Department of Conservation and Land Management
State Operations Headquarters
50 Hayman Road
COMO W.A.

Survey of South-West Forest and Woodland Areas for the Numbat (*Myrmecobius fasciatus*)

By

G.W. CONNELL B.Sc.(Hons.)

Western Australian
Wildlife Research Centre
P.O. Box 51
WANNEROO W.A. 6065

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Abstract

An extensive survey was carried out in the south-west of Western Australia to define the current distribution of the Numbat *Myrmecobius fasciatus* Waterhouse. Since 1960 the range of the species has contracted dramatically. Sizeable persisting populations are known only from Dryandra and Perup State Forests. Occurrence of the Numbat in the West Australian wheatbelt is limited to six localities, of which four may become locally extinct in the foreseeable future.

Numbats are present within the northern Jarrah (*Eucalyptus marginata*) forest belt in localised populations at very low densities. The species occurs primarily in the drier, open understorey areas near the northern and western boundaries of the region.

In recent years Numbat sightings have occurred on the Swan Coastal Plain. All reports have been restricted to the Jandakot-Canning Vale area. It is uncertain if the population remains extant, and may be viewed as non-viable due to increasing development of the area.

No confirmed sightings of Numbats have been reported from the Eastern Wheatbelt area since the early 1970s. It is concluded that the Numbat no longer persists in this region.

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1.0 Introduction

The Numbat *Myrmecobius fasciatus* Waterhouse is currently listed in the IUCN MAMMAL RED DATA BOOK (1982) as endangered. Formerly the Numbat was widespread, occurring from the south-west of Western Australia through Laverton and the Warburton Range, the Everard Range in Northern South Australia, to south-western New South Wales (Shortridge, 1910; Finlayson, 1961; Ride, 1970). Since the advent of European man the range of the species has contracted dramatically.

The last known specimen from N.S.W. was collected in 1857 (Archer, 1979) while in South Australia it has not been recorded since 1933 when it was reported near the Everard Range (Finlayson, 1961). By the 1950s the Numbat was known to occur only in the south-west of Western Australia. Calaby (1960) limited the Numbat to the Wandoo (*Eucalyptus wandoo*) woodlands of the Western Australian wheatbelt (Fig. 1). Within this region he found the species to be widely distributed and locally abundant. However in the mid-1970s a dramatic decline in the frequency of Numbat sightings occurred (Christensen, 1978), and further reduction in range within the wheatbelt region (Turner and Borthwick, 1980). However, Turner and Borthwick (1980) reported the Numbat occurring in very low densities in the northern Jarrah (*Eucalyptus marginata*) forest and in the mallee regions of the Lake King - Ravensthorpe area.

In 1981, an intensive long-term study of the Numbat's ecology was initiated (Friend, 1982, 1983). Following increased knowledge of the Numbat's ecology, research is being directed towards effective management of the species. In order to ensure long-term survival any management plan for the

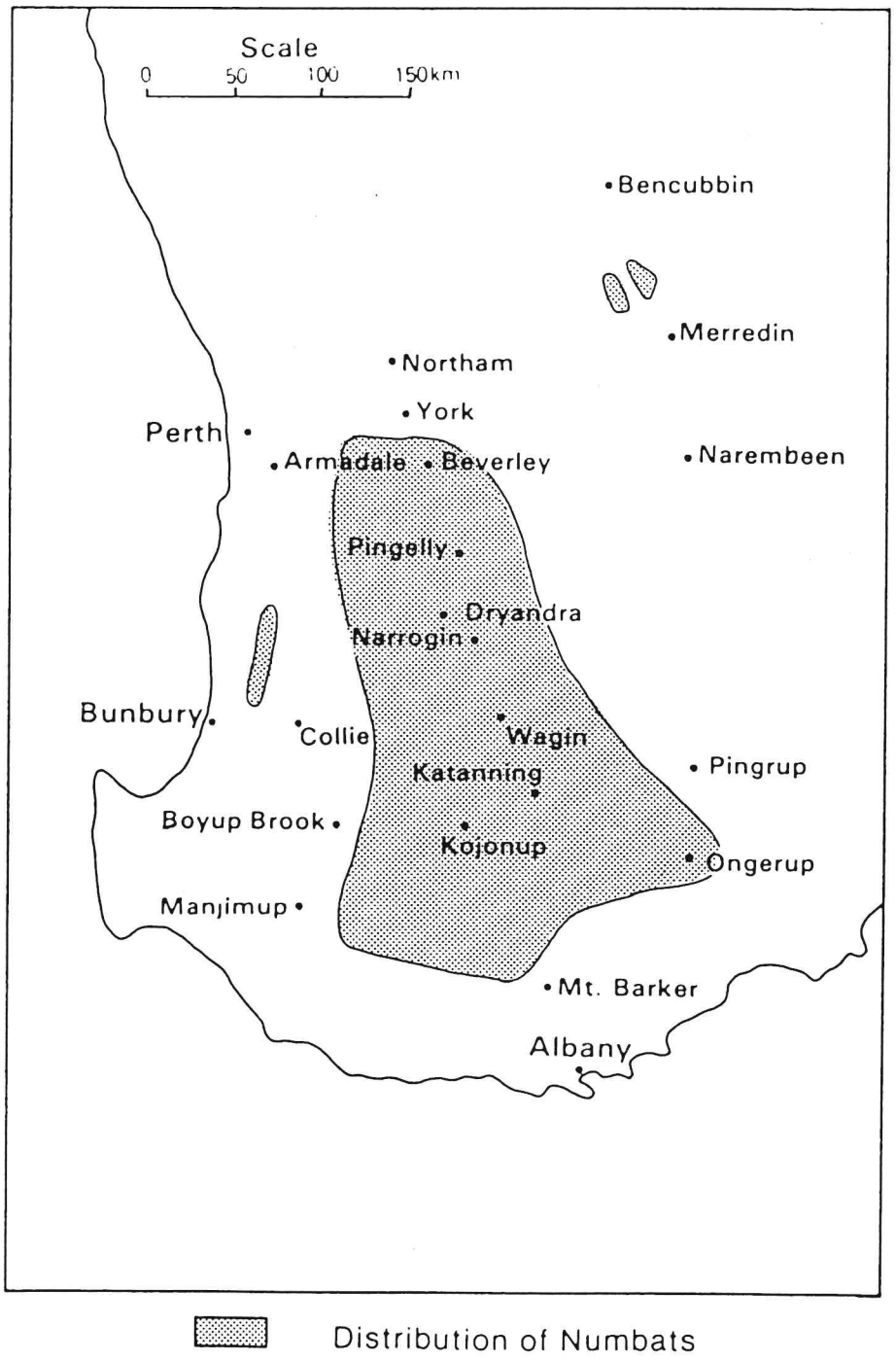


Fig. 1: Estimated distribution of the Numbat in 1960 (Calaby, 1960).

Numbat must be based upon knowledge of the species' current distribution. To this end the present study was carried out to examine areas of possible occurrence for evidence of Numbat presence.

1.1 Project Description

The survey involved:

1) A review of Numbat sighting reports, in Departmental files and those collected through recent research on the species.
2) Collection of further sighting reports through contact with the public, generated by an appropriate publicity campaign.
3) Survey of possible Numbat habitat utilizing suitable methods to detect Numbat presence. The survey concentrated in:
   a) Northern Jarrah forest between Armadale and Collie.
   b) Wandoo woodland : eastern blocks of State forest, remnants in agricultural areas in the Numbat's former range.
   c) Eastern wheatbelt areas of Salmon Gum (*Eucalyptus salmonophloia*) and Mallet (*Eucalyptus astringens*) woodland.
   d) Swan Coastal Plain : Jandakot to Canning Vale area.

2.0 Methods

2.1 Previous Numbat Sightings

Fisheries and Wildlife Departmental Numbat files were reviewed for all sighting reports, by both the public and Departmental officers, prior to commencement of the current project. Date, time, location and other relevant data were extracted from the reports. These sighting reports were then collated with those collected by Dr J.A. Friend during the course of the Numbat research project and broken down into spatial groups (as in Section 1.1.3) and temporal groups; Recent = post 1979, 1970-1979, 1950-1969 and pre 1950.

2.2. Publicity and Public Participation

Given the Numbat's diurnal habit and high mobility (Friend, 1982) sightings by the general public, naturalists and forestry workers, though infrequent, do occur. In order to utilize this hidden source of information an extensive publicity campaign was carried out in the early stages of the project.

Four major metropolitan and sixteen country newspapers were approached for participation in the program. The newspapers which agreed, were subsequently sent a series of black and white photographs of Numbats and a prepared text, as a guideline for an appropriate news article (Appendix A). This article contained general information on the Numbat and made an appeal to the public to report any recent or historical sightings.

During the initial phase of the publicity campaign, Channel Seven Television Network produced a short 7 minute documentary on the Numbat which was aired on the Network's State Affair program. This program also generated invaluable

public response.

All persons who reported Numbat sightings were interviewed initially by telephone, then in person to obtain further details. Each informant was asked to provide information regarding precise location, date, time, description of animal/animals seen, behaviour and habitat description of sighting locality. In order to confirm the validity of the sighting, a selection of skins of various mammals occurring in the south-west were shown during the interview. The informant was asked to identify which specimen most closely resembled the animal seen. Skin specimens of the Short-Nosed Bandicoot (*Isoodon obesulus*), Brushtail Possum (*Trichosurus vulpecula*), Western Native Cat (*Dasyurus geoffroii*), Mardo (*Antechinus flavipes*), Brushtail Wambenger (*Phascogale tapotafata*) and the Numbat were shown. Some interviews, where appropriate, were followed up by accompanying the informant to the sighting locality.

All sighting data were collated and grouped as in Section 2.1.

2.3 Selection of Survey Sites

Choice of survey sites for Numbat presence was made subjectively after considering these following criteria.

1) Age and frequency of previous sightings, with priority given to post 1979 sighting localities.
2) Area - due to the limited time span of the survey only forest remnants of a size capable of supporting a persisting population were selected for survey, e.g. Tutanning Nature Reserve (2087ha) and Dragon Rocks Nature Reserve (30,000ha).

The main sources of information available to assist in

selection of survey sites based on area were;

a) Landsat imagery, Dept. Lands & Surveys, Scale 1:500,000 1981

b) Aerial Photographs, Dept. Lands & Surveys, B/w 1:20,000 1984

c) Topographical Maps, Dept. Lands & Surveys, 1:1,000,000 and 1:100,000 1978

d) Forest Department State Forest District Maps, Scale 1:50,000.

3) Vegetation Communities. Previous workers have identified the Wandoo woodland and Jarrah forest as being prime Numbat habitat (Calaby, 1960; Friend, 1982; Christensen, 1984). Areas were selected for survey which predominated in these communities. In the eastern wheatbelt region areas predominating in Salmon Gum/Mallet woodland were selected.

The sources of information utilized were;

a) Structural Vegetation Maps (1:250,000 and 1:1,000,000) of Beard (1972).

b) Forest Department State Forest District Maps, Scale 1:50,000.

2.4 Survey Techniques

The method employed to survey field sites was to slowly traverse the area by foot while searching for signs of Numbat presence, such as diggings and scats. In some larger areas, e.g. northern Jarrah forest, slow (20kmh) driven vehicle surveys were utilized to supplement pedestrian searches.

2.4.1 Diggings : Numbat diggings are distinctive and unique. Diggings are most readily found in open soil patches

in Wandoo woodland where single termite galleries are attacked. The diggings vary between 8-5cm long and form a neat "V" shape up to 2-5cm wide and 1-3cm deep. Often the termite gallery is noticeable at the apex of the "V". There is very little evidence of tailings to the digging, as seen with Wyolie (*Bettongia penicillata*) and Quenda (*Isodoon obesulus*) diggings. Occasionally a large network of single diggings is produced in a confined area, or a larger more extensive digging may be made around the base of trees and in the soil along the side of logs. However these diggings are still readily distinguishable from Echidna (*Tachyglossus aculeatus*) diggings. They are much smaller in size and lack the large side thrusts of dirt, pronounced head and snout imprint in the apex, of the Echidna digging.

Knowledge of Numbat diggings has been gained from direct observation of feeding Numbats during radio-tracking operations (J.A. Friend, pers. comm.). It is felt that the diggings described by Turner and Borthwick (1980) were produced by an Echidna, rather than a Numbat. This is particularly true of diggings on termite mounds, which Numbats rarely attack (Friend, 1982). Where logs are friable, Numbats will attack the wood, exposing the galleries inside. This occurs more frequently in the Jarrah forest (Christensen *et al.*, 1984; J.A. Friend, pers. comm.).

2.4.2 Scats : Numbat scats are easily distinguishable from those of other mammals. Scats are most readily found in or near diggings, on termite mounds, logs and on open patches of soil where the animal has paused to survey its surroundings. The scats are black when fresh, with a smooth waxy coating on the surface and very hard. They contain large amounts of sand

and termite remains, never any plant material contrary to that stated by Morrison (1981). The scats are 10-20mm long and 7-10mm in diameter and weather to a grey colour with age (Turner and Borthwick, 1980).

2.4.3 Hair Analysis : The method of hair identification developed by Brunner and Coman (1974) has been found useful in mammal surveys (Friend, 1978). Uncommon or inconspicuous species which are not often recorded by conventional techniques may be detected by the analysis of hair remains in predator scats (Brunner and Bertuch, 1976; Valente and Woolley, 1982). During the course of the current survey all predator scats found in the field were collected, for examination of hair remains, to detect if Numbat hairs were present. In the laboratory the predator scats were soaked in 70% Alcohol for 24 hours, then prised apart and the individual hairs extracted for identification.

In view of the Numbat's regular use of hollow logs for shelter (Calaby, 1960b; Friend, 1982; Christensen *et al.*, 1984), hair samples were collected from logs using the method of J.A. Friend (pers. comm.). A National HC-120 DC12V 80W car battery carried on a back pack frame, was attached to a 2m length of 25mm diameter clear plastic tubing. This apparatus was used to extract any loose material within the log such as hair, feathers and termite mound material. The material collected was emptied onto a flat black sorting tray and all individual hairs removed for identification. Each log was vacuumed 3 times for one minute duration.

Hairs found in the predator scats and logs were processed as described by Brunner and Coman (1974) and identified using the photographic reference system of Valente and Woolley (1982).

3.0 Results

Due to past and current research programs, a large body of information has been gathered on the Numbat populations at Dryandra State Forest and the Perup Fauna Management Priority Area. In both these areas sizeable, persisting populations are known to exist. Thus for the purposes of the current project, Numbat sighting reports received from these areas, while recorded, were not acted upon.

3.1 Numbat File Review

From the Departmental Numbat files (129/51 Vols 1 and 2) and the current Numbat research program files (J.A. Friend, pers. comm.), a total of 196 Numbat sighting records, dating from 1933 to the commencement of the current project (June 1984), were extracted. Of this total, 29 sightings occurred in Dryandra State Forest and 80 in the Perup Fauna Management Priority Area. Manjimup Forests Department personnel reported 75% of the sightings in the Perup region.

Details of each individual Numbat sighting record occurring outside the Perup and Dryandra regions, are contained within Appendix C. The data are presented on a regional basis and an approximate chronological sequence.

Table 1 details the breakdown of Numbat sighting records into regional and age groupings. Sighting records from outside the major regions were reported from Morawa (1963), Badgingarra (1977), the Capel River (1981) and Wongan Hills (1982). The two most recent must be regarded as doubtful records due to their inconclusive nature.

Regions	# records	Age	# records
Swan Coastal Plain	7	Recent, Post 1979	35
Northern Jarrah Forest	47	1970 - 1979	23
Wheatbelt	26	1950 - 1969	29
Eastern Wheatbelt	3	Pre 1950	1
Other Areas	4		

Table 1: Breakdown of Numbat sighting records from Departmental files (pre June 1984) into regional and age groupings.

	# records	Source	# records
Live Sightings	68	Metropolitan	22
Confirmed Sightings	64	Country	34
Invalid Records	6	Departmental	31
Road Kills	14		
Killed by *Felis cattus*	1		
Total # records	87		

Table 2: Source and status of Departmental Numbat file sighting records (pre June 1984).

Since 1951, the general public residing in country areas and Departmental officers have reported the greatest number of sightings (75%) (Table 2). Live sightings made up 77% of records, while mortalities only 17%.

3.2 Public Response

During the publicity program fourteen metropolitan and country newspapers published an article containing information on the Numbat and the current survey. Most newspapers also published a black and white photograph of a Numbat along with the article (see Appendix B). As a result of the publicity generated, a further 56 Numbat sightings were reported by the

general public. Six sightings originated in the Perup region and one from Dryandra State Forest.

Area	# records	Age	# record
Swan Coastal Plain	6	Recent, Post 1979	38
Northern Jarrah Forest	23	1970 - 1979	8
Wheatbelt	9	1950 - 1969	3
Eastern Wheatbelt	4	Pre 1950	0
Other Areas	7		

Table 3: Breakdown of Numbat sighting records collected during the current survey into regional and age groupings.

The data collected with each sighting report are contained in Appendix C, presented as described in Section 3.1. For simplicity the raw data of all Numbat records obtained from Departmental files and the current project, were collated together in Appendix C.

	# records	Source	# records
Live Sightings	35	Metropolitan	12
Confirmed Sightings	29	Country	30
Invalid Records	12	Departmental	7
Road Kills	6		
Total # records	49		

Table 4: Source and status of reported Numbat sightings June 1984 to November 1984.

3.3 Field Survey

Following the examination of all Numbat sighting reports collected from the general public and Departmental files, fifty-nine sites throughout the south-west were selected for field

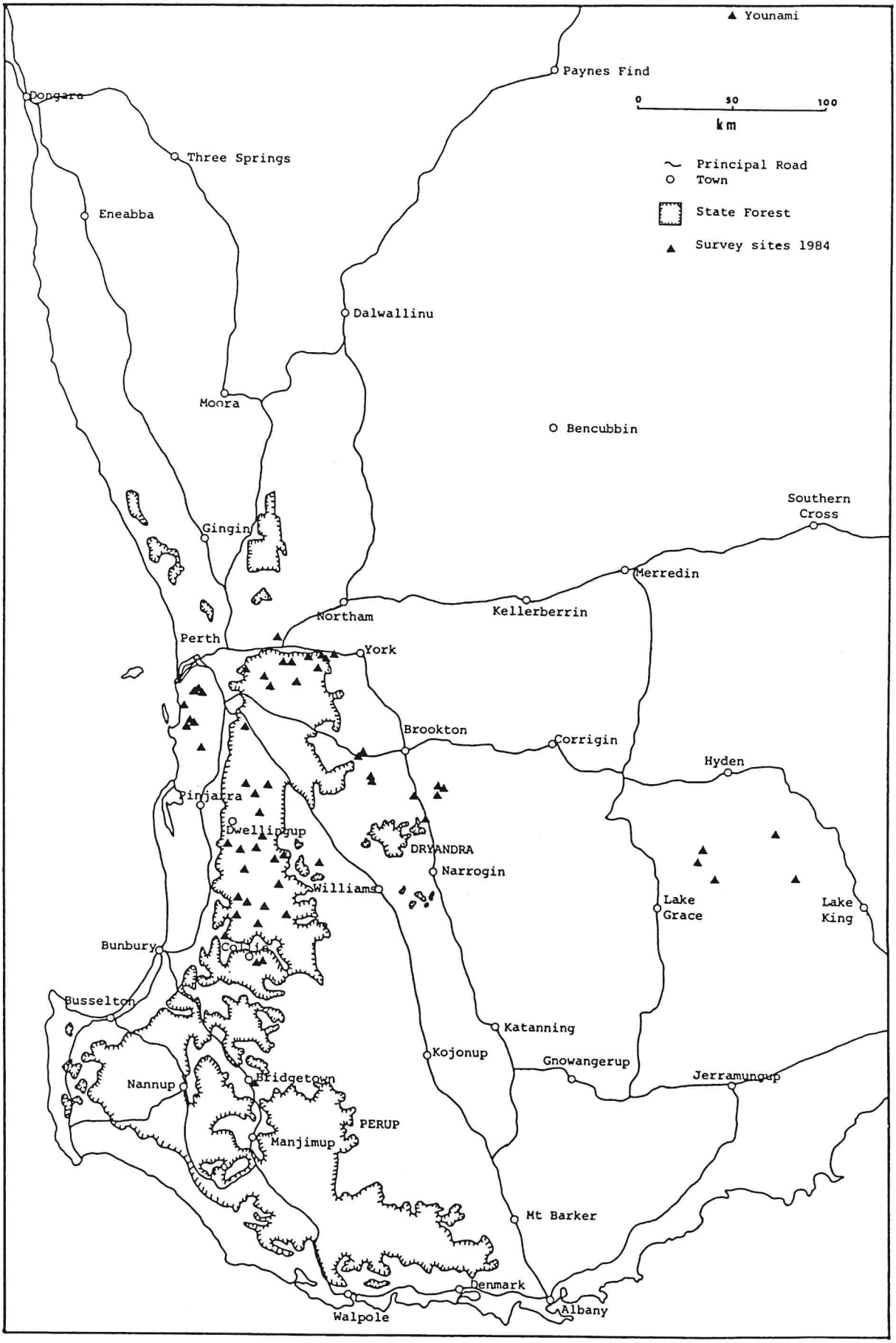


Fig. 2: Field survey sites inspected for Numbat presence June - September 1984.

survey (Fig. 2). A total of 63 days were spent in the field and 244 hours of foot survey. Details of each survey carried out are contained in Appendix D. Site location, survey duration and summarized results are listed, with the data presented on a regional basis.

Throughout the field survey program, no Numbats were sighted. However signs of Numbat presence were found at 16 sites. Of these 12 sites were previously known localities, e.g. Tutanning Nature Reserve, or reported Numbat sighting locations. The remaining 4 sites are new Numbat localities discovered by the field survey program. The new locations are;

31 Talbot, Wundabiniring Rd : AN88

35 Bunbury : EA64

38 Dwellingup, Windsor Rd : CJ74

41 Murray, George Rd : DJ79

The frequency of evidence type, found during foot surveys, indicating Numbat presence is listed in Table 5. Scats were found in association with diggings three times, and once in the entrance of a hollow log. A lower than expected frequency of diggings found, may be attributed to the season during which the survey was carried out. Frequent winter rains easily obscure the small shallow diggings produced by the Numbat, allowing little accumulation of diggings within a given area.

	# Sites
Diggings	8
Scats	4
Numbat burrows	4
Hair samples	2

Table 5: Frequency of evidence indicating Numbat presence.

Numbat hairs were collected from hollow logs at two locations, Bartrams Rd Reserve 19740 and Roelands Hill (Appendix D, reports #32 and 36). Eighteen other hair samples were collected, 13 belong to the Rabbit (*Oryctolagus cuniculus*), one the Short-Nosed Bandicoot (*Isoodon obesulus*), one the Brush-Tailed Possum (*Trichosaurus vulpecula*) and 3 unidentifiable samples.

Analysis of the predator scats found during the survey, 12 Fox (*Vulpes vulpes*) and one Native Cat (*Dasyurus geoffroii*) revealed no remains of Numbats. Nine of the scats examined contained Rabbit hair, 6 scats with unidentifiable bone fragments, 7 with insect material and 4 scats containing unidentifiable hair fragments.

4.0 Discussion

4.1 Regional Status

4.1.1 Northern Jarrah Forest

Previously it had been considered that the Jarrah forest was unsuitable habitat for the Numbat (Calaby, 1960). Historical records from the region were attributed to Numbat occurrence in pockets of Wandoo woodland on clay soil on the margins of the Jarrah forest. However recent research in the Perup (Maisey and Bradbury, 1982; Christensen *et al.*, 1984) and the survey of Turner and Borthwick (1980), showed that the Numbat does inhabit Jarrah forest. During the present survey 70 reports of Numbats in the northern Jarrah forest, dating from 1960 to 1984, were collected from Departmental files and the public.

The distribution of the Numbat within the Jarrah forest appears to be discontinuous and restricted to localised populations. The patchiness of populations is borne out by the clusters of sightings along the Albany Highway (Fig. 3). Sightings regularly occur in the North Bannister and Gleneagle localities, with few in the intervening area. Also the infrequency of sightings along a high traffic volume highway indicates a low population density.

There is no evidence of Numbat presence from large areas of the forest despite frequent visitation by forestry workers and searches carried out during the present survey (Fig. 3). However, many areas of prime Numbat habitat, primarily the Wandoo-Jarrah mixed communities along the eastern boundary of the region, are within rarely visited forest quarantine areas. It has been suggested that logging operations enhance Jarrah forest suitability for the Numbat (Christensen *et al.*, 1984).

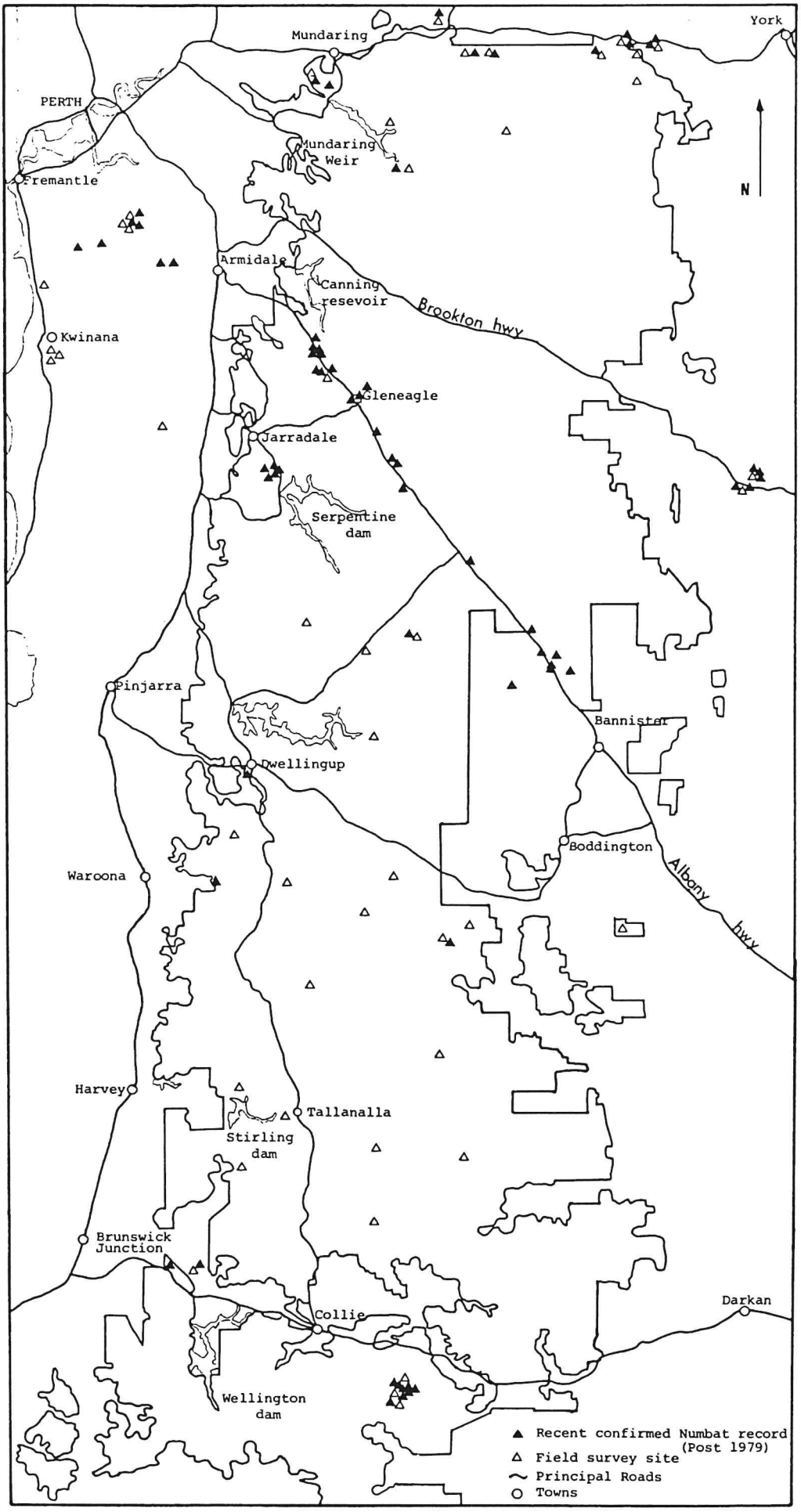


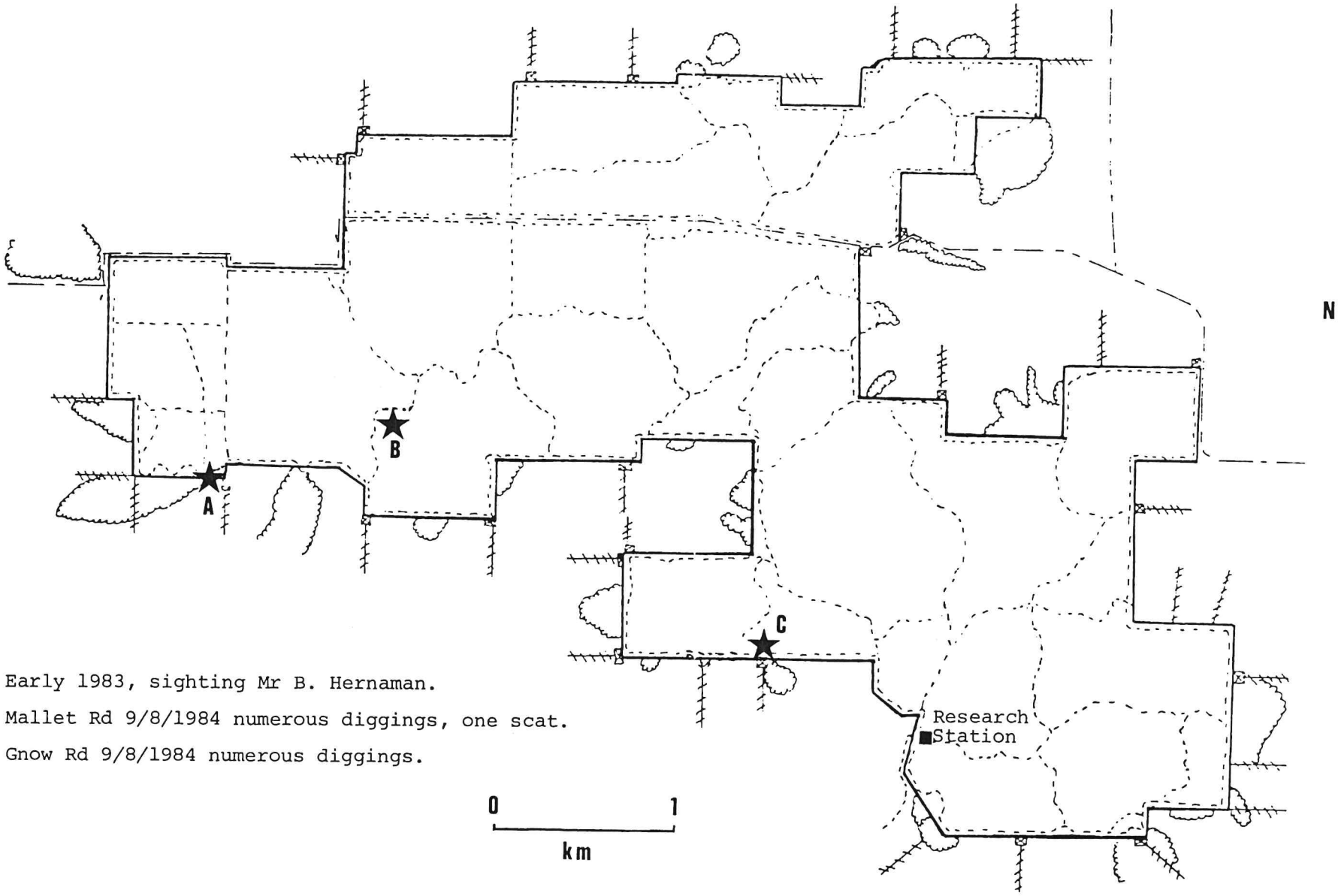
Fig. 3: Recent confirmed Numbat record localities and field survey sites in the northern Jarrah forest region.

However, the density of understorey vegetation seems to determine occurrence at a given site. Within the northern Jarrah region Numbats occur in the drier, open understorey areas near the northern and western boundaries. They appear to be absent from the higher rainfall, dense, closed forest of the central area.

4.1.2 Wheatbelt

The Numbat was once fairly common in open Wandoo woodland in the wheatbelt region. Calaby (1960) considered it among the more abundant of the small mammals of the south-west. However the present survey found the Numbat to occur in only six locations within the wheatbelt (Fig. 6). Most of the area is now cleared for agriculture with few bush blocks remaining. Also, few of the nature reserves in the area are large enough to contain a viable population of Numbats. The largest woodland area remaining is Dryandra State Forest which contains a well-researched, large, self-perpetuating population. Yornaning water reserve, where two sightings (Appendix C, reports #100 and 131) and other signs of Numbat activity have been noted in recent years, is sufficiently close to Dryandra for the forest to act as a source of new colonizers for the reserve. It is known from recent research that young Numbats when first becoming independent will sometimes travel up to 15km before settling into new home territories (J.A. Friend, pers. comm.).

In the past Numbats were seen frequently on Tutanning Nature Reserve, east of Pingelly. Since 1980 however, only two sightings have been made. The present survey found Numbat diggings at two locations within the reserve (Fig. 4). In June 1984, two Numbats were sighted on Hernaman's property,



A Early 1983, sighting Mr B. Hernaman.

B Mallet Rd 9/8/1984 numerous diggings, one scat.

C Gnow Rd 9/8/1984 numerous diggings.

Fig. 4: Tutanning Nature Reserve recent Numbat reports.

less than 2 kilometers from Tutanning Reserve. Subsequently the present survey found diggings and scats at this locality. The small wooded hillock where the sightings occurred, is sufficiently close to the reserve for it to be included within the range of the Tutanning population. The population while still surviving, appears to be small and may be in danger of becoming extinct in the near future.

A similar fate seems in store for two other locations in the Pingelly area, a reserve 5km south of Pingelly and a bush block on Shipley's farm north of Tutanning. Both of these bush blocks are small in area and have provided only one sighting report each since 1979. The only other wheatbelt locations with evidence of Numbats are two adjacent nature reserves (Reserves ↑ 19740 and ↑ 36742) on Brookton Highway east of the main State Forest Block. Sightings have been made here irregularly over recent years, with diggings and hair samples noted by the present survey. Though the reserves are small they are close to the State Forest which could act as a source of colonists.

4.1.3 Eastern Wheatbelt

Historically no specimens of Numbats have been collected from this region, but in 1961 a Numbat was reported from the mallee country halfway between Hyden and Norseman ("Pingelly - Brookton Leader" 5th June 1961), then in the early 1970s they were reported to occur in the Dragon Rocks area (McKenzie *et al.*, 1973). Also in 1972 and 1979 Numbats were reported near Ravensthorpe (Turner and Borthwick, 1980). Despite some recent reports from the public and an extensive field survey of the area (Fig. 2), no confirmed records of Numbats have occurred since 1979. It is concluded that the Numbat no longer persists

in this region.

4.1.4 Swan Coastal Plain

The earliest record of Numbats occurring on the Swan Coastal Plain is the report of two roadkills on Nicholson Road, Canning Vale, in the early 1970s (Appendix C, reports #2 and 3). Although one record predates this report, a sighting in Kelmscott in the mid-1960s, the location is close to the Jarrah forest of the Darling Scarp. The Nicholson Road report comprises the first record solely from the coastal plain. Since 1981 a further six reports of Numbats have come from this area, three of which have been roadkills along Forrest and Armadale Roads (Fig. 5). As the area is predominantly Banksia woodland, this appears to be the only population of Numbats persisting in lightly wooded habitats, despite the former widespread occurrence of the species in non-forested areas (Friend *et al.*, 1982).

However it is uncertain is a viable population does exist in the area, although signs were found during the survey indicating Numbat activity. The amount of urban development and level of human activity in the area suggests sightings would be more frequent if a Numbat population of any size existed. There is a clear need for a detailed survey to determine the range and number of Numbats in the area and the probable impact of future development upon the population.

4.1.5 Other Areas

During the course of the present study, members of the public reported sightings of Numbats in areas outside the main survey region. These reports ranged from Youanmi near Mt Magnet to Northcliffe. Upon examination, all were disregarded as non-Numbat sightings (Appendix C, reports #118 -

A Dec 1982, roadkill, preserved

B Jul 1983, sighted roadkill

C Jul 1983, sighted roadkill

D Jan 1981, live sighting

E April-Oct, 6 live sightings

F 1981, sighted roadkill

G 1972, sighted roadkill

H 4/7/84, possible Numbat burrows (2) and digging (1)

Uncleared woodland Jan 1984 aerial photography

★ Confirmed record

☆ Unconfirmed record

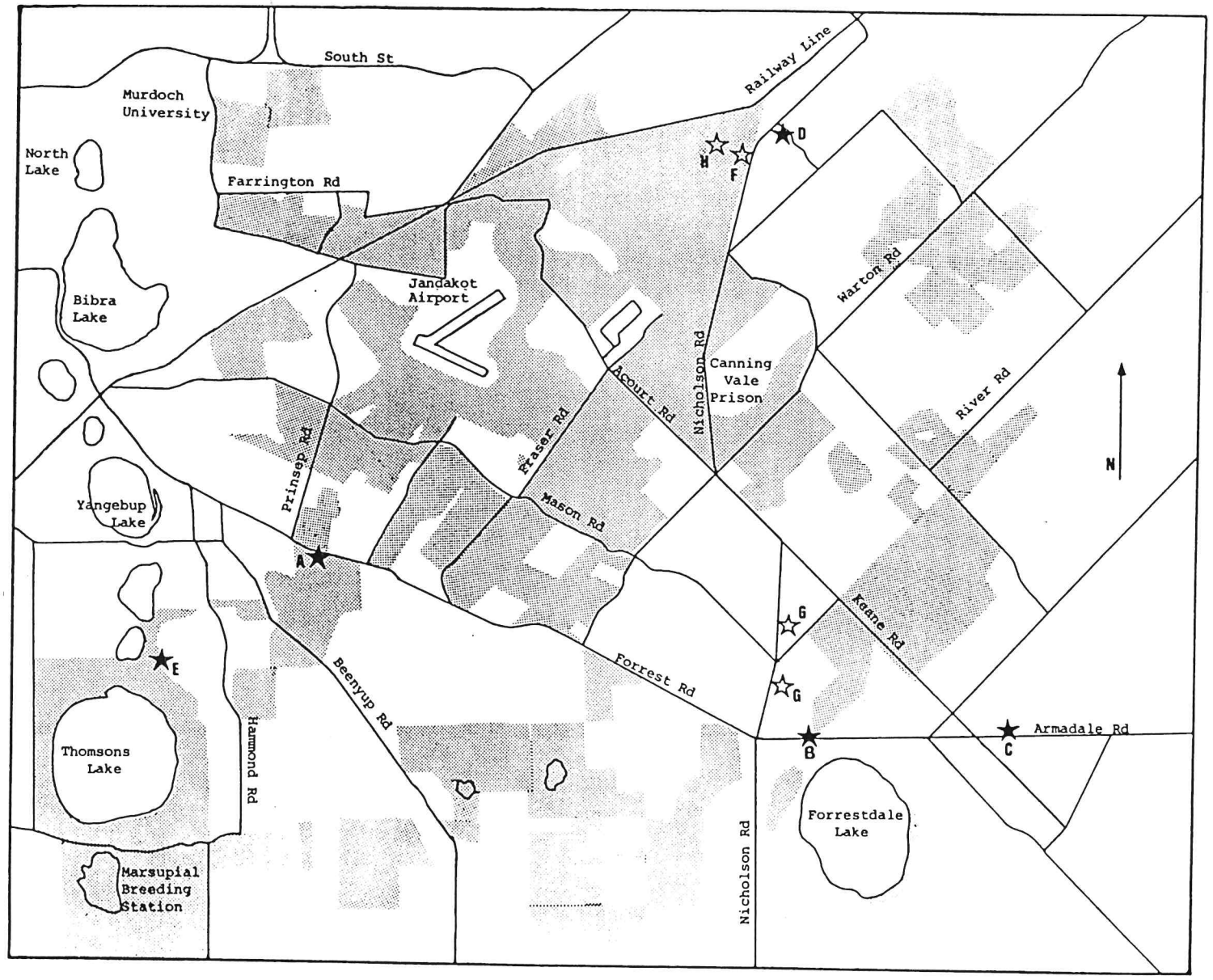


Fig. 5: Numbat record locations in the Jandakot-Canning Vale Area.

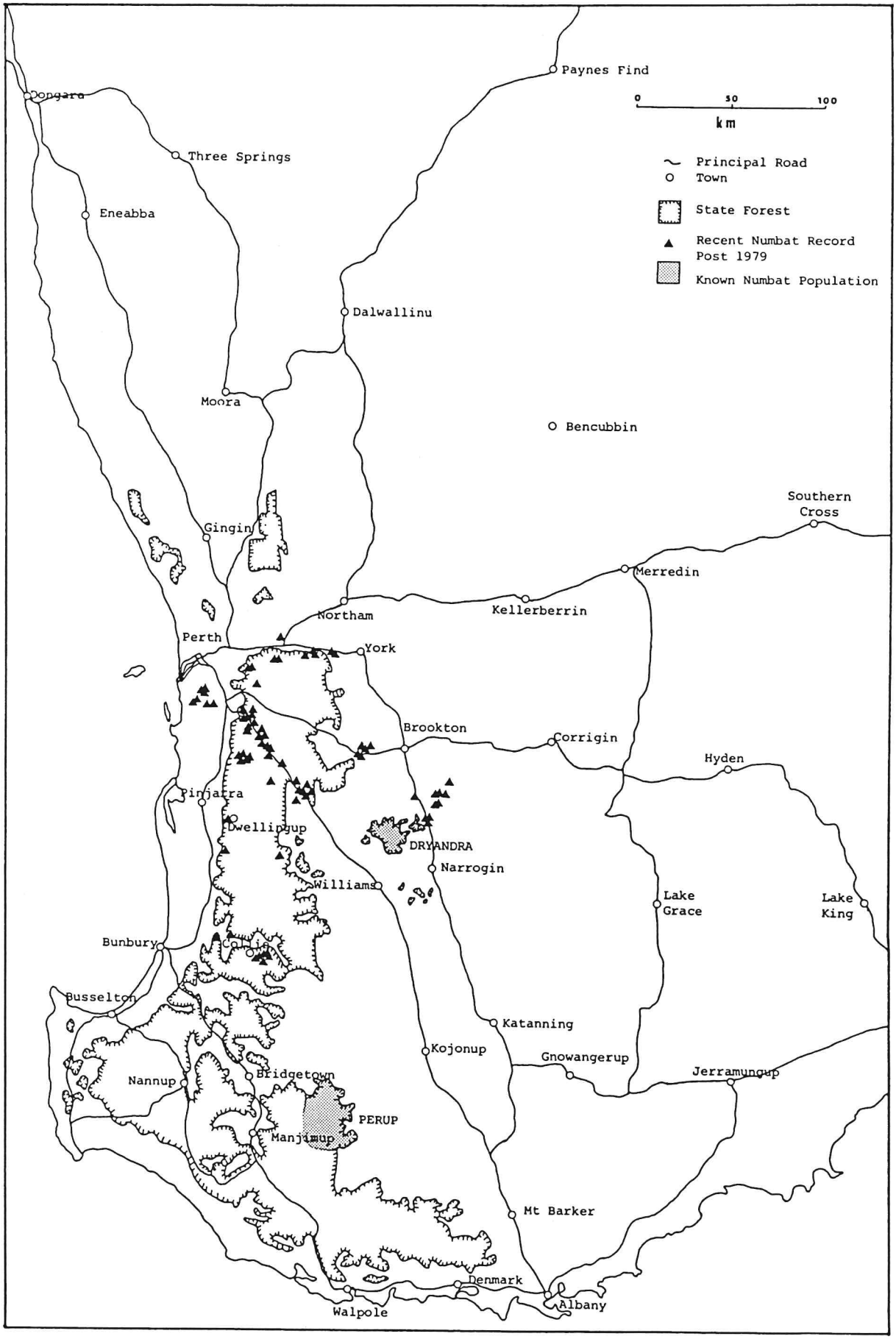


Fig. 6: Distribution of recent (post 1979) confirmed Numbat record localities.

127). Exceptions were from the Canna Dam Reserve near Morawa (1963) and Nannup (1973). However no recent reports have originated from these areas. Of historic interest is the capture of a Numbat and young near Augusta in 1960, reported by the "Pingelly - Brookton Leader" 7th September 1960.

4.2 Conclusions

The Numbat's distribution in the south-west has contracted dramatically in the last 30 years. Little of the former range estimated by Calaby (1960) is now occupied by the Numbat. This is clearly due to the extensive destruction of their former habitat in the wheatbelt. Within this region, Dryandra State Forest is the single location with a viable long-term population. Other wheatbelt sites presently contain small populations and are in danger of becoming extinct in the foreseeable future. Persistence of the Numbat in Tutanning Nature Reserve may require active management programs, such as predator control and translocations to build up the population. Local residents report a great increase in Fox numbers in the area over recent years. They attribute the decline in native species abundance to this increase. The present survey found positive evidence of Fox predation upon the Wyolie (*Bettongia penicillata*) with Tutanning reserve.

The present survey documented an extension of the range of the Numbat to the Swan Coastal Plain. However it is uncertain if a viable population exists in the area. Persistence of the population, in the face of future development of the area, seems unlikely. Survival of the population would be dependent on the retention of the remaining natural vegetation in the area.

Evidence of Numbat presence in the northern Jarrah forest, indicates that many small localised populations exist. While movement between areas undoubtedly occur, large portions of the region appear unoccupied by the species. The occurrence of the Numbat in the northern Jarrah forest offers greater hope for the species' future, but more knowledge is required to assess the viability of the population.

Dryandra and Perup State Forests remain the major strongholds of the Numbat. Large, well-documented populations persist in these areas. With appropriate management strategies aimed at maintaining or increasing present population levels, these areas may provide a source of future colonists for translocation to areas of former occurrence.

Acknowledgements

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Appendix A:

Guideline Text for Newspaper Articles.

SEARCHING FOR NUMBATS

The Numbat is a small unique marsupial seriously threatened with extinction. Though the Numbat is W.A.'s State mammal emblem, few people have seen one alive. The area where Numbats occurred has shrunk dramatically since European settlement. Once abundant from the western border of N.S.W., extending across the semi-arid areas of S.A. to the south west of W.A., they are now confined to only a few areas of the south west. While occurring only in the south west for the last forty years, the Numbat was, until recently, common in certain areas. A decline in the number of sightings during the 1970's has caused concern regarding its survival.

During the last 3 years Dr Tony Friend, a biologist with the Department of Fisheries and Wildlife, has been carrying out an intensive field investigation on the Numbat. Using radio-tracking techniques to follow and study individual animals he has concentrated on understanding the reasons for its decline, determining its numbers and distribution and its food source. This information will enable biologists to recommend management procedures to safeguard the Numbat's future.

While recent studies on the Numbat have been undertaken primarily in the Narrogin and Manjimup areas, there have been occasional reports from the public in recent years of Numbat sightings in other parts of the south west. In order to establish exactly where Numbats are still presently living, an extensive field survey will be carried out covering most of the south west. Mr Garry Connell, also a biologist with the Fisheries and Wildlife Department, working with Dr Friend, will examine all areas where Numbats have been sighted. Mr Connell will be looking for Numbat diggings, droppings and use of hollow logs as well as the animals themselves to determine to what extent Numbats are still present in the area. Mr Connell will also visit other areas of suitable habitat where Numbats may occur or have been known to occur in the past. As the survey covers such a large area, Mr Connell hopes that local residents will aid his search for the Numbat, by informing him of any sightings of Numbats during recent years.

Numbats are small marsupials (head and body 25cm tail 17cm), slightly smaller than a rabbit. The Numbat is easily recognised by its long sharp nose, pointed upright ears, a long tail often with its hairs erect giving a bottle brush effect, and a rich red-brown fur barred with black and white stripes across its back. A Numbat's diet consists almost entirely of termites extracted from the forest floor. Small dead branches are turned over, excavations are dug in open spaces and around the bases of trees, and termite-infested logs are pulled apart with the sharp claws of the forefeet. Hollow logs, which are common in woodland where Numbats occur, are very important to the Numbat for shelter. These logs are used extensively for shelter at night and sometimes during the day, especially on hot summer afternoons.

The only hope for the long-term survival of the Numbat is that with knowledge of their biology and habitat, sufficient suitable land is reserved or managed appropriately. With the help of the general public in reporting sightings of the Numbat to biologists these aims may be achieved. If a Numbat is sighted or has been recently, please record:

a) Date
b) Time of Day
c) Exact Location (leave a marker at the spot if possible)
d) Type of vegetation Numbat was seen in, e.g. Wandoo, Jarrah

and contact Dr Friend or Mr Connell
Department of Fisheries and Wildlife
W.A. Wildlife Research Centre
P.O. Box 51
WANNEROO W.A. 6065

or phone (09) 405 1555.

Appendix B:

Examples of Final Published

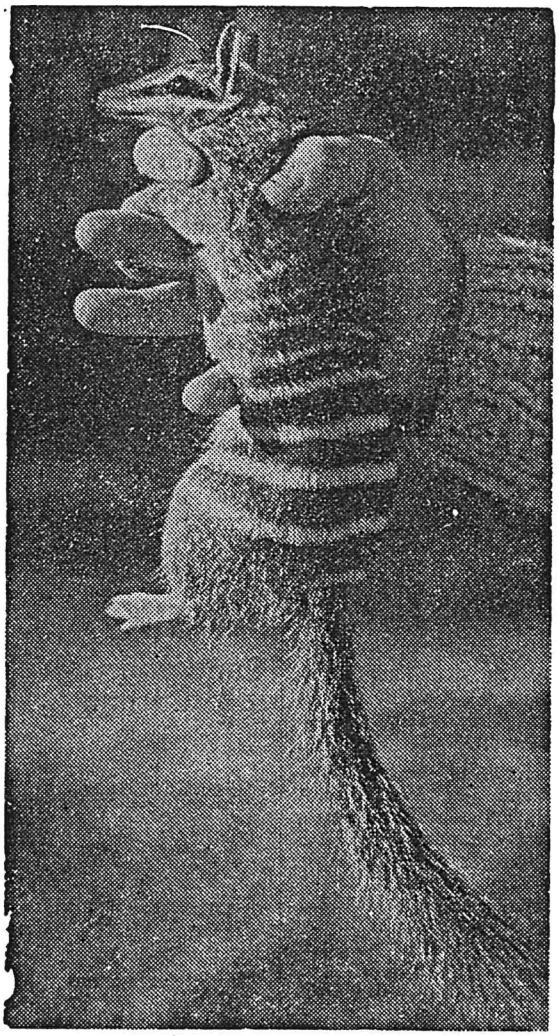
Newspaper Articles.

The Wagin Argus & Arthur, Dumbleyung, Lake Grace Express— Thursday, July 19, 1984

SEARCHING FOR NUMBATS

The Numbat is a small unique marsupial seriously threatened with extinction. Though the Numbat is WA's State mammal emblem, few people have seen one alive. The area where Numbats occurred has shrunk dramatically since European settlement. Once abundant from the western border of NSW, extending across the semi-arid areas of SA to the south west. While occurring only in the south west for the last forty years the Numbat was, until recently, common in certain areas. A decline in the number of sightings during the 1970's has caused concern regarding its survival.

During the last three years Dr Tony Friend, a biologist with the Department of Fisheries and Wildlife, has been carrying out an intensive field invesigation on the Numbat. Using radio-tracking techniques to follow and study individual animals he has concentrated on understanding the reasons for its decline, determining its number and distribution and its food source. This information will enable biologists to recommend management procedures to safeguard the Numbat's future.



While recent studies on the Numbat have been undertaken primarily in the Narrogin and Manjimup areas, there have been occasional reports from the public in recent years of Numbat sightings in other parts of the south west. In order to establish exactly where Numbats are still presently living, an extensive field survey will be carried out covering most of the south west. Mr Garry Connell, also a biologist with the Fisheries and Wildlife Department. working with Dr Friend, will examine all areas where Numbats have been sighted. Mr Connell will be looking for Numbat diggings, droppings and use of hollow logs as well as the animals themselves to determine to what extent Numbats are still present in the area. Mr Connell will also visit other areas of suitable habitat where Numbats may occur or have been known to occur in the past. As the survey covers such a large area, Mr Connell hopes that local residents will aid his search for the Numbat, by informing him of any sightings of Numbat during recent years.

Numbats are small marsupials (head and body 25cm, tail 17cm), slightly smaller than a rabbit. The Numbat is easily recognised by its long sharp nose, pointed upright ears, a long tail often with its hairs erect giving a bottle brush effect, and a rich red-brown fur barred with black and white stripes across its back. A Numbat's diet consists almost entirely of termites extracted from the forest floor. Small dead branches are turned over, excavations are dug in open spaces and around the bases of trees, and termite-infested logs are pulled apart with the sharp claws of the fore-feet. Hollow logs, which are common in woodland where Numbats occur, are very important to the Numbat for shelter. These logs are used extensively for shelter at night and sometimes during the day, especially on hot summer afternoons.

The only hope for the long-term survival of the Numbat is that with knowledge of their biology and habitat, sufficient suitable land is reserved or managed appropriately. With the help of the general public in reporting sightings of the Numbat to biologists these aims may be achieved. If a Numbat is sighted or has been recently, please record a) Date, b) Time of Day, c) Exact Location (leave a marker at the spot if possible), d) Type of vegetation Numbat was seen in, e.g. wandoo, jarrah, and contact Dr Friend or Mr Connell, Department of Fisheries and Wildlife, WA Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

Appendix Bi : The Wagin Argus 19th July 1984

Where have all the numbats gone?

MOORA: The WA Wildlife Research centre is asking for assistance from local residents in their efforts to locate one of the State's rare residents, the numbat.

Selected as the mammal to represent the State on a state emblem in July 1973, the research centre now believes the small creature is in danger of becoming extinct.

A decline in the number of numbat sightings in the 1970's, first drew the research centre's attention to the problem.

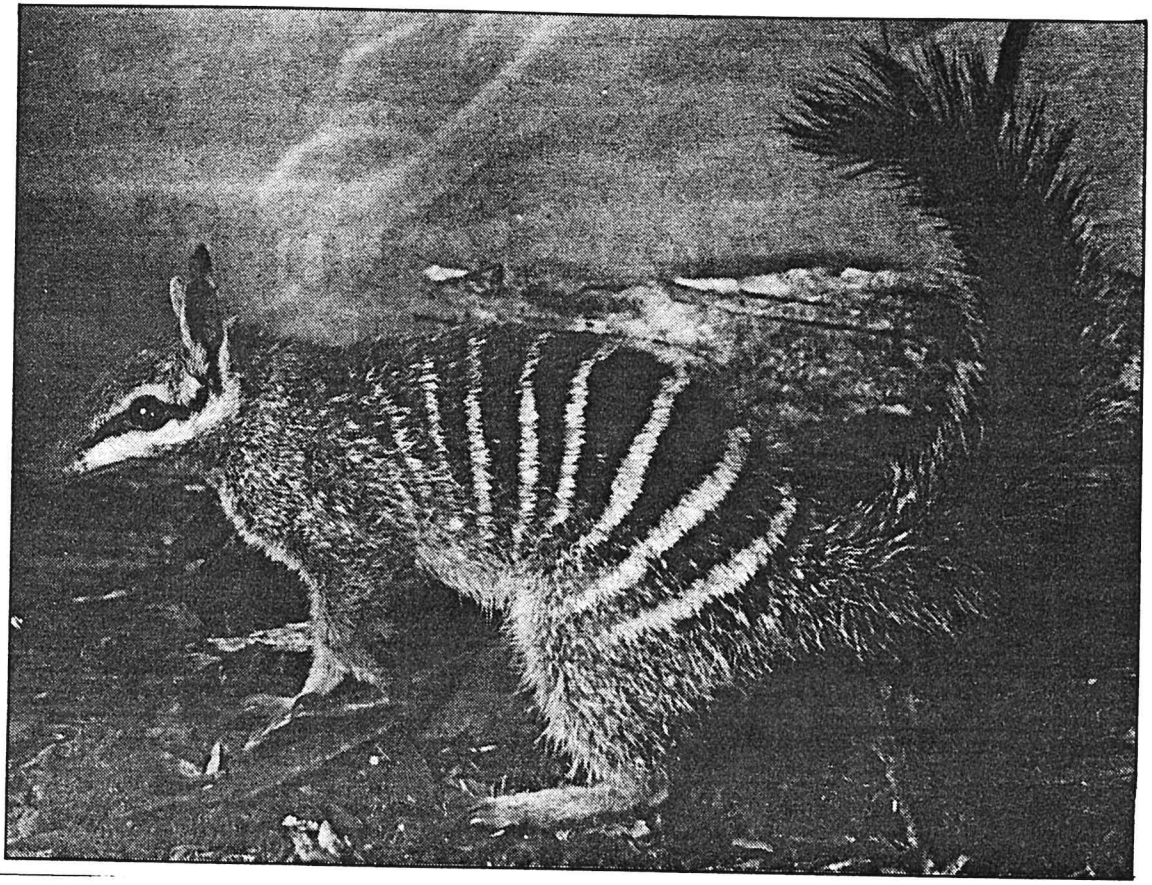
Local officer with the Wildlife and Fisheries Department, Bernie Haberley, said numbats had been found along the costal region, and it is quite possible they are in the Moora wildlife district.

Given the facts on the distribution and life style, biologists with the Department of Fisheries and Wildlife, believe they will be able to recommend management procedures to safeguard the numbat's future.

Described as slightly smaller than a rabbit, with a head and body measurment of 25cms and a tail of 17cms, the numbat can be easily distingished by its long sharp nose and pointed upright ears.

Local residents are requested to record any numbat sightings to Dr Friend, or Mr Connell, of the WA Wildlife Research Centre at Wanneroo either by writing or by phoning (09) 4051555.

Living on a termites diet, WA's mammal emblem the numbat is now considered an endangered species. Local residents have been requested to assist conservation measures, by reporting any sightings to the WA Wildlife Research Centre.



Appendix Bii : Midlands Telegraph 5th July 1984

Appendix C:

Summary of Numbat Sighting Records.

Key to Abbreviations

Source

G.W.C. - G.W. Connell, present study June - October 1984

J.A.F. - Dr J.A. Friend, Numbat research project

FWD - Department Fisheries and Wildlife Numbat files 129/51 Vols 1 and 2

J.T. Turner and Borthwick (1980)

K.W. - Mr K. Wallace

Sighting Validity

*** - Confirmed valid sighting

Nil - Invalid, non-Numbat sighting

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
	SWAN COASTAL PLAIN								
1	CANNING VALE; Cnr Nicholson and Amherst Rds.	Jan 1981	-	stripes, very long tail with fur like quills, grey-brown definite stripes, approx.	running up street	-	J.A.F. Mrs H. BECK 25 Appledore St, Beckingham 6107	J.A.F. searched area, no signs	***
2	FORRESTDALE; Nicholson Rd, 4.6km south of Wanton Rd.	1972	-	Numbat road kill	-	-	J.A.F. Mrs THOMAS 09 277 5960	-	***
3	FORRESTDALE; Nicholson Rd, 5.2km south of Wanton Rd.	1972	-	Numbat road kill	-	-	J.A.F. Mrs THOMAS 09 277 5960	-	***
4	CANNING VALE; Nicholson Rd, 0.5km south of Amherst Rd.	1981	-	road kill	-	-	J.A.F. GREENVALE NURSERY	J.A.F. showed skin	Doubtful
5	JANDAKOT; Forrest Rd, 400m east of Prinsep Rd.	Dec 1982	-	Numbat road kill	-	Banksia woodland on north side of road, horse paddock and houses to south	J.A.F. BOB WILSON 341 3332 HANK YORKER 399 3093	J.A.F. searched area	*** Animal preserved
6	FORRESTDALE; Forrest Rd, 700m east of Nicholson Rd.	Jul 1983	-	Numbat road kill	-	Area burnt extensively prior to sighting	G.W.C. Mr MAWSON	G.W.C. showed skin	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
7	FORRESTDALE; Armadale Rd, 1.3km east of Forrest Rd.	Jul 1983	-	Numbat road kill	-	As #6	G.W.C. Mr MAWSON	As #6	***
8	THOMPSONS LAKE; Reserve	3/10/84	1130	grey-brown, stripes, bushy tail, long nose, size of small cat	running through grass	Banksia woodland close to Yongebup	G.W.C. Mrs HOGG	G.W.C. showed skin	***
9	MEDINA; Sloanes Reserve	Jan 1984	-	striped back, bushy tail, pointy nose	timid, caught in rabbit trap, released	Banksia woodland	G.W.C. Mr E. BOND 095 27 2160	G.W.C. showed skin, searched area	Doubtful
10	CANNING VALE; Nicholson Rd, 1.2km south of Amherst Rd	3/6/84	1715	long nose, striped back hunched over, size of cat, fluffy tail	just sat beside road	Banksia woodland nearby	G.W.C. Ms H. BERECZSKY 361 7560	G.W.C. showed skin, searched area	Doubtful, probably *Isoodon obesulus*
11	CARDUP; Redcliffe St.	Jun 1984	-	dried carcass, long nose, long claws, pointy tail	-	large reserve, Tuart nearby	G.W.C. Mrs PARSONS 095 25 1522	G.W.C. collected carcass	NIL, *Isoodon obesulus*
12	BOLD PARK; Oceanic Drive	May 1984	Night	pointed nose, bushy tail, big cat	-	Bold Park, reserve nearby	G.W.C. Mr G. SENGER	NIL	NIL
13	NEERABUP NATIONAL PARK; Wanneroo Rd, 22 mile peg	31/3/76	2300	accurate description of Numbat	-	near National Park	FWD FILE Mr N. WISE C/o W.O.	NIL	NIL

		LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
		NORTHERN JARRAH FOREST								
✓	14	BROOKTON HWY; 35 mile peg	May 1960	0300	4 Numbats seen	-	-	FWD FILE Mr H.W. NORRIS	NIL	NIL
✓	15	ALBANY HWY; 60 mile peg	Oct 1960	0800	-	sunning on log, ducked under log, ran off	Jarrah forest	FWD DILE Mr E.H. DAY	NIL	***
✓	16	YORK RD; 400m west of Flynn Rd.	7/5/61	early evening	clear view, +ve Numbat	-	Jarrah/Wandoo forest	FWD FILE Mr S.W. BOWLER	NIL	***
✓	17	ALBANY HWY; 38 mile peg	Feb 1963	-	Numbat	-	Jarrah forest	FWD FILE Mr E.H. DAY	NIL	***
✓	18	ALBANY HWY; 57 mile peg	Feb 1963	-	Numbat	-	Jarrah forest	FWD FILE Mr E.H. DAY	NIL	***
✓	19	TALLANALLA; 2 miles east of Mornington Mill	May 1963	-	Numbat	-	Jarrah forest	FWD FILE Mr E. HANDLY	NIL	***
✓	20	TALLANALLA; Mornington Mill	1956	-	Numbat	2 animals	Jarrah forest	As #19	NIL	***
✓	21	NORTH BANNISTER; 300m west	26/3/63	1330	Numbat road kill ♂	-	Jarrah forest	FWD FILE	NIL	***
✓	22	ALBANY HWY; 51 mile peg	31/5/67	1430	Numbat	crossing road, entered hollow log	Jarrah forest	FWD FILE Mr M.J. WILSON	NIL	***
✓	23	ALBANY HWY; 28 mile peg	26/1/70	morning	Numbat	roadside	Jarrah forest	FWD FILE Mr J. GILLIAN	NIL	***
?	24	CHURCHMANS BROOK	Oct 72	-	Numbat	-	-	FWD FILE Mr C.E. BRINDLEY	-	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
25	ALBANY HWY	27/7/72	1430	squirrel like, brown-grey, sharp nose, pricked ears, bands, tail erect	moved with jerky gait	-	FWD FILE Mr F. SYNOTT	-	***
26	ALBANY HWY; 1 mile from Armadale intersection	22/12/74	-	Numbat	-	cleared area with Jarrah on hill tops	FWD FILE Mr P. BIRD	-	***
27	YORK RD; near Mt Observation Litho 2A/40 2B/40	29/7/79	-	Numbat	emerged from log	Wandoo/Marri forest	J.A.F. G. BARRON W.A.M.	G.W.C. searched area	***
28	COBB RD; Flynn Block, Mundaring S.F. AO 7899	24/1/81	0930	Numbat	-	Jarrah/Wandoo forest, loamy flat	J.A.F. Mr SUNNY CAVE 295 1372 F.D.	G.W.C. searched area	***
29	ZAMIA BLOCK; Mundaring S.F. AQ 6653	Aug 1980	-	Numbat	-	Jarrah forest	as #28	G.W.C. searched area	***
30	WOOROLOO; Chidlow Rd, ↑30681	23/2/81	1530	1' long, pointy nose, rusty red, white bars, tail puffed up	came out from bush onto road, went back and returned 2nd time	Jarrah/Banksia woodland	J.A.F. Mrs R. JOLLY	J.A.F. and G.W.C. searched area	***
31	MUNDARING WEIR; Reservoir Rd AW 7258	13/2/81	1500	Numbat	unafraid, stood up when car went by, walked to log	scrappy Jarrah	J.A.F. Mr L. TALBOT	G.W.C. searched area	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
32	DWELLINGUP; F.D. map CK 8863	1979	-	Numbat diggings and scats	-	Jarrah	J.T. survey	-	***
33	DWELLINGUP; F.D. map CP 8344	1979	-	Numbat	-	Jarrah	J.T. survey Mr L. FRASER	-	***
34	GLENEAGLE; F.D. map BP 6993	1976	-	Numbat	-	Jarrah/Pine	J.T. survey	-	***
35	ALBANY HWY; 27 mile peg	1979	-	Numbat	-	Jarrah	J.T. survey	-	***
36	WUNGONG DAM	1970's	-	Numbats	-	Jarrah	J.A.F. Mr H. YORKER	-	***
37	ALBANY HWY; 64km peg	29/11/82	0800	tail straight up and flared juvenile	prancing around crossing road	Jarrah	J.A.F. Mr N. ALLEN 098 83 8005	-	***
38	ALBANY HWY; 45km peg	3/12/82	0740	Numbat	moved off west	Jarrah	As #37	-	***
39	ALBANY HWY; 65km peg	24/10/82	1430	Numbat, tail erect, black nose stripe	crossed road	Jarrah	J.A.F. Mrs TEPSLEY 448 5650	-	***
40	ALBANY HWY; 112km north of Williams	15/11/82	0900	Numbat	-	-	J.A.F. Mr BILL RENZAG 272 7192	J.A.F. interviewed respondent	***
41	ALBANY HWY; 45km peg	10/9/82	1030	Numbat	beside road	Jarrah	J.A.F. Mr K. MASTERS	J.A.F. searched area, found scats diggings	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
42	ALBANY HWY; 45km peg	11/9/82	1100	ginger, white bands, fluffy tail	-	-	as #41	as #41	***
43	ALBANY HWY; 2km north of North Bannister	Jun 1982	-	Numbat	crossed road	-	J.A.F. Mr C. CAMPBELL	J.A.F. searched area	***
44	ALBANY HWY; Gleneagle Picnic Area	25/7/82	1145	Numbat	crossed highway	-	J.A.F. R.E. SMITH 337 6400	-	***
45	ALBANY HWY; 4km south of North Bannister 2km west Hwy	Mar 1981	dusk	Numbat	lives in burrow	Jarrah	J.A.F. Mr P. BRAYLISH 409 9828	-	***
46	ALBANY HWY; 3km south of North Bannister	Mar 1981	-	Numbat	-	-	J.A.F. Mr B. PHILBY	-	***
47	ALBANY HWY; 2.5km south of North Bannister	19-21/3/81	-	Numbat road kill	-	-	J.A.F. Mr P. FULLER	-	***
48	ALBANY HWY; Gleneagle Picnic Area	Jul 1982	-	Numbat	2 animals	-	J.A.F. Mr M. GLASS	-	***
49	SERPENTINE; Day Rd.	Mid 1979	-	Numbat road kill	-	-	J.A.F. Mr B. WYKES W.A.I.T.	-	***
50	ALBANY HWY; 65-70km pegs	Feb 1979	-	Numbat	ran down small valley, unafraid of vehicle	Jarrah area	J.A.F. Mr J. BAINBRIDGE 098 21 2184	interviewed by J.A.F.	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
51	ALBANY HWY; 60km peg	28/1/81	-	Numbat road kill	-	-	J.A.F. MALCOLM GRAHAM	-	*** animal preserved
52	ALBANY HWY; 95km peg	20/11/80	-	Numbat road kill	-	-	J.A.F. Mr K. HOLMWOOD National Parks Authority	-	***
53	ALBANY HWY; 45km peg	early 1983	-	fawny colour, striped back, bushy tail	ran across road	-	G.W.C. Mr MARTIN 098 85 1118	-	***
54	ALBANY HWY; 300m down Beehive Rd west	Jun 1984	1100	standing on hind legs, striped grey brown	ran off into bush scampering fashion, 2 animals	Jarrah and Pine forest	G.W.C. Mr MACPHERSON 451 2644	G.W.C. met respondent and searched area, found diggings and scats	***
55	ALBANY HWY; 80km peg	12-13/11/84	-	Numbat	trying to cross road	Jarrah/Pine forest	J.A.F. D. FERGUSON Dryandra	-	***
56	DWELLINGUP; Coraholly Rd.	25/9/84	midday	Numbat	-	Jarrah forest	G.W.C. Mr J. CORNOCK F.D.	-	***
57	SERPENTINE; Serpentine Rd, Day Rd junction	early 1984	-	Numbat	-	Jarrah forest	G.W.C. Mr A. RICE M.W.A. 390 8222	-	***
58	SERPENTINE; Day Rd.	early 1984	-	Numbat	-	-	as #57	-	***
59	SERPENTINE; 100m to Jarrahdale from #57 intersection	early 1984	-	Numbat	-	-	as #57	-	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
60	YORK RD; Wambyn Reserve	Jan 1983	-	Numbat road kill	-	Wandoo forest	G.W.C. Mr C. ALYMORE	G.W.C. interviewed respondent, searched area	***
61	ALBANY HWY; Serpentine River	Jun 1984	0330	flat like a stoat	-	Wandoo forest	G.W.C.	NIL	NIL
62	WOOROLOO; Bailup Rd.	8/9/81	-	dark coat, stripe on back, larger than possum	on edge of road	-	J.A.F. Mr N. HODGSON	NIL	Doubtful
63	COLLIE; #5 mine - East Muja Power House	mid 1982	late after-noon	erect tail, hair, grey	on side of road	Paperbark swamp	G.W.C. Mr R. DANIEL	G.W.C. searched area, showed skin	***
64	COLLIE; Collie Drive-In	mid Apl 1984	-	road kill	-	-	G.W.C. Mr CONLAN 097 34 3139	G.W.C. unable to contact again	NIL
65	COLLIE; Shotts Rd.	1983-84	1530	Numbat, 5 sightings during 83/84	-	Paperbark and Jarrah dense undergrowth	G.W.C. Mr T. BOOTH 097 34 1409	G.W.C. showed skin and searched area	***
66	COLLIE; Shotts Rd.	late 1983	-	Numbat road kill, young male	-	as #65	as #65	as #65	***
67	COLLIE; Roelands Hill	8/2/81	1700	Numbat	-	Jarrah	J.A.F. Mr B. FIRNS 097 21 1254	G.W.C. showed skins, inter-viewed, searched area	***
68	WILLERDALE	late 1970's	-	Numbat	-	Jarrah	G.W.C. Mr P. KEPPLE 097 29 1745 F.D.	G.W.C. searched area	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
69	BEDFORDALE; Churchmans Brook Rd.	1972	-	Numbat, photo of young	adult female, 3 young	Jarrah	G.W.C. Mrs TOWELL 390 7174	G.W.C. showed skins	***
70	BRUNSWICK RIVER;	1972	-	Numbat, large individual, rusty red	adult male	Jarrah	G.W.C. as #67	as #67	***
71	WAROONA; Drakes Book Reservoir	11-13/10/80	1100-1200	Numbat	refuge under broken tree	Jarrah	J.A.F. Ms D. CHASE 384 6124	J.A.F. searched area	***
72	ALBANY HWY; 63 mile peg	5/10/60	-	Numbat	-	-	FWD FILE K.W.	-	***
73	COLLIE	5/1/66	-	Numbats	-	-	FWD FILE K.W.	-	***
74	ZAMIA BLOCK; Mundaring AQ 68	12/8/84	-	Numbat digging	around base of stump	Jarrah forest on ridge top	G.W.C. J.A.F.	J.A.F. found digging	***
75	GLENEAGLE; 1km north of pine plantation	30/9/84	-	Numbat diggings	diggings in open	top of Jarrah ridge	G.W.C. J.A.F.	J.A.F. found diggings	***
76	JARRAHDALE; Day Rd. nr Plot 22		-	Numbat caught in Elliot trap	-	Jarrah	J.A.F.		***
77	MUNDARING; AQ 72 8 Rushy Rd.	1974	-	Numbat	running through undergrowth	Jarrah/Banksia woodland	G.W.C. Mr A. SELKIRK ex F.D.	G.W.C. searched area with respondent	***
78	MUNDARING; Yetar Rd. AT 807	Mar 1977	1430	Numbat	running across track	open Jarrah woodland	as #77	as #77	***
79	MUNDARING; Kelmscott AW 74 Tableland Rd.	1964	-	Numbat	ran into log, captured, then released	Jarrah, Casurina forest	as #77	as #77	***
114	BODDINGTON	15/6/60	-	Numbat	-	-	FWD FILE K.W.	-	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
	WHEATBELT								
80	KOJONUP	27/7/51	-	Numbat	captured	-	FWD FILE Mr E. SMITH	-	***
81	KOJONUP	18/9/51	-	Numbat	captured	-	as $80	-	***
82	KOJONUP	21/1/52	-	Numbat	captured	-	as #80	-	***
83	PINGELLY; Avon 6439, 5821	Jan 1958	-	Numbat	-	-	FWD FILE	-	***
84	POPANYINNING	Jan 1959	-	Numbat	captured	Wandoo woodland	FWD FILE Mr BUCKINGHAM	-	***
85	MOULYINNING	Sep 1960	-	Numbat	-	-	FWD FILE Mr RISEBOROUGH	-	***
86	WEST PINGELLY	28/10/61	-	Numbat	-	-	FWD FILE Mr F.J. GRAHAM	-	***
87	WANDERING	Oct 1961	-	Numbat	-	-	FWD FILE Mr A.G. LYMON	-	***
88	PINGELLY	1/10/61	-	Numbats	-	-	FWD FILE Mr AINSWORTH	-	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
89	EAST POPANYINNING	15/4/65	-	Numbat road kill	-	-	FWD FILE Mr M. HAYDEN	-	***
90	MT BARKER; Township Boundary	9/10/69	-	Numbat road kill	-	located on edge of town	FWD FILE Mr A.J. MILES	-	***
91	NARROGIN	12/11/69	-	Numbat, young male	captured, burnt in fire	-	FWD FILE Mr C. BONNEY	-	***
92	PINGELLY	Dec 1974	-	Numbat	-	-	FWD FILE Dr P. BIRD	-	***
93	WANDERING	22/4/64	-	Numbats	-	-	FWD FILE K.W.	-	***
94	NARROGIN	9/9/64	-	Numbat	-	-	FWD FILE K.W.	-	***
95	WANDERING	15/6/60	-	Numbat	-	-	FWD FILE K.W.	-	***
96	PINGELLY; 6 miles east	15/6/60	-	Numbat	-	-	FWD FILE K.W.	-	***
97	NARROGIN	1936-37	-	Numbats very common	-	Wandoo woodland	J.A.F. Mr H. HALL	-	***
98	BROOKTON HWY; Bartrams Rd.	Nov 1968	-	Numbat	ran across road into Wandoo reserve	Wandoo	as #97	-	***
99	CORRIGIN; 0517 6371 1:25000	1970	-	Numbats	3 animals seen	-	J.T. survey Mr A. TAYLOR	-	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
100	YORNANING	2/12/81	-	Numbat, killed by cat	-	adjacent to Yornaning reserve	J.A.F. Mr K. WYATT Cuballing 83 6054	-	***
101	PUMPHRIES BRIDGE; 500m from first corner	30/11/81	1630	Numbat road kill	-	-	J.A.F. Mr P. WOOD	-	*** animal preserved
102	WOODANILLING	1965	-	Numbat	-	-	J.A.F. Mr C. HALDER	-	***
103	YORNANING RESERVE	1965	-	Numbats very common	-	Wandoo	G.W.C. Mr H. PINCHIN 090 71 1767	G.W.C. searched area, found scat	***
104	BROOKTON HWY; Reserve ↑19740	Dec 1982	1000	Numbat 2 sightings 14 days apart	-	Wandoo woodland	J.A.F. C/o K.W. Mr J. BARTRAM 096 92 4034	G.W.C. searched area	***
104	BROOKTON HWY; Reserve ↑36742	1978	-	Numbat road kill	-	as #104	as #104	as #104	***
105	BROOKTON HWY; Reserve ↑19740	1976	1700	Numbat	-	Wandoo woodland	as #104	as #104	***
106	NARROGIN; Foxes Lair National Park	3/3/84	2200	Numbat, bushy tail, stripes, pointy nose	ran across road in dark	Wandoo, woodland very disturbed	G.W.C. Mr J. PARRY 098 81 1394	G.W.C. searched area	NIL
108	KULIN	22/7/64	-	Numbat	-	-	FWD FILE K.W.	-	***
109	YEALERING	15/6/60	-	Numbat	-	-	as #109	-	***
109a	BROOKTON HWY; Reserve 36742	1981	Midday	Numbat	ran across road	as #105	as #105	as #105	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
128	BRUNSWICK RIVER	15/6/60	-	Numbat	often seen, running among rocks	Jarrah	G.W.C. Mr B. FIRNS	G.W.C. searched area	***
129	BOYAGIN ROCKS RESERVE	7/8/84	-	Numbat diggings	-	Wandoo woodland	G.W.C. W.O.L. SILVESTER	G.W.C. searched area	Doubtful Quail scratchings
130	PINGELLY RESERVE 5km south	May 1984	midday	Numbat	running along into large log	open Wandoo	G.W.C. Mr G. CURTIS	G.W.C. searched area	***
131	YORNANING	1979	-	Numbat	on Hwy edge	Wandoo woodland	G.W.C. Mr G. CURTIS	G.W.C. searched area, found scat	***
132	TUTANNING NATURE RESERVE	early 1983	-	Numbat	on edge of reserve	open Wandoo	G.W.C Mr B. HERNAMAN	G.W.C. searched area	***
132a	SHIPLEY'S FARM Locality 17819	1980	-	Numbat	just north of	Salmon gum and	J.A.F. Mr C. SHIPLEY	J.A.F. searched area	***
133	TUTANNING; 2km west Hernaman's property	Jun 1984	-	Numbat pair	ran out of burning log	open Wandoo	as #132	as #132 found scat	***

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
	EASTERN WHEATBELT								
110	HYDEN; halfway to Norseman	5/4/61	-	Numbat	-	Mallee area	FWD FILE K.W.	-	***
111	PINGARING; White property	Aug 1983	-	Numbat, rusty colour, bushy tail large, rabbit size bands	ran away across paddock	Salmon gum, open ground, since been cleared	G.W.C. Mrs K. WHITE 098 66 8016	G.W.C. showed skin, searched area. No recent signs	Doubtful
112	PINGARING 5km west	1973	-	Numbat	moving over outcrop	Salmon gum area, large block	as #111	as #111 No recent signs	***
113	DRAGON ROCKS	1974	-	Numbat	-	-	as #111	as #111	Doubtful
115	RAVENSTHORPE; Elverton copper mine	1972	-	Numbat	-	-	J.T. survey	-	***
116	RAVENSTHORPE; Esperance Rd.	1979	-	Numbat	crossing road	-	J.T. survey	-	***
117	LAKE KING; Holt Rock South Rd.	1984	-	suspected numbat diggings	-	Salmon gum woodland	G.W.C. Mr G. FRUSHER 098 74 7011	G.W.C. searched area	NIL - Echidna diggings

	LOCALITY	DATE	TIME	ANIMAL DESCRIPTION	BEHAVIOUR	HABITAT DESCRIPTION	SOURCE	ACTION TAKEN	SIGHTING VALIDITY
	OTHER AREAS								
118	NANNUP; 10 miles from Nannup to Busselton	1973	-	Numbats, 2 found dead on railway track	rusty, striped bushy tail	Jarrah/Marri forest	G.W.C. Mrs RAJAINIS	G.W.C. spoke to respondent	***
119	DENMARK; Mt Barker Rd, near Denbarker turnoff	4/9/74	1630-1700	light brown, bushy tail, stripes on snout and back, smaller than cat	ran down road, hindquarters bumping up and down	-	G.W.C. Mrs KLEEMAN	-	Doubtful
120	BRIDGETOWN;	1981	-	-	ran down hill, breeding in burrows	-	G.W.C. Mrs DIXON 272 2022	G.W.C. showed skins, searched area	NIL - *Trichosurus vulpecula*
121	NORTHCLIFFE; Besara Rd.	Jan 1984	2300	stripes, fuzzy tail	ran backward	-	G.W.C. Mr G. SEPKUS 097 76 7128	-	NIL
122	WONGAN HILLS; Reserve ↑ 25808	Spring 1982	2200	pointed snout, striped tail up in air	-	-	G.W.C. Mr D. HOLMES 096 71 1135	-	NIL
123	MARGARET RIVER	20/11/83	2300	pointed nose, stripes	-	thick bush	G.W.C. M. LESLIE 57 2201	-	NIL
124	CAPEL RIVER	Nov 1981	morning	size of small fox	may be mating	by river	J.A.F. D. GLEESON	G.W.C. searched area	NIL
125	BADGINGARRA	May 1977	-	Numbats, 3 sightings	-	Wandoo, Red gum, Sheoak, like Tutanning	J.A.F. Mr H.A. HALEY	-	Doubtful
126	MORAWA; Canna Dam Reserve	Apl 1963	-	Numbats	-	-	FWD FILE Mr S.L. VINCE	-	***
127	YOUANMI	Aug 1984	1000-1100	golden brown, fawn, large tail, big ears, striped back, pointed head	sat on hind-quarters. Adult and 2 juveniles	open Mallee	G.W.C. Mr FAY 367 3121	G.W.C. searched area	Doubtful

Appendix D:

Summary of Field Survey Results

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
	SWAN COASTAL PLAIN					
1	CANNING VALE; north of Hope Rd.	24/5/1984	1230 - 1645 4.25 hrs	Extremely abundant rabbit population, abundant foxes/dogs, sparse macropods, very soft sand, few termites, open vegetation, no hollow logs.	2 fox scats	No Numbat signs. Poor habitat.
2	WATTLEUP; Mt Brown	27/6/1984	0900 - 1000 1 hr	Saw Bandicoot diggings, fox tracks, very open, sandy.	-	No Numbat signs. Poor habitat.
3	SLOANES RESERVE	27/6/1984	1030 - 1230 2 hrs	Abundant rabbits, smelt fox, few termites, sandy.	-	No Numbat signs. Poor habitat
4	SLOANES RESERVE	2/7/1984	0910 - 1345 4.5 hrs	Bandicoot diggings, very few macropod scats, very open, no logs.	2 hair samples (rabbit)	No Numbat signs. Poor habitat.
5	SLOANES RESERVE	4/7/1984	0940 - 1315 3.5 hrs	as #4	-	as #4
6	NICHOLSON RD; 1.0km south of Amherst Rd.	4/7/1984	1330 - 1500 1.5 hrs	Bandicoots common, abundant rabbit signs, possible 2 Numbat burrows, log disturbed for termites.	-	* Possible Numbat signs. Habitat poor but feasible.

	LOCALITY	DATE	SUEVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
7	LOWLANDS	9/7/1984	0940 - 1500 5.2 hrs	Abundant Grey Kangaroos, rabbits, few termites, dense leaf litter, few logs, Bandicoot diggings.	-	No Numbat signs.
17	CANNING VALE; North of Hope Rd.	25/7/1984	0930 - 1200 2.5 hrs	Banksia woodland, few Jarrah, Bandicoot diggings, Brush Wallaby scats, very sandy, no logs, very few termites, fox tracks.	1 fox scat.	No Numbat signs. Very poor habitat.
	OTHER AREAS					
48	BRIDGETOWN	26/7/1984	1545 - 1645 1 hr	Open paddock, rabbit burrows, possum scats.	Possum scats.	No Numbat signs. *Trichosurus vulpecula*
49	YOUANMI Mt Barker Rd, Sandstone Rd junction	13/10/1984	0800 - 1215 4.25 hrs	Abundant rabbits, very open Mallee, few termites, heavily grazed, little soil cover	-	No Numbat signs. Very poor habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
	NORTHERN JARRAH FOREST					
8	WAMBYN RESERVE; York Rd.	10/7/1984	0949 - 1515 5.5 hrs	Abundant Echidna diggings, scats. Possible 2 Numbat diggings. Bandicoot digging. Wandoo woodland.	2 hair samples	* Possible Numbat signs. Good habitat.
9	MT OBSERVATION; York Rd.	11/7/1984	1036 - 1300 2.5 hrs	Possible Numbat burrow under log, Wandoo/Powder bark woodland, Echidnas.	1 hair sample	* Possible Numbat signs. Good habitat.
10	PONY RD; Sandstone Rd junction	11/7/1984	1345 - 1530 1.75 hrs	Echidnas, few rabbits. Wandoo/Jarrah woodland.	1 hair sample, rabbit	No Numbat signs. Good habitat.
11	COBB RD; Mundaring	12/4/1984	0933 - 1051 1.5 hrs	Possum scat, Echidnas. Jarrah/Wandoo, thick leaf litter.	2 hair samples, rabbit	No Numbat signs. Good habitat.
12	COBB RD; 2km past Wariin Rd.	12/7/1984	1111 - 1222 1 hr	Quail scratchings, possible Numbat digging, cow scat, Echidna.	a hair sample	* Possible Numbat signs. Good habitat.
13	CHIDLOW; Reserve ↑ 30681	12/7/1984	1329 - 1419 1 hr	Rabbits abundant, possum scats. Jarrah over Hakea. Few logs.	2 fox scats	No Numbat signs. Poor habitat.
14	ZAMIA BLOCK; Southall track	12/7/1984	1500 - 1652 2 hrs	Brush Wallaby, Echidna. Jarrah slope, no logs, recently burnt.	-	No Numbat signs. Fair habitat.
15	BEEFARM RD; Albany Hwy.	16/7/1984	1000 - 1135 1.5 hrs	Numbat diggings, Emu scat, Numbat scats. Jarrah forest.	3 Numbat scats	***Numbat presence. Good habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS		SUMMARY
16	COLLIE; Shotts Rd.	18/7/1984	1000 - 1430 4.5 hrs	Echidna diggings, few good logs, Jarrah. Brush Wallaby scats.	Native cat scat, *Dasyurus geoffroi*		No Numbat signs. Fair habitat.
17	MUNDARING; AQ 728, AT 807, AW 74	24/7/1984	0900 - 1600 7 hrs	Quarantine Jarrah forest. Open understorey. Abundant termites.	-		No Numbat signs. Fair to good habitat.
18	COLLIE; Collie SF ET76	27/7/1984	1030 - 1433 4 hrs	Echidna diggings, Brush Wallaby scats, possum scats. Jarrah/paper-bark forest. Large patch Numbat diggings.	-	***	Numbats present. Fair habitat.
30	MT OBSERVATION; Picnic Site TALBOT : AN901	13/8/1984	1035 - 1255 2.25 hrs	Echidna, Emu scats, Wandoo similar to Dryandra, Bobtail, few large logs. Jarrah Wandoo mix forest.	-		No Numbat signs. Good habitat.
31	MT OBSERVATION; 4km west TALBOT : AN88 Wundabiniring Rd.	13/8/1984	1335 - 1545 2 hrs	as #30 3 individual Numbat diggings	-	*	Possible Numbat signs. Good habitat.
34	CROSSMAN RESERVE; ↑32448 F.D. DG92 Lucy Rd.	16/8/1984	1053 - 1420 3.5 hrs	Mixed Jarrah/Marri heavily logged. Abundant termites, some logs.	dead *Sminthopsis*		No Numbat signs. Fair habitat.
35	ROELANDS HILL; BUNBURY : EA64	19/9/1984	1039 - 1245 2 hrs	Open dry Jarrah, Bobtail, Echidna, and abundant termites.	Numbat hairs, tail	***	Numbats present. Good habitat.
36	OLD COLLIE RD; TALLANALLA : EA64	19/9/1984	1328 - 1440 1.2 hrs	Termites as #35 Similar to Perup.	-		No Numbat signs. Good habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
37	MYLES AVE; TALLANALLA : DW 66	19/9/1984	1515 - 1632 1.2 hrs	as #36	Tree creeper feathers, fox scat.	No Numbat signs. Good habitat.
38	DWELLINGUP; - RANGER RD : CJ68 - NORTH EAST RD : CL71 - WINDSOR ROAD : CJ74 - DUNCAN ROAD : CR731	24/9/1984	0815 - 1651 8.5 hrs	Open Jarrah forest all sites, Banksia/Casurina Understorey. Abundant logs, few hollow. Numbat like burrow at CJ74. Deep litter, few termites.	Fox scat. 2 hair samples.	* Possible Numbat signs. Good habitat.
39	MURRAY; GEORGE RD : DC74	26/9/84	0840 - 1041 2 hrs	Feral pig activity, fox tracks, Echidna digging, thick Jarrah forest, Zamia palms, few logs.	-	No Numbat signs Fair habitat.
40	MURRAY; GEORGE RD : DG80.1	26/9/1984	1103 - 1159 1 hr	Numerous feral pig diggings, Emu scat, few hollow logs, Jarrah/ Casurina forest.	-	No Numbat signs. Fair habitat.
41	MURRAY; GEORGE RD : DJ79	26/9/1984	15 min	Found log beside road, highly suspicious Numbat burrow under log habitat as #40.	-	* Possible Numbat signs. Fair habitat.
42	MURRAY; MURRAY RD : DF72 KING JARRAH FORM RD : DO66	26/9/1984	1240 - 1631 4 hrs	Feral pig diggings in Casurina, Jarrah dense understorey. Very thick leaf litter. Possum scats. Very few logs.	-	No Numbat signs. Fair habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
43	MURRAY; NYNGAN RD : DA612	27/9/1984	0830 - 1005 1.5 hrs	Jarrah forest heavily logged. Echidna diggings widespread. Thick Banksia understorey.	1 hair sample, rabbit	No Numbat signs. Fair habitat.
44	MURRAY; LOGUE BROOK RD : DL672	27/9/1984	1025 - 1155 1.5 hrs	Flooded gum/Jarrah forest. Very dense understorey, ferns, thick litter.	*Antechinus* scat.	No Numbat signs. Poor habitat.
45	TALLANALLA; KENT RD : DQ641	27/9/1984	1228 - 1409 1.75 hrs	Jarrah dense gastrolobum understorey, few logs, heavily logged, Echidna diggings, few termites.	-	No Numbat digns. Fair habitat
46	TALLANALLA; BELL BROOK RD : DR78	28/9/1984	1028 - 1255 2.5 hrs	Jarrah Wandoo mix forest, Emu sighted, abundant feral pig activity.	-	No Numbat signs. Good habitat.
47	TALLANALLA; NALYERIN LAKE RD : DZ802	28/9/1984	1315 - 1446 1.5 hrs	as #46	1 hair sample	No Numbat signs. Good habitat.
	ASQUITH RD : EE73		1458 - 1530 1 hr	Dense undergrowth as #46	-	No Numbat signs. Fair habitat.
	CHALK RD : DY72		1550 - 1705 1 hr	Jarrah/Banksia forest. Some logs suitable, abundant termites, possum scat.	-	No Numbat signs. Good habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
	EASTERN WHEATBELT					
19	PINGARING; White property	30/7/1984	0900 - 1130 2.5 hrs	Open Mallee, heavy sheep grazing, abundant termites and Echidna diggings, few logs.	-	No Numbat signs. Fair habitat.
20	PINGARING 5km north.	30/7/1984	1310 - 1630 3.5 hrs	Widespread Echidna, abundant termites, open Mallee, no logs.	-	No Numbat signs. Fair habitat.
21	NORTH BURNGUP WATER RESERVE ↑18962	1/8/1984	0844 - 1040 2 hrs	Echidna diggings, tall Salmon gum forest, abundant logs, termites.	-	No Numbat signs. Good habitat.
21	DRAGON ROCKS RESERVE	1/8/1984	1227 - 1500 4.5 hrs	Small area Salmon gums, logs, termites, Echidnas, much open Mallee, heath.	Fox skeleton.	No Numbat signs. Fair habitat.
22	CUNNAMORE; Holt Rock Rd.	2/8/1984	1100 - 1515 4.25 hrs	Tall Salmon gum and Gimlet, termites and Echidnas, logs abundant.	-	No Numbat signs. Good habitat.
	WHEATBELT					
23	BOYAGIN ROCKS RESERVE	7/8/1984	1120 - 1430 4 hrs	*Antechinus* scats, Echidna, termites, abundant logs, Wandoo/Powderbark forest. Quail scratchings. Possum scats.	*Antechinus* scat. 3 hair samples.	No Numbat signs. Very poor habitat.
24	PINGELLY RESERVE; 5km south	8/8/1984	1010 - 1210 2 hrs	Open Wandoo block, gravel pit, possum scats, abundant rabbits, few Echidna diggings.	-	No Numbat signs. Fair habitat.

	LOCALITY	DATE	SURVEY PERIOD	OBSERVATIONS	COLLECTIONS	SUMMARY
25	YORNANING RESERVE	8/8/1984	1240 - 1530 3 hrs	Powderbark, Brush Wallaby scats, Wandoo, like Dryandra, Numbat scat beside log.	Numbat scat.	***Numbats present. Good habitat.
26	TUTANNING NATURE RESERVE; Gnow Rd.	9/8/1984	0845 - 1025 2 hrs	Casurina, 30 individual Numbat diggings on track. Wandoo nearby.	-	***Numbats present. Good habitat.
27	TUTANNING; 2km west Hernamans property	9/8/1984	1100 - 1245 1.75 hrs	Rock outcrop, open, abundant Numbat diggings around tree bases. Casurina/Wandoo.	1 Numbat scat (old). 1 fox scat.	***Numbats present. Fair habitat.
28	TUTANNING NATURE RESERVE; Mallet Rd.	9/8/1984	1435 - 1723 3 hrs	Possum scat, very abundant, Echidna diggings, 18 Numbat diggings. Fox den.	1 fox scat. Bone material from fox den.	***Numbats present. Good habitat.
29	BOYAGIN NATURE RESERVE	10/8/1984	1015 - 1136 1.2 hrs	Wandoo flat, abundant Echidna, Brush Wallaby, Grey Kangaroo.	1 *Antechinus* scat.	No Numbat signs. Good habitat.
32	BARTRAM RD RESERVE; ↑19740	14/8/1984	1040 - 1636 6 hrs	Bandicoot diggings, rabbits abundant on reserve fringes, Bobtail. Numbat digging, scat. Quail scratchings.	Lizard jawbone. Numbat hair. *Antechinus* scat. 2 Numbat scats.	***Numbats present. Fair habitat.
33	BROOKTON HWY RESERVE; ↑36742	15/8/1984	1125 - 1531	Emu scat, Powderbark ridges, some Wandoo, few hollow logs, mostly used up. 5 Numbat diggings in west portion of block.	*Antechinus* scat. 3 hair samples.	*Possible Numbat signs. Good habitat.