

NOTES ON THE SMALL MAMMALS OF NORTH-EASTERN SOUTH AUSTRALIA AND SOUTH-WESTERN QUEENSLAND

by C. H. S. WATTS* and HEATHER J. ASLIN*

Summary

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The results of five field trips to north-eastern South Australia and south-western Queensland are presented. The following four species (and numbers) of dasyurid marsupials were collected: *Sminthopsis crassicaudata* (61), *S. froggatti* (3), *Antechinomys spenceri* (13), and *Dasyuroides byrnei* (18). Seven species of native rodents were collected: *Notomys alexis* (3), *N. cervinus* (48), *N. fuscus* (39), *Pseudomys forresti* (2), *P. hermannsburgensis* (8), *P. australis* (4), and *Rattus sordidus* (many). In addition, a colony of Rabbit Bandicoots (*Macrotis lagotis*) was located in Queensland.

Distribution, status, and habitat preference within the area is discussed for a number of species collected. In particular, *R. sordidus* was found to be common in 1968 and 1972, but uncommon in 1971, when it was restricted to wet areas around bores and floodplains. It is suggested that, following periods of good rainfall, *R. sordidus* spreads from mesic refuges and temporarily occupies surrounding areas, giving rise to plagues in exceptional years.

Introduction

Knowledge of the distribution and habits of many of Australia's small desert mammals is accumulating only very slowly. There is little or no published information on many species of native rodents and small marsupials from the central areas of the continent. Without further distributional records it is impossible to assess whether these species are maintaining their numbers, or have been seriously affected by land-use practices and by the presence of exotic mammals.

In the hope of adding to present knowledge of the distribution and habits of small desert mammals, this paper reports the findings of five field trips to north-eastern South Australia and south-western Queensland. The field work was carried out with the aim of collecting small mammals to establish breeding colonies in captivity. However, in the course of this work, information was obtained on the distribution, status, habitat preference, and habits of the species collected. This information is a necessary prerequisite for effective conservation of the various species in the wild.

The species collected were the following: the dasyurid marsupials *Sminthopsis crassicaudata*, *S. froggatti*, *Dasyuroides byrnei*, and *Ante-*

chinomys spenceri; the rodents *Notomys alexis*, *N. cervinus*, *N. fuscus*, *Pseudomys australis*, *P. hermannsburgensis*, *P. forresti*, and *Rattus sordidus*. Information was also obtained about the status of the Rabbit Bandicoot (*Macrotis lagotis*) in Queensland. A representative specimen of each species collected has been lodged in the South Australian Museum.

Methods

Five trips were made, in September 1968, June 1969, June–July 1971, July 1972 and October 1972. A total of 43 days was spent in the field. A summary of routes taken is shown in Fig. 1.

Most animals were caught by spot-lighting on 33 nights, usually between the hours of 20.00 to 24.00. After detection, animals were caught in a hand-held net. Sherman live mammal traps (7 x 8 x 23 cm) were set on several occasions. Two species were obtained by digging up burrows.

Some animals were released after examination, but most were transported to the laboratory alive.

As it was difficult to determine precise locations at which animals were caught, the locations given are approximate.

* Institute of Medical and Veterinary Science, Frome Road, Adelaide, S. Aust. 5000.

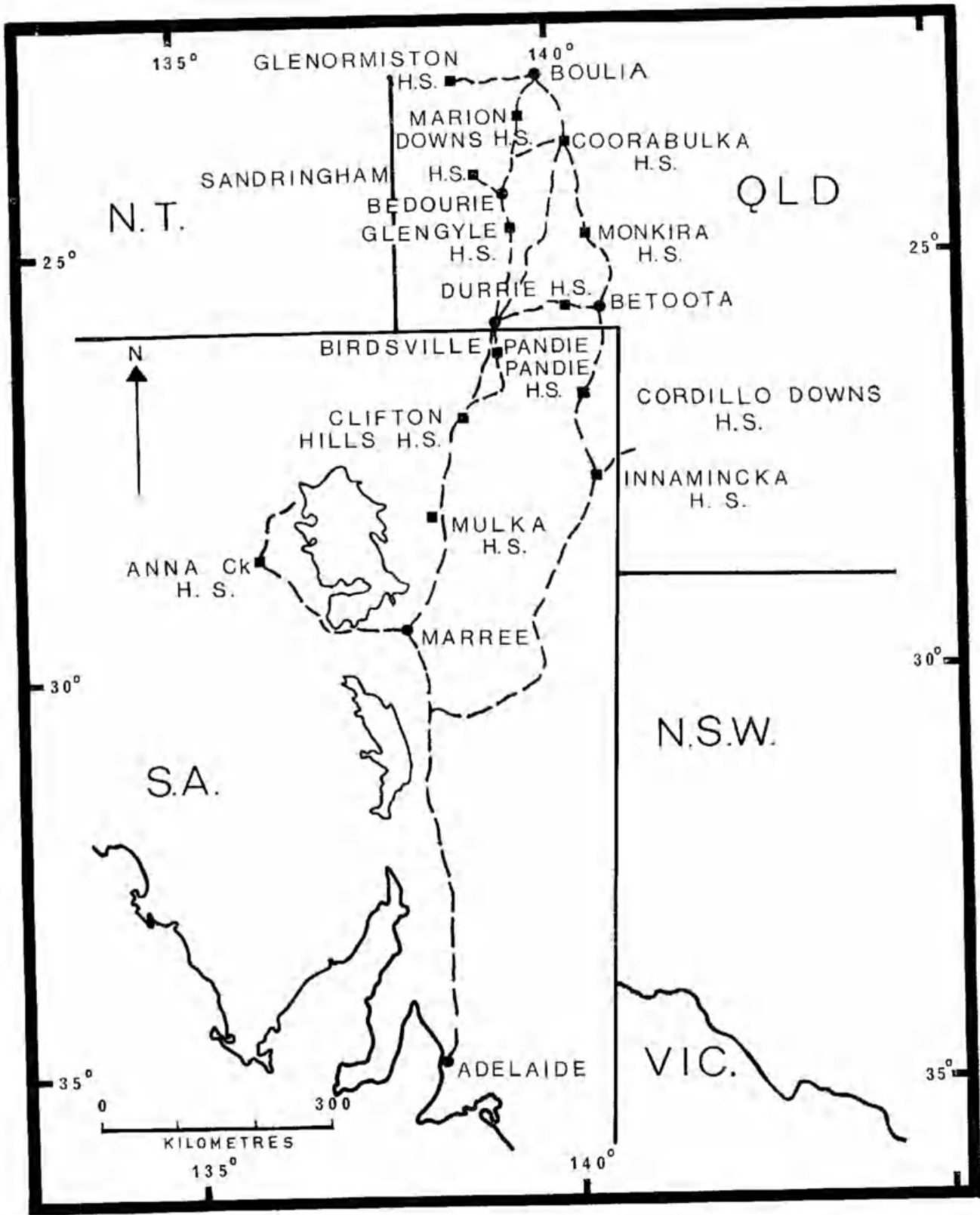


Fig. 1. Summary of the routes taken on the five field trips. The routes followed are indicated by a broken line.

Nomenclature used in this paper follows that of Ride (1970), with the exception of the Long-haired Rat, which is now considered by Taylor & Horner (1973) to be a subspecies of the Dusky Field-rat, and is therefore referred to as *Rattus sordidus villosissimus*, not *Rattus villosissimus*.

Results

MARSUPIALIA

Family PERAMELIDAE

1. *Macrotis lagotis* (Reid), Rabbit Bandicoot

Locality: 16 km N Coorabulka Homestead, Qld; July 1972; 1 (sex unknown).

Notes: One Rabbit Bandicoot was sighted on gibber plain while spot-lighting, and this animal took refuge in a complex burrow system, consisting of approximately 20 holes. Reports from local residents indicate that a colony of *M. lagotis* exists in an area extending from Coorabulka Station into the adjoining stations of Marion Downs and Lorna Downs.

In addition to this colony, reports of animals answering the description of Rabbit Bandicoots were obtained from residents of Glengyle and Sandringham Stations.

Family DASYURIDAE

1. *Sminthopsis crassicaudata* (Gould), Fat-tailed Dunnart

Localities: (i) 72 km NE Anna Creek Homestead, S.A.; June 1971; 2 ♂. (ii) 8 km E Mulka Homestead, S.A.; June 1969, July 1972; 2 ♂. (iii) 112 km SW Innamincka Homestead, S.A.; June 1969; 1 ♀. (iv) 80 km N Innamincka Homestead, S.A.; June 1969; 1 ♀, 1 ♂. (v) 8 km S of Birdsville, Qld; Sept. 1968, June 1969, Oct. 1972; 4 ♀, 12 ♂. (vi) 48 km SE Pandie Pandie Homestead, S.A.; July 1972; 1 ♀. (vii) 16 km W Betoota, Qld; June 1969, July 1972; 5 ♂. (viii) 32 km W Durrie Homestead, Qld; July 1972; 1 ♀. (ix) 32 km NW Monkira Homestead, Qld; July 1972; 1 ♂. (x) 16 km W Coorabulka Homestead, Qld; July 1972; 8 ♂. (xi) 32 km NW Coorabulka Homestead, Qld; July 1972; 1 ♀. (xii) 16 km N Coorabulka Homestead, Qld; July 1971, July 1972; 5 ♂. (xiii) 8 km SE Sandringham Homestead, Qld; Sept. 1968; female with three young. (xiv) 8 km S Glengyle Homestead, Qld; Sept. 1968; 2 ♀, 9 ♂. (xv) 8 km E Glenormiston Homestead, Qld; Sept. 1968; 1 ♂.

Notes: *S. crassicaudata* was found in a variety of habitats, including gibber and sand plain, alluvial flats, and clay pans. One animal was trapped by a bore drain. The species appeared to be thinly spread in most areas, but 11 animals were caught by spot-lighting in an area of less than 2 hectares near Glengyle Homestead, on recently flooded clay pans.

2. *Sminthopsis froggatti* (Ramsay), Stripe-faced Dunnart

Localities: (i) 16 km N Pandie Pandie Homestead, S.A.; Sept. 1969; 1 ♂. (ii) 16 km N Coorabulka

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Fig. 2. Habitat of *Sminthopsis froggatti* on Coorabulka Station, Qld.



Fig. 3. Adult male *S. froggatti* from Coorabulka, Qld.

Homestead, Qld; July 1972; 1 ♂. (iii) 32 km NW Coorabulka Homestead, Qld; July 1972; 1 ♂.

Notes: One of the three *S. froggatti* is illustrated in Fig. 3, together with the habitat in which it was collected.

3. *Antechinomys spenceri* Thomas, Wuhlwuhl

Localities: (i) 8 km W Birdsville, Qld; July 1969; 1 ♂. (ii) 16 km W Betoota, Qld; June 1969, July 1972, Oct. 1972; 3 ♀, 5 ♂. (iii) 16 km W Coorabulka Homestead, Qld; Sept. 1968, July 1971, July 1972; 2 ♀, 2 ♂.

Notes: *A. spenceri* was captured on gibber plain, by spot-lighting, and at each of the three localities was sympatric with the rodent, *Notomys cervinus*. One female *A. spenceri* took refuge in what appeared to be a disused burrow of *N. cervinus*.

4. *Dasyuroides byrnei* Spencer, Kowari

Localities: (i) 8 km SE Coorabulka Homestead, Qld; Sept. 1968; 1 ♀. (ii) 16 km N Coorabulka Homestead, Qld; July 1971; 8 ♀, 6 ♂. (iii) 16 km W Coorabulka Homestead, Qld; July 1971; 2 ♂. (iv) 8 km N Coorabulka Homestead, Qld; July 1972; 1 ♂.

Notes: Of the 18 animals collected, 14 were trapped, two were caught by spot-lighting, and one was a road-kill.

In July 1972, seven *D. byrnei* were sighted on station roads north of Coorabulka Homestead. When pursued, two of these animals took refuge in burrows occupied by Long-haired Rats (*R. s. villosissimus*) which were abundant at the time. All *D. byrnei* were captured on gibber plain.

Reports of animals which may have been *D. byrnei* were obtained at Betoota, Qld, and a skull of *D. byrnei* was found under an airport marker near Betoota.

RODENTIA

Family MURIDAE

1. *Notomys alexis* Thomas, Spinifex Hopping-mouse

Localities: (i) 80 km N Innamincka Homestead, S.A.; June 1969; 2 ♂. (ii) 8 km SE Sandringham Homestead, Qld; Sept. 1968; 1 ♂

2. *Notomys cervinus* (Gould), Fawn Hopping-mouse

Localities: (i) 48 km S Pandie Pandie Homestead, S.A.; July 1972; 1 ♀. (ii) 8 km S Birdsville, Qld; June 1969; 1 ♀, 2 ♂. (iii) 16 km N Birdsville, Qld; Sept. 1968; 3 ♀, 13 ♂. (iv) 16 km W Betoota, Qld; June 1969, July 1972, Oct. 1972; 3 ♀, 3 ♂. (v) 32 km W Durrie Homestead, Qld; July 1972; 2 ♀. (vi) 16 km S Glengyle Homestead, Qld;

Sept. 1968; 5 ♀, 9 ♂, (vii) 16 km S Glengyle Homestead, Qld; July 1971, 1 ♀, 4 ♂, (viii) 16 km N Coorabulka Homestead, Qld; July 1972; 1 ♀.

Notes: A total of 15 females and 31 males of *N. cervinus* were captured, by spot-lighting, either on open gibber plain, or gibber plain with alluvial flats. Several *N. cervinus* took refuge in burrows which consisted of one to three closely grouped entrance holes, situated on open gibber plain.

3. *Notomys fuscus* (Jones), Dusky Hopping-mouse

Localities: (i) 16 km N Birdsville, Qld; Sept. 1968; 1 ♂. (ii) 16 km W Betoota, Qld; June 1969, July 1972, Oct. 1972; 21 ♀, 17 ♂.

Notes: All *N. fuscus* from Betoota were obtained from a limited area of sand ridge which was visited on four occasions (Fig. 4).

Two burrow systems of *N. fuscus* were excavated, and a diagram of one is shown in Fig. 6. Neither of the burrows contained animals.

4. *Pseudomys forresti* (Thomas), Forrest's Mouse

Localities: (i) 16 km W Coorabulka Homestead, Qld; July 1972; 1 ♀. (ii) 32 km NW Coorabulka Homestead, Qld; July 1972; 1 ♀.

5. *Pseudomys (Leggadina) hermannsburgensis* (Waite), Sandy Inland Mouse

Localities: (i) 8 km SE Sandringham Homestead, Qld; Sept. 1968; 1 ♀. (ii) 16 km W Betoota, Qld; June 1969, July 1972, Oct. 1972; 3 ♀, 3 ♂. (iii) 32 km NW Coorabulka Homestead, Qld; July 1972; 1 ♂.

6. *Pseudomys australis* Gray, Plains Rat

Locality: 96 km NE Cardillo Downs Homestead, S.A.; June 1969; 3 ♀, 1 ♂.

Notes: the four *P. australis* were obtained from a single burrow, which was one in an extensive area of burrows situated on gibber plain with clay-pans. Seven burrows were dug up, but only one was occupied. Sections of some burrows were stuffed with green vegetation.

7. *Rattus sordidus villosissimus* (Waite), Long-haired Rat

Localities: (i) 16 km N Clifton Hills Homestead, S.A.; Sept. 1968; 3 ♀, 5 ♂. (ii) 32 km NE Clifton Hills Homestead, S.A.; Sept. 1968; 7 ♀, 1 ♂. (iii) 16 km N Birdsville, Qld; Sept. 1968, July 1971; 9 ♀, 11 ♂. (iv) 72 km NE Anna Creek Homestead, S.A.; June 1971; 2 ♀, 1 ♂. (v) 32 km SE Pandie Pandie Homestead, S.A.; July 1971; 1 ♀ and 6 young, 1 ♂. (vi) 16 km N Coorabulka Homestead, Qld; July 1972; many animals.

Notes: Sixteen *R. s. villosissimus* were trapped on sand-ridges and flood-plain at Clifton Hills Station in 1968. Green vegetation was plentiful

at this time. A further 20 animals were trapped near Birdsville on gibber plain in 1968 and 1971.

The locality on Anna Creek Station was a road and sedge area around a bore drain, while on Pandie Pandie Station a female and her six young were dug out from a simple burrow in a sand ridge close to flood-plain. The young were enclosed in a spherical nest of shredded plant material.

In July 1972, signs of *R. s. villosissimus* were found in most areas visited, from Mulka Station northwards. Many rats were sighted during spot-lighting on Pandie Pandie, Durrie, Monkira and Coorabulka Stations, and also near Betoota. They were in plague proportions on Coorabulka Station, where many were trapped on gibber plain, and extended north to Boulia.

Discussion

The finding of *Macrotis lagotis* in south-western Queensland is of interest because of its present rarity and great decrease in range this century. Mack (1961) obtained Rabbit Bandicoots from near Birdsville in 1957-59, but the species has not been seen recently in this area. Smyth & Philpott (1967) found the species to be common at Warburton Mission, W.A., and Watts (1969) located colonies at Yuendumu, Hamilton Downs and Papunya in the Northern Territory. This study suggests that Rabbit Bandicoots may still occur in several areas of western Queensland, where rabbits and foxes are in low numbers.

Of the four species of dasyurid marsupials collected, *Sminthopsis crassicaudata* was the most common, and appears to occur in all types of habitat in the area studied. *S. crassicaudata* from these areas were characterized by larger ears, longer tails and paler coat colour than animals from southern South Australia, and are referable to the sub-species *S. crassicaudata centralis* Thomas.

Another species of *Sminthopsis*, identified by M. Archer (pers. comm.) as *S. froggatti* (sens. Ride 1970), was obtained in the same areas as *S. crassicaudata*, but was much less common.

An extremely biased sex ratio of 46 males to 11 females (four animals were not sexed), was found for *S. crassicaudata* captured by spot-lighting. This contrasts with Wood Jones' (1923) finding that many more females than males were captured by trapping and by domestic cats. This serves to illustrate the way

in which methods of capture may discriminate against one sex in favour of the other.

Of the 11 female *S. crassicaudata* captured, only two had young, both in the spring months. Since all animals were captured in winter or spring, and since most breeding in *S. crassicaudata* occurs between July and February, both in the field and in the laboratory (Godfrey & Crowcroft 1971), it is surprising that more females with young were not captured. It seems that either only a small percentage of females are breeding at any one time, or that methods of capture which depend on the amount of time which the animals spend active outside refuges discriminate against females with pouch young. This is consistent with Ewer's (1968) observations that captive females with pouch young were less active than usual.

The small dasyurid *Antechinomys spenceri* was found to be moderately common in several areas of south-western Queensland, but was not taken in South Australia, and appears to be rare in the north-east of the State, although Finlayson (1961) found it plentiful in the Everard and Musgrave Ranges of the north-west. All the animals captured in Queensland were taken on gibber plain, which contrasts with Wood Jones' (1923) statement that *A. spenceri* is an animal of sand-ridge desert. Marlow (1968) also found *A. spenceri* in areas of gibber plain habitat.

Until recently *A. spenceri* was believed to hop bipedally like the murids of the genus *Notomys*. Ride (1965) showed, however, that *A. spenceri* moves quadrupedally at all times, and Marlow (1968) found that *A. spenceri* also adopted different escape tactics from *N. cervinus* when pursued in similar habitat. This was also noted in the present study, *A. spenceri* frequently crouched behind small clumps of vegetation, relying on concealment to escape capture, whereas *N. cervinus* invariably hopped at high speed, and frequently changed direction.

Unfortunately none of the female *A. spenceri* from Queensland had pouch young, although there is a record of one female with young which was captured in September in the Northern Territory (unpublished data). If this species breeds during the winter and spring months, once again it is surprising that none of the five females captured had pouch young. The argument used to account for the similar situation with *S. crassicaudata* may not be applicable to *A. spenceri*, as only a slight

excess of males (8 males, 5 females) was recorded for this species.

Dasyuroides byrnei was found in a limited area of south-western Queensland, and appears to be restricted to gibber plain. The type locality of this species is Charlotte Waters in the Northern Territory, and it has been taken as far south as Killalpaninna, on Cooper's Creek in South Australia (Wood Jones 1923). However, *D. byrnei* has seldom been collected from the Northern Territory or South Australia in recent times, although it remains common in parts of south-western Queensland.

Seven of the eight female *D. byrnei* collected in July, 1971, had pouch young, all of which were estimated to have been born in June. Woolley (1971) collected pouch-gravid females in June, and pregnant females in November. Female cycles appear to be synchronized in this species, and most females come into breeding condition in May or June both in the field and in the laboratory.

Turning to the rodents, firstly it is worth noting that although seven species of native rodents were collected, the introduced house mouse (*Mus musculus*) was not found in the area under study. Of the native rodents obtained, *Notomys cervinus* was the most common; 48 were collected in South Australia and Queensland. *N. cervinus* was found on both gibber plain and alluvial flats, but not on sandy areas. It was abundant in some parts, particularly near Betoota. *N. cervinus* appears to be a social species as indicated by the groups of three to four animals sighted simultaneously in the field.

Of the 15 female *N. cervinus* collected, one was lactating in September, and another pregnant in July. One juvenile was also collected in July. These records suggest that *N. cervinus* may be a winter breeder in the wild.

Notomys fuscus was obtained at Betoota in the same area as *N. cervinus*, which it closely resembles. However, both sexes of *N. fuscus* have an obvious gular pouch, which distinguishes the species from *N. cervinus*, in which neither sex possesses a gular pouch (Aitken 1968).

N. fuscus was found to be abundant on one sand-ridge near Betoota, and was apparently confined to this ridge. *N. cervinus* was collected from the adjacent gibber flats, but only one *N. fuscus* was captured on these flats. It seemed, therefore, that *N. fuscus* ventured only rarely onto open gibber plain. Aitken (1968) has mapped the distribution of *N.*

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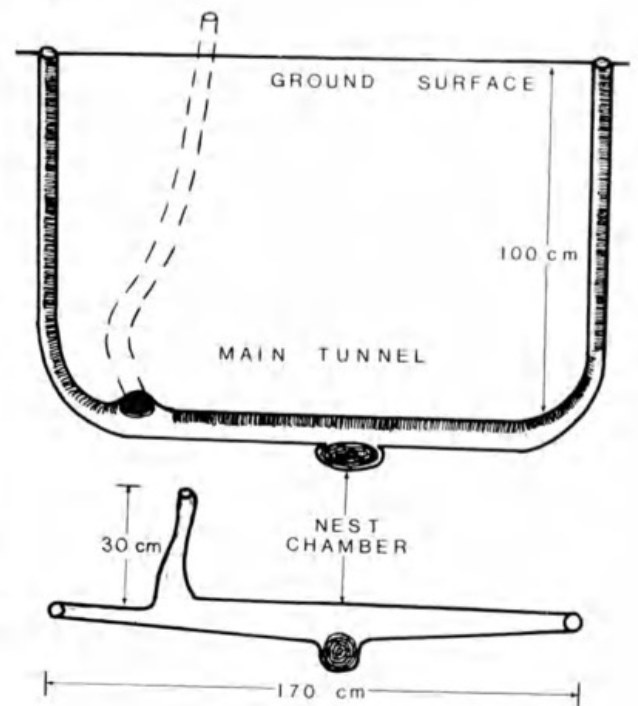


Fig. 4. Habitat of *Notomys fuscus* near Betoota, Qld.

Fig. 5. Adult female *N. fuscus*.

Fig. 6. Diagram of a burrow system of *N. fuscus* excavated on the sand-ridge shown in Fig. 4.

fuscus, and has shown that most records of this species are from north-eastern South Australia, with the greatest concentration between Lake Eyre and the Queensland border. The present record from Betoota appears to be the most northerly locality at which the species has been taken.

Burrows of *N. fuscus* located on the sand-ridge conformed to the typical *Notomys* pattern (Fig. 6), having several vertical shafts descending to a depth of 70–140 cm (two to four feet). The number of animals present on the sand-ridge appears to fluctuate, as none was sighted in June, 1971, although conditions at this time were better than in July, 1972, when *N. fuscus* was common. In addition, two females collected in July, 1972, were pregnant; one gave birth to five young within a week of capture, and the other gave birth to one young 35 days after capture. Breeding in this species, if opportunistic as suggested for many desert rodents, may not be directly dependent on rainfall, or there may be a considerable lag in response to improved conditions. Watts (1970) has shown that *N. fuscus* eats mainly seed in the wild, and much of this seed may be lost due to germination immediately after rainfall.

A third *Notomys* species, *N. alexis*, was collected from two areas of sand-plain covered with *Triodia*, but was not common in the areas visited. From these records it can be seen that the three species of *Notomys* in south-western Queensland have distinct habitat preferences: *N. cervinus* favours open gibber or alluvial plains, *N. fuscus* inhabits sand-ridges, and *N. alexis* lives on the flatter areas of deep sand.

Three species of the genus *Pseudomys* were collected: *P. forresti*, *P. hermannsburgensis*, and *P. australis*. The records of *P. hermannsburgensis* from Queensland are unusual, as the greatest concentration of this species is to the west of Alice Springs, some 480 km from the present localities. Finlayson (1961) states that he could obtain no evidence of this species to the east of Stuart's Line, but in this study *P. hermannsburgensis* was taken from three widely separated localities in western Queensland.

Of the four female *P. hermannsburgensis* captured, one was pregnant when collected in June, 1969, and gave birth to two young eight days after capture. One juvenile male was collected in July, 1972, indicating that this species shows breeding activity in the winter months. Similarly, two of the three female *P.*

australis collected in June, 1969, were pregnant, and gave birth to three and two young in the laboratory at 15 and 16 days after capture.

Rattus sordidus villosissimus was collected on many occasions, and some conclusions about its habits can be drawn. This species is known to increase vastly in numbers at intervals of five to seven years, and Finlayson (1961) suggested that at these times it swarms from a breeding centre in western Queensland into South Australia and the Northern Territory. This theory requires large-scale migration of the species into previously unoccupied areas.

Information from the present study indicates that during rat plagues the animals can be found in all types of habitat, provided green plants or roots are available as a source of water, as *R. s. villosissimus* is unable to survive without preformed water (unpublished data). These conditions prevailed in 1968 and 1972, when the species was abundant from northern South Australia to Boulia in Queensland. However, animals collected in 1971 were obtained from areas close to water, such as around bore-drains and from flood-plain.

Three females obtained from Clifton Hills Station in 1968 were pregnant, but there was evidence that the rats were decreasing their range in this area, as there were many unoccupied burrows in gibber plain which had recently dried out. In a good season it seems that *R. s. villosissimus* can occupy all types of habitat, but as vegetation dries out the gibber plains are the first areas which become untenable. Similarly, in 1972, although rats were present on gibber plain in many areas, they were most numerous around bore-drains, and animals living on the open plains were often in poor condition.

This information suggests that *R. s. villosissimus* is always present in small numbers in pockets of favourable habitat, such as around bore-drains. In such pockets the rats can survive droughts, and if conditions improve in surrounding areas they are able to expand into these areas. These successive expansions from many breeding nuclei are therefore responsible for rat plagues, not mass migration from a single centre in western Queensland. In mesic refuges *R. s. villosissimus* is a relatively cryptic species, which may account for the common belief that it is completely absent from most areas in non-plague years.

In summary, it seems that a number of native mammals are moderately common in

north-eastern South Australia and south-western Queensland, in spite of almost complete pastoral exploitation of the area. The small mammals have fared better than those of intermediate size. In particular, the desert bandicoots have suffered greatly in this century. *Macrotis leucura*, *Chaeropus ecaudatus*, *Perameles eremiana* and *Isodon auratus* all appear to have vanished with the invasion of the fox into central Australia (Finlayson 1961). In view of this fact, the Rabbit Bandicoot is most urgently in need of protection in Queensland, as the colonies in this area are probably small and are widely separated from other known colonies.

Many of the small mammals, however, appear to be maintaining their numbers, although in many cases little is known about their distribution and habits. This lack of knowledge can only be remedied by more extensive field work carried out regularly over long periods. Such field work is particularly necessary for an understanding of the population dynamics of many of Australia's native rodents.

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