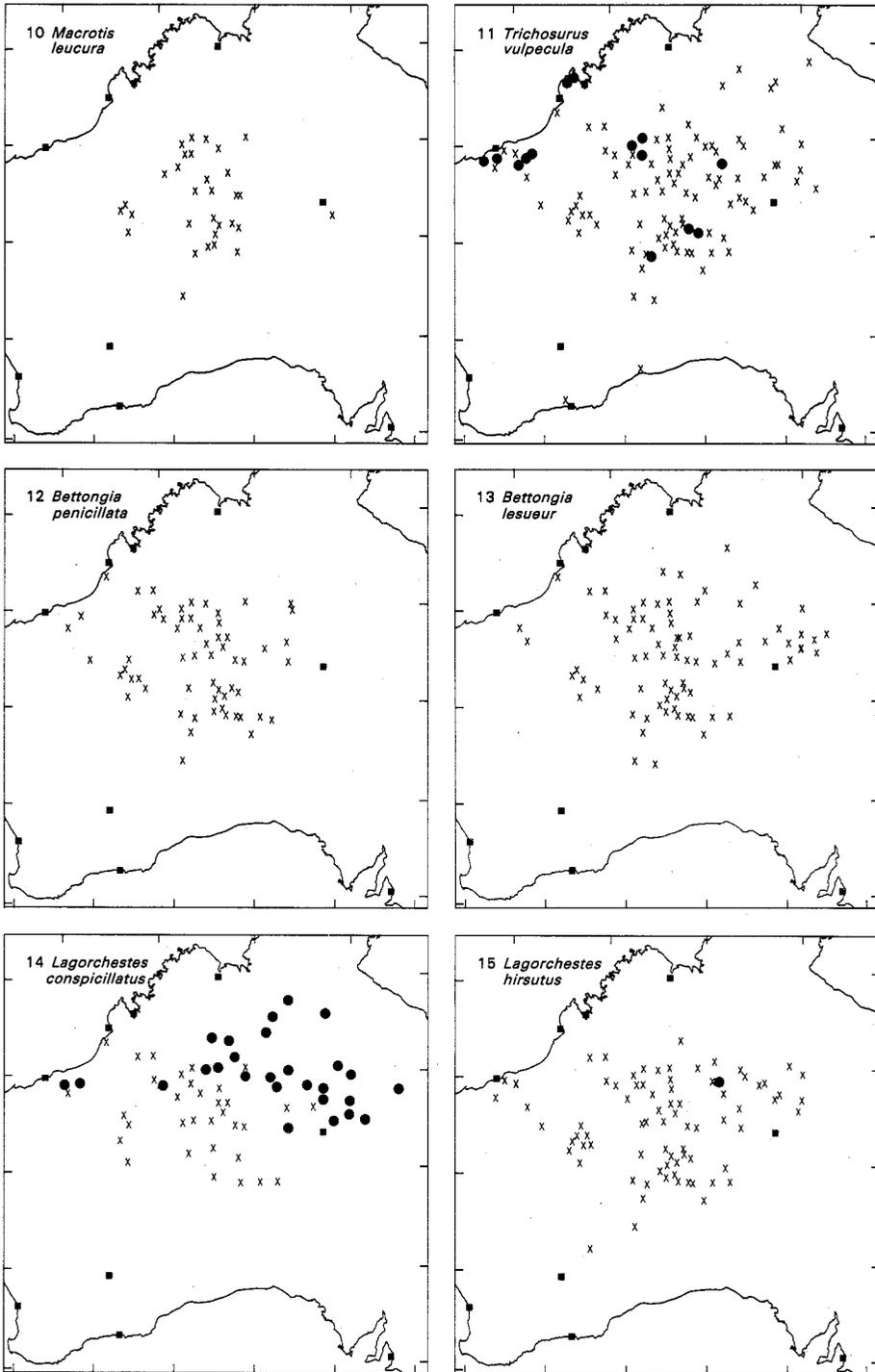
Habitat. Sandplains and dunes with spinifex.

Shelter. In a grass-lined nest inside a spinifex hummock or grass tussock. One man pointed to the grass nest of the Zebra Finch *Poephila guttata*, an ovoid structure with a single entrance, and likened it to the larger nest of the Bettong. Several groups said it sometimes dug a short burrow like that of *Lagorchestes hirsutus*. We were often told that it would run into a hollow log when chased.

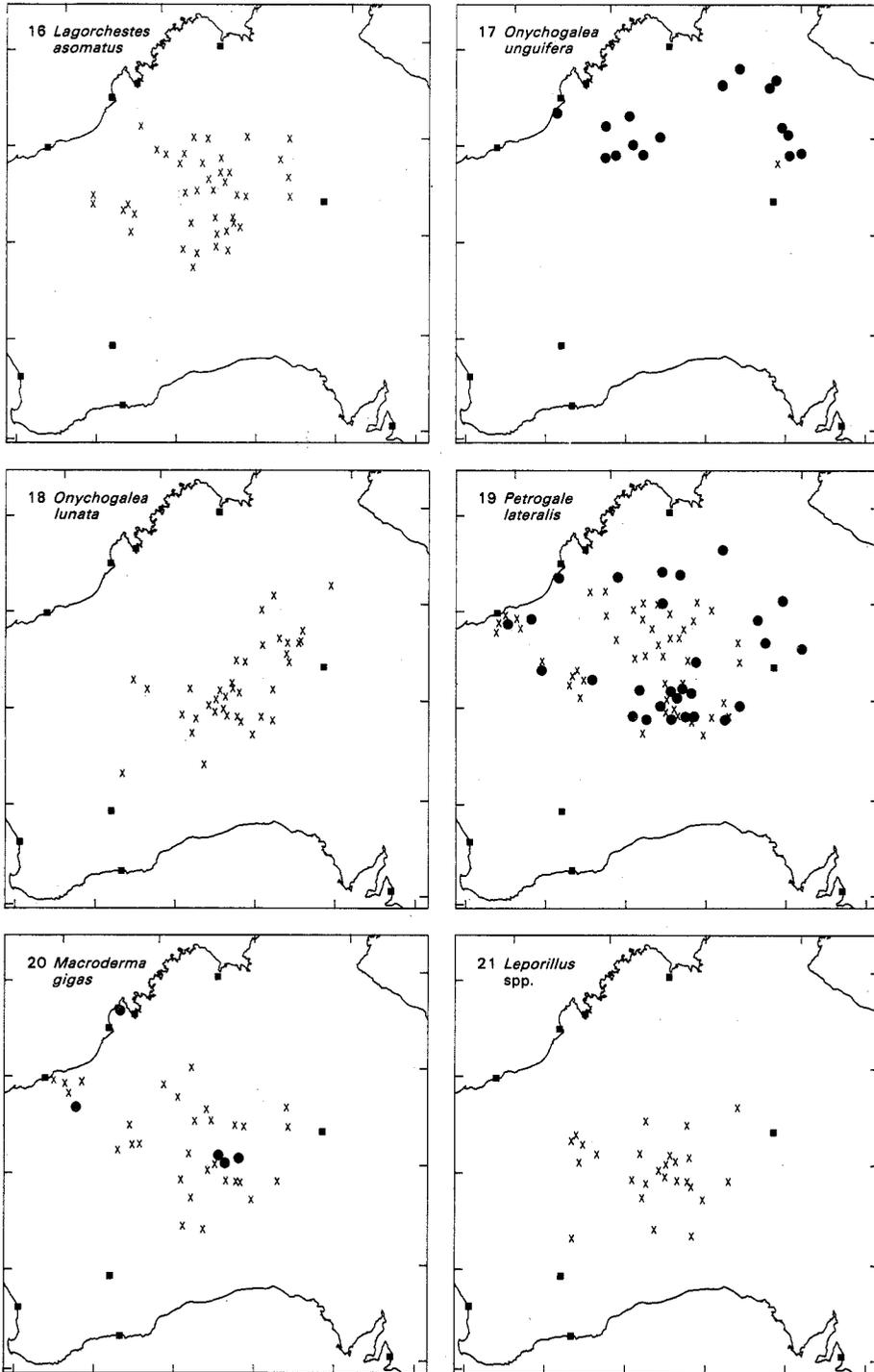
Food. Fruits, especially Quandong; seeds and grass.

Breeding. One young.

Status. Fig. 12. Disappeared between 25 and 40 years ago, earlier in the south. In the Great Sandy and Tanami Deserts it persisted until about 25 years ago.



Figs 10-15. Distribution and status of six species of mammals. Symbols as in Fig. 1.



Figs 16-21. Distribution and status of six species of mammals. Symbols as in Fig. 1.

Comments. We were often told that it was a noisy animal making a variety of clicks, squeals and grunts. Many people reported that it carried grass with its tail for lining its nest.

Discussion. This behavioural information is consistent with data from elsewhere in Australia (Gould 1845–63; Sampson 1971; Christensen 1980), except that reports of the burrowing habit are new. Finlayson (1958) has previously reported the species from central Australia but Ride (1970) and Parker (1973) overlooked or dismissed his records and subsequent authors have followed suit. A subfossil jaw and cranial molar row from Muranji Rockhole have recently been identified by one of us (K.A.J.). Aboriginal names provided by Finlayson (1961) are the same as those recorded by us for the same language groups (e.g. karpitchi v. karpitji).

Bettongia lesueur, Burrowing Bettong

Names. **Alyawarra:** aluta; **Anmatjara:** urtaya; **Aranta, eastern:** aluta; **Kaititja:** atjurta, kapwapwa; **Karatjari:** tjilpuku; **Kartutjarra:** mitika, nurrtu, tjungku, yalanmunku, yunkupalyi; **Kukatja:** kunayuna, mitika, nurrtu, purtaya/putaya, tjunku, walkatju, yiilkirra; **Luritja:** purtaya; **Mangala:** pitikariti, purtaya, walkatju, yiilkita, yilyikarra, yunkupalyi; **Manytjilytjarra:** mitika, nurrtu, tjiliku, wilyinpa, yunkupalyi; **Ngaanyatjarra:** mitika, tjungku; **Ngaatjatjarra:** mitika, murlyuyuna, tjungku; **Nyangamarta:** tjiliku; **Pintupi:** kunayuna, mitika, murlyuyuna, purtaya, tjungku, yungkupalyi; **Pitjantjatjarra:** mitika, tjungku; **Putitjarra:** nurrtu; **Tjaru:** purtaya, walkaru; **Wamatjari:** purtaya, tjpalyi, walkatju, yiilkita, yunkupalyi; **Wangkatjungka:** mitika, nurrtu/nurrtu, purtaya, tjunku, walkatju, yiilkirra; **Warlpiri:** purlana, purtaya, walkatju, wirlana; **Warnman:** minilka/minirika.

Habitat. Widespread, all types of country except ranges.

Shelter. In deep burrows in warrens.

Food. Roots, seeds, fruits and grass.

Breeding. One young.

Status. Fig. 13. Disappeared between 25 and 50 years ago. In the south (e.g. in South Australia and around Warburton), it had gone by 40 years ago; in the Gibson Desert, Pintupi people told us that it was still present 25 years ago.

Comments. It was considered excellent meat and was captured by digging out warrens or by smoking animals from their burrows. Some people noted its ability to kick viciously when caught, so it was usually dispatched quickly. Some reiterated the hunting method described by Finlayson (1958), of blocking burrows a short way below the surface after the animals dispersed at night, and returning in the early morning to extract them from the remaining short tunnel.

Discussion. This species was once extremely common and widespread, and old warrens are still clearly visible in parts of the Great Sandy, Little Sandy, Gibson and Tanami Deserts, especially in limestone, calcrete and lateritic country. Some warrens, such as those reported by Giles (1889) in Christopher Lake, are now occupied by rabbits. However, warrens in the north of the study area often show little or no evidence of recent disturbance. Some regarded this species as the 'mate' of the rabbit as both were often extracted from the same burrows.

Lagorchestes conspicillatus, Spectacled Hare-wallaby

Names. **Anmatjara:** kwarlpa; **Aranta, western:** kwalpa/kwarlpa; **Aranta, eastern:** kwalpa/kwarlpa; **Kaititja:** irlyaku, kwalpa; **Karatjari:** marrkapurr, pitang; **Kartutjarra:** tjantjipuka, tjunngaru; **Kukatja:** miripatiri, tingarri, wampana; **Kurintji:** wampana; **Luritja:** ukalpi; **Mangala:** miripatiri,

pitan, warngaru; **Manytjilytjarra**: milparti, tjantjipuka; **Mutpura**: wampana; **Ngaatjatjarra**: ukalpi/mukalpi/pukalpi; **Nyangamarta**: tjantjipuka; **Pintupi**: yukalpi/mukalpi, wampana; **Pitjantjatjarra**: ukalpi; **Tjaru**: mangkapan, miripatiri, wampana; **Tjinkili**: kalama, wampana; **Walmartjari**: mangkapan, wampana; **Wangkatjungka**: wampana, yukalpi; **Warlpiri**: miripatiri, wampana, yulkaminyi.

Habitat. Sand and gravelly plains, dunes, stony rises and hills with spinifex, sometimes also with mulga.

Shelter. In scrape under spinifex hummock or leafy shrubs. Sometimes digs a short burrow under cover, especially during hot weather.

Food. Spinifex seeds and leaves, fruits (especially *Solanum* spp.) and leaves of other plants.

Breeding. One young.

Status. Fig. 14. Most people said it had disappeared 20–50 years ago in southern areas. In Western Australia some, mainly along the southern edge of the Kimberley and in the Pilbara, said it was still present. In the Northern Territory extant north of the MacDonnell Ranges, becoming increasingly common with decreasing latitude.

Comments. We were told it was sometimes hunted with the aid of dogs. Also speared in its scrape after being tracked to it. Sometimes the hunter would utter a short but specific squeak, which made the wallaby freeze in its squat, while he quickly circled it to get close enough to deliver a spear. Some said that in the evening it hopped with its feet more splayed and wider apart than in the morning. A hunter's search for an animal would be shortened by following the morning tracks. A favoured food item regarded as having a lot of blood that was drunk from the body cavity after cooking.

Discussion. Recent specimens from near Shay Gap, W.A.; widely scattered through the Tanami Desert and parts of the Central Ranges.

Lagorchestes hirsutus, Rufous Hare-wallaby

Names. **Aranta**, eastern: atnukwa; **Kaititja**: irlraku, mala; **Karatjari**: landaa, landalyparti; **Kartutjarra**: mala, matjirri; **Kukatja**: mala, parranti, tarngga, tiwilpa/liwilpa, warku, witjari/witjarri; **Luritja**: mala; **Mangala**: mala, raltatu; **Manytjilytjarra**: mala, matjiri/matjirri, ngartimpa, tarngga; **Ngaanyatjarra**: mala, tarngga, tjiwilpa; **Ngaatjatjarra**: mala, tarngga, tjanpitja, tjiwilpa/tiwilpa, warku; **Nyamal**: matjirri, ningnga; **Nyangamarta**: mala, matjirri; **Nyiyapali**: mala, matjirri; **Pintupi**: mala, parranti, tarngga, tintimpa, tjiwilpa/tiwilpa, tjunpu, warku, wirrini; **Pitjantjatjarra**: mala, tjanpitja, warku; **Putitjarra**: mala; **Tjaru**: mala, witjari; **Walmartjari**: mala, malyi, witjari; **Wangkatjungka**: liwilpa, mala, parranti, tarngga, witjari; **Warlpiri**: kunatjinpa, mala, parranti, tipirri, witjari; **Warnman**: mala, matjirri.

Habitat. Sandplains, gravelly plains and dunes with spinifex or tussock grass, sometimes with mulga.

Shelter. In tunnel in, or scrape under, a spinifex hummock; in summer in a short burrow, usually under a hummock, but sometimes under a shrub such as *Melaleuca glomerata*.

Food. Spinifex leaves and seed; leaves, fruits and seeds of a variety of other plants.

Breeding. One young.

Status. Fig. 15. Disappeared from most areas between 25 and 50 years ago, earlier in the south. Most recent records include: about 30 years, Amata, Clutterbuck Hills, near Percival Lakes and between Southesk Tablelands and Jupiter Well; 20–25 years ago, Kiwirrkurra. A relict colony occurs near The Granites in the Tanami Desert.

Comments. Formerly very common and widespread; very well known to almost all our informants. Hunted by tracking to its hide and stamping on it; also by stamping in the entrance to the burrow and then digging out the animal (sometimes two animals) in it. Pintupi and Warlpiri people told us they hunted it by making brush fences and driving the animals with much shouting, sometimes with the aid of dogs, through gaps where hunters lay in wait to hit the fleeing animals with clubs. Also hunted by driving with fire (see also Finlayson 1935). The body cavity after cooking contained much blood, which the old men regarded as good medicine. People reported using a small leafy branch attached to a spear or long stick which was wished around to imitate the flapping wings of a Wedge-tailed Eagle *Aquila audax*. This made the wallaby crouch in its shelter, making close approach and capture easier. Wedge-tailed Eagles were reported to stoop and kill them, an activity reported by Giles (1889) and by Lipfert (McKenzie and Youngson 1983).

Discussion. Finlayson (1935) had difficulty acquiring specimens during his 1931–35 expeditions and considered it (Finlayson 1961) to have occurred in widely scattered colonies. George Lanagan, who drove cattle down the Canning Stock Route, told us that the stock would often flush Rufous Hare-wallabies. The species was common north of Well 30 until his last trip in 1940. In 1959 he saw a few in the vicinity of Billiluna Station. A mandibular fragment attributable to *L. hirsutus* (A. Baynes and D. J. Kitchener, personal communication) was collected by R. G. Kimber at Jupiter Well at an old campsite estimated to have been active between 1955 and 1962. The Tanami Desert relict population has probably fewer than 200 individuals. Bolton and Latz (1978) considered the tight patchy burns created by the Aborigines before European occupation to have favoured the species, and the generally large, mainly summer fires in recent years to have been a major reason for its decline. Recent extensive searches in the Great Sandy and Little Sandy Deserts failed to locate additional populations by two of us (A.A.B. and P.J.F.).

?Lagorchestes asomatus, Central Hare-wallaby

Names. **Kartutjarra:** kalanpa/kananpa, pungkurpa, raputji; **Kutatja:** kalanpa, kuluwarri, tjuntatarrka, yamari; **Mangala:** kalanpa, pukurl-pukurl?; **Manytjilytjarra:** kalanpa/kananpa, pungkurpa, raputji; **Ngaanyatjarra:** kuluwarri; **Ngaatjatjarra:** kuluwarri; **Pintupi:** kulkuma, kuluwarri, pilakarratja, tjinapawulpa, tjuntatarrka, warrkuntilpa, yamarri; **Pitjantjatjarra:** kuluwarri; **Walmatjari:** pukurl-pukurl?; **Wangkatjunga:** kalanpa, kuluwarri, tjuntatarrka, yamari; **Warlpiri:** kulkuma, nantjwayi, yamari/yamarri.

Habitat. Sandplains and dunes with spinifex.

Shelter. In a scrape under a spinifex hummock. Some people said it dug a short burrow like *L. hirsutus*. Several said it made a grass-lined nest.

Food. Grass (including spinifex) leaves and seeds, Quandong fruit.

Breeding. Most said one young, a few said one or two.

Status. Fig. 16. Disappeared between 25 and 45 years ago, earlier in the south. At Kiwirrkurra and Warla Warla (Pollock Hills) it was still present in 1960. Present in the Tanami Desert at least until the late 1940s.

Comments. The animal we assume was *L. asomatus* was described to us as follows: fur soft, long and grey (colour similar to *Bettongia lesueur* or *Macrotis lagotis*), long hair on top of feet, extending to the ground (some said this made the tracks less distinct), tail relatively short and thickened, a small wallaby similar in size to *B. lesueur*, hopped 'like a kangaroo'. Many people referred to it as the 'quiet one' or 'deaf one' or sometimes 'stupid one' because it did not flush from its shelter. It was hunted by tracking to its hide and killed by spearing. Sometimes it could be caught by hand. The fur was spun to make belts.

Discussion. *L. asomatus* is known to science only from the type, a skull collected by Michael Terry in 1931, from somewhere between Mt Farewell and Lake Mackay, N.T. The size of the skull indicates a wallaby about the size of the one described to us. Several groups were shown skins of *Caloprymnus campestris* and *Potorous gilberti* but nobody recognised them, strengthening our view that the species discussed here was *L. asomatus*.

Onychogalea unguifera, Northern Nailtail Wallaby

Names. **Aranta, eastern:** tjunma/tjurnma; **Kaititja:** tjunma; **Kartutjarra:** kurrurungku, partjarning; **Kukatja:** kurrurungku, wutu-wutu; **Kurintji:** kurrurungku; **Mangala:** karapulu, kuparti, wutu-wutu; **Manytjilytjarra:** karapulu, kurrurungku, partjarning; **Mutpura:** kurrurungku; **Nyikana:** kumpina; **Pintupi:** karrtjarti; **Tjinkili:** tjunma; **Walmatjari:** kuparti, kurrurungku/kurungku/kurrurungku, wutu-wutu; **Wangkatjunga:** kuparti, kurrurungku, wutu-wutu; **Warumungu:** tjunma; **Warlpiri:** kurrurungku/kurrurungu, lunlunpa, lyanwarpa, ngunngunpa, wanwanpa.

Habitat. *Acacia* woodlands and shrublands with tussock grasses or spinifex.

Shelter. Lies on its side under a shady shrub or spinifex hummock.

Food. Grass.

Breeding. No data.

Status. Fig. 17. No change in abundance. Possibly showing some drift to the south, especially during recent favourable seasons.

Comments. People noted its peculiar splay-footed tracks with one foot slightly ahead of the other. They were amused at its ability to swap the lead foot from one to the other.

Discussion. Recent records as far south as Lake Gregory, W.A., and Tanami Downs, N.T. Occurs in Mulga communities of the Tanami Desert where it exists in depressions where water collects from surrounding country. Seems to prefer feeding in very short vegetation.

Onychogalea lunata, Crescent Nailtail Wallaby

Names. **Kartutjarra:** warlpartu; **Luritja:** tjawalpa; **Manytjilytjarra:** tjawalpa, warlpartu; **Ngaanyatjarra:** tjawalpa; **Ngaatjatjarra:** pitjilpa?, tjawalpa, warlpatju/walpatju; **Pintupi:** pitjilpa?, tjawalpa, wamaru, warlpatju/walpatju; **Pitjantjatjarra:** tjawalpa; **Warlpiri:** pitarri, tjawalpa/tawalpa.

Habitat. All types of country, including stony hills. Mulga shrubland regularly mentioned by Warlpiri people.

Shelter. Lay on its side under a low shady tree or shrub, or sometimes under a spinifex hummock. Some people told us it hid in a hollow log and others said it lived in thickets.

Food. Grass.

Breeding. No data.

Status. Fig. 18. Disappeared more than 40 years ago.

Comments. Hunted by building brush fences and enclosures and driving the animals into them or through a gap behind which people waited with clubs to make killing easier. One group of people said it did not leave the peculiar leading foot track of its congener.

Discussion. Several explorers (e.g. Giles 1889) recorded the presence of brush fences built by Aborigines but did not record seeing them used, nor their purpose.

Petrogale lateralis, Black-footed Rock-wallaby

Names. **Alyawarra:** arra; **Anmatjara:** arrwa, yilariya; **Kartutjarra:** tjirti; **Kukatja:** tjinangalku, warru; **Kurintji:** warkartji; **Mangala:** rukapiki; **Manytjityjarra:** pakultarra, tanpa, tjirti, warru; **Mutpura:** warru; **Ngaanyatjarra:** warru, wartilara; **Ngaatjatjarra:** warru, wartilara; **Pintupi:** tjinangalku, warru, wartilara; **Pitjantjatjarra:** warru, wartilara; **Putitjarra:** pakultarra, tjirti, warru; **Tjaru:** kakuya; **Wamatjari:** kakuya, lungkarrpa, warru; **Wangkatjungka:** kakuya, lungkarrpa, tjinangalku, warru; **Warumungu:** yukulyarri; **Warlpiri:** milpangapa/milpangapa, wakalyarri, wilitji.

Habitat. Hills, ranges and breakaways.

Shelter. Caves and crevices in rockpiles.

Food. Grass leaves and seed (including spinifex).

Breeding. One young.

Status. Fig. 19. Declined in most areas, disappeared in others.

Comments. Hunted by spearing when sunning themselves, dogs also used to flush animals.

Discussion. Although it has disappeared completely from some areas, it remains in scattered pockets in others. We have recorded it in the Walter James Range, and at Kutjurntari Rockhole in the Schwerin Mural Crescent (see also Burbidge and Fuller 1979). J. E. Kinnear (personal communication) has recently found a thriving population in the Calvert Range in the Little Sandy Desert, and two of us (A.A.B. and P.J.F.) have found old droppings at Sir Fowell Headland. Those (*wilitji*) formerly occurring at The Granites were reputedly smaller than the typical form. Still common along the MacDonnell Ranges and other ranges 100 km to the south and 200 km to the north. Still hunted occasionally with rifles.

Macropus fuliginosus, Western Grey Kangaroo

Names. **Ngaanyatjarra:** kulpirra; **Ngaatjatjarra:** kulpirra.

Discussion. This species occurs sparingly at the south-western and southern edge of the study area, and is well known to Aborigines who have visited these areas.

Macropus robustus, Common Wallaroo

Names. **Anmatjara:** aanga; **Aranta, eastern:** aanga; **Kartutjarra:** kanyala, nyarrtu, pikuta; **Kukatja:** kanyala, kirti-kirti; **Kurintji:** kanyala, wauwiri; **Luritja:** kanyala, kaputu, kirti-kirti, nyatunya, tjuni; **Mangala:** kanyala, mitimaru; **Manytjityjarra:** kanyala, kirti-kirti, nyarrtu, pikuta; **Mutpura:** kanyala; **Ngaanyatjarra:** kanyala, nyatunya, tjunikarrpuru; **Ngaatjatjarra:** kanyarla, kirti-kirti, nyatunya, tjunikarrpuru; **Nyamal:** pikurta; **Nyiyapali:** kirti-kirti; **Pintupi:** kakutu, kanyala, kirti-kirti, mulyayurltu, nyatunya, tjuni; **Pitjantjatjarra:** kanyala, nyatunya; **Putitjarra:** kanyala, nyarrtu, pikuta; **Tjaru:** kanyala; **Wamatjari:** kanyala, pikuta, tjamati; **Wangkatjungka:** kanyala, kirti-kirti, mulyayurltu, tjamunti/tjamanti; **Warumungu:** maratji; **Warlpiri:** kanyala.

Habitat. Ranges and hills.

Shelter. Caves, shady trees and shrubs near water.

Food. Spinifex and other grasses.

Breeding. One young.

Status. No change.

Comments. A favoured food item, but apparently much less sought after than the Red Kangaroo, possibly because it lives in terrain where access is difficult.

Discussion. Hunted today with rifles.

Macropus rufus, Red Kangaroo

Names. Anmatjara: arura; Aranta, western: arura; Aranta, eastern: arura; Kartutjarra: marlu; Kukatja: marlu; Kurintji: marlu; Mangala: marlu; Manytjilytjarra: marlu; Mutpura: marlu; Ngaanyatjarra: marlu; Ngaatjatjarra: marlu; Pintupi: marlu; Pitjantjatjarra: marlu; Putitjarra: marlu; Tjaru: marlu; Tjinkili: kuntjalawari, marlu; Walmatjari: marlu; Wangkatjungka: marlu; Warumungu: yawirri; Warlpiri: marlu, tjurrkapantji, wawirri.

Habitat. Stony or loamy plains with tussock grasses or mixture of tussock grasses and spinifex, usually with mulga or eucalypt open woodlands. Generally absent from sandplains and dunes where spinifex predominates.

Shelter. Lies on side in shade of tree or shrub.

Food. Grass.

Breeding. One young, occasionally two.

Status. No change.

Comments. Keenly hunted by the men, nowadays with vehicles and rifles. Imparts status to successful hunters, perhaps because the species has strong ties with the initiation of boys to manhood, but also because a single carcass provides several bountiful meals to a small group. Meat regarded as good medicine by the men.

Discussion. Aboriginal law prevented many tribes from skinning a carcass as more easterly people did for the production of skin waterbags.

Macroderma gigas, Ghost Bat

Names. Luritja: irkintjiri; Manytjilytjarra: warramurrungka; Ngaatjatjarra: tjalku-tjalku; Ngangamarta: warramurrungka; Pintupi: tjalku-tjalku; Pitjantjatjarra: tjalku-tjalku; Warnman: warramurrungka.

Habitat. Ranges, caves.

Shelter. Caves.

Food. No data.

Breeding. No data.

Status. Fig. 20. Only ever occurred in a few favourable areas; most people said it was still present.

Discussion. Extensive recent surveys by Peter Helman and Sue Churchill (unpublished report) of known and potential roost sites in central Australia did not produce any evidence of the species' persistence. A reported roost at Tjintjinti, a sinkhole in dunes near Lake MacDonald, was investigated in May 1986, but there was no evidence of the presence of Ghost Bats. The lack of specific Aboriginal names in many areas for this dramatically different species of bat suggests that, except in the central ranges and the Pilbara, it was not a permanent member of the fauna.

Small Insectivorous Bats

Names. Kartutjarra: mirlanpa, patupirri, patuuta, tjarti; Kukatja: matju-matju, mirlanpa, patupirri, tjinytjinytji, yalpurru; Luritja: patupirri; Mangala: pintjirmi, tjarti; Manytjilytjarra:

kunpal, mirlanpa, muntja, tjarti, tjinytjinytji; **Ngaanyatjarra**: parturta, pinytjanyarra; **Ngaatjatjarra**: patupirri, pinytjanyarra, tjinytjinytji; **Nyamal**: tjarti; **Nyangamarta**: tjarti; **Nyikana**: ngarraminayamina; **Nyiyapali**: tjarti; **Nyungar**: palan; **Parti**: liinpin, liringpin; **Pintupi**: patupirri, tjinytjinytji; **Pitjantjatjarra**: patupiri, pitjantjarra/pinytjanyarra, tjinytjinytji, ulpurulpuri; **Putitjarra**: muntja; **Walmatjari**: ngaraminyamina, pankal, pinkirrimi, pintjirmi, upungki, walumali; **Wangkatjungka**: marawatjarra, mirlanpa, tjartiminyamina; **Warlpiri**: yantjipiri; **Warnman**: tjarti.

Discussion. We showed most groups three species of insectivorous bats: *Tadarida australis*, *Chalinolobus gouldii* and *Eptesicus regulus* (indistinguishable externally from *E. finlaysoni*). Although some people gave us different names for different species of bats, the names were not consistently applied to any one species, and we were not able to reach the firm conclusion that any species was consistently distinguished from any other.

Leporillus conditor and *L. apicalis*, Stick-nest Rats

Names. **Aranta, western**: yintjurrka; **Kartutjarra**: purnuwuru, yinurnma/yininma; **Manytjilytjarra**: purnuwuru, tjuyalpi, yinurnma; **Ngaanyatjarra**: tjuyalpi, yinurnma; **Ngaatjatjarra**: tjuyalpi, yinurnma/yininma; **Pintupi**: purnuwuru, tjuyalpi, yanputjura, yinurnma; **Pitjantjatjarra**: tjuyalpi; **Putitjarra**: purnuwuru, yininma.

Habitat. Widespread, most habitats.

Shelter. Built stick or stick and stone nests around the base of trees and shrubs and in caves.

Food. Grass leaves and seeds.

Breeding. 'Many' young.

Status. Fig. 21. Disappeared at least 40–50 years ago.

Comments. Many people knew stick-nest rats by the large nests remaining in breakaway caves and from the stories that have been handed down about their former occupants. Only the very oldest people could remember nests other than in caves (see Burbidge and Fuller 1979). We could find no evidence that more than one species was recognised. We were told that *Dasyurus geoffroii* hunted stick-nest rats.

Discussion. Once apparently very common, at least in some places, since Giles (1889) reported abundant nests out in the open in some areas. However, Spencer (1896) had difficulty in obtaining specimens near Alice Springs, so it may have already been in decline by then. In the 1930s Tindale shot ciné-photography in north-western South Australia of Aborigines huting stick-nest rats with the aid of dogs. Both species are presumed extinct on the Australian mainland; one, *L. conditor*, remains on Franklin Island, S.A.

Feral Mammals

Aboriginal people have been quick to develop their own names for feral species that have established in their lands. All feral species are recognised as being different because they have poorly developed or no associated dreamings (i.e. they are not embedded into religious mythology). Some of the names are approximations of the English names, others are descriptive or invented.

Oryctolagus cuniculus, Rabbit

Names. **Luritja**: nani, pinytjatanpa, yurapiti; **Manytjilytjarra**: mulkamalka; **Ngaanyatjarra**: nani, pinytjatanpa, raapita; **Ngaatjatjarra**: nani, pinytjatanpa, raapita; **Nyiyapali**: malka-malka; **Pintupi**: nani, pinytjatanpa, raapita, yurapiti; **Pitjantjatjarra**: nani; **Warlpiri**: langawiri, mutjunku, rapita, yurapiti.

Comments. Old people remember times before rabbits arrived in their country. A favoured food item that is dug from warrens with consummate skill.

Discussion. Rabbits crossed the South Australian border into the Northern Territory by late 1894 (Strong 1983), and had reached the Tanami Goldfields by 1910 (Gibson 1986). Many groups oppose control measures due to its food value (Letts *et al.* 1979) and possibly because few other mammals of this size remain.

Canis familiaris dingo, Dingo

Names. **Luritja:** ngupanu, papa, parrutju, tjantu, wanaparri, yinura; **Ngaanyatjarra:** papa, ngupanu, yinura; **Ngaatjatjarra:** ngupanu, papa, yinura; **Pintupi:** ngupanu, papa, parrutju, tjantu, wanaparri, yinura; **Warlpiri:** maliki.

Status. Widespread and abundant.

Discussion. The dingo entered Australia a few thousand years ago, well after the Aborigines, but long enough for it to be firmly established in dreamtime mythology.

Vulpes vulpes, Fox

Names: **Kukatja:** ningani, waltaki; **Luritja:** tuuka, waltaki; **Manytjilytjarra:** waltaki; **Ngaanyatjarra:** tuuka; **Ngaatjatjarra:** tuuka; **Pintupi:** tuuka, waltaki; **Warlpiri:** pakt, puwutjuma.

Status. Abundant in the south of the study area, less common in the northern Gibson Desert, the Great Sandy Desert and the northern Tanami Desert, although it may invade these areas in good times.

Discussion. Finlayson (1961) recorded its arrival in north-western South Australia by 1932. Dick Kimber (personal communication) can reasonably date the arrival of foxes at Jupiter Well at between 1945 and 1950, and at Papunya at 1971. It is a very rare species in the Tanami Desert and northern Great Sandy Desert, but becomes increasingly common, along with rabbits, in more southerly latitudes. King and Smith (1985) have summarised available information on its spread through Western Australia.

Felis catus, Feral Cat

Names. **Anmatjara:** anngthathaka; **Aranta, eastern:** nyarapingi; **Luritja:** miiyawu, ngaya, nyumpunypa, puutji, taanpa, wiika, wilpinpa, wilyka; **Manytjilytjarra:** miinau; **Ngaanyatjarra:** miiyawu, ngaya, wilyka; **Ngaatjatjarra:** ngaya, wilyka; **Pintupi:** miiyawu, ngaya, nyumpunypa, puutji, taanpa, wiika, wilpinpa, wilyka; **Warlpiri:** minitja, ngaya.

Status. Common throughout.

Comments. All people questioned regarded cats as always being present. Some indicated that they moved into central Australia from the west. A favoured food item, still avidly hunted in many areas. Cats when flushed, often by burning the vegetation, are pursued on foot, sometimes with the aid of dogs, in the hope of forcing them to climb a tree or shrub where they can be killed.

Camelus dromedarius, One-humped Camel

Names. **Kukatja:** kuutjuwal; **Ngaanyatjarra:** kamulpa; **Ngaatjatjarra:** kamulpa; **Pintupi:** kamula; **Warlpiri:** kamala.

Status. Widespread in the study area, usually in groups of up to six or eight, occasionally larger.

Discussion. An uncommon species in the Tanami and northern Great Sandy Deserts, but increasingly numerous in more southerly latitudes. Very abundant along salt lake chains in the southern Great Sandy and Little Sandy Deserts.

'Generic' Names

Throughout the study area there are a number of names that are applied generally to groups of species of similar appearance. These names can often confuse a questioner who may not realise that the name can be properly applied to several species in the same way as words like 'wallaby' and 'rat' can in English. A list of these names as used by Pitjantjatjarra, Ngaatjatjarra, Ngaanyatjarra and Pintupi dialects follows.

Word	Meaning
Arrutju/yarrutju	Small rodent, dasyurid
Kilu	Bandicoot, wallaby
Mingkiri	Small-medium rodent or dasyurid, usually with tuft on tail
Nyartari	Bandicoot, large rodent
Pun-pun	Rat
Tarrkawara	Small rodent or dasyurid with long legs
Wiltjin	Mouse
Wirlitji	Wallaby
Wuurl-wuurl	Bandicoot, rodent, small dasyurid
Wunypunpun	Rat

Discussion

The data presented here provide a basis for understanding the distribution, abundance and habitat of a range of mammal species in the central deserts and adjacent regions of Australia over the past 50-60 years. We have no doubts regarding the veracity of our data, and, other than for *L. asomatus* for which no study skin is available, we are certain that the Aboriginal names we list (except for a few marked with a ?) are correctly applied to the current scientific names. The various mammals discussed here are extremely well known to our informants and are deeply intertwined with their knowledge of the environment in which they lived. Not only did the Aborigines depend on the mammals for food, but mammals also play a significant part in their mythology and culture.

The Aboriginal names we have presented are consistent with those given by Finlayson (1961) from his work in the 1930s in the relevant part of our study area. Unfortunately the same cannot be said for many works published by anthropologists, who have worked in the absence of properly identified museum specimens and have frequently recorded names for one species as belonging to others.

Most dialects contain several names for each species of mammal, and these names may have general use throughout the respective tribal area or have a more regional use. For example, Warlpiri people make general use of *marlu* for the Red Kangaroo, but *wawirri* is often used by eastern Warlpiri. Names confined generally to a particular dialect may, nevertheless, be recognised by people from adjoining language groups because of contact for social or ceremonial purposes. The need for several names for the one animal can be explained partly by the fact that people are sometimes named after animals and Aboriginal law does not allow the use of a deceased person's name for some time after the death. Mammal names are also applied to places, e.g. Mitika (Burrowing Bettong), a settlement near Warburton. Different names are sometimes applied to different classes of the same species. In Warlpiri the name *maliki* is applied to dingoes generally, but *wanapari* refers specifically to wild dingoes and *tjarntu* to domesticated dingoes. In a number of dialects, e.g. Ngaanyatjarra and Ngaatjatjarra, different names are applied to different age classes of the Red Kangaroo.

Some important, widely distributed species have few names. This is most striking in the case of the Red Kangaroo, for which the name *marlu* is almost universally used. It also occurs to a lesser extent with *mala* for the Rufous Hare-wallaby, *parrtjarta/parrtjita* for the Western Quoll and *walputi* for the Numbat.

Inexperienced people must take care when recording Aboriginal names, because of the number of consonant sounds unfamiliar to speakers of Australian English. The difference between *r* (as in rally) and *rr* (similar to the Scottish rolled *r*) is obvious to an Aboriginal, but not to most Australians of European origin. For example, in a number of dialects *waru* is fire, but *warru* is the Black-footed Rock-wallaby. The difference between *l*, *rl* and *ly* are also clear to Aborigines, but cannot so easily be described here.

In many cases our data provide significant additions to current knowledge of the distribution and ecology of arid-zone mammals. In particular, we have significantly extended the known range of *Dasyurus geoffroii*, *Isoodon auratus*, *Perameles eremiana*, *Chaeropus ecaudatus*, *Macrotis leucura*, *Trichosurus vulpecula*, *Bettongia penicillata*, *Lagorchestes conspicillatus*, *L. asomatus* and *Onychogalea lunata*. Our Aboriginal informants have also added significantly to current knowledge of the biology of *D. geoffroii*, *Phascogale calura*, *P. eremiana*, *C. ecaudatus*, *M. leucura*, *T. vulpecula*, *B. penicillata* and *L. asomatus*.

The Western Quoll, *Dasyurus geoffroii*, was previously known to occur in the arid zone but our data extend its range significantly. Evidently it occurred at the northern and western edges of the study area, where it may have been sympatric with *D. hallucatus*. Its habit of sheltering in hollow tree-limbs, in *M. lagotis* burrows and in *B. lesueur* warrens has not previously been recorded.

The Red-tailed Phascogale, *Phascogale calura*, has previously been recorded in the deserts but our data extend its known range. Up until now there was no record of where it sheltered.

The Golden Bandicoot, *Isoodon auratus*, was evidently even more widespread than has been recorded (McKenzie 1983). It was very common, being known to all Aboriginal people old enough to remember it, and survived until the 1950s or 1960s in some places.

The Desert Bandicoot, *Perameles eremiana*, was also a widespread species, occurring throughout the study area. The biological data here are mostly new.

The Pig-footed Bandicoot, *Chaeropus ecaudatus*, is known in Western Australia from one specimen only, collected near Northam during the 19th century. The most recent specimens were collected at Lake Eyre North in 1907 (Aitken 1983a), although one from 'Alice Springs' was donated by Spencer to the National Museum of Victoria in 1916 (Parker 1973). Although the fossil record suggests a wider distribution in the past, modern data have been interpreted as indicating that the species was uncommon and that it had become extinct early in the 20th century. Our data show that it was widespread in the northern parts of the central deserts and remained a common part of the fauna in parts of the study area until the 1940s and 1950s.

The Lesser Bilby, *Macrotis leucura*, was known only from the Simpson Desert and adjacent areas, and has never previously been recorded in Western Australia. There are no records of live specimens since Finlayson's from the Lower Diamantina of South Australia in 1931 (Johnson 1983). Evidently, the species had a much wider arid-zone distribution than was thought, and survived in the northern Gibson Desert and parts of the Great Sandy Desert until the 1950s.

The Common Brushtail Possum, *Trichosurus vulpecula*, was much more widespread and abundant in the deserts than recorded by How (1983). It occurred in a wide variety of habitats and sheltered in rock-piles, caves and other animals' burrows where trees were not available. Often, when we asked people about the origin of old warrens, they would tell us that they were made by Burrowing Bettongs and possums. The species still occurs in scattered pockets in the study area but appears to be continuing to decline. The widespread belief that *Trichosurus* is unaffected by the changes wrought on the environment since European settlement does not hold true for the deserts.

The Brush-tailed Bettong, *Bettongia penicillata*, was recorded in the arid zone by Finlayson (1958), but because this was based on a specimen from Lake MacKay regarded by others to be a misidentified *B. lesueur* or a *Lagorchestes*, and on verbal accounts from Aborigines, his records have been dismissed or ignored by subsequent authors (e.g. Ride 1970; Parker 1973). A summary of current knowledge is provided by Christensen (1983). Testimony from Aborigines, together with the recent skeletal remains from Muranji Rockhole, vindicates Finlayson's findings and lends support to his determination of a specimen from the Lake Mackay region (Finlayson 1958). Our data show that its distribution was centred on the deserts, where it was widespread in spinifex grasslands. Its habit of sometimes digging a short burrow has not previously been reported.

The Spectacled Hare-wallaby, *Lagorchestes conspicillatus*, was known to be widespread in the arid zone (Burbidge and Johnson 1983). Our data have filled in gaps in the previously known range and confirmed its decline and local extinction in the more western and south-western parts of its former range.

The Central Hare-wallaby, *Lagorchestes asomatus*, is known to science from only a single skull collected near Lake Mackay in 1931 (Aitken 1983b). Although we cannot prove that the animal we have been told of is this species, the evidence strongly supports this conclusion. Aboriginal knowledge is that it had a wide distribution in the Great Sandy, Gibson and Tanami Deserts and in the Central Ranges and that it was sympatric with *L. hirsutus* and *L. conspicillatus*. Aitken's (1983b) hope that the species might survive because of the vast unaltered nature of the country whence the type came cannot, unfortunately, be substantiated by our informants.

The Crescent Nailtail Wallaby, *Onychogalea lunata*, was previously known to occur in the arid zone. Our data extend its known range (Burbidge 1983) and show that it was restricted to the southern and eastern parts of the study area, being absent from the Little Sandy and Great Sandy Deserts.

The timing of the disappearance of so many desert mammal species is now clearer. We have shown that some species previously thought to have been extinct since the early part of the 20th century (e.g. *Chaeropus ecaudatus*) or since the early 1930s (e.g. *Lagorchestes asomatus*), actually persisted in parts of the central deserts until the 1940s or 1950s. In most cases, species that have declined or become extinct disappeared first from the south of the study area and later in the north (e.g. *Macrotis lagotis*, *Isoodon auratus*, *Lagorchestes asomatus*, *L. hirsutus*, and *L. conspicillatus*). This pattern is consistent with the timing of the movement of Aborigines from their traditional lands to European settlements. When interviewing Aboriginal people about the mammals of their areas, we asked about their status in relation to the timing of the move into settlements, and consistently received the answer that the mammals were present in a particular area up to the time that most people left their nomadic life-style.

Three main hypotheses have been put forward to account for the massive decline in arid-zone mammals: changes in fire regimes, the effects of exotic predators, and competition from exotic herbivores.

The first hypothesis suggests that major changes in fire regimes resulted from the depopulating of the deserts. Aborigines used fire for hunting, the regeneration of food plants and signalling, as well as for numerous other purposes (Gould 1971; Kimber 1983; Burbidge 1985). These uses resulted in a tight mosaic of areas of differing age since fire, and also promoted fires at different seasons, providing an environmental diversity that favoured the mammals, and preventing the development of extensive wildfires in summer. As the Aborigines left their traditional lands for European settlements and missions a 'natural' fire regime took over: one of infrequent but very extensive, hot summer wildfires, usually started by lightning. This change is thought to have had a profound effect on the mammals, depriving them of the diversity of shelter and feeding areas that they required and leading to a rapid decline and local or total extinction.

The second hypothesis suggests that the indigenous mammals could not cope with exotic

predators. Feral cats and foxes are now widespread and abundant in the deserts. It is not known when cats first became established, but they were present when European explorers entered the area in the latter half of the 19th century. Most Aborigines residing in the central deserts regard cats as always having been present and some indicate that they moved into central Australia from the west, so they may have established from 17th-century shipwrecks on the west coast. Foxes entered later, becoming established in parts of the centre by the 1930s (Finlayson 1961; Griffin and Friedel 1985; King and Smith 1985).

Rabbits entered from the south-east, first appearing in southern Northern Territory and arid Western Australia in the 1890s and becoming widespread shortly afterwards. Population size has fluctuated since then. The present distribution of rabbits is mainly south of the Tropic of Capricorn, with pockets in favourable country to the north (Griffin and Friedel 1985). The One-humped Camel became feral from escapes from pack animals first used in the latter half of the 19th century (Newman 1983). They are now very abundant throughout the deserts.

If the decline of the various species of mammal coincided with the time that the Aborigines left their country, as we have been told, this would support the hypothesis that changes in fire regimes are the primary factor leading to the decline of so many species from the central deserts. Our informants have told us that foxes did not become established in many areas until after the mammals had gone, and it is clear that in much of the northern half of the study area rabbits were never common except in particular habitats and none of the indigenous species were restricted to these.

It is clear from the information presented here that the mammal fauna of the central deserts of Australia and adjacent areas was richer and more numerous than generally believed. It is also clear that the area has suffered a massive and sudden loss of much of its mammal fauna, probably unparalleled in extent elsewhere in the world. This loss is not only of concern to scientists and conservationists; it is shared by the Aboriginal people with whom we have worked. Many Australians have a concept of Aborigines being interested in the fauna only to the extent that it provided food. This is not the case. Aborigines have a strong interest in the mammals, seeing them as an important and integral part of the whole environment (Mountford 1976). They are greatly saddened by the disappearance of the culturally important species and are keen to see them rehabilitated. The 'increase' ceremonies that are passed down from generation to generation are a manifestation of this attitude. Often, Aborigines blamed themselves for the disappearance of a species because they ceased to perform the relevant ceremonies after they had left their traditional lands for European missions or settlements.

Acknowledgments

This paper is dedicated to H. H. Finlayson (1895–) of Adelaide, who pioneered the systematic collection of zoological data from desert Aborigines and published a wealth of information on Australian mammals.

The information reported in our paper is based on a large number of interviews with Aboriginal people from all over the central deserts of Australia, and it would not have been possible without their ready cooperation. The many people who helped us are too numerous to thank individually, but we should especially like to thank the following Communities and the smaller Outstations under their jurisdiction: Milyirrtjarra (Warburton), Walunguru (Kintore), Mantamaru (Jameson), Irruntju (Wingellina), Ngangganawili (Wiluna), Mt Margaret, Kiwirrkurra, Angata, Pipalyatjarra, Amata, Yalata, Cundelee, Papulankutja (Blackstone), Warakurna (Giles), Balgo, Lake Gregory, Billiluna, Wangkatjungka (Christmas Creek), Marra Worra Worra (Fitzroy Crossing), Noonkoonbah, Looma, La Grange, Beagle Bay, One Arm Point, Lombadina, Strelley, Jiggalong, Callawa, 12 Mile Camp (Port Hedland), Warralong, Yandearra, Well 33 (on the Canning Stock Route), Kaltukatjarra (Dockers River), Yuendumu, Papunya, Willowra, Nyirripi, Lajamanu, Utopia, Baikal, Neutral

Junction, Stirling Station, Murray Downs, Tea Tree, Wave Hill Station, Ali Curung and communities around Elliott.

We should also like to thank people who acted as interpreters, especially Herbert Howell, Jim Marsh, Brian Geytenbeek, David Nash, Mary Laughren and Avery Andrews. We thank George Carlisle, George Lanagan and Dick Kimber for their readiness to share their experiences with us.

Museum study skins, including rare specimens of species now extinct, were generously loaned by Darrell Kitchener (Western Australian Museum), Catherine Kemper (South Australian Museum) and Peter Stanbury (Macleay Museum). Our study could not have been conducted without their help.

Some of the information reported here was collected during research into the Bilby, sponsored by World Wildlife Fund Australia.

The maps were generated on a Tektronix 4054 computer by means of routines from FLORAPLOT, a program written by Paul Gioia with the assistance of a grant from the Australian Biological Resources Study and in use at the Department of Conservation and Land Management's Western Australian Wildlife Research Centre. We are most grateful to Paul for his help. Mike Choo provided valuable assistance with manipulation of the computer data-base used to store the Aboriginal mammal names.

We thank David Morton for the bone material from which *Bettongia penicillata* was identified. Darrell Kitchener and Alex Baynes identified the skeletal material from the *B. lesueur* warren at Kiwirrkurra.

Many people helped on field trips when interviews were conducted. We would especially like to thank Anna Napier, Louise Boscacci, Herbert Howell, Sara Bagglely and Glenda Motum.

This study was funded by the Western Australian Departments of Fisheries and Wildlife and of Conservation and Land Management, and the Conservation Commission of the Northern Territory.

References

- Aitken, P. F. (1983a). Pig-footed Bandicoot *Chaeropus ecaudatus*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 104-5. (Angus and Robertson: Sydney.)
- Aitken, P. F. (1983b) Central Hare-wallaby *Lagorchestes asomatus*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 200-1. (Angus and Robertson: Sydney.)
- Arnold, J. M. (1983). Western Quoll *Dasyurus geoffroii*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) p. 22. (Angus and Robertson: Sydney.)
- Beard, J. S. (1969). The natural regions of the deserts of Western Australia. *J. Ecol.* **57**, 677-711.
- Beard, J. S. (1981). Vegetation of central Australia. In 'Flora of central Australia'. (Ed. J. Jessup.) (A.H. and A.W. Reed: Sydney.)
- Bolton, B. L., and Latz, P. K. (1978). The western hare-wallaby *Lagorchestes hirsutus* (Gould) (Macropodidae) in the Tanami Desert. *Aust. Wildl. Res.* **5**, 285-93.
- Burbidge, A. A. (1983). Crescent Nailtail Wallaby *Onychogalea lunata*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) p. 206. (Angus and Robertson: Sydney.)
- Burbidge, A. A. (1985). Fire and mammals in hummock grasslands of the arid zone. In 'Fire ecology and management in ecosystems of Western Australia'. (Ed. J. Ford.) Proc. Fire Symp. W.A.I.T. Campus, May 1985. (Western Australian Institute of Technology: Perth.)
- Burbidge, A. A., McKenzie, N. L., Chapman, A., and Lambert, P. (1976). The wildlife of some existing and proposed reserves in the Great Victoria and Gibson Deserts. *West. Aust. Wildl. Res. Bull. No. 5*. (Department of Fisheries and Wildlife: Perth.)
- Burbidge, A. A., and Fuller, P. J. (1979). Mammals of the Warburton region, Western Australia. *Rec. West. Aust. Mus.* **8**, 57-73.
- Burbidge, A. A., and Fuller, P. J. (1984). Finding out about desert mammals. *SWANS* **14**, 9-13.
- Burbidge, A. A., and Johnson, P. M. (1983). Spectacled Hare-wallaby *Lagorchestes conspicillatus*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 197-8. (Angus and Robertson: Sydney.)

- Christensen, P. E. S. (1980). The biology of *Bettongia penicillata* Gray, 1837, and *Macropus eugenii* (Desmarest, 1817) in relation to fire. For. Dep. West. Aust. Bull. No. 91. (Forests Department: Perth.)
- Christensen, P. (1983). Brush-tailed Bettong *Bettongia penicillata*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 184-5. (Angus and Robertson: Sydney.)
- Finlayson, H. H. (1935). 'The Red Centre. Man and beast in the heart of Australia.' (Angus and Robertson: Sydney.)
- Finlayson, H. H. (1958). On central Australian mammals (with notice of species from adjacent tracts). Part III. The Potorinae. *Rec. S. Aust. Mus.* **13**, 235-302.
- Finlayson, H. H. (1961). On central Australian mammals. IV. The distribution and status of central Australian species. *Rec. S. Aust. Mus.* **14**, 141-91.
- Freeman, L. (1967). Skull and tooth variations in the genus *Perameles*. Part I. Anatomical features. *Rec. Aust. Mus.* **27**, 147-66.
- Friend, J. A., Fuller, P. J., and Davis, J. A. (1982). The numbat in central Australia. *SWANS* **12**, 21-6.
- Friend, J. A., and Burrows, R. G. (1983). Bringing up young numbats. *SWANS* **13**, 3-9.
- Gibson, D. (1986). A biological survey of the Tanami Desert in the Northern Territory. Conserv. Comm. North. Territ. Tech. Bull. No. 30.
- Giles, E. (1889). 'Australian Twice Traversed: the romance of exploration, being a narrative compiled from the journals of five exploring expeditions into and through central South Australia and Western Australia from 1872 to 1876.' (Sampson Low, Marston, Searle and Rivington: London.)
- Glass, A. (1975). 'Ngaanyatjarra word list.' (United Aborigines Mission and Summer Institute of Linguistics: Darwin.)
- Glauert, L. (1933). The distribution of the marsupials in Western Australia. *J. Proc. R. Soc. West. Aust.* **19**, 17-32.
- Gould, J. (1845-63). 'The Mammals of Australia.' (Author: London.)
- Gould, R. A. (1971). Uses and effects of fire among the Western Desert Aborigines of Australia. *Mankind* **8**, 14-24.
- Gordon, G. (1983). Desert Bandicoot *Perameles eremiana*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) p. 102. (Angus and Robertson: Sydney.)
- Griffin, G. F., and Friedel, M. H. (1985). Discontinuous change in central Australia: some implications of major ecological events for land management. *J. Arid Environ.* **9**, 63-80.
- How, R. A. (1983). Common Brushtail Possum *Trichosurus vulpecula*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 147-8. (Angus and Robertson: Sydney.)
- Jessup, J. (Ed.) (1981). 'The Flora of Central Australia.' (A.H. and A.W. Reed: Sydney.)
- Johnson, K. A. (1983). Lesser Bilby *Macrotis leucura*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) p. 109. (Angus and Robertson: Sydney.)
- Johnson, K. A., and Roff, A. D. (1982). The Western Quoll, *Dasyurus geoffroii* (Dasyuridae, Marsupalia), in the Northern Territory: historical records from venerable sources. In 'Carnivorous Marsupials'. (Ed. M. Archer.) Vol. 1. (Royal Zoological Society of New South Wales: Sydney.)
- Kimber, R. (1983). Black lightning. Aborigines and fire in Central Australia and the Western Desert. *Archaeol. Oceania* **18**, 38-45.
- King, D. R., and Smith, L. A. (1985). The distribution of the European Red Fox (*Vulpes vulpes*) in Western Australia. *Rec. West. Aust. Mus.* **12**, 197-205.
- Kitchener, D. J., and Vicker, E. (1981). Catalogue of modern mammals in the Western Australian Museum 1895 to 1981. (Western Australian Museum: Perth.)
- Letts, G. A., Bassingthwaite, A., and de Vos, W. E. L. (1979). Feral animals in the Northern Territory. (Northern Territory Government Department of Primary Production.)
- McKenzie, N. L. (1983). Golden Bandicoot *Isoodon auratus*. In 'The Australian Museum complete Book of Australian Mammals'. (Ed. R. Strahan.) p. 98. (Angus and Robertson: Sydney.)
- McKenzie, N. L., Youngson, W. K., Burbidge, A. A., and Chapman, A. (1979). Mammals. In 'The wildlife of some existing and proposed reserves in the Gibson, Little Sandy and Great Victoria Deserts, Western Australia'. (Eds N. L. McKenzie and A. A. Burbidge.) West. Aust. Wildl. Res. Bull. No. 7.
- McKenzie, N. L., and Youngson, W. K. (1983). Mammals. In 'Wildlife of the Great Sandy Desert, Western Australia'. (Eds A. A. Burbidge and N. L. McKenzie.) West. Aust. Wildl. Res. Bull. No. 12.

- Milliken, E. P. (1976). Aboriginal language distribution in the Northern Territory. In 'Tribes and Boundaries in Australia'. (Ed. N. Peterson.) Soc. Anthropol. Ser. No. 10. (Australian Institute for Aboriginal Studies: Canberra.)
- Mountford, C. P. (1976). 'Nomads of the Australian Desert.' (Rigby: Adelaide.)
- Newman, D. M. R. (1983). One-humped Camel *Camelus dromedarius*. In 'The Australian Museum Complete Book of Australian Mammals'. (Ed. R. Strahan.) pp. 497-8. (Angus and Robertson: Sydney.)
- Parker, S. A. (1973). An annotated checklist of the native land mammals of the Northern Territory. *Rec. S. Aust. Mus.* **16**, 1-57.
- Ride, W. D. L. (1970). 'A Guide to the Native Mammals of Australia.' (Oxford University Press: Melbourne.)
- Sampson, J. C. (1971). The biology of *Bettongia penicillata* Gray 1837. Ph.D. Thesis, University of Western Australia.
- Spencer, W. B. (1896). In 'Report on the work of the Horn Scientific Expedition to Central Australia.' (Ed. W. B. Spencer.) Pt 2—Zoology. (Melville, Mullin and Slade: Melbourne.)
- Strahan, R. (1983). 'The Australian Museum complete Book of Australian Mammals.' (Angus and Robertson: Sydney.)
- Strong, B. W. (1983). The invasion of the Northern Territory by the wild European Rabbit *Oryctolagus cuniculus*. Conserv. Comm. North. Territ. Tech. Rep. No. 3.
- Tindale, N. B. (1974). 'Aboriginal Tribes of Australia.' (University of California Press: Los Angeles.)
- van der Graaff, W. J. E., Crowe, R. W. A., Bunting, J. A., and Jackson, M. J. (1977). Relict early Cainozoic drainages in arid Western Australia. *Z. Geomorphol.* **21**, 379-400.

Manuscript received 4 December 1986; accepted 3 February 1987
