NATURE CONSERVATION :

THE ROLE OF REMNANTS OF NATIVE VEGETATION

POST CONFERENCE TOUR 28 & 29TH SEPTEMBER

ITINERARY FOR POST CONFERENCE TOUR 28, 29 SEPTEMBER

Friday 27th

1800 Depart Busselton for Collie.

2000 Arrive Collie. Dinner.

Saturday 28th

0830 Depart Collie for Wagin via Darkan. (233 km).

1000 Wagin Nature Reserve 1 km north of town. Guide - Ken Wallace, Regional Manager for the Wheatbelt. This reserve is a good example of conflicting land uses - rifle range gravel extraction, rubbish dumping and a rare plant Eucalyptus macrocarpa.

1100 Depart Wagin for Dryandra via Highbury and Narrogin (47 km).

1200 Dryandra State Forest. Guide - Tony Friend - Research Officer, Woodvale Research Centre; Numbat Research. Wandoo woodland, managing a dissected reserve.

Lunch, packed by Geographe Motel.

1430 Depart Dryandra for Tutanning via Pingelly (65 km).

1530 Tutanning Nature Reserve. Guides - Ken Atkins, Reserve Management Officer, Pingelly; Reserve Management. Angas Hopkins - Systematic grid sampling, species diversity in the wandoo/casuarina woodlands and heath and regeneration of farmland.

1800 Depart Tutanning for Pingelly. Accommodation at Roadhouse (20) and Pingelly Hotel (12).

1900 Dinner at the hotel. Roast with choice of entree and sweets. Address by Ken Wallace or Ken Atkins.

Sunday 29th

0800 Depart Pingelly for Nangeen Hill via Alderside, Dangin, Quairading, Yoting and Pantapin (160 km).

1030 Nangeen Hill Nature Reserve. Guide - Jack Kinnear, Research Officer, Woodvale; Rock Wallabies.

1130 Depart Nangeen for Charles Gardner National Park (15 km).

1200 Charles Gardner Guide - Angas Hopkins. One of the last remaining examples of the rich sandplain heath.

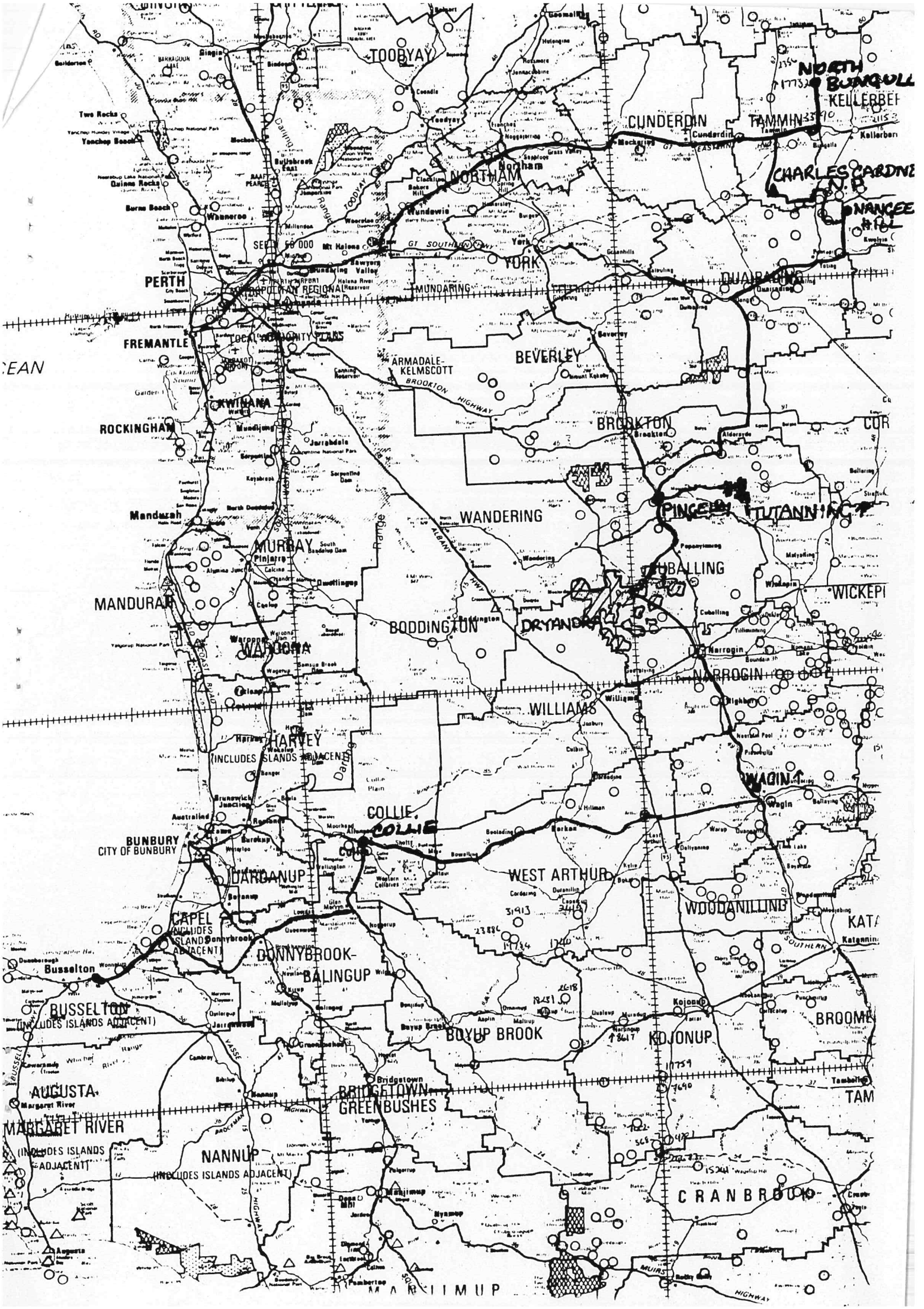
1230 Lunch - sandwiches, fruit and juice prepared by the Pingelly Hotel.

1400 Depart Charles Gardner for North Bungalla Reserve via Tammin (35 km).

1430 North Bungalla Flora and Fauna Reserve. Guide - Barbara York - main zoologist studying spiders.

1530 Depart Bungalla Reserve for Perth via Northam 240 km. The Northam agricultural area is one of the longest settled. Management plan being prepared for several reserves

1830 ETA Perth.


TOODYAY
NORTHAM
YORK
CUNDERDIN
TAMMIN
KELLERBERRIN
PERTH
METROPOLITAN REGIONAL
MUNDARING
FREMANTLE
LOCAL AUTHORITY PLANS
ARMADALE-KELMSCOTT
BEVERLEY
BROOKTON HIGHWAY
KWINANA
ROCKINGHAM
BROOKTON
DUAL CARRIAGEWAY
Mandurah
MURRAY
WANDERING
PINGELLY
TUTANNING
CUBALLING
WICKEPIN
MANDURAH
BODDINGTON
DRYANDRA
WARDONA
NARROGIN
WILLIAMS
HARVEY
(INCLUDES ISLANDS ADJACENT)
WAGIN
COLLIE
BUNBURY
CITY OF BUNBURY
DARDANUP
WEST ARTHUR
WOODANILLING
CAPEL
(INCLUDES ISLANDS ADJACENT)
DONNYBROOK-
BALINGUP
Busselton
BUSSELTON
(INCLUDES ISLANDS ADJACENT)
BOYUP BROOK
KOJONUP
AUGUSTA
Margaret River
BRIDGETOWN
GREENBUSHES
MARGARET RIVER
(INCLUDES ISLANDS ADJACENT)
NANNUP
(INCLUDES ISLANDS ADJACENT)
CRANBROOK
MANJIMUP

RESERVE NO. 30443

Reserve No. 30443 was set aside for the purpose of "Conservation of Flora and Fauna", and vested in the Western Australian Wildlife Authority (now the National Parks and Nature Conservation Authority) in 1974.

The Reserve is some 90ha in area and is divided (Figure 1) by a Rifle Range Reserve (Reserve No. 10486) and Gravel Reserve (Reserve No. 32817).

Reserve No. 30443 contains a representative sample of upland flora, and the small populations of Eucalyptus macrocarpa and E. decipiens are of biogeographic interest.

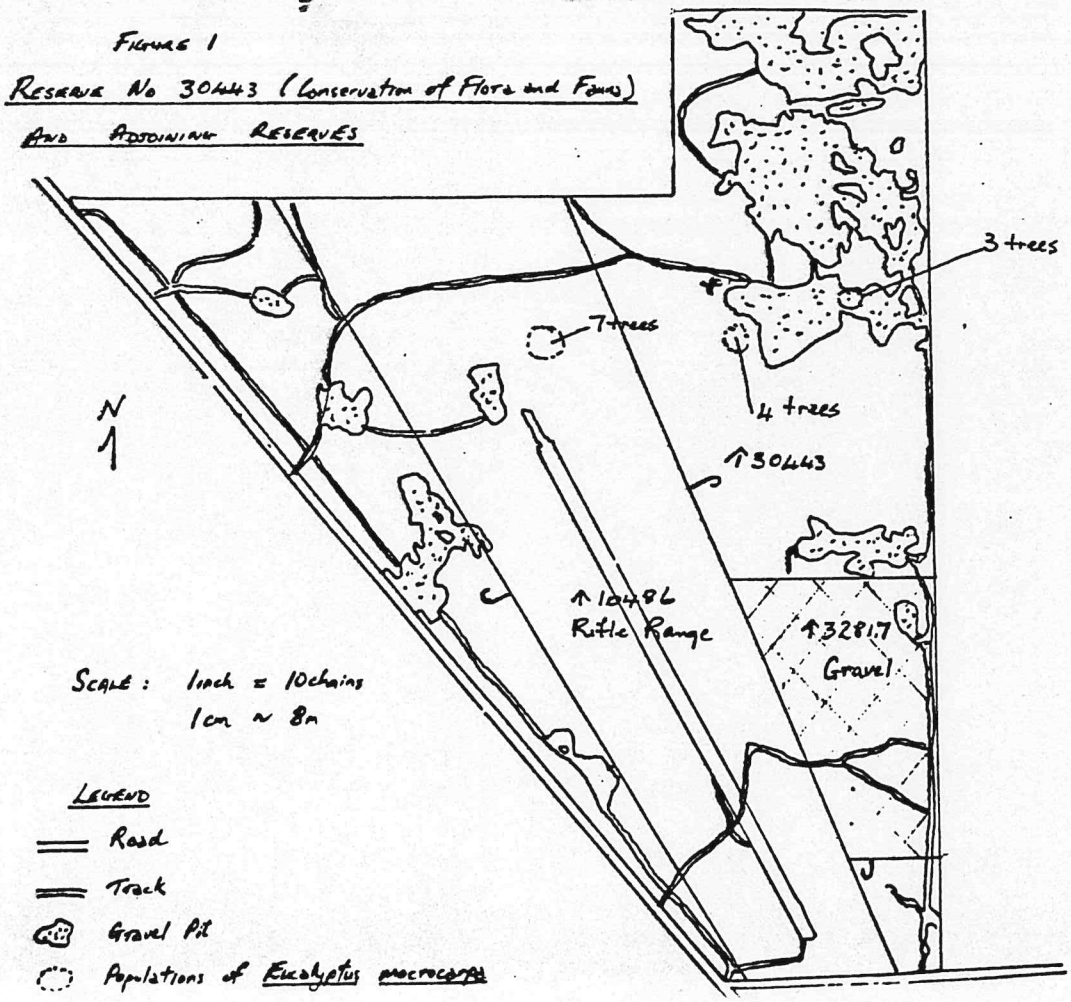
The distribution of E. macrocarpa is shown in Figure 2. Once relatively common, land clearing for agriculture has reduced the species to small, scattered populations. Of the 191 known populations, less than 7% occur on Nature Reserves or National Parks. Most populations are on road verges or private land. Those of Reserve No. 30443 are the most south-western, and the next nearest population occurs on private land.

The distribution of E. decipiens is less well recorded, however the population on Reserve No. 30443 appears to be at or near the northern limit of the inland distribution of the species.

The conservation values of Reserve No. 30443 have been severely damaged by gravel mining. However this activity has now ceased following liaison work by a District Wildlife Officer. Rubbish dumping, which frequently follows gravel mining, has further degraded the Reserve.

Future management will include -

(i) rehabilitation of mined areas;
(ii) closure and rehabilitation of access tracks;
(iii) increased level of policing; and
(iv) media releases concurrent with the above management.



DRYANDRA FOREST

Background

Much of the 28 000 ha of Dryandra Forest was set aside as State Forest in 1926 for the establishment of brown mallet (Eucalyptus astringens) plantations. This species occurs naturally in small stands below low laterite cliffs in the area, and was valued as a source of tannin. By 1962, 8 000 ha of plantation had been established at Dryandra and this is still maintained today.

By the time the natural tannin market collapsed in the early 1960s, a small industry manufacturing tool handles from mallet timber had been set up, so the area was retained as State Forest, although its value for nature conservation was acknowledged. Land tenure at Dryandra was rationalised at this time, and several small adjacent nature reserves and a large water reserve (supplying water for steam engines on the local railway) were incorporated into the State Forest.

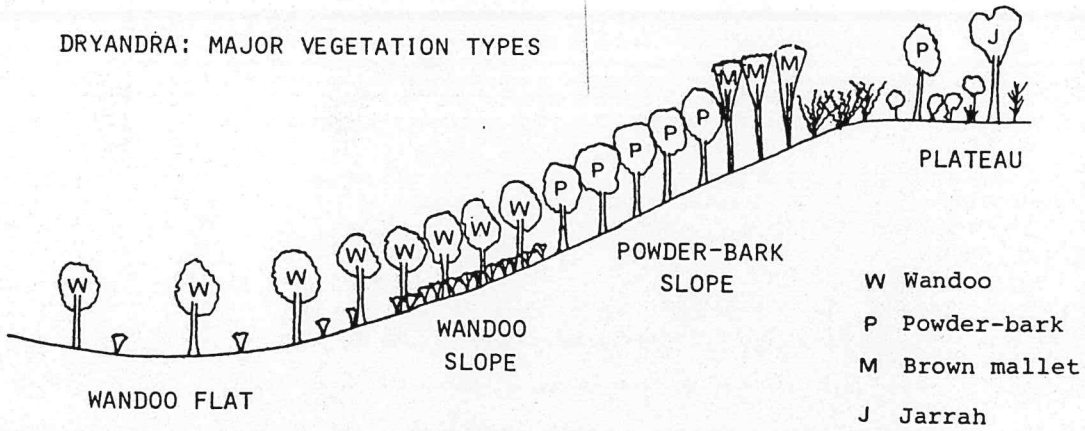
Apart from the water reserve, most valleys around and within the Dryandra area were excluded from the Forest and have been cleared for agriculture. As a result, the Forest consists of a large amount of upland (which was most suitable for mallet) and its shape is extremely dissected (see map).

Conservation value

The main conservation value of Dryandra Forest is due to its size and position. It is the largest reserve in an area which was rich in mammal species until clearing for agriculture removed most native vegetation. Although some species have undoubtedly been lost (Crescent Nail-tailed Wallaby, Western Barred Bandicoot, Burrowing Bettong,

Rabbit-eared Bandicoot) the fauna of Dryandra includes the Numbat, Brush-tailed Bettong, Red-tailed Phascogale and Western Quoll (all listed as rare and endangered) as well as the Common Ringtail Possum (rare in W.A.). Other interesting/rare species present include the Mallee-fowl, Crested Shrike-tit and Carpet Python. The avifauna comprises well over 100 species. The Forest has not been surveyed for rare plants, but it is likely that a number will be found there.

A diagrammatic representation of the forest types and their place in the landscape is shown below:



The lower slope and valley floor vegetation types (dominated by E. wandoo) are poorly represented in wheatbelt reserves. These areas comprise the favoured habitat of the Numbat.

Management problems

Dissected shape, high edge : area ratio

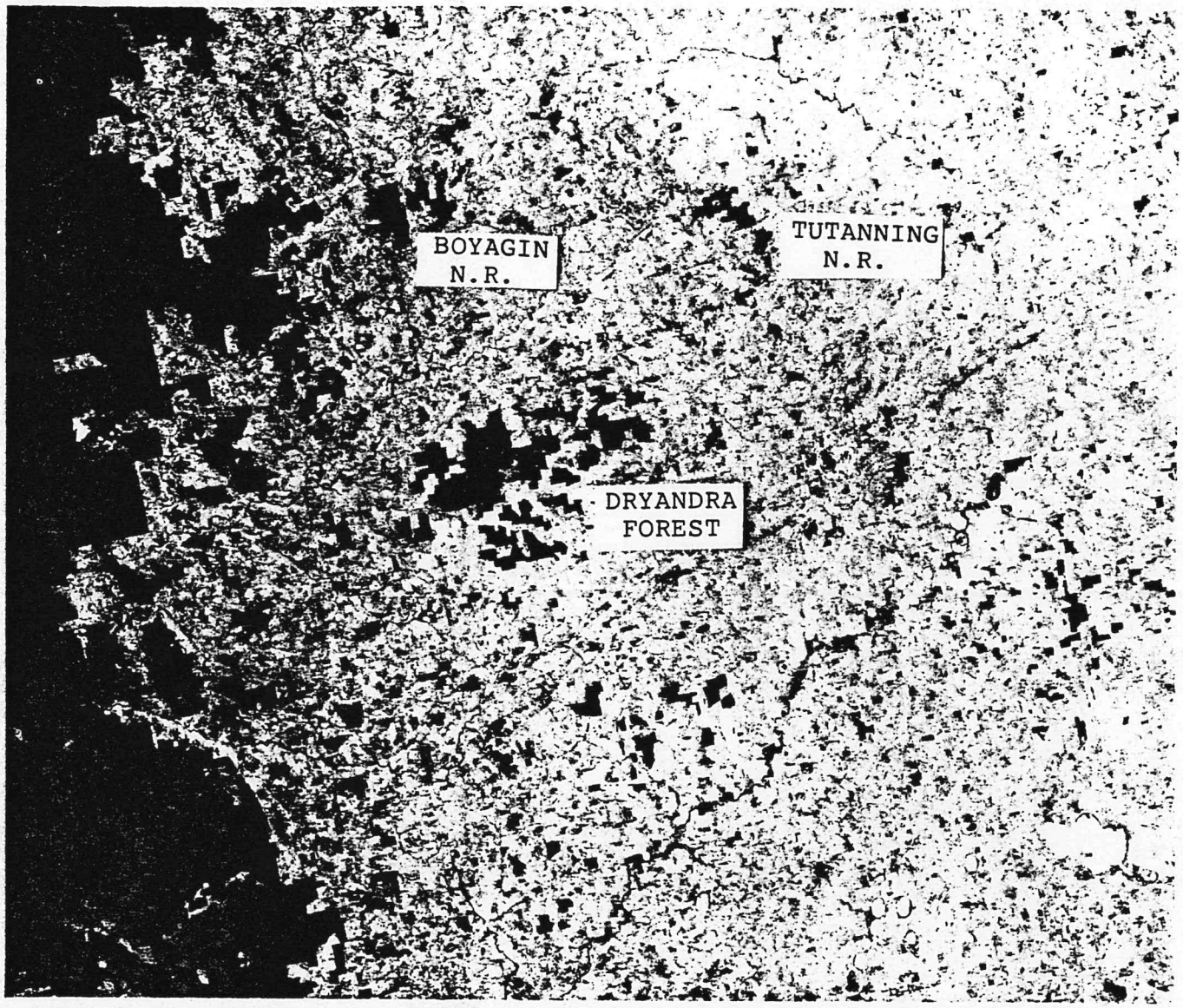
- weed invasion
- fire incursion
- edge maintenance

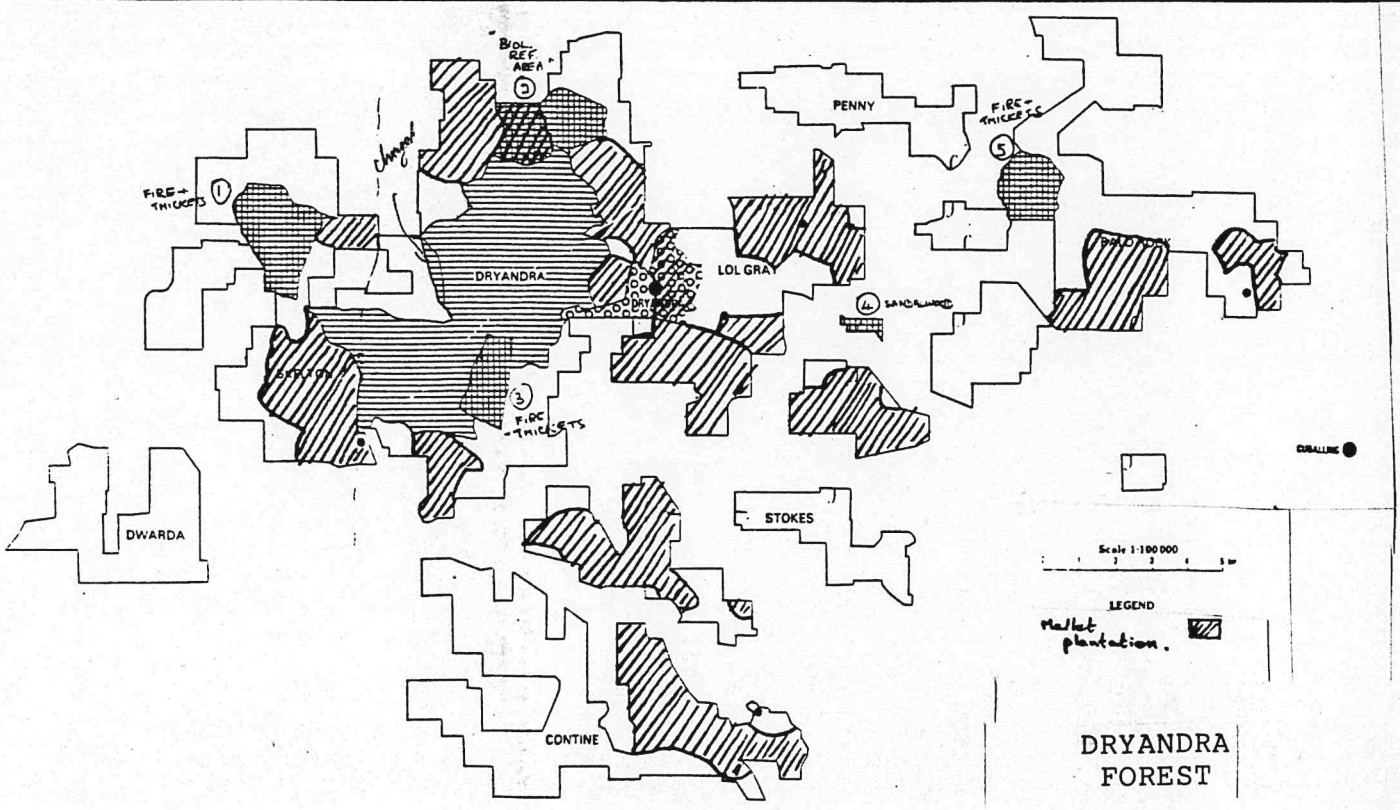
Fragmented nature

- discrete gene pools

Mallet plantations

- valuable for wildlife?
- rehabilitation methods





DRYANDRA
FOREST

TUTANNING NATURE RESERVE, WESTERN AUSTRALIA

Notes for post-workshop tour (28, 29 September 1985) prepared by AJM Hopkins, JM Brown and P Farrington.

The Regional Setting

The wheatbelt is the cereal producing area of the Southwest of the State and occupies an area of about 14 m ha within the 280 mm 580 mm annual rainfall zone. The biota is important for several reasons. The flora is rich in species (perhaps 2 000 vascular plants in total) of which a large proportion are endemics. It is probable that these two features reflect evolutionary history of the region where the dissection of the highly weathered, subdued, nutrient-poor, landscape has created a mosaic of soil types and microhabitats, patchy disturbances such as fire and drought have caused local extinctions and major wet-dry climatic cycles over the past 2.5 m year have promoted fragmentation of a poorly dispersed flora.

The fauna of the wheatbelt area was once extremely rich but has been reduced greatly since European settlement. For example, of the 44 mammal species originally recorded for the region, 4 are probably extinct, a further 11 are no longer found there (mainly confined to offshore islands) and the survival of an additional 10 species is in doubt.

The central wheatbelt that includes Tutanning was intensively settled over 100 years ago, at which time little priority was given to setting aside land for non-agricultural purposes. As a result nature reserves occupy only about 1.5% of the land area. The reserves are typically small (medium size 125 ha) and often poorly shaped and not representative of the variety of landforms. It is clear that the effective management of the existing reserves

is crucial to the persistence of the biota. The reserves are inadequate and under constant pressure because of the intensive nature of the adjacent land-use. Fire control and kangaroo management are major concerns; others include weed invasion, salinization, mining and general maintenance of the biological systems.

The Reserve

Tutanning Nature Reserve has an area of 2078 ha of which some 315 ha is in a block to the southeast separated from the main body of the reserve by 700 m of cleared farmland. The reserve was gazetted in 1960 over an area that had previously (1929) been set aside for timber. Over the past 25 years, extra land has been consolidated into the reserve; this has come about by inclusion of other timber reserves, road reserves and through the purchase of intervening blocks of farmland.

The reserve has a mediterranean-type climate which is mapped as Kopen Csa a or Thermomediterranean attenuated. Annual rainfall is about 420 mm while free pan evaporation is 1500 mm. Mean summer temperature is 22°C; that for winter is 10°C.

In the setting of the relatively subdued topography of south western Australia, Tutanning Nature Reserve encompasses an extremely diverse cross section of the landscape. The reserve includes the Dutarning Range and nearby lateritic plateau remnants to 440 m in elevation and a variety of lower numbers of the landform sequence to an evaluation of 340 m. At the top of the landform sequence is the Norrine landform unit which consists of a complex of lateritic residuals and associated sediments with pools of sand, gravelly sand duplex yellow soils and duricrust (fused laterite). In the middle of the sequence is the Noombling landform, a unit stripped of lateritic materials to produce gentle slopes with sandy loams, yellow duplex soils and

exposures of doleritic or granitic country rock. The slopes of the Noombling Unit run into a valley floor unit (Buberkine landform) which, in Tutanning, is composed mainly of coarse textured soils (Figures 1 and 2).

Tutanning Nature Reserve lies in the Avon District of the South West Botanical Province in an area with predominantly Eucalyptus and Banksia woodland vegetation. The vegetation map (Figure 3), however, illustrates the mosaic pattern of units on the reserve. There is some relationships between soils and vegetation. The lateritic soils together with the pockets of overlying sands support low woodlands (Eucalyptus accedens) and mallee (E. drummondii and E. pachyloma) together with shrublands dominated by Dryandra armata, D. nobilis, D. ferruginea, D. senecifolia (on laterite) and Leptospermum erubescens, Eremaea pauciflora Banksia sphaerocarpa, Conospermum stochadis, Davesia spp. and Hakea spp. (on sand). Pediment slopes below the lateritic breakaways support woodlands (E. astringens and E. accedens with some E. wandoo and Allocasuarina huegeliana) and shrublands (Dryandra proteoides). In the mid- to lower-slope areas below the heavy clay upper slopes, soils are predominantly sandy (to sandy loam) with occasional outcrops of granite and dolerite. Woodlands and low forests of E. wandoo, E. loxlphloeba, A. huegeliana, Acacia acuminata and A lasiocalyx occur, often with Oxylobium parviflorum (box poison) in the understorey. One small area of E. salmonophloia is located at the western end of the reserve. Sandy loams on the lower slopes and the drainage floor soils support woodlands E. wandoo, Allocasuarina huegeliana, Acacia lasiocalyx and A. saligna.

Despite its relatively small area, Tutanning has a rich biota which reflects the diversity of landform and soil units occurring there. Some 630 species of vascular plants have so far been collected. Thirteen species of terrestrial mammals have been reported for the reserve including the Tammar wallaby (Macropus eugenii) and Woylie (Bettongia

penicillata) which are relatively uncommon elsewhere in the South West.

Tutanning Nature Reserve has been the site of major ecological studies over the past decade.

The work has included:

1. The development of a grid of 316 permanently marked sampling points on a 250 grid interval and sampling of these (to be used per monitoring and other studies as well).

2. Detailed mapping soils, vegetation, fire history, and topography (development of a Geographical Information System).

3. Detailed ecological studies of species-rich shrublands on different soil types and in relation to fire history.

4. Studies of the effects of fire and subsequent regeneration of the vegetation (a prescribed fire in April 1985).

5. Studies of secondary succession and rehabilitation of abandoned farm land.

6. Studies of the ecology of the tammar and the woylie

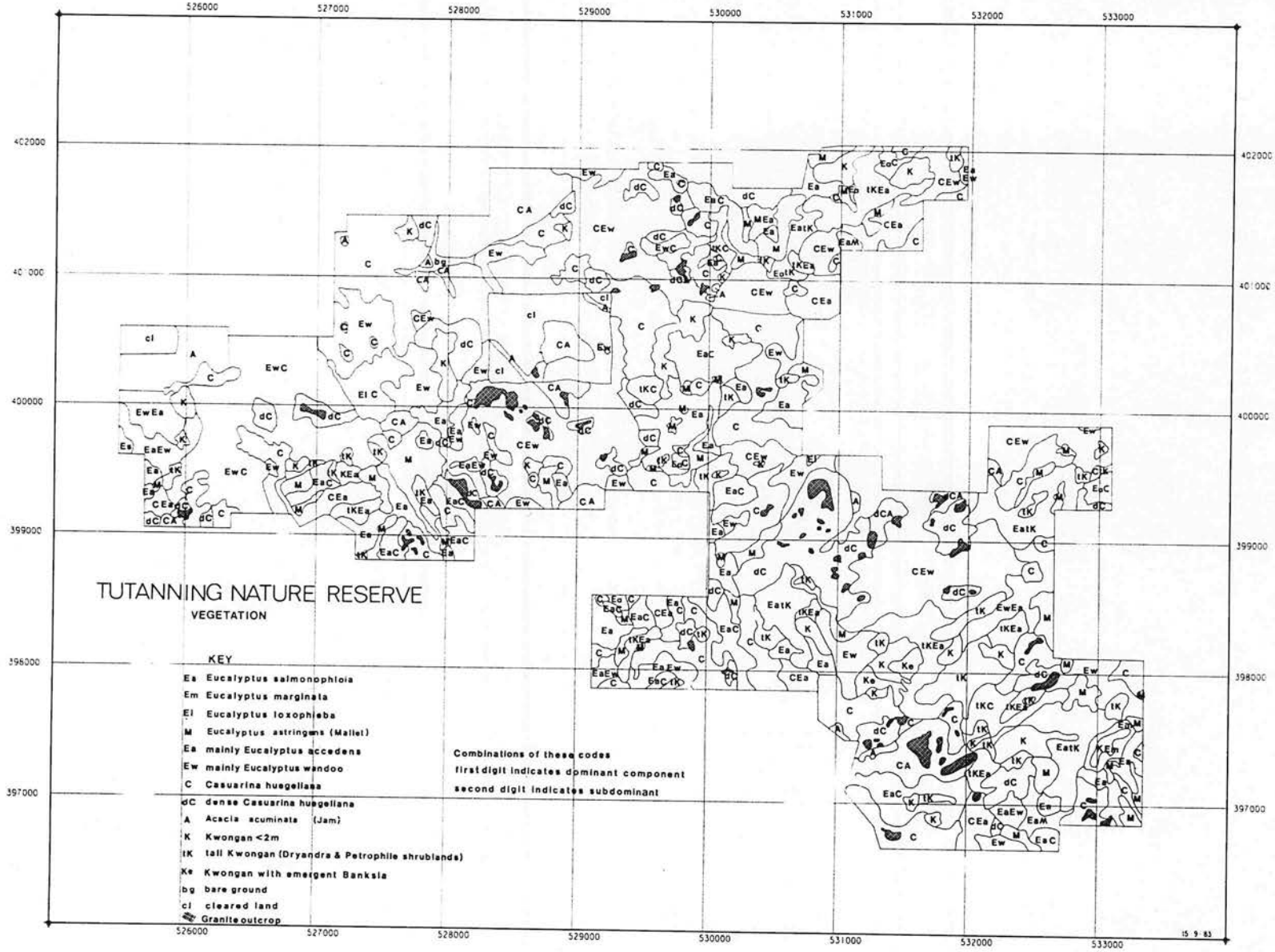
7. Behavioural studies of the grey Kangaroo (Macropus fuliginosus).

8. Studies of fire fuel-accumulation, litter decay sites.

9. Some surveys of litter invertebrate.

10. Pattern analysis of species-rich shrublands.

11. Development of a version of PREPLAN, a computerised land management information system.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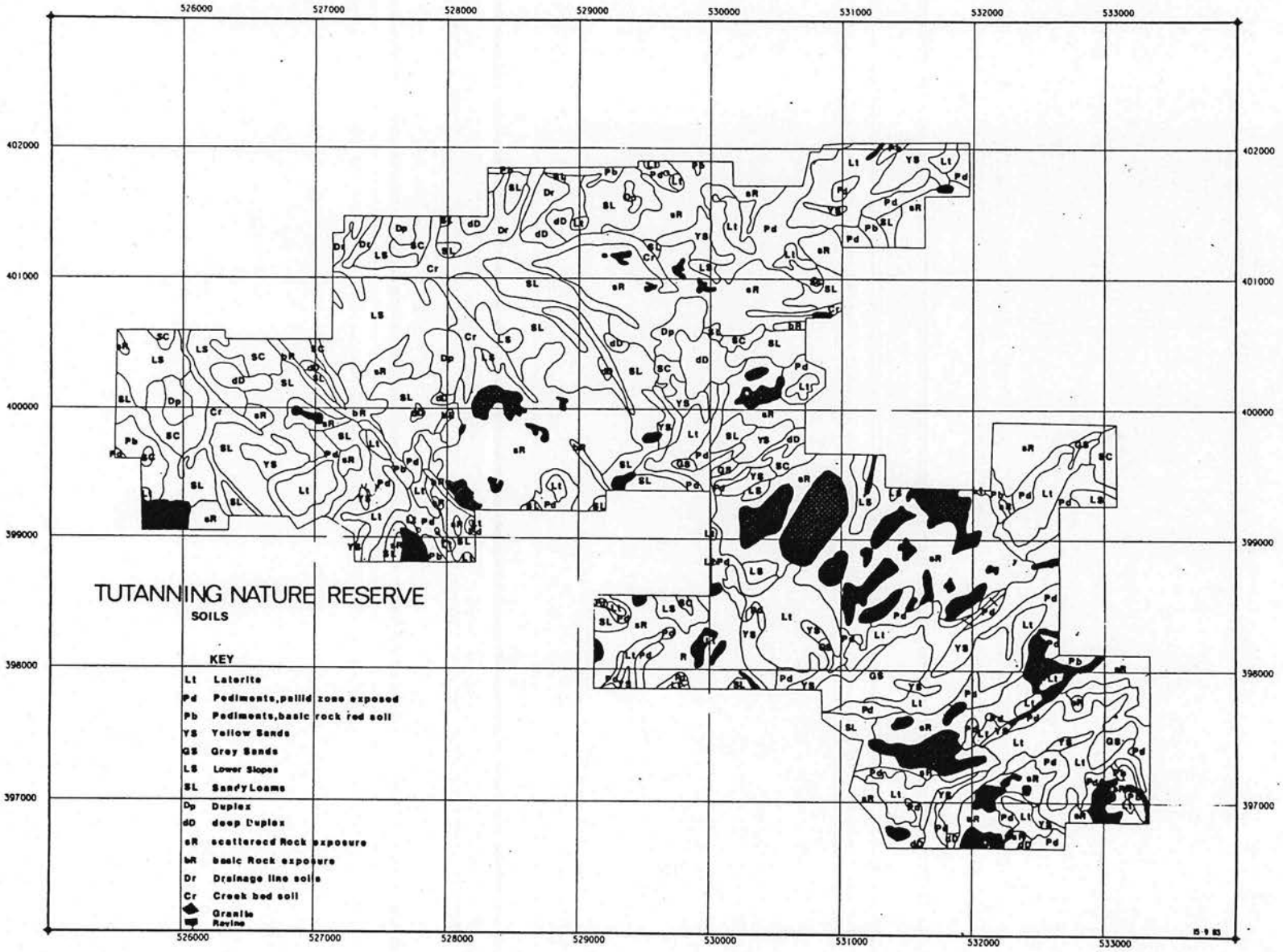
TUTANNING NATURE RESERVE
VEGETATION
KEY
Es Eucalyptus salmonophloia
Em Eucalyptus marginata
El Eucalyptus loxophleba
M Eucalyptus astringens (Mallet)
Ea mainly Eucalyptus accedens
Ew mainly Eucalyptus wandoo
C Casuarina huegeliana
dC dense Casuarina huegeliana
A Acacia acuminata (Jam)
K Kwongan <2m
tK tall Kwongan (Dryandra & Petrophile shrublands)
Ke Kwongan with emergent Banksia
bg bare ground
cl cleared land
Granite outcrop
Combinations of these codes
first digit indicates dominant component
second digit indicates subdominant
15 9 83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TUTANNING NATURE RESERVE
SOILS
KEY
Lt Laterite
Pd Pediments, pallid zone exposed
Pb Pediments, basic rock red soil
YS Yellow Sands
GS Grey Sands
LS Lower Slopes
SL Sandy Loams
Dp Duplex
dD deep Duplex
sR scattered Rock exposure
bR basic Rock exposure
Dr Drainage line soils
Cr Creek bed soil
Granite
Ravine

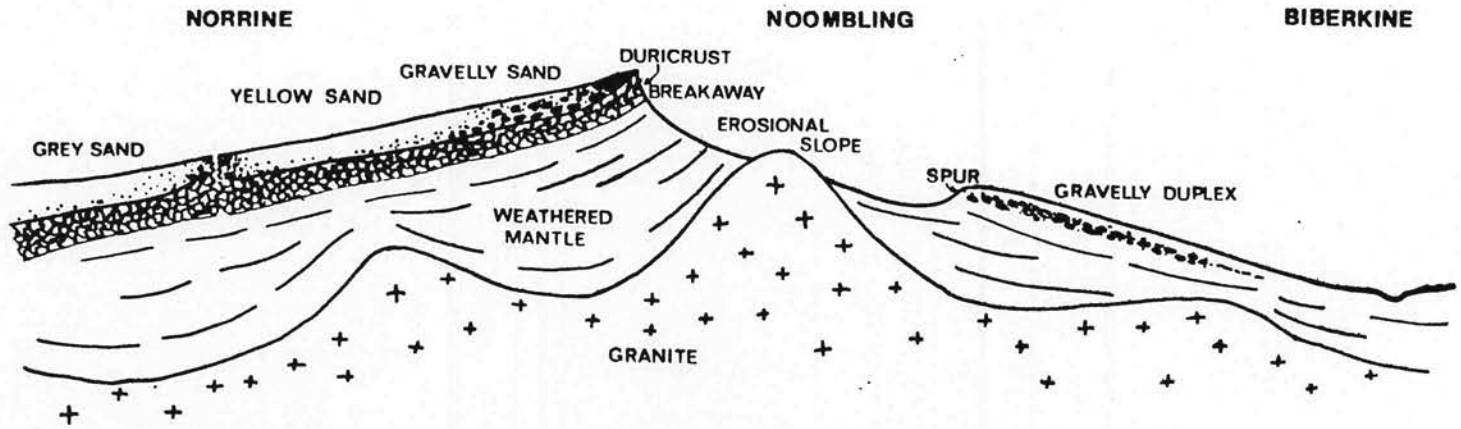


FIG 3. Cross section of the Tutanning landscape showing the landform units and the major soil types.

THE CHARLES GARDNER RESERVE

(651460 ha for the purpose of Protection of Indigenous Flora vested in the National Parks and Nature Conservation Authority)

The small reserve is in the Meckering Vegetation System of the Avon Botanical District. This vegetation system is described by Beard (1980) as typical inner wheatbelt country - dissected, hilly and drained by creeks that actually flow in winter. It is similar in these respects to the area around Tutanning Nature Reserve.

The Charles Gardner Reserve contains a good example of the kwongan (shrub dominated vegetation) that previously occurred over the uplands. It is reasonably well collected botanically (328 vascular plant species) through the work of T.E.H. Aplin of the W.A. Herbarium. This study began in 1967 following an extensive fire in 1966. It is believed that the reserve has not been burnt since then.

The reserve as a whole has a gentle northerly aspect with some woodlands of York gum (Eucalyptus loxoeba) and Salmon gum (E. salmonophloia) occurring on loamy soils in the north-eastern corner. The remainder of the reserve is covered by sandy soils supporting scrub heath and heath formations.

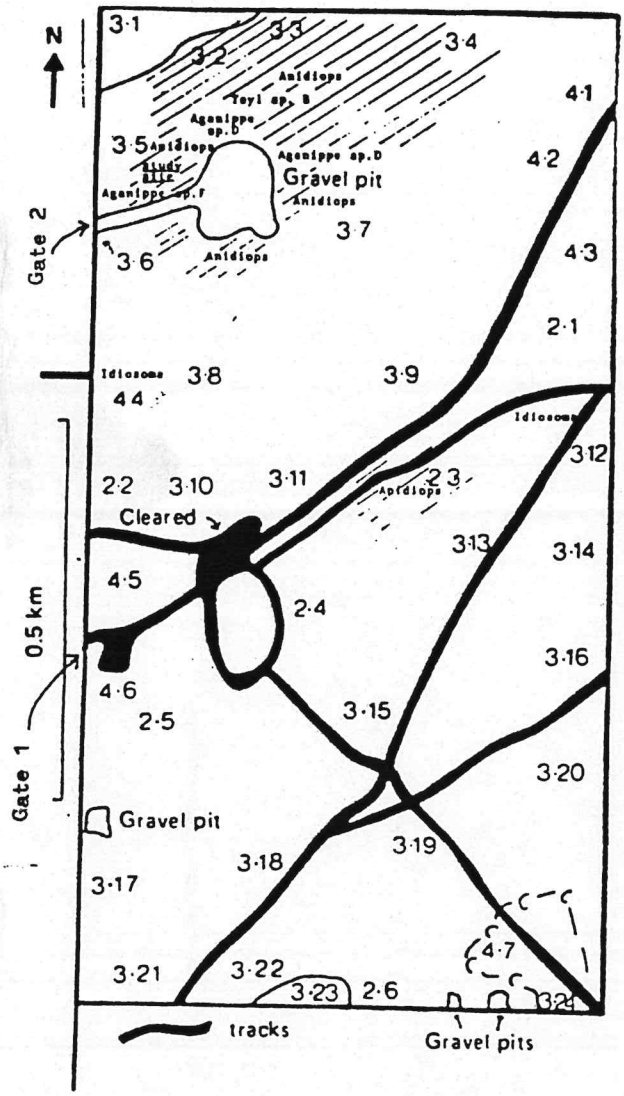
The tour approaches the reserve from the east where scrub heath on yellow sands is first encountered. Here the emergent shrubs are Actinostrobus arenarius and Allocasuarina campestris with occasional Xylomelum angustifolium, Grevillea eriostachya. The wealth of understorey species includes Eremaea pauciflora, Banskia sphaerocarpa Grevillea pritzelli, G pilvlifera, Hakea

platysperma, H. cumueata, Lysinema ciliatum and Mesomelaena stygia. There are occasional plants of the rare and attractive Dryandra speciosa

As the bus proceeds to the west over the crest of the ridge, there is a transition to predominantly grey sand with some commensurate floristic changes. In particular the Actricostobus no longer occus while occasional sandlewood plants (Santalum spicatum) can be seen. Shrubs species included Grevillea pilulifera, Allocasuarina microstachya Petrophile media, Conospermum stoechadis, Comesperma scorparium, Verticordia spp, and Calothamnus quadrifidus.

There is a small patch of Eucalyptus wandoo with an understorey of Allocasuarina campestris, Melaleuca uncinata, M. cordata and Arthropodium capillipes.

TRAPDOOR SPIDERS AT
NORTH BUNGULLA NATURE RESERVE (B.Y. Main)



Map of Reserve (adapted from Chapman et al, 1980, Rec. W.A.Mus. Supp. 12).

15 kms NE of Tammin. Annual average rainfall 339 mm. Area of 104 hectares. High vegetation diversity, 115 species distributed in three associations of mallee, shrubland and heath including typical Wheatbelt 'wodjil'. Reserve has has been surrounded by cleared farmland for over 50 years except for small area adjacent to southern west corner cleared in the early 1960's. Closest bushland about 1.5 kms to north west on private properties Soil mainly sandy loam, sand & clay over laterite with exposures of kaolonised granite and laterite. Most favourable sites for trapdoor spiders northern, lower part of reserve which has deeper sandy loam soil.

Fifteen species of trapdoor spiders present, range in status from Rare to Common. Only two species rate as Common. Tenure of all but these two is precario s. Sufficient propinquous areas of micro-habitats combined with capacity to withstand drought, habitat diversity to support dominant prey species (ants & termites) and inherent reproductive strategies and foraging efficiency ensures persistence of these two.

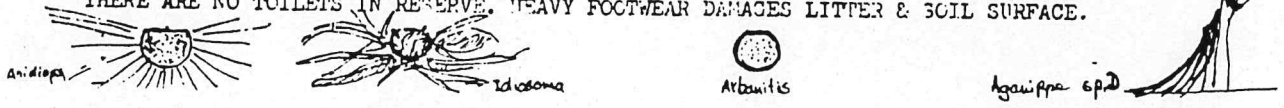
Nests of the following species will be exhibited: Anidiops villosus (Common), Aganippe sp.D (Sparse), Idiosoma nigrum (Uncommon) and Arbanitis sp. (Rare).

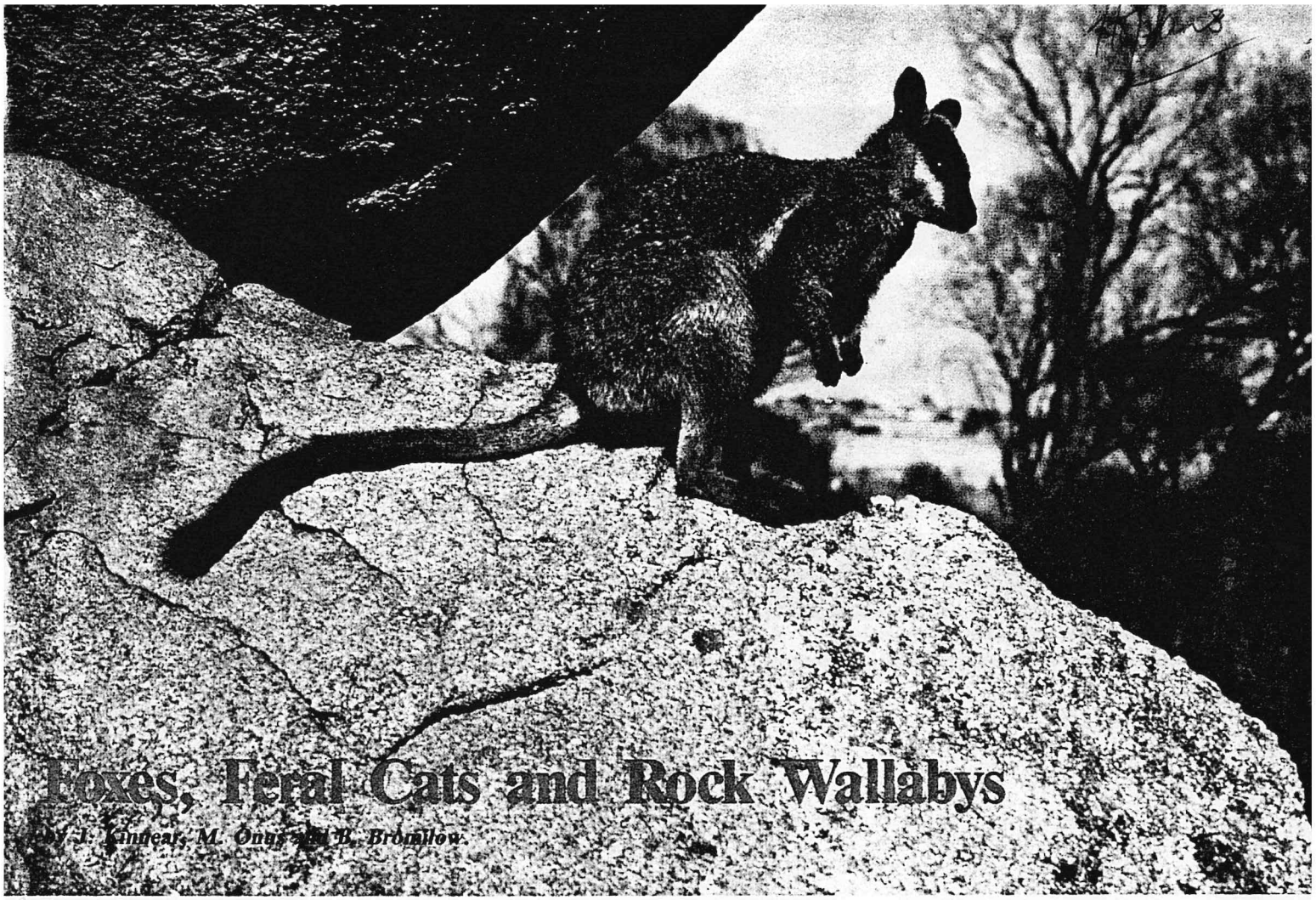
Enter reserve through Gate 1 and proceed to Cleared area (old hall site) from where two sequential walks will proceed.

(i) Along track to eastern boundary to see Anidiops nests in unfavourable habitat on laterite

(ii) Northwards along boundary to Gravel Pit. Idiosoma nests will be viewed en route. Study site is adjacent to Gravel Pit where monitoring procedures of Anidiops will be discussed. (Please do not enter Study Area) . Proceed from Gravel Pit back to western boundary and towards northern boundary where will enter at end of fence near Reserve Sign. Proceed along old firebreak track and will enter bush to view Anidiops clusters which have high persistence potential. Arbanitis nest in track.

THERE ARE NO TOILETS IN RESERVE. HEAVY FOOTWEAR DAMAGES LITTER & SOIL SURFACE.





Foxes, Feral Cats and Rock Wallabys

by J. Kinnear, M. Onus and B. Bromilow

▲ Black-flanked rock wallaby (*Petrogale lateralis*) of the granite rocks area of the wheatbelt (Photo copyright A.G Wells).

Introduction

Two species of exotic mammals – the feral cat and the red fox – are widely distributed throughout most of mainland Australia. The cat has a longer history and possibly landed as a shipwreck survivor or through Malays trading with northern coastal aboriginal tribes. The fox was deliberately released about 1870 in Victoria so that the English pastime of following the hounds might be pursued in Australia. Apparently, those foxes which escaped the hounds found Australia a good place in which to raise families. By 1916 decendants of the Victorian introduction had found their way to W.A.

With the establishment of these two foreign species in W.A. a question follows, namely "Has the cat and the fox affected our native fauna?" This is a reasonable question because, after all, both species are genuine carnivores, and it does not seem unreasonable to suspect that foxes and feral cats might just exercise their carnivorous instincts on suitable species of our native W.A. fauna. Furthermore, suspicion becomes stronger when it is realized that, associated with the arrival of the fox in particular, a number of small to medium sized mammals subsequently became rare or extinct on the W.A. mainland.

However, the factors that cause extinctions of species are usually complex and are seldom documented. For some species (e.g. wheatbelt mammals) habitat destruction was particularly severe. The rabbit plagues must have had an effect, disease has been advanced as a cause, and some biologists believe that the climate has changed sufficiently to affect the survival of many W.A. species. These factors acting singly or in concert are plausible explanations and need to be considered.

With regard to the fox, opinions about its impact on the W.A. fauna vary from outright condemnation to indifference. One viewpoint (which dismisses the fox as a factor) equates the fox with the dingo, it is reasoned that since the native species have co-existed with the dingo for several thousand years then why should the coming of the fox worry the fauna? An extension of this reasoning concedes the possibility that foxes may have caused damage in the past, but the damage is done and the

surviving species have learned to live with the fox – relax, why worry? This is the so-called "equilibrium theory" of species living in harmony where the "balance of nature" forces are operating.

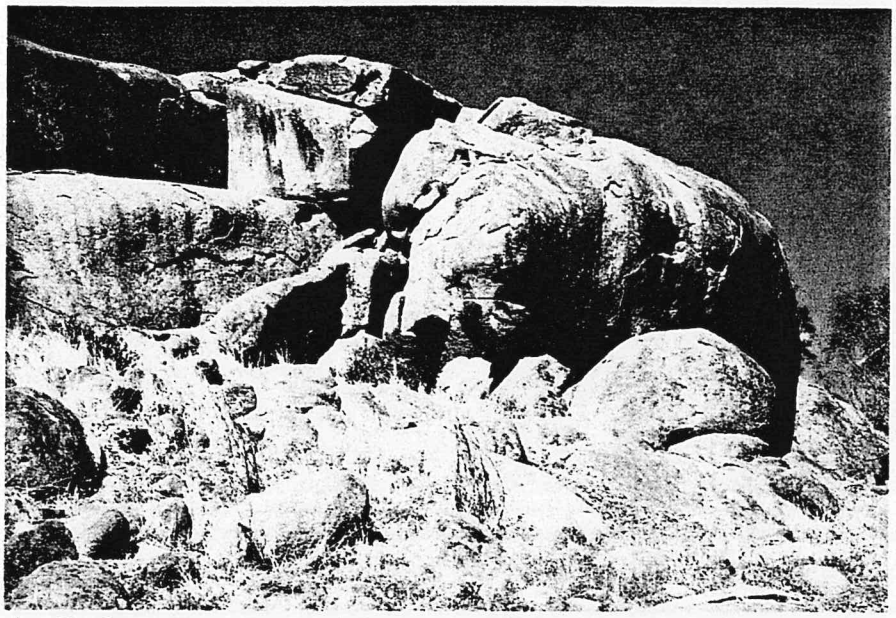
The Rock Wallaby Study

In 1978, we began a study on rock wallabies *(Petrogale lateralis)* in the central wheatbelt where colonies still persisted on some granite outcrops south of Kellerberrin. A survey of these sites revealed that the numbers had declined. We estimated that the total population consisted of about 75 animals; one population had become extinct during the last 10 years and 2 more were nearly so. During this initial phase we sighted and encountered many foxes and feral cats, but we had no cause at this stage to link them to the decline of the rock wallaby colonies, however, as the study progressed, this attitude was to change markedly and these alien species subsequently became the focal point of the study.

By the end of 1978 we realized that it was important to try and collect some vital statistics on rock wallabies, it was essential to gain some information about things like – the number of wallabies occupying a rocky outcrop, how many babies were born each year, the age of individuals and so on. If it is possible to collect such information, then one can gain some insight into why the colonies of rock wallabies were so small and therefore prone to extinction.

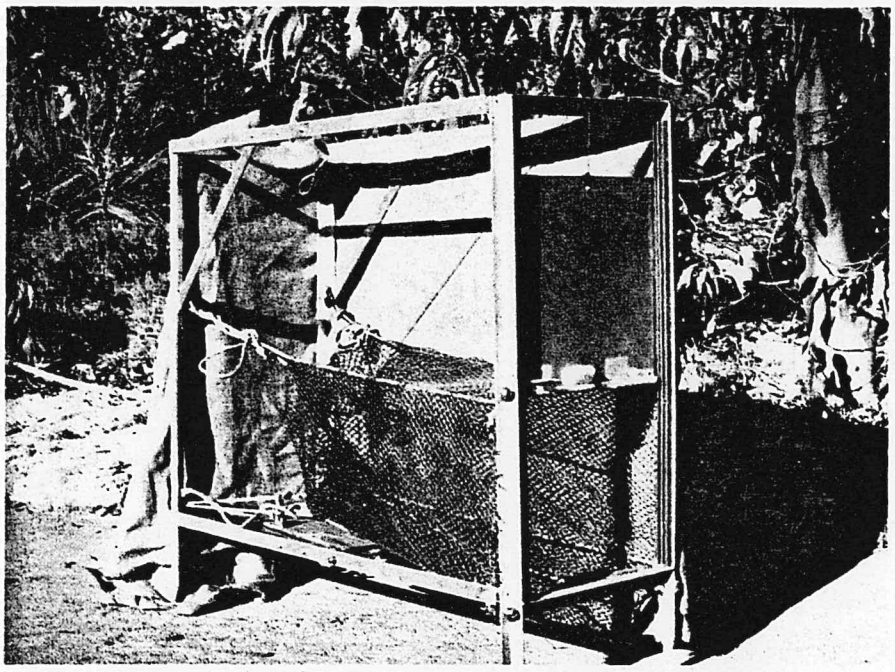
In order to gain such information it is necessary to catch wallabies and measure the length of their foot, check their teeth, check in their pouches for young, fix a numbered tag in each ear and then let them go. All of these activities are routinely performed in most population studies involving wallabies.

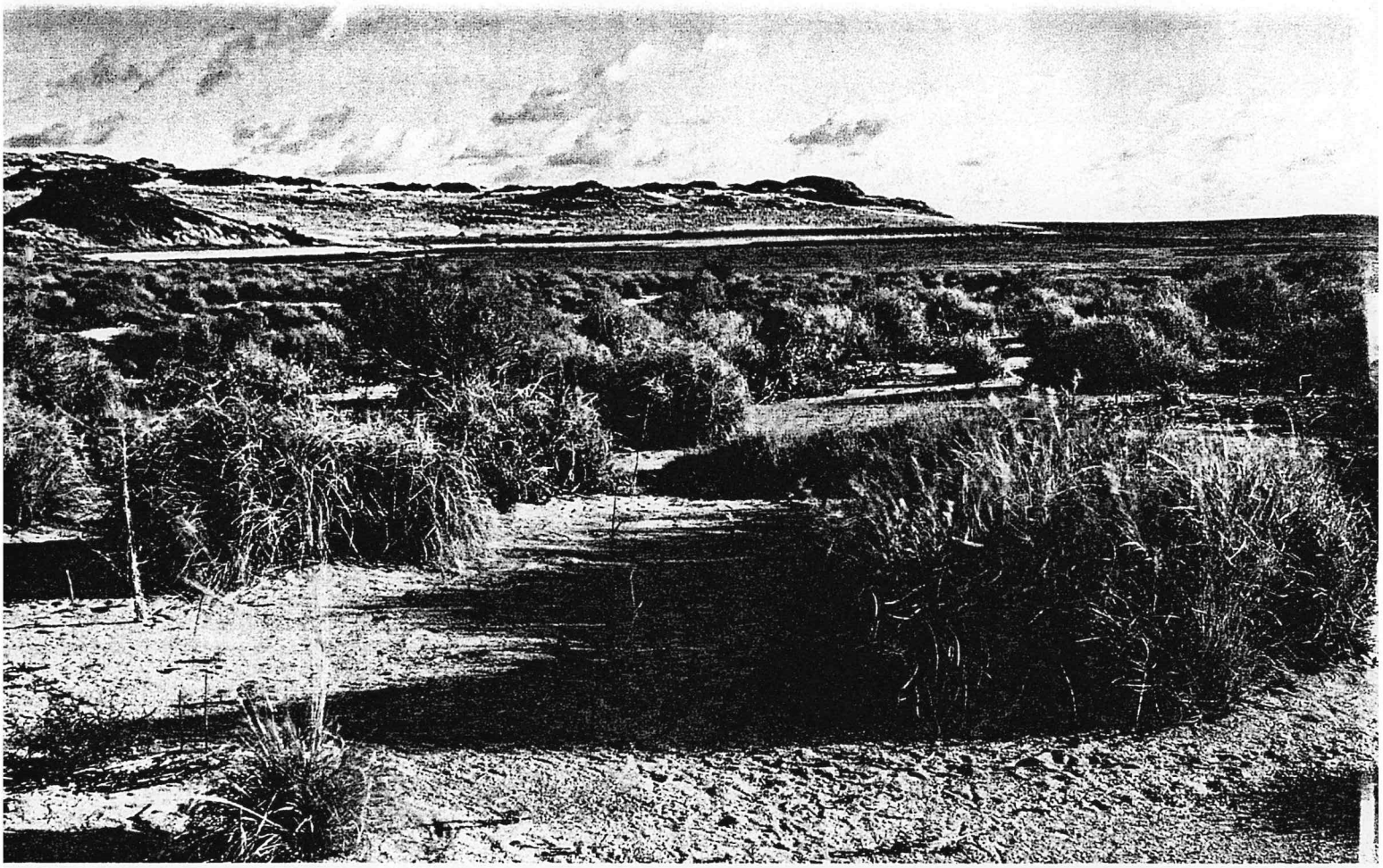
Now trapping wallabies is usually not very difficult, we soon learned that rock wallabies considered apples equivalent to lollies, and so it is easy to get them to enter a trap but keeping them there was a problem.



▲ "The Granites" near Shackleton W.A. illustrates the type of rocky outcrops that occur in the wheatbelt and the crevices of which protect rock wallabies that are still surviving in the wheatbelt. (Photo copyright A.G. Wells).

▼ Rock Wallaby trap successfully developed to capture rock wallabies in the wheatbelt without injuring the animals (Photo J. Kinnear).





▲ Enderby Island W.A. The relative isolation of the island from mainland predators has probably assisted the rock wallaby population in its survival within the open habitat of the island.

After modifications which seem adequate to trap any normal wallaby, they still proved to be agile escape artists, at this early stage we found it an easy job to clear the traps because we never caught any, and we used to complain that for our efforts the least rock wallabies could do was to leave a note thanking us for the apple.

When we finally made the traps secure we began to catch wallabies, but it soon became apparent our problems were just beginning, we found that if a rock wallaby cannot escape from a trap it will propel itself upwards with great force and injure its head if measures are not taken to prevent this. What we failed to appreciate was that rock wallabies live in a three dimensional world where up and down is just as natural as straight ahead. After many trials, a trap ingeniously designed and built by Robert Bromilow allowed us to trap rock wallabies virtually without risk.

From our trapping endeavours it was learned that rock wallabies breed continuously throughout the year, and that most adult females were carrying young in their pouch. Moreover, the population was fit and healthy and did not suffer excessive weight loss during drought. Additionally, we learned that the population consisted of mostly mature animals and was not increasing despite the fact most females were bearing young, this information suggested that the reason why the populations were not increasing was because once a juvenile leaves the mother's pouch, it had a low probability of surviving to adulthood.

As evidence from trapping began to build up, our suspicions regarding foxes and feral cats began to grow. Foxes and cats were found to be living in the rocks amongst the rock wallabies, bones of wallabies were recovered from a fox den and rock wallaby hair was found on a firebreak some distance from the rock. We noted that rock wallabies were only found in rock piles that afforded protective shelter in the form of crevices and deep caves, whereas in the past, they were recorded from sites which offered far less protection.

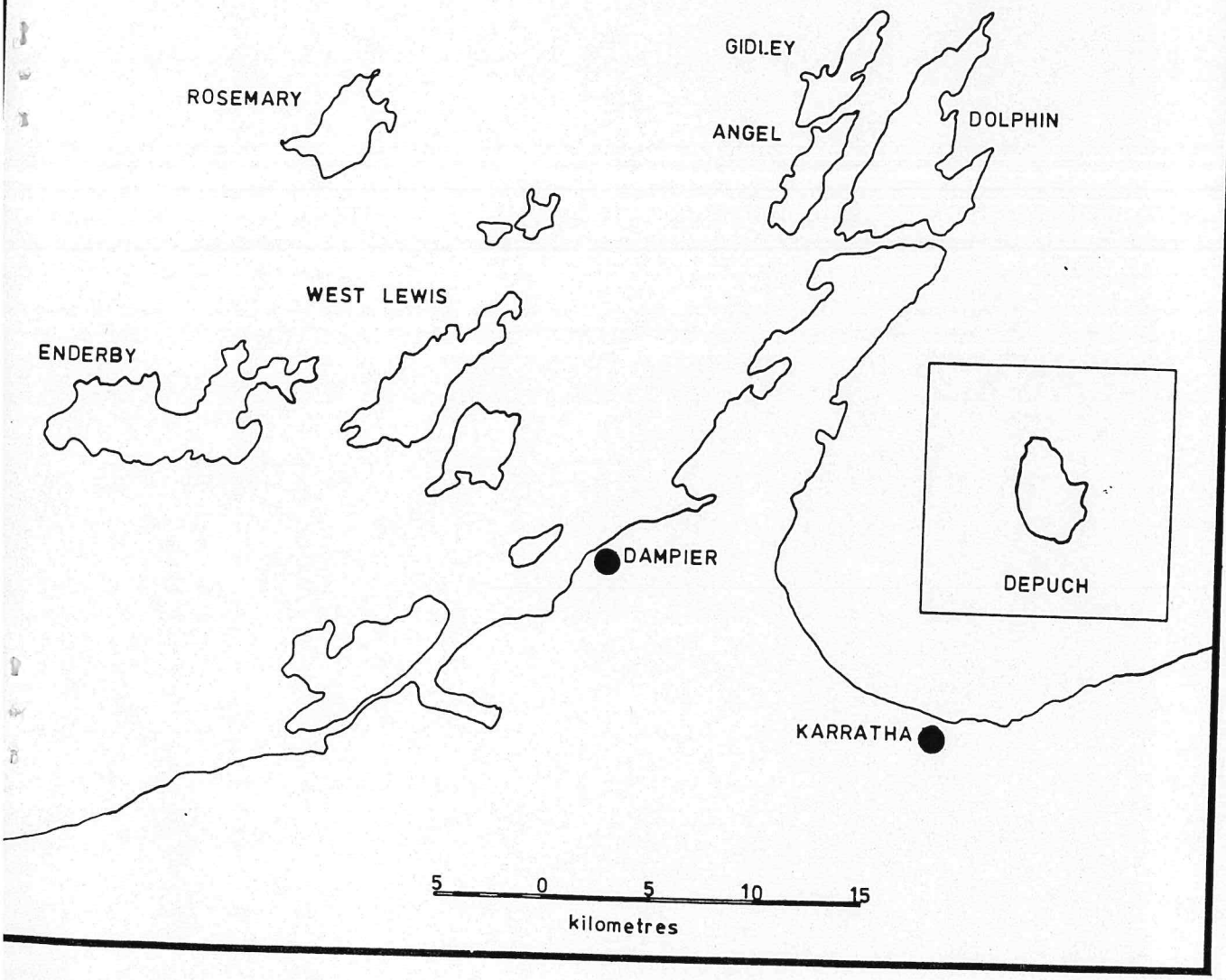
Meanwhile some evidence from studies in the Pilbara served to reinforce our suspicions about the possible effects of foxes and cats. On islands in the Dampier Archipelago another rock wallaby species – Rothschilds' rock wallaby *(Petrogale rothschildi)* – is found on 3 islands, two islands are free of foxes and cats and support thriving populations of

rock wallabies, in contrast the third island, which has foxes and cats, has very few rock wallabies.

To illustrate the differences in numbers between these islands consider the information gained when an observer records the number of rock wallabies seen per hour on a standard traverse of an island (such procedures provide measures of relative abundance). On the islands free of foxes and feral cats (Rosemary and Enderby Island), one routinely observes 12-15 rock wallabies per hour, while on the island that has these predators (Dolphin Island), one sees on average 1 rock wallaby per 3-4 days! This difference is even more striking when one compares population sizes between the islands. On Enderby (fox free), we estimated that there were about 1500 rock wallabies, while on Dolphin, less than 50.

Further north more incriminating circumstances are found on Depuch Island which is an island a few kilometres offshore and due west of Whim Creek. In 1962 the W.A. Museum surveyed Depuch Island and recorded the presence of the rock wallaby *(P. lateralis)* and the fox. Dr. D. Ride, former Director of the Museum, wrote in his report – "tracks of foxes were numerous; . . . fox droppings containing fur bone fragments and arthropod remains are common; and the remains of rock wallabies that had clearly been eaten by a carnivore were to be found in many of the valleys near fresh water and behind the beaches". In his summary of the situation Ride concluded . . . "Today, rock wallabies seem to be present on the Island in large numbers and it seems that foxes have not been successful in reducing the population to a low level. However, there are obvious

ROCK WALLABY STUDY AREA SHOWING ISLANDS OFF NORTH WEST COAST OF W.A.



▲ Rothschild's rock wallaby (*Petrogale rothschildi*) was the species studied in the islands off the north west of W.A. (Photo copyright A.G. Wells).

signs of predation both by foxes and birds of prey and we cannot be at all certain that the relatively recent introduction of the fox will not have some long term effect on the wallaby population".

Ride was obviously uncertain about the outcome of this predator/prey system involving a marsupial and alien predator which has recently become established on Depuch Island. In 1962 the relationship seemed to be at equilibrium, but 20 years later when we visited the Island, we found no trace of the rock wallaby *P. lateralis,* foxes were still there, foraging in the intertidal zones on the beaches, so much for the equilibrium theory and the balance of nature arguments.

Such evidence is rather compelling and it is hard not to feel absolutely convinced that foxes, in particular, must have done a lot of damage to our native wildlife, and indeed also, that the fox still poses a threat. But strong as the evidence appears, it is still circumstantial, it still is easy to be mislead as for example by the difference between rock wallaby numbers on Enderby Island and Dolphin Island, we now know that this large difference in abundance is partly environmental. Research has shown that Enderby is a better place to live for rock wallabies because there is more food, but even though food accounts for some of the difference in numbers, it still does not completely explain why there are so few rock wallabies on Dolphin Island.

Given the above situation, and the circumstantial nature of the evidence, it was decided that an ecological experiment might provide more definitive evidence. Two opportunities for experimentation were readily apparent as for example in the Dampier Archipelago. A useful experiment would involve eliminating the fox and feral cat from Dolphin Island, a population increase would signify predation as a factor affecting rock wallaby abundance. The wheatbelt rock wallabies afforded even better opportunities, and for this reason this area was selected.

For the wheatbelt experiment we divided the 5 rock wallaby populations into 2 zones or areas (see fig. 1). In area 1 foxes and feral cats were to be eliminated or at least their numbers significantly reduced. In area 2 things were to be left alone – that is, no effort to control foxes or feral cats was to be made at all. The outcome of this experiment should shed some light on the following possibilities namely:

(1) rock wallaby numbers should increase in the zone where foxes and feral cats are eliminated if these predators are responsible for keeping the numbers low;

(2) at the same time little or no increase in rock wallabies should be observed where nothing was done to keep the numbers of foxes and feral cats down.

While it is easy to plan and design experiments such as the one outlined above, the implementation of the actual experiment has not been easy and has required a sustained commitment to see it through. At the start of the experiment we needed to know two things – how many rock wallabies there were and how to eliminate (or at least reduce significantly) foxes and feral cats. The Bromilow trap solved our first problem, the other problem is another story which must wait until another issue.

At this writing, 2 years have elapsed since we have trapped the rock wallaby populations, in the meantime intensive fox control studies have been carried out. It is not possible to predict the outcome at this stage, but a preliminary assessment may be possible this year for one population. Hopefully, the outcome will allow us to reach some conclusions one way or the other. Whatever the answers, it should be an interesting story to tell.