A VERTEBRATE FAUNA SURVEY OF THE WESTERN HIGH RAINFALL FOREST OF THE SERPENTINE AREA

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(1982)

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BY

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Cover photograph: Lateritic upland site 5, showing open jarrah forest (Karan Maisey)

SUMMARY

A vertebrate survey was carried out over a seven day period in October 1981 in the western high rainfall zone of the Jarrahdale Forest Division.

Seventeen species of mammals including 5 exotics, 61 species of birds, 22 reptiles, 6 amphibians and a single fish species were found within the area.

Searching was the most productive survey technique yielding 527 individuals of 23 species in 63 man hours. Each of the four major topographic units (major valleys, minor valleys, lateritic uplands and granite outcrops) yielded similar total numbers of animals. The importance of shelter sites has been demonstrated particularly in relation to dieback and bauxite mine rehabilitation.

LOCATION

The survey area lies within the Northern Jarrah Forest between latitudes $32^{o}15'$ and $32^{o}31'$ and longitudes $116^{o}00'$ and $116^{o}15'$. It id divided into two main areas, Serpentine and Karnet forest blocks, north and south of the Serpentine Dam respectively. An area unburnt since 1937 within Chandler Block, to the east of the main areas was also included in the survey (Fig. 1).

CLIMATE

The climate within the south west of Western Australia in general is influenced by the anti-cyclonic belts which move northward from the south coast of Western Australia in winter. As a consequence the area is dominated by a warm mediterranean climate with cold, wet winters and warm, dry summers.

The effect of the Darling Scarp on rainfall is pronounced, rainfall declining rapidly eastward and also westward from the edge of the scarp (Fig. 2). The three survey areas lie within the Western high rainfall forest zone (Havel, 1975) with an average annual rainfall exceeding 1,200 mm (Heddle et al, 1979).

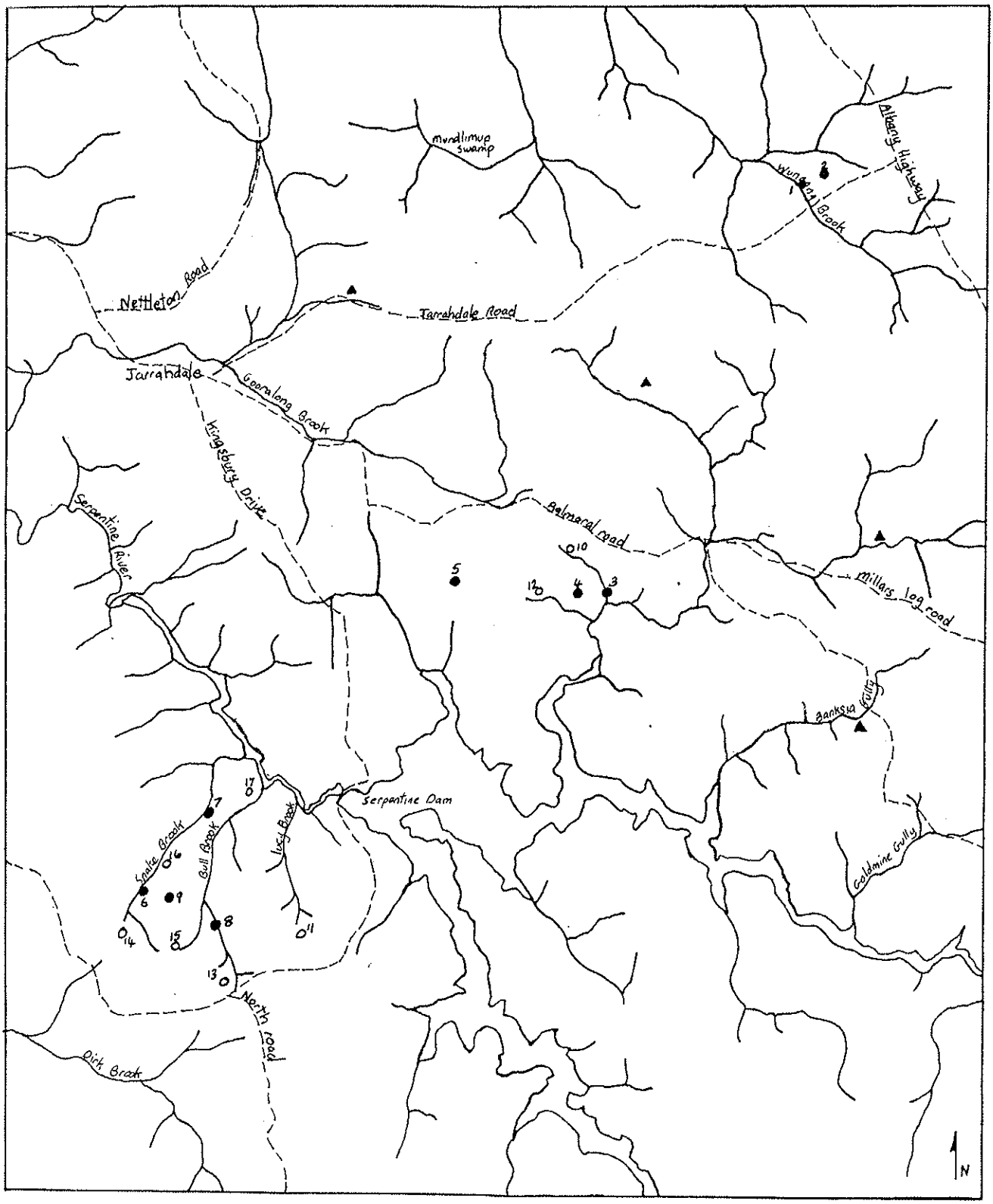
GEOLOGY

The survey area lies towards the western edge of the Australian Precambian shield or Yilgain Block. Within the survey area the Yilgain Block is composed largely of granitic rocks with smaller enclosed patches of migmatite. Base rock is generally covered by deep lateritic weathering but exposed in large patches of outcropping in Karnet Forest Block.

LANDFORMS AND SOILS

The survey areas within Karnet and Serpentine Blocks are drained by the Serpentine River which flows between them. Chandler Block is drained from

Figure 1: Survey Area Showing Drainage Patterns



KEY

- - - Major roads

● Traplines

o Searching sites other than traplines

▲ Bat trapping sites

Scale: 1:100,000

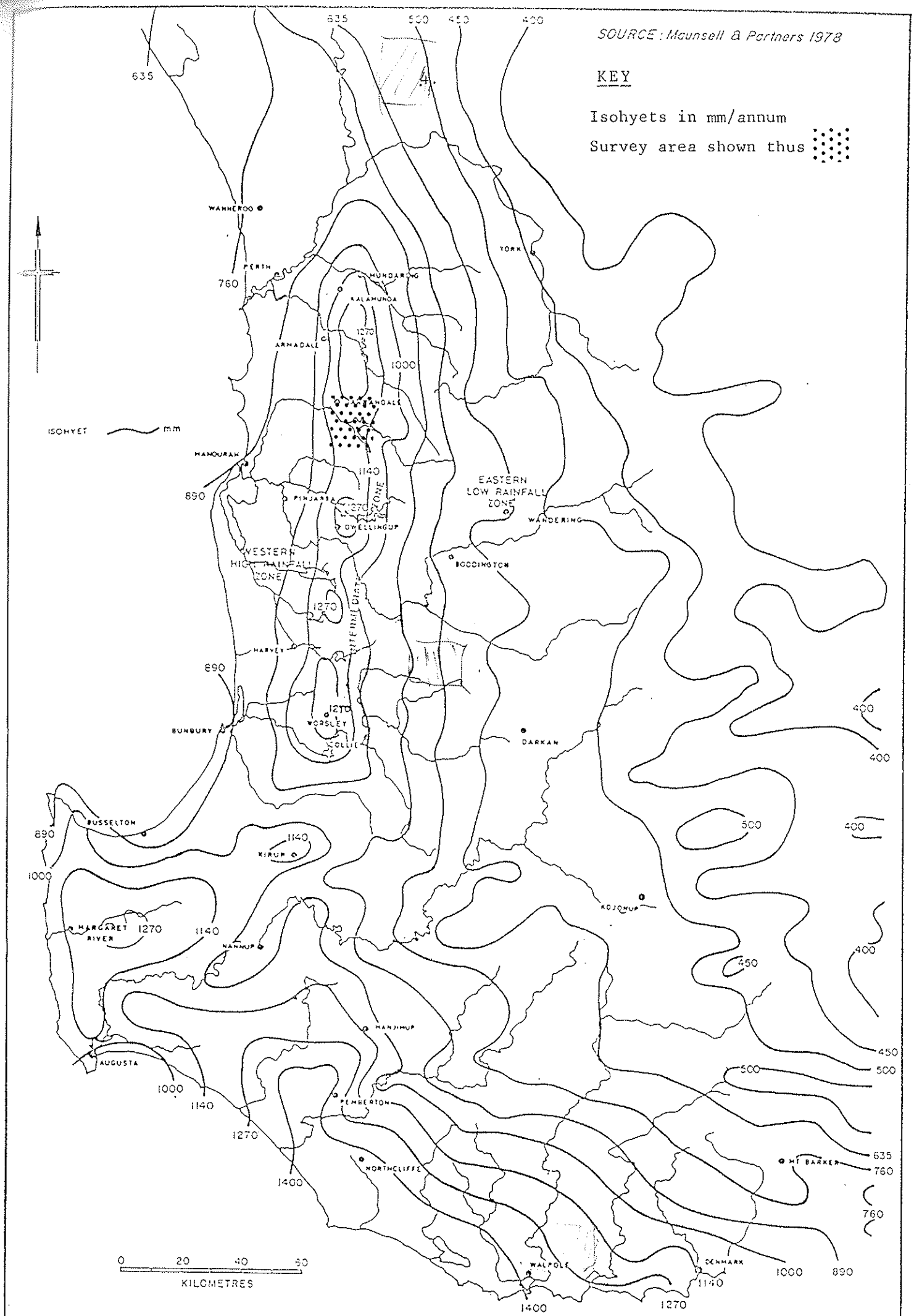


Figure 2: Isohyet map of South West Showing Survey Location

the upper reaches of Wungong Brook which flows north to join the Canning River (Fig. 1).

According to Churchward and McArthur (1978) who have mapped the soils and landforms for the "system 6" report, three main landforms - soil units occur within the survey area.

The main upland unit within the area is the Dwellingup unit. It is characterised by a gently undulating surface with duricrust on ridges, sands and gravels in shallow depressions. In some areas, particularly in Karnet Block, large areas of outcropping occur within this unit.

The Yarragil unit describes the minor valleys on the western part of the plateau (including and to the east of Chandler Block). It contains sandy gravels on the slopes and orange earths in swampy floors. The broad flat headwaters and upper valleys within the survey area fall within this category.

The Murray unit describes the major valleys of the survey area including the Serpentine River and the lower reaches of its tributaries with deeply incised valleys. Soils consist of red and yellow earths on slopes with narrow alluvial terraces. This unit includes small areas of outcropping within Karnet Block.

VEGETATION

Vegetation structure and floristics of the survey area has received considerable previous treatment which is largely summarized in Beard (1979).

The overstorey structure is relatively uniform throughout the area, being largely open forest (Smith 1972, Beard 1979) although it has been thinned on certain sites to woodland or open woodland due to the effects of dieback disease (Appendix 1, Fig. 3).

The survey area lies within the Dale sub-district of the Darling Botanical District (Speck, 1958). This sub-district contains the Northern Jarrah Forest. Beard (1979) recognizes what he calls four major catenas within this area.

"(a) the open vegetation of granite rock outcrops which protrude through the lateritic mantel

(b) jarrah forest on the lateritic plateau and screes descending from its edges

(c) marri - wandoo woodland on the younger red soils of the scarp and the slopes of the deeply excavated small valleys

(d) river gums and paperbarks along the watercourses in these".

Although the survey area includes all catenas, the overstorey species within catena (c) include varying mixtures of *Eucalyptus patens, megacarpa, marginata* and *calophylla* sometimes with *Melaleuca preissiana* but does not include *Eucalyptus wandoo.*

Havel (1975) described a number of "site-vegetation types" (or "minor catenas" according to Beard (1979)) which occur within the Northern Jarrah forest).

Although these "site vegetation types" cannot be easily mapped, a method of portrayal based on Churchward and McArthur's (1978) landform/soil units was devised for a detailed presentation of an area known as "system 6". On the vegetation map of the Pinjarra area these "vegetation complexes" are grouped according to major topographic units. The descriptions of the relevant vegetation complexes occurring within the survey area are quoted from Heddle, Loneragan and Havel (1975).

Plate 1: Lateritic upland site 2 showing open jarrah forest (Karan Maisey)

Plate 2: Minor valley site 12 showing open dieback affected gully headwaters (Tom Leftwich)

Plate 3: Minor valley site 8 showing open Bullich forest (Tom Leftwich)

Plate 4: Major valley site 7 showing open marri/jarrah forest (Karan Maisey)

Plate 5: Site 9, granite outcrops typical of those within the survey area (Karan Maisey)

Plate 6: Site 14, showing open marri woodland resulting from severe effects of dieback (Karan Maisey)

The lateritic uplands within the survey area are dominated by the Dwellingup and Hester complex in high rainfall - central and south and the Dwellingup complex in medium to high rainfall (minor catenas 1 and 2). These contain open forest of *E. marginata* and *E. calophylla*.

A small area of the Goonaping complex (minor catena 8) is included within the area but was not surveyed. (The Goonaping complex includes open forest of *E. marginata* and low open woodland of *B. attenuata - B. menziessii* on the dry sites and low open forest of *M. preissiana* on moist sites.)

The minor valleys are dominated by the Yarrigal complex in medium to high rainfall (minor catenas 10 and 11). These contain open forest of *E. marginata - E. calophylla* on upper slopes with a mixture of *E. patens* and *E. megacarpa* on the valley floors.

The minor valleys also include a swamp complex (minor catena 12) with vegetation ranging from low open woodland of *M. preissiana* and *B. littoralis* to sedgelands.

The major valleys are dominated by the Murray complex in medium to high rainfall (minor catena 20). Vegetation ranges from open forest of *E. marginata - E. calophylla* with *E. patens* on the slopes to fringing woodland of *E. rudis - M. rhaphiophylla* on the valley floors.

The vegetation structure and floristics of the survey sites within the area are summarized in Appendix 1.

DIEBACK STATUS

The disease jarrah dieback is now widespread within the survey area (Fig. 3). It has the capacity in certain situations to severely deplete the overstorey and ground cover of an area (Plate 6).

No traplines were within dieback affected areas. Searching areas included dieback affected uplands within Karnet Block (sites 13 and 14) and dieback affected gully headwaters within Serpentine Block (sites 10 and 12). Searching site 14 is within open woodland with a sparse sedge dominated understorey characteristic of severe dieback effects.

CUTTING HISTORY

The western high rainfall jarrah forest of the Jarrahdale Division has had a considerable history of utilization dating to the middle 19th century.

The survey area displays a range of cutting history and includes recent heavy cutting in response to dieback infection within Karnet Block, initial clearfelling of the late 1930s within Chandler survey sites (Plate 1) and more recent selection cutting within Serpentine Block.

FIRE HISTORY

The survey area has been subject to a regular prescribed burning cycle since 1952 (Peet, 1979). Figure 4 shows the coverage of the two most recent burning cycles within the area.

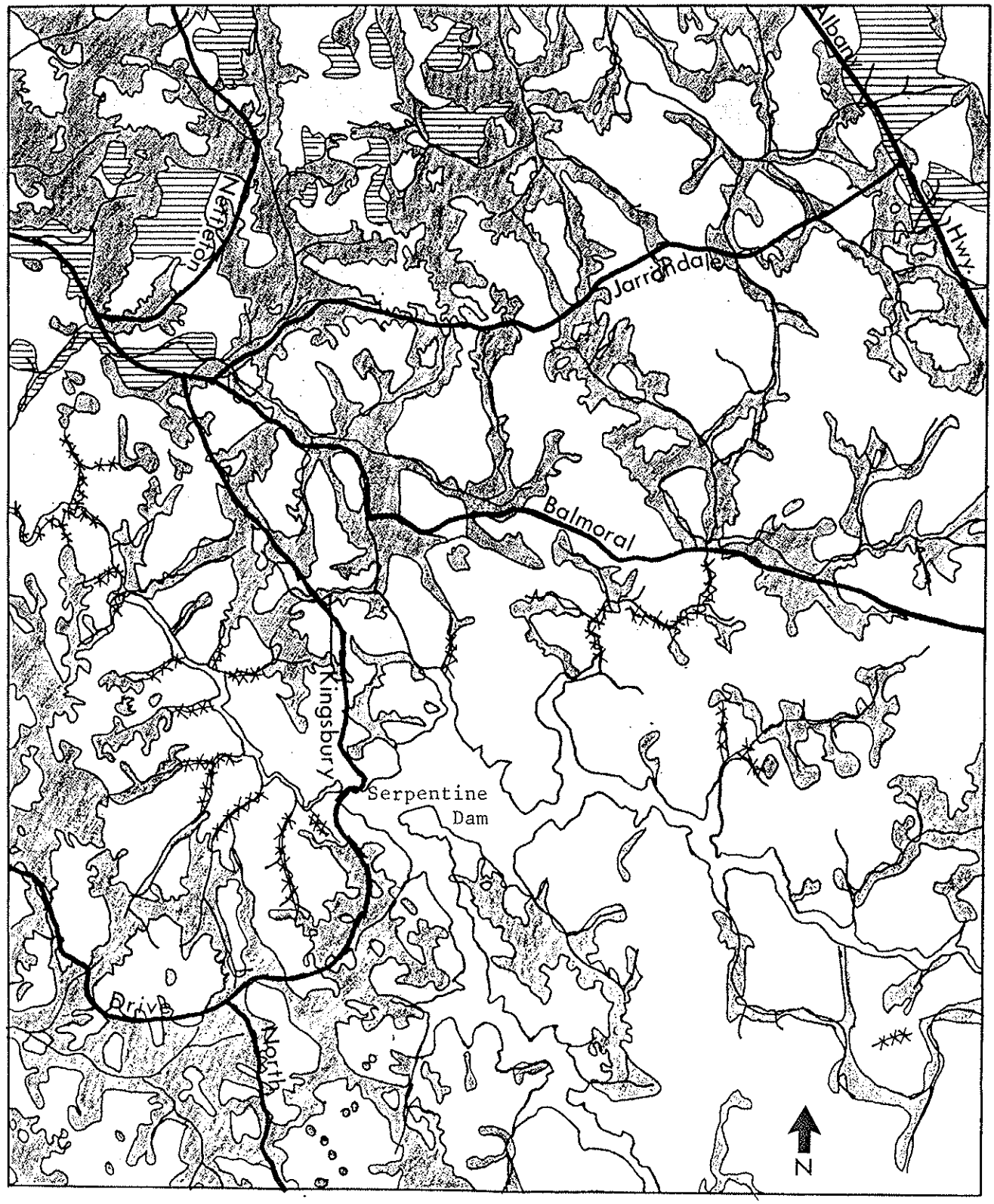
Sites 1 and 2 have been unburnt since 1937.

Sites within Serpentine Block were burnt most recently in 1979 and those within Karnet Block in 1977.

DAM CONSTRUCTION

Pipehead dam was constructed in 1961 and Serpentine dam a year later. This resulted in 1253 hectares of major valley vegetation complex, 20 to be inundated. The margins of the dams were searched for waterbirds. Site 7 contained the closest trapline.

FIG. 3 Dieback Status of Survey Area.



SCALE

0 1 2 3 km

LEGEND

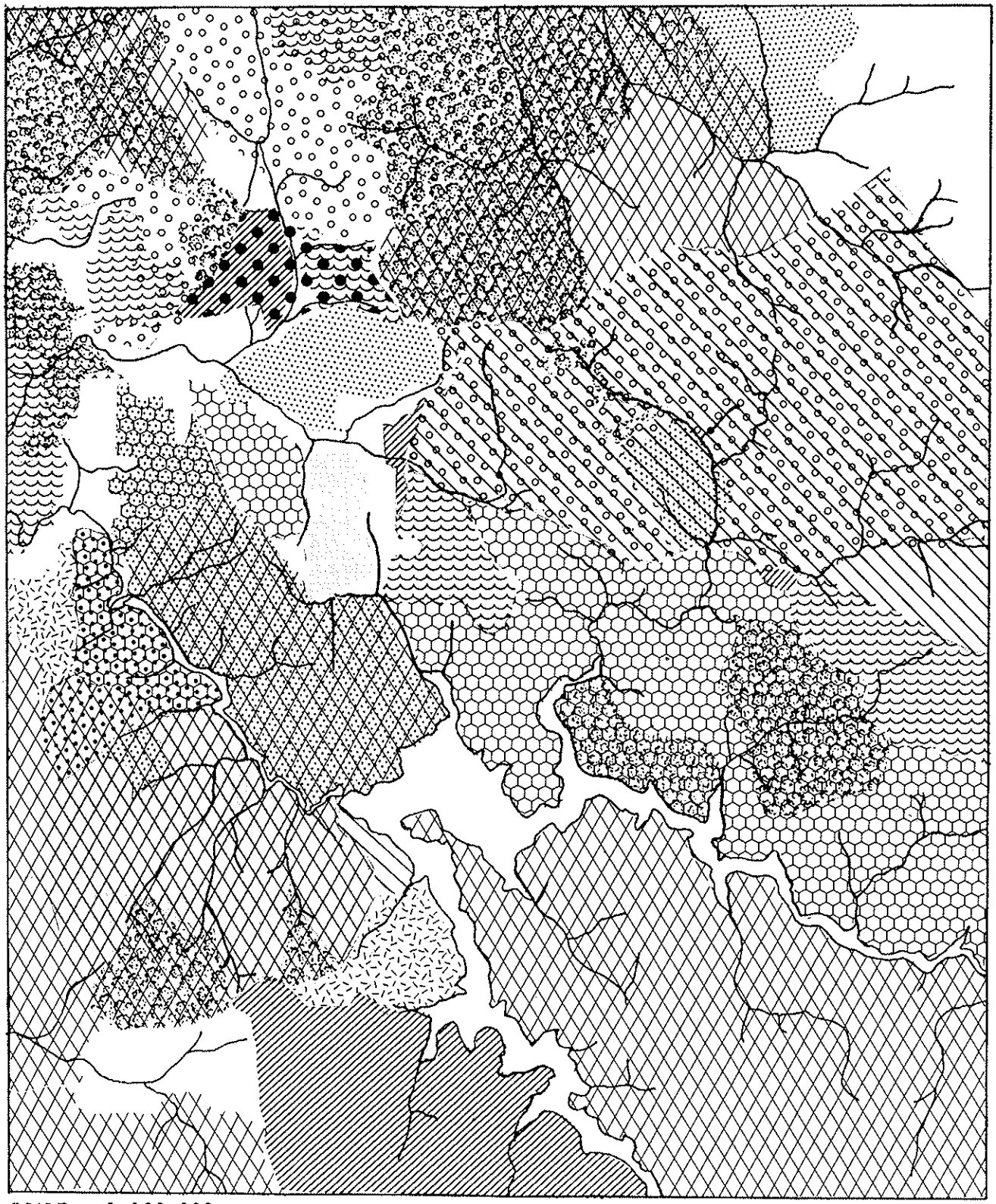
Dieback

Dieback probably present but no obvious symptoms.

Main Roads

Rivers

FIG. 4 Recent Burning History of Jarrahdale Survey Area.



SCALE: 1;100 000

0 1 2 3 km

KEY

Burn Ages

1973/74

1975/76

1968/69

1969/70

1970/71

1972/73

1973/74

1976/77

1977/78

1978/79

1979/80

1980/81

FAUNA

METHODS

As the overstorey vegetation structure is relatively uniform throughout the area, locations of sample sites were based on the major vegetation complexes of Heddle et al (1979).

The locations of sample sites are shown in Fig. 1 and a broad description of each site and the survey techniques employed is shown in Appendix 1.

These sites were grouped for convenience into major topographic units (i.e. minor valleys; containing vegetation complexes 10 and 11, major valleys; containing vegetation complex 20 and lateritic uplands containing vegetation complexes 1 and 2). Granite outcrops, although within the other topographic units are separated because of their distinct faunal assemblage.

The following survey techniques were employed.

(1) DIRECT OBSERVATIONS

All sites were traversed during day and night by vehicle and on foot. Any sign of animal activity was recorded. Predator scats were collected for later analysis.

(2) SPOTLIGHTING

This was undertaken on three nights and was used for the detection of nocturnal animals. Including all major vegetation complexes, 15.6 km was traversed.

(3) FISHING

Fish were collected using a scoop net (as Christensen, unpublished) from waterpoints, streams and dams within the survey area.

(4) SEARCHING

This technique involves turning logs and other debris for a set period and identifying or collecting any animal disturbed. Signs of an animals presence such as runnels, diggings and scats are also recorded. Searching is most useful for reptiles and amphibians.

The 13 search sites and 9 traplines are grouped in analysis into major topographic units. Differential effort was allocated to each of the units both in trapping and searching time (Table 4).

This differential time allocation has been corrected to 10 equivalent hours in figures 3-6 to provide comparisons between areas.

(5) BAT SHOOTING

Shooting was attempted without success on two nights.

(6) BAT TRAPPING

A collapsible bat trap (Tidemann and Woodside, 1978) was set on narrow bush tracks approaching water on two nights during the main survey period and a further six trap nights during March 1982.

(7) BAT MIST NETTING

A mist net (terylene, four tiered 12.1 m x 2.7 m, 3.1 cm mesh) was set over water on three nights during the main survey period.

(8) TRAPPING

Three types of traps were used;

(i) Breakback trap - a wooden rat trap.

(ii) Cage trap - a wire mesh trap with dimensions 60 cm x 22 cm x 22 cm.

(iii) Drift line - a line of 3 drums (28 cm diameter, 42 cm depth)

buried to ground level, placed at intervals of 4 metres and connected by a low (25 cm high) mesh drift fence which crosses the centre of each drum.

A standardised trapline consisting of 5 cage traps, and 10 breakbacks alternated and a 12 metre drift fence were used at all but two of the nine traplines.

Trapline 8 contained no drift fence.

Trapline 9, a granite outcrop, consisted of 20 breakback traps only.

All traps except pits were baited with a universal bait made up of peanut paste, rolled oats and bacon.

Traplines were operated for six days and drift fences for ten days at each trap site.

(9) BIRD TRANSECTS

Six 1200 metre transects based on 10 points, 120 metres apart were walked to include all of the vegetation complexes within the area.

The six transects are grouped into ridge and gully sites. Three transects were walked in each of these categories. Hence the totals listed in table 2 are each from 30 transect points.

In addition, bird sightings and calls were recorded at all times particularly in the early mornings whilst checking traplines, and from the margins of dams and agricultural areas within the survey area.

Plate 7: Bat trap in operation at Herold Road water-hole

Plate 8: The lesser long-eared bat *(Nyctophilus geoffroyi)* trapped at the site shown above

MAMMALS

RESULTS

Appendix 2 lists the trapping details of each trapline. Table 4 groups the traplines by topographic unit and shows the comparison between animals found searching and trapping.

Specimens of several species were collected over the survey period. These are now lodged at the W.A. Museum. Details of the specimens collected and their accession numbers are listed in Appendix 4.

The following list of species includes where applicable historical records from the museum, from within similar forest types or within 20 km radius of the survey area.

LIST OF SPECIES

MARSUPIALIA

Macropodidae

Macropus fuliginosus - Western Grey Kangaroo

This species was the most commonly observed mammal within the survey area and was observed in groups of up to four in all but the thick gully vegetation types.

Macropus irma - Western Brush Wallaby

Three animals were sighted during the survey period. In addition two recent museum records exist from approximately 25 km south of Jarrahdale. (WAM 007247 and 007689 collected in September 1963 and September 1967 respectively). Other specimens have been collected to the north and west of the survey area.

TABLE 1

JARRAHDALE SURVEY MAMMAL LIST

MAMMAL	SEEN	TRAPPED	SPOTLIGHT	RUNNELS, DIGGINGS, SCATS OR OTHER EVIDENCE
Macropus fuliginosus (Western Grey Kangaroo)	✓		✓	
Macropus irma (Western Brush Wallaby)	✓			
Setonix brachyurus (Quokka)				✓
Isoodon obesulus (Short-nosed Bandicoot)				✓
Antechinus flavipes (Mardo)		✓		
Sminthopsis murina (Common Dunnart)				✓
Chalinolobus gouldii (Gould's Wattled Bat)		✓		
Chalinolobus morio (Chocolate Bat)		✓		
Nyctophilus gouldii (Gould's Long-eared Bat)		✓		
Nyctophilus geoffroyi (Lesser Long-eared Bat)		✓		
Tadarida australis (Mastiff Bat)			✓	
Tachyglossus aculeatus (Echidna)				✓
Rattus rattus (Black Rat)		✓		
Felis catus (Cat)		✓		
Sus scrofa (Pig)	✓			✓
Oryctolagus cuniculus (Rabbit)			✓	✓
Vulpes vulpes (Fox)				✓

Although the range of this species has been reduced by clearing (Burbidge, 1967), it is still widespread in the south west of Western Australia where it relies on the availability of forest and woodlands for shelter.

Setonix brachyurus - Quokka

Although no animals were found in the area during the survey their runnels were in evidence in the broad gully headwaters of Bull and Snake Brooks in Karnet Block.

Several museum records exist for the general area, including, one recent record from approximately 20 km north east of Jarrahdale (Aug. 1970 WAM 008370), and five from 12 km north, north east of Jarrahdale (Sept. 1958 WAM 003536, May 1957 WAM 003222, 003223 and 006508 and May 1958 WAM 003360).

This animal is found in broad gullies characterised by dense low scrub within high rainfall areas between the Moore River and east of Albany.

Phalangeridae

Trichosurus vulpecula - Brush-tail Possum

This species was not seen or collected during the survey and is not listed in museum records for the area.

Nevertheless this species is widespread in the south west and may be present within the survey area.

Burramyidae

Cercartetus concinnus - Pigmy Possum

This species was not found in the area during the survey but there is a recent museum record from approximately 15 km east of Jarrahdale

(Oct. 1971, WAM 010289).

The pigmy possum is local in distribution but common in the north, east and south forest extremities. Although it may have a wide range of habitats from forests to heaths, its presence is often associated with the presence of flowering proteaceous plants. It may be present in the area.

Tarsipedidae

Tarsipes spencerae - Honey Possum

This species was not collected during the survey and is not listed in museum records for the area.

Its presence is associated with the availability of nectar producing plants and it is normally found within wandoo or banksia woodland and southern heath communities.

Granite outcrop heaths and the banksia stands within the survey area are a potential food source. However the flowering period may be limited within these two vegetation types.

Peramelidae

Isoodon obesulus - Short-nosed Bandicoot

Although no animals were seen, a number of this species characteristic diggings were observed in gully situations within the survey area.

Several museum records exist for the general area, including two specimens from approximately 9 km north west of Jarrahdale (July 1969, 007947 and no date, 013723), one recent record from approximately 14 km east of Jarrahdale (Oct. 1976, 014877) and one specimen from 13 km east of Jarrahdale (Nove. 1967, WAM 007964).

Dasyuridae

Dasyurus geoffroii - Western Native Cat

No animals were found in the area during the survey. However one specimen, a road death, was identified by R. Chandler along Jarrahdale Road, one kilometre west of site 1 in November 1981.

Eight museum records exist for the general area, from approximately 15 km north of Jarrahdale (no date WAM 002063), approximately 12 km north of Jarrahdale (no date WAM's 000235/001 and 000235/002), approximately 8 km north east of Jarrahdale (Feb. 1980 WAM 018586), approximately 17 km east, north east of Jarrahdale (April 1962 WAM 004969), approximately 4 km east of Jarrahdale (June 1958 WAM 003359) and approximately 9 km south, south east of Jarrahdale (June 1958 WAM's 003491 and 004098). The modern distribution of the native cat encompasses the south west forests but it is nowhere common.

Phascogale tapoatafa - Brush-tailed Phascogale

No animals were seen in the area during the survey but there is a recent museum record from 8 km south west of Jarrahdale (Dec. 1972 WAM 011954).

Within Western Australia this species appears to be most common within the high rainfall forest zones of the south-west.

Antechinus flavipes - Mardo

Four specimens were collected from breakback traps during the survey as follows.

One adult female trapped ten metres from Wungong Brook at site 1, one unsexed adult trapped along a ridge at site 2 and two adult females trapped mid slope at site 7.

Museum records indicate that the animal is not uncommon in jarrah/ marri forest within the Jarrahdale area. It has been recorded from a variety of areas throughout the south west of Western Australia.

Its occurrence and abundance in an area appears correlated to the time since the area was burnt. All specimens obtained during this survey were associated with a deep litter layer in forest unburnt for several years.

Sminthopsis murina - Common Dunnart

Although no animals were found in the area during the survey, hair from this species was found in a fox scat found near site 17 within vegetation complex 20. In addition nests of this species were often found within blackboy debris of the survey area.

A museum record exists for the animal from approximately 9 km north, north east of Jarrahdale (July 1966 WAM 007940).

This animal although widespread from Shark Bay in the north west to Israelite Bay in the south east, appears to be more common in the southern areas where it is often found in hollow logs and blackboys.

Sminthopsis crassicaudata - Fat Tailed Dunnart

This species was not found in the area during the survey but there is a recent museum record from approximately 9 km north, north west of Jarrahdale (June 1966 WAM 007511).

Although this species in Western Australia is widely distributed extending inland from the south west, it appears confined to more or less open country within its range.

Myrmecobius fasciatus - Numbat

This species was not found during the survey, although several recent sightings have been reported by forestry officers within the area including one from approximately 12 km south east of Jarrahdale during winter 1981 and one from approximately 3 km south of Jarrahdale on the 16th August 1982.

Five museum records exist for the general area, from approximately 16 km north of Jarrahdale (undated WAM's 000648 and 000649), from approximately 5 km east of Jarrahdale (undated WAM's 000482 and 002879) and from approximately 13 km east of Jarrahdale (Dec. 1976 WAM 014949).

This species may be found within jarrah forest or wandoo woodland within the south west of Western Australia. Although uncommon, it has recently been found in greater numbers in the jarrah forest (Christensen et al, unpublished) and may be within the general survey area.

RODENTIA

Muridae

Mus musculus - House Mouse

This species was not found in the area during the survey. Although there are only two museum records for the general area (approximately 9 km and 6 km north, north east of Jarrahdale, July 1966 WAM 007940 and May 1963 WAM 005817 respectively), this species could be expected to occur commonly within the area.

It is widely distributed in Western Australia and is common in the south west, especially near farming areas or in recently burnt areas.

Rattus rattus - Black Rat

Three specimens were collected during the survey, two from breakback traps and one from a cage trap, as follows.

One unsexed adult trapped along a ridge at site 2, one juvenile female trapped five metres from the creek at site 2 and one adult male trapped (cage trap) five metres from Bull Brook at site 8.

The large number of museum records suggest that it is common within the survey area.

This species occurs throughout the south west where it appears to favour moist sites within high rainfall areas.

Hydromys chrysogaster - Water Rat

This species was not found in the area during the survey, although there is an undated museum record from approximately 9 km north, north west of Jarrahdale (WAM 000631). It should be noted however that the grid co-ordinates given for this specimen may not be accurate as it is described as being from the Canning River reserve (well to the north of the given references).

Nevertheless this animal is relatively common throughout the south west of the state in swamps, lakes and watercourses and may be within the survey area.

CHIROPTERA

Vesperitilionidae

Nyctophilus major - Long Eared Bat

This species was not found in the area during the survey, although

four recent museum records exist from jarrah forest approximately 40 km south of Jarrahdale (Feb. 1980 WAM's 016850, 016853, 016862 and 018709). It is likely to occur within the area.

Nyctophilus geoffroyi - Lesser Long Eared Bat

One animal was captured by bat trap within the survey area during March 1982. A recent museum record exists from jarrah forest approximately 40 km south of Jarrahdale (Feb. 1980 WAM 018710). It may be relatively common within the survey area.

Nyctophilus gouldii - Gould's Long Eared Bat

One animal was trapped within the survey area during March 1982. Although this species is not listed in museum records for the area it may be relatively common.

Eptesicus regulus - Little Brown Bat

This species was not found in the area during the survey. Fourteen museum records exist for the general area as follows.

Four specimens from approximately 25 km north west of Jarrahdale (June 1972, WAM's 008844, 45, 46 and 47), one specimen from approximately 8 km north, north west of Jarrahdale (Jan. 1980 WAM 018998) and eleven specimens from approximately 40 km south of Jarrahdale (Feb. 1980 WAM's 016842, 43, 44, 45, 46, 47, 48, 49, 018711, 018712 and 018713).

This species is very common in southern Western Australia (Christensen & Kimber, 1977) and probably occurs within the survey area.

Chalinolobus gouldii - Gould's Wattled Bat

One specimen was collected in a mist net during the survey period. A further six animals were trapped during March 1982.

Nine recent museum records exist for the general area as follows.

Six specimens from approximately 25 km north west of Jarrahdale (June 1972 WAM 008838, 39, 40, 41, 42 and 43), two specimens from approximately 9 km north, north west of Jarrahdale (Jan. 1981 WAM 018999, 019000 and one specimen from approximately 40 km south of Jarrahdale (Feb. 1980 WAM 016841).

This bat is common in jarrah and wandoo forest (Christensen and Kimber, 1977) and could be expected to be abundant within the survey area.

Chalinolobus morio - Chocolate Wattle Bat

Four animals were captured in bat traps during March 1982. There is only one recent museum record for the area, from approximately 40 km south of Jarrahdale (Feb. 1980 WAM 016840). However this bat is likely to be common within the survey area.

Pipistrellus tasmaniensis - Great Pipistrelle

This species was not collected during the survey and is not listed in museum records for the area.

Nevertheless this bat occurs in the south west of Western Australia where studies (Christensen and Kimber 1977, Dames and Moore 1981) have reported it from dry sclerophyll forests. Hall and Richards (1979) describe its preference for tall, wet sclerophyll vegetation in the eastern states.

Hence although it may be more frequent in the southern than the northern jarrah forest, it is likely to occur within the survey area.

Molossidae

Tadarida australis - White Striped Mastiff Bat

Although no animals were captured in the area, a number of calls of

this species were heard throughout the survey area during spotlighting, mist netting and bat shooting surveys.

One record of this species exists with the W.A. Museum, from approximately 8 km north, north west of Jarrahdale (Jan. 1981 WAM 018996).

This is a common tree dwelling bat throughout the southern part of the continent (Hall and Richards, 1979) and it inhabits a variety of forest types within the south west of W.A. (Christensen and Kimber, 1977).

Tadarida planiceps - Little Flat Mastiff Bat

This species was not found during the survey. However one museum record exists for this species within the general survey area, from approximately 8 km north, north west of Jarrahdale (Jan. 1981 WAM 018997).

This species is found throughout southern Australia, although occurring more commonly in wandoo woodland than jarrah forest (Christensen and Kimber, 1977). Nevertheless it is likely to be found within the survey area.

MONOTREMATA

Tachyglossidae

Tachyglossus aculeatus - Echidna

Although no animals were seen, the characteristic diggings of this species were sighted within site (Fig. 1) during the survey.

A single undated museum record exists for the area from approximately 16 km north of Jarrahdale (WAM 000260).

This species occurs throughout Australia, although is not often seen, south of Perth.

CARNIVORA

Canidae

Vulpes vulpes - Fox

Although no animals were seen, several scats of this species, were collected within the survey area.

Analysis of the scats indicated a wide range of diet. *Sminthopsis murina* presence was determined from the analysis.

The fox is a common introduced species in the south west of Western Australia where it has caused considerable damage to the native fauna (Christensen, 1980).

Felis catus - Cat

One adult male was captured in a box trap ten metres from Wungong Brook at trapline one during the survey.

This feral animal is common throughout the south west of W.A. in almost all vegetation types.

ARTIODACTILA

Suidae

Sus scrofa - Pig

One animal was seen along trapline 7 and the characteristic heavy soil disturbance of this species was seen in a number of localities, chiefly in moist and shaded conditions.

This feral animal is now very common in the western high rainfall and medium rainfall areas of the jarrah forest north of Greenbushes where it

poses as a potential disease threat and causes much disturbance to the native vegetation.

LAGOMORPHA

Leporidae

Oryctolagus cuniculus - Rabbit

Rabbits were recorded from scats and diggings at a number of sites, chiefly near granite outcrops or open gully situations.

They are common in the south west, particularly near agricultural land.

DISCUSSION

In summary, a total of 12 species of native mammals were recorded in the area during the survey. However only three of these, the Grey Kangaroo *(M. fuliginosus)*, the mardo *(A. flavipes)* and Gould's Wattled Bat *(C. gouldii)* were found to be common. Further work is required to determine the status of the other eight bat species occurring or likely to occur in the area.

In addition to those species recorded from the survey area (Table 1), museum records taken together with the types of habitat present in the area make it almost certain that the Phascogale *(Phascogale tapoatafa)*, the Long Eared Bat *(N. major)*, the Great Pipistrelle *(P. tasmaniensis)*, the Little Brown Bat *(E. regulus)* and the Little Flat Mastiff Bat *(T. planiceps)* occur within the survey area.

It is possible that the Water Rat *(H. chrysogaster)*, Fat Tailed Dunnart *(S. crassicaudata)*, Honey Possum *(T. spencerae)*, Numbat *(M. fasciatus)* and Brush Tailed Possum *(T. vulpecula)* also occur there.

Introduced mammals were found to be dominant. In addition to the five species observed, the House Mouse *(M. musculus)* is likely to occur in the area.

Of the introductions the fox and the cat are known to be very different predators and may be partly responsible (both as predators and competitors) for the low population densities of many native mammals within the area.

The effect of control burning on the mammal fauna of the survey area is not clear from the three terrestrial species trapped. The mardo *(Antechinus flavipes)* was found to prefer long unburnt areas although populations were low of all species in all areas.

BIRDS

RESULTS

A total of 61 species of birds were recorded from the survey area, including 40 species recorded during one or more of the six transects.

This total includes 34 passerines and 27 non passerines (or 24 passerines and 16 non passerines encountered along the transects).

It is considered that most resident forest dwelling birds have been recorded on the survey but that longer term observations would include many more waterfowl and raptors (only 9 species from these two groupings were encountered on the survey).

Few waterfowl were recorded during the survey period from within Pipehead or Serpentine dams. This may be due to the poor quality of habitat provided by large, deep, steep walled dams containing few areas of reeds or cover.

Three migrating species, the pallid cuckoo, the rainbow bee-eater and the striated pardalote were recorded from the survey area, the pardalote being one of the most frequently encountered species. The recording of the Red-eared Firetail is of interest as it is classified as being rare and endangered. An individual was recorded in thick gully vegetation at site 3.

In summary, the birds observed constitute a typical south west assemblage with all species being within their previously known range.

TABLE 2

JARRAHDALE SURVEY BIRD LIST

BIRDS	MINOR AND MAJOR VALLEY TRANSECTS	LATERITIC UPLANDS, GRANITIC OUTCROP TRANSECTS	OTHER SIGHTINGS
STRUTHIONIFORMES - CASUARIIDAE			
Emu *Dromaius novaehollandiae*			✓
ARDEIFORMES - ARDEIDAE			
White-faced Heron *Ardea novaehollandiae*			✓
ANSERIFORMES - ANATIDAE			
Wood Duck *Cheronetta jubata*			✓
Black Duck *Anas superciliosa*			✓
ACCIPITRIFORMES - ACCIPITRIDAE			
Wedge-tailed Eagle *Aquila audax*	1		
Black Shouldered Kite *Elanus notatus*			✓
Collared Sparrowhawk *Accipiter cirrocephalus*	1		
Square Tailed Kite *Lophoictinia isura*	1		
PODICIPEDIFORMES - PHALACROCORACIDAE			
Little Pied Cormorant *Phalacrocorax melanoleucos*			✓
COLUMBIFORMES - COLUMBIADE			
Brush Bronzewing *Phaps elegans*			✓
Domestic Pigeon *Columba livia*			✓
Common Bronzewing *Phaps chalcoptera*			✓
PSITTACIFORMES - PSITTACIDAE			
Ring-necked Parrot *Platycercus zonarius*	9	21	
Western Rosella *Platycercus icterotis*	5	2	
Red-capped Parrot *Purpureicephalus spurius*	6	10	

BIRDS	MINOR AND MAJOR VALLEY TRANSECTS	LATERITIC UPLANDS, GRANITIC OUTCROP TRANSECTS	OTHER SIGHTINGS
Red-tailed Black Cockatoo *Calyptorhynchus magnificus*			✓
White-tailed Black Cockatoo *Calyptorhynchus baudini*	5	10	
Elegant Parrot *Neophema elegans*		5	
CUCULIFORMES - CUCULIDAE			
Pallid Cuckoo *Cuculus pallidus*			✓
Fan-tailed Cuckoo *Cuculus flabelliformis*	6	7	
Golden Bronze Cuckoo *Chrysococcyx lucidus plagosusi*	4		
Rufous Tailed Bronze Cuckoo *Chrysococcyx basalis*	3	2	
STRIGIFORMES - STRIGIDAE			
Boobook Owl *Ninox novaeseelandiae*			✓
CAPRIMULGIFORMES - AEGOTHELIDAE			
Australian Owlet-nightjar *Aegotheles cristatus*			✓
- PODARGIDAE			
Tawny Frogmouth *Podargus strigoides*			✓
CORACIIFORMES - ALCEDINIDAE			
Laughing Kookaburra *Dacelo gigas*	4		
- MEROPIDAE			
Rainbow Bee-eater *Merops ornatus*		5	
ASSERIFORMES - HIRUNDINIDAE			
Welcome Swallow *Hirundo neoxena*			✓
Tree Martin *Hirundo nigricans*	7		
- MOTACILLIDAE			
Richard's Pipit *Anthus novaeseelandiae*			✓

BIRDS	MINOR AND MAJOR VALLEY TRANSECTS	LATERITIC UPLANDS, GRANITIC OUTCROP TRANSECTS	OTHER SIGHTINGS
ASSERIFORMES - CAMPEPHAGIDAE			
Black-faced Cuckoo-shrike *Coracina novaehollandiae*		5	
- PARCHYCEPHALIDAE			
Scarlet Robin *Petroica multicolor*		4	
Yellow Robin *Eopsaltria australis*	1		
White-breasted Robin *Eopsaltria georgiana*	9		
Golden Whistler *Pachycephala pectoralis*	29	20	
Grey Shrike-thrush *Colluricincia hammonica*	7	4	
- MONARCHIDAE			
Grey Fantail *Rhipidura fuliginosa*	33	10	
Willie Wagtail *Rhipidura leucophrys*			✓
- ACANTHIZIDAE			
Western Gerygone *Gerygone fusca*	25	23	
Inland Thornbill *Acanthiza apicalis*	19	2	
Western Thornbill *Acanthiza inornata*	20	11	
Yellow-rumped Thornbill *Acanthiza chrysorrhoa*			✓
White-browed Scrub-wren *Sericornis frontalis*	14	1	
- MALURIDAE			
Splendid Fairy-wren *Malurus splendens*	36	2	
Red-winged Fairy-wren *Malurus elegans*	12		
- DAPHOENOSITTIDAE			
Varied Sittella *Daphoenositta chrysoptera*		8	

BIRDS	MINOR AND MAJOR VALLEY TRANSECTS	LATERITIC UPLANDS, GRANITIC OUTCROP TRANSECTS	OTHER SIGHTINGS
ASSERIFORMES - CLIMACTERIDAE			
Rufous Tree-creeper *Climacteris rufa*	2		
- PARDALOTIDAE			
Striated Pardalote *Pardalotus striatus*	71	55	
- ZOSTEROPIDAE			
Silvereye *Zosterops lateralis*	15	2	
- MELIPHAGIDAE			
Brown Headed Honeyeater *Melithreptus brevirostris*			✓
Brown Honeyeater *Lichmera indistincta*			✓
White-naped Honeyeater *Melithreptus lunatus*	8	8	
New Holland Honeyeater *Phylidonyris novaehollandiae*	29	10	
Western Spinebill *Acanthorhynchus superciliosus*	34	18	
Little Wattlebird *Anthochaera carunculata*	5		
Red Wattlebird *Anthochaera carunculata*	7	4	
- PLOCEIDAE			
Red-eared Firetail *Emblema oculatum*			✓
- ARTAMIDAE			
Dusky Woodswallow *Artamus cyanopterus*			✓
- CRACTICIDAE			
Australian Magpie *Cracticus tibicen*			✓
Grey Currawong *Strepera versicolor*			✓
- CORVIDAE			
Australian Raven *Corvus coronoides*	3	3	

REPTILES & AMPHIBIANS

RESULTS

Searching was the most productive of the methods used to record reptiles and amphibians.

A total effort of 63 man hours in 13 sites yielded 527 animals of 26 species. In addition animals were collected from each of the nine traplines, usually in pitfall traps, although breakback and cage traps captured larger skinks and goannas.

Table 3 lists the total numbers of species of each of the reptiles and amphibians found during the survey both in searching and from traplines.

Figures 3 - 6 provide an analaysis of shelter sites in major topographic units by families. In these the differential time allocated to each area has been corrected to 10 equivalent hours to provide comparisons between areas.

REPTILES

A total of 22 species of reptiles were collected or sighted during the survey, including 3 geckos, 1 legless lizard, 1 dragon lizard, 11 skinks, 1 goanna, 1 blind snake and 4 front fanged snakes.

The skink family (Scincidae) were found to be the most dominant reptile group.

The burrowing skink *(Hemiergis initialis initialis)* and *Ctenotus labillardieri* were found to be the most common species found through searching, the former being found most frequently under logs in upper slope areas, the latter most often from lower slope areas. The ornate dragon *(Amphibolurus ornatus)*, the only member of this family (Agamidae) found, was confined to upland granitic outcrops where it was dominant. *Ctenotus labillardieri* appeared to replace the dragon in lower slope outcrops (those areas within vegetation complex 20). Although only 2 hours was spent searching lower slope outcrops, 75% (n = 21) of the *C. labillardieri* animals found on granitic outcrops were found there. By comparison only 4% (n = 3) of the dragons were found in lower slope outcrops. *Ctenotus labillardieri* could be expected to be more common in moister sites in the northern part of its range, for it is a predominantly lower south western species.

Other skink species showing preferences included *Lerista distinguenda* which was generally found in upland sites, *Egernia napoleonis* which was associated with upland or minor valley forested sites and *Ctenotus delli*, a species favouring moist sites.

The Bobtail *(Tiliqua rugosa)* could have been expected from upland sites but was not observed during searching. This is largely attributed to the mild weather. Few larger reptiles were found during searching.

Of the geckos *Phyllurus milii* was restricted to granite outcrops, 83% (n = 5) of all captures being from lower slope outcrops. *Diplodactylus polyopthalmus* was also most often associated with outcrops while the marbled gecko *(Phyllodactylus marmoratus)* showed no preference.

Of the sankes, the blind snake *(Rhamphotyphlops australis)* was found to be most common. It was usually found in upslope areas, often from very bare (e.g. dieback affected) sites.

Although all common species of the area are likely to have been recorded, fourteen additional species from eight families of reptiles are thought to occur in the area. These are *Lialis burtonii* (Pygopodidae); *Amphibolurus minimus* and *Moloch horridus* (Agamidae); *Ctenotus impar, Egernia luctuosa* and *Morethia lineoocellata* (Scincidae); *Varanus tristis* and *Varanus rosenbergi* (Varanidae); *Rhamphotyphlops pinguis* and *Typhlops bituberculata* (Typhlopidae); *Acanthophis antarcticus* and *Simoselops semifasciatus* (Elapidae); *Morelia spilotes* (Boidea) and *Chelodina oblonga* (Chelidae).

Plate 9: Marbled gecko *(Phyllodactylus marmoratus)* a species collected from a variety of situations during the survey.

Plate 10: Barking gecko *(Phyllurus milii)* collected under a rock at site 17. This species was invariably found under rocks in lower slope granitic outcrops.

Plate 11: Whip snake *(Denisonia gouldii)*, the most frequently collected of the front fanged snakes. This one was found in a blackboy.

Plate 12: Moaning frog *(Heleioporus inornatus)* collected from Jarrahdale road after rain.

TABLE 4

REPTILES & AMPHIBIANS RECORDED DURING THE JARRAHDALE SURVEY

Total individuals recorded from each of the major topographic units during searching and trapping times with numbers trapped in brackets.

✓ = animals recorded during survey outside searching or trapping times.

TOPOGRAPHIC UNIT	MAJOR VALLEYS	MINOR VALLEYS	LATERITIC UPLANDS	GRANITIC OUTCROPS	TOTAL
HOURS OF SEARCH TIME (NUMBER OF TRAPLINES)	5(1)	15(4)	30(3)	13(1)	63(9)
SPECIES					
ANURA - LEPTODACTYLIDAE					
Crinia georgiana	4(4)	18(12)	13(7)	4	39(23)
Ranidella glauertii		2(2)			2(2)
Geocrinia leai		14(13)			14(13)
Heleiporus inornatus		3(3)			3(3)
Heleioporus eyeri		✓			
Limnodynastes dorsalis	✓		1(1)		1(1)
Crinia sp.		3(2)			3(2)
- HYLIDAE					
Litoria adelaidensis		✓			
LACERTILIA - GEKKONIDAE					
Phyllodactylus marmoratus	2	2	3	2	9
Phyllurus milii				6	6
Diplodactylus polyphthalmus		2		5	7
- PYGOPODIDAE					
Aprasia pulchella		3(1)		3	6(1)
- AGAMIDAE					
Amphibolurus ornatus				67(1)	67(1)
- SCINCIDAE					
Ctenotus labillardieri	16(1)	46(1)	24(2)	28	114(4)
Ctenotus delli	4	6	3	1	14
Cryptoblepharus plagiocephalus		1	1(1)	1	3(1)
Egernia napoleonis		8(3)	13(7)		21(10)
Egernia kingii		2(2)	1		3(2)

TABLE 4 (cont)

TOPOGRAPHIC UNIT	MAJOR VALLEYS	MINOR VALLEYS	LATERITIC UPLANDS	GRANITIC OUTCROPS	TOTAL
HOURS OF SEARCH TIME (NUMBER OF TRAPLINES)	5(1)	15(4)	30(3)	13(1)	63(9)
SPECIES					
LACERTILIA - SCINCIDAE					
Hemiergis initialis initialis	19(2)	23	113(5)	6	161(7)
Lerista distinguenda	4(2)	7	15	6	32(2)
Leiolopisma trilineatum		1(1)		1	2(1)
Tiliqua rugosa		6(6)	1(1)		7(7)
Menetia greyii	1	2(1)			3(1)
Morethia obscura	7(5)	6(3)	4(4)	3	20(12)
Unidentified	2	22(1)	21	19	64(1)
- VARANIDAE					
Varanus gouldii		1(1)			1(1)
- TYPHLOPIDAE					
Rhamphotyphlops australis	2	1	10		13
- ELAPIDAE					
Denisonia gouldii		1	3	1	5
Denisonia nigriceps			1		1
Pseudonaja affinis affinis				1	1
Notechis scutatus occidentalis		✓			
TOTAL INDIVIDUALS	61(14)	180(52)	227(28)	154(1)	622(95)
TOTAL SPECIES	9(5)	22(13)	15(8)	15(1)	26(18)

AMPHIBIANS

Six species of frogs were collected during the survey. Most were obtained from pit traps, although searching revealed individuals of 3 species.

Crinia georgiana was heard calling from most shallow streams within the survey area and was frequently obtained in searching and trapping well away from water.

Geocrinia leai was also common, although always close to water. *Litoria adelaidensis* was found using headtorches in reeds.

Road searching after rain revealed *Heleioporus inornatus*. Two gavid females of this species were also seen whilst road searching after rain in March 1982.

Although no *Heleioporus eyrei* were seen during the main survey period, they were heard calling in sandy gullies throughout the survey area during March 1982.

This demonstrates the fact that the surveying of Amphibians is very seasonally dependent, most species being located only during their breeding seasons or unseasonal periods of rain.

Six additional species are thought to occur in the area including one tree frog *(Litoria moorei)* and five ground frogs *(Heleioporus albopunctatus, barycragus* and *psammophilus, Crinia pseudinsignifera* and *Pseudophryne guentheri)*.

It is likely that a late autumn survey would reveal most of these species not collected but likely to occur in the area.

JARRAHDALE SURVEY SEARCHING DETAILS

FIGURES 3 - 6

FIG. 3

Major Valley
5 hours Actual Searching Time

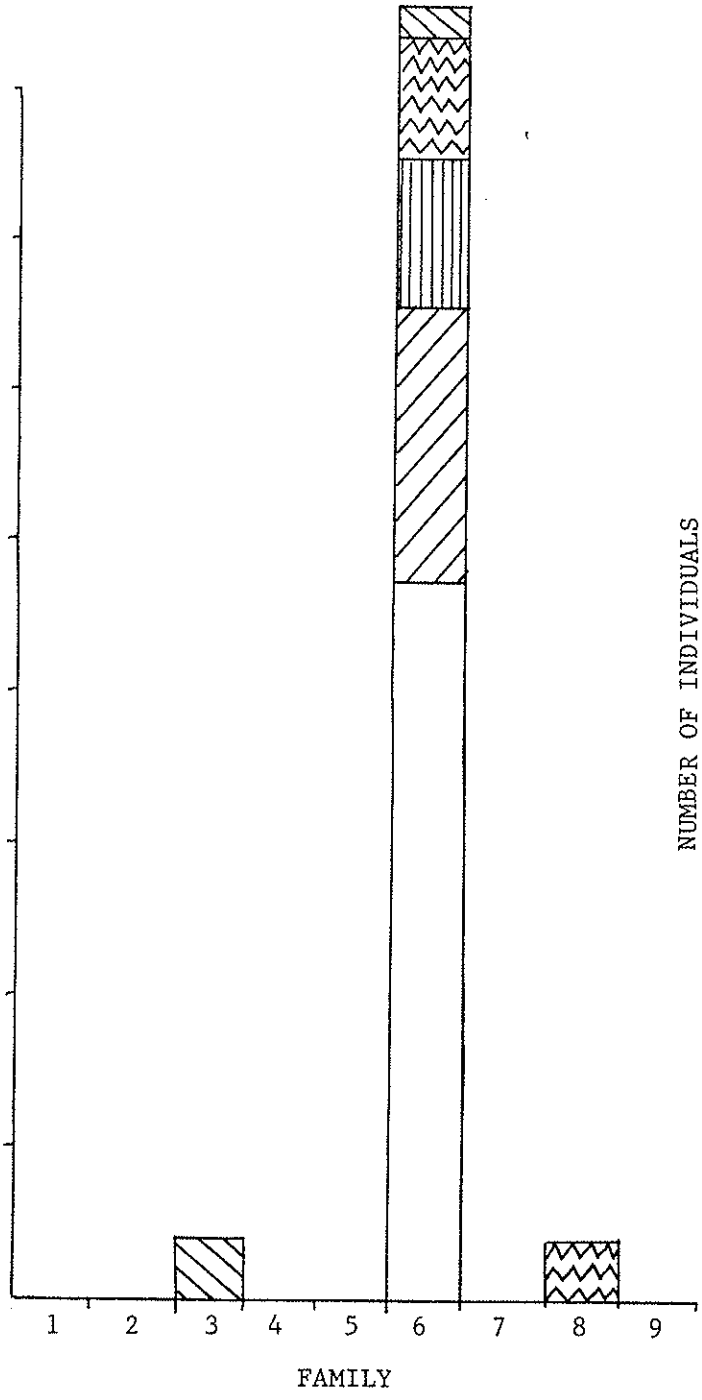
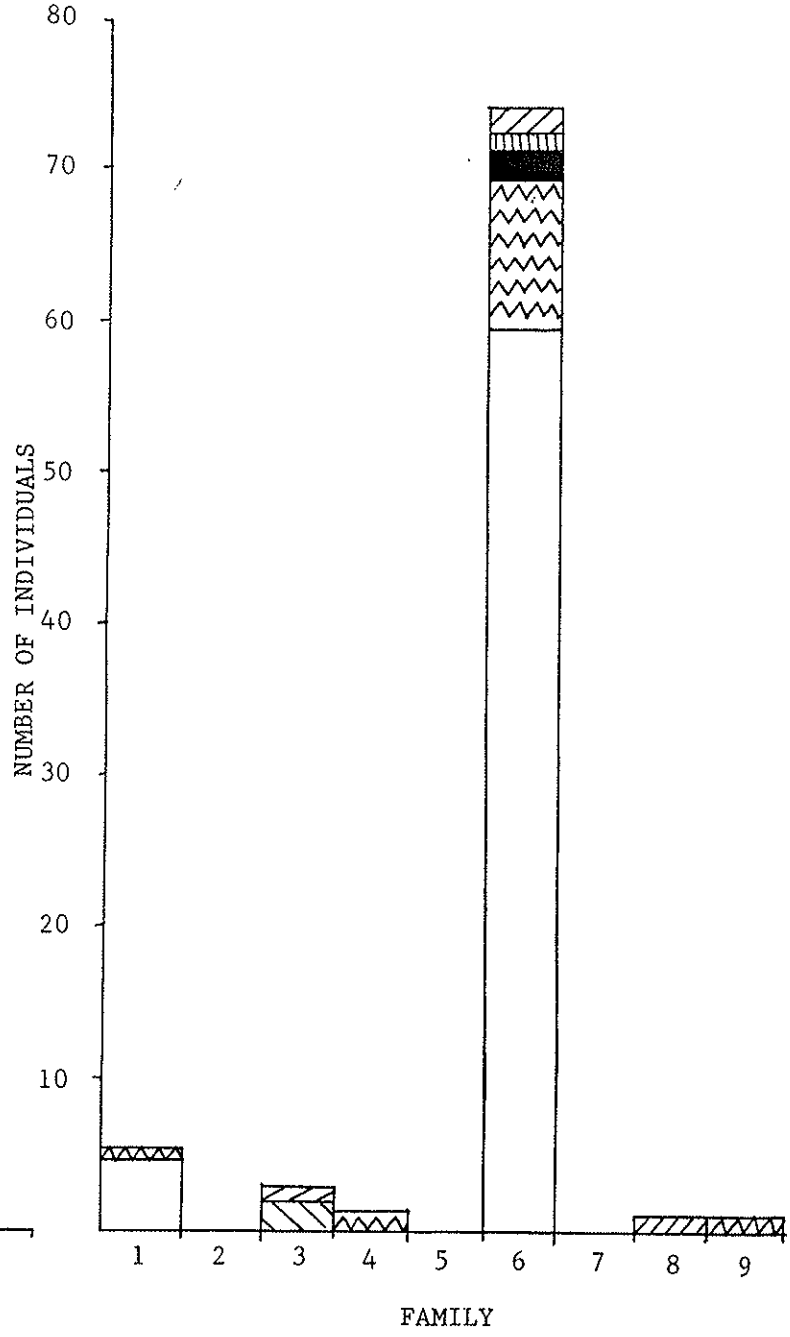


FIG. 4

Minor Valleys
15 hours Actual Searching Time



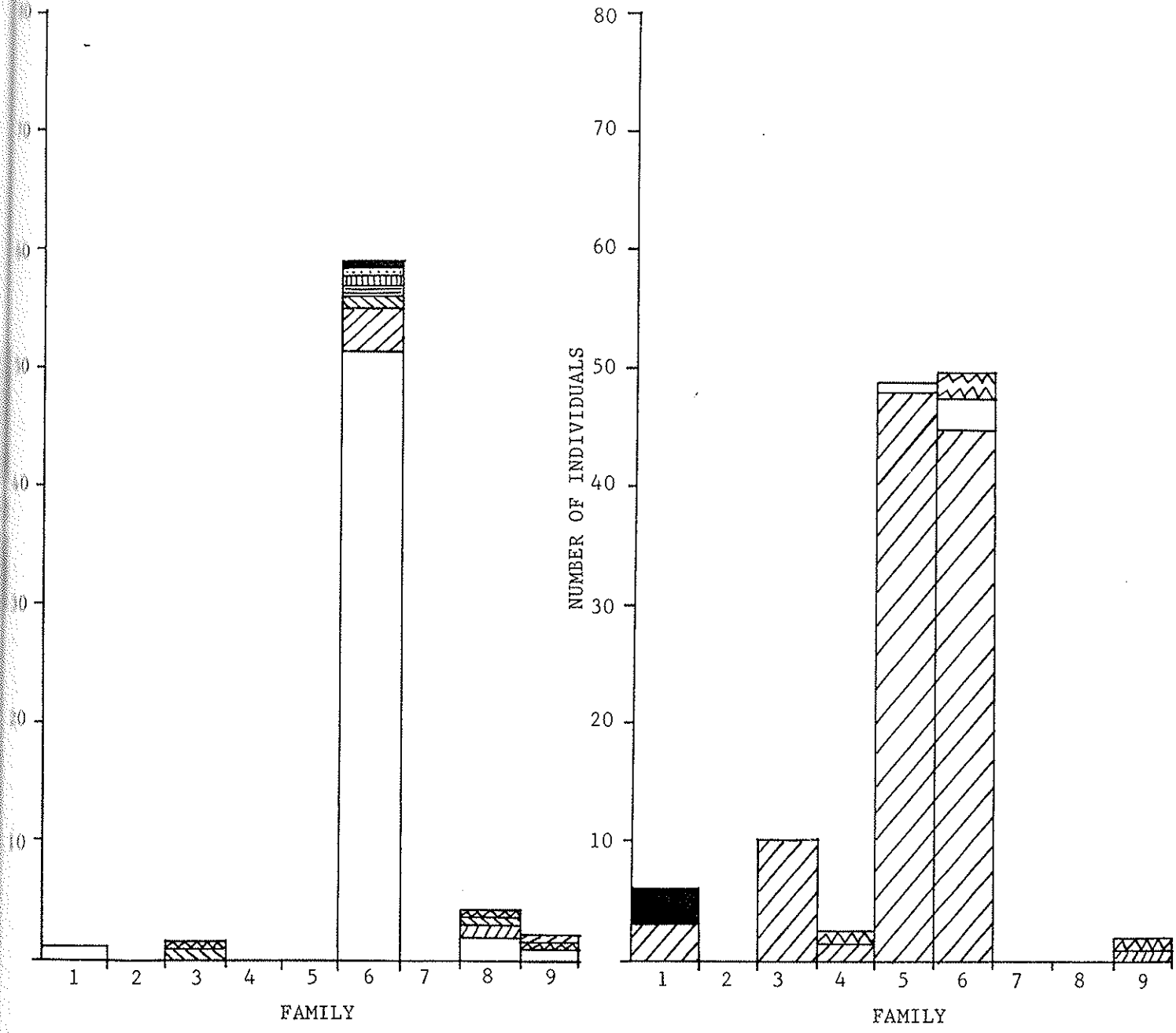
key overleaf

FIG. 5

Lateritic Uplands
30 hours Actual Search Time

FIG. 6

Granitic Outcrops
13 hours Actual Search Time



Reptile and Amphibian Shelter Sites by Family in Major Topographic Units
10 Hours Equivalent Search Time

KEY

POSITION

- Animal found in or under logs
- Animal found under rock
- Animal found in Blackboy debris
- Animal found in Stick Ants nest
- Animal found on or under bark
- Animal found in litter
- Animal found running
- Animal found in old tins, rubbish or inside another species

FAMILY

1 Leptodactylidae - Ground frogs
2 Hylidae - Tree frogs
3 Gekkonidae - Geckos
4 Pygopodidae - Legless lizards
5 Agamidae - Dragon lizards
6 Skincidae - Skinks
7 Varanidae - Goannas
8 Typhlopidae - Blind Snakes
9 Elapidae - Front fanged snakes

DISCUSSION

SURVEY TECHNIQUES AND SHELTER SITES

Figures 5 - 8 compare the numbers of Reptile and Amphibian families found by searching in each of the major topographic units. Each of the areas yielded similar total numbers of animals. The skinks were the dominant family in all but granite outcrop areas. Of the 22 species of reptiles found within the survey area, 11 of them were skinks. Trapping revealed 48 individuals of 10 species and searching 44 individuals of 10 species.

Nevertheless the two techniques did show differences (Table 3). Of note is that the larger lizards were trapped but not found during searching. The larger species are more likely to be revealed in searching during warmer weather than they are more active, although small reptiles would then be too fast to capture and identify.

Some of the skinks appear more trapable than others. The two species of *Ctenotus*, readily located during searching, were rarely trapped. The burrowing skink and *Lerista distinguenda* were also rarely trapped. Both species of *Egernia* were equally likely to be trapped or found whilst searching, while the bobtail was located only through trapping.

Searching was the most valuable of the survey techniques in locating sedentary species and families on this survey. All geckos, blind snakes and front fanged snakes and virtually all legless lizards and dragon lizards found on the survey were located with this technique.

The ground frogs are readily found by trapping or searching in the correct conditions, but the species and numbers found through either technique is very seasonally and weather dependent. A comparison of shelter sites shows great similarities among forested areas of the survey.

Members of the dominant family, Scincidae were generally found under logs, although rocks, blackboy debris and ants nests were also favoured sites.

Bark is recognized as a favoured shelter site for many geckos. Fifty five percent (n = 5) of the geckos found in the forested areas were in fact found in this site. Nevertheless most geckos found on the survey were in fact found on granite outcrops (59%, n = 13), invariably under rocks in this situation. These were however in general different species than those found under bark.

The snakes were found in a variety of shelter sites, generally blackboy debris, rocks and logs. *Denisonia gouldii* in particular favoured blackboy debris (60%, n = 3), while the blind snake was often found under logs (46%, n = 6).

For many species, these shelter sites are probably equally a reflection of the percentages of each type of category searched. Many species appear adaptable enough to accept whatever sites are available. It is noted that most skinks were found under rocks in granite outcrop areas, these being largely the same species that were elsewhere found under logs.

It is also not possible to search all possible shelter sites; however in the ground, large logs and slabs of rock being common reptile and amphibian shelter sites.

The types of animals found in searching and the shelter sites they inhabit is largely determined by the availability and variability of these sites in any area.

The large numbers of reptiles and amphibians found within these shelter sites demonstrate the importance of this debris within the forest landscape.

This has implications in dieback graveyard, gravel pit and bauxite pit rehabilitation. The provision of shelter sites for reptiles also provides habitat for invertebrates possibly enabling more rapid colonization of hostile sites.

The short term effects of control burning and dieback on reptile fauna appear to be interrelated. Three upland searching sites were compared. Burrowing skinks accounted for 88% (n = 43), 52% (n = 46) and 33% (n = 16) of reptiles found in searching sites 2, 5 and 13 respectively. Hence burrowing skinks were found to be most dominant in upland sites with a deep littler layer. The results are less clear for minor valley sites, although more species were found in open areas. This may be a reflection of bias in the searching method.

FISH

A scoop net similar to that used by Christensen (unpublished) to collect southern species was used to sample fish within and around freshwater streams and dams within the study area.

A single species *Galaxias occidentalis*, the western minnow, was collected within the upper reaches of the Canning River, Wungong Brook (a tributary of the Canning), tributaries of the Serpentine River and Serpentine Dam.

This species was found to be common in all streams and waterpoints sampled.

According to Chubb et al (1979) indigenous freshwater teleosts are represented in the Swan-Avon River system by only four species, one galaxiid *(Galaxias occidentalis)*, one plotosid *(Tandanus bostocki)*, one percichthyid *(Bostockia porosa)* and one kuhliid *(Edelia vittata)*. The introduced poeciliid *Gambusia affinis* is also known to occur in the system.

Technical problems may be the reason for only one of these species being collected.

CONCLUSIONS

The results of the survey are encouraging for all but the terrestrial mammal fauna considering the single season and short survey period.

This survey has almost certainly failed to locate some species from all groups which occur within the vegetation complexes sampled. However, it has probably located most of the common species from all but the amphibian group, occurring in the area at the present time.

The dominance of some introduced mammals may be one factor responsible for the paucity of native terrestrial mammals within the area. This is likely to be one of several related factors. The recent land use of the survey area is likely to have had an important though diffuse effect on its fauna. This includes the effects of control burning, dieback and logging within the area.

Most of the passerine fauna likely to occur in the area was recorded. The paucity of raptors and waterbirds was pronounced, possibly because of the likely poor habitat of large, deep, steep walled dams and the low populations of terrestrial mammals. Nevertheless Ford et al (1982) showed a reduction in bird numbers in woodland areas of northern N.S.W. variously affected by (non-pathogenic) dieback and Weste (1981) discussed the effects of a change in vegetation structure and floristics in Victoria. Little work has been done in this field in Western Australia.

A good diversity of reptile fauna was found within the area demonstrating the capacity of this group to respond to changes. Nevertheless the importance of shelter sites has been demonstrated, particularly in dieback areas. This also demonstrates the importance of the provision of debris in the rehabilitation of bauxite pits and dieback graveyard sites.

Several frog species likely to be common within the area were not found, largely due to survey timing. Several fish species were not recorded largely due to technical difficulties.

Management plans for the flora, fauna and landscape M.P.A.s of the Northern Jarrah forest are required. Attention should be paid to fauna management in relation to dieback and burning within these areas. It is recommended that firewood operations should continue to be withheld from benchmark dieback sites and flora, fauna and landscape M.P.A.s.

The impact of the F.I.R.S. programme on fauna populations within dieback graveyard areas requires examination.

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APPENDIX 1

Descriptions of Survey Sites

SITE	DOMINANT OVERSTOREY SPECIES	VEGETATION COMPLEX	TOPOGRAPHIC UNIT	STRUCTURAL CLASSIFICATION	YEAR OF LATEST BURN	SURVEY TECHNIQUES
1	*E. patens, E. calophylla*	11	minor valley	open forest	1937	1, 2, 3, 4
2	*E. marginata*	1	lateritic upland	open forest	1937	1, 2, 3, 4
3	*E. marginata, E. calophylla, E. patens*	11	minor valley	open forest	1979	1, 3, 4
4	*E. marginata*	2	lateritic upland	open forest	1979	1, 3, 4
5	*E. marginata, E. calophylla*	2	lateritic upland	open forest	1979	1, 2, 3, 4
6	*E. patens, E. marginata*	10	minor valley	open forest	1977	1, 3, 4
7	*E. calophylla, E. marginata, E. patens*	20	major valley	open forest	1977	1, 2, 3, 4
8	*E. megacarpa*	10	minor valley	open forest	1977	1
9	-	2	granitic outcrop	rock outcrop	-	1, 2, 3, 4
10	*E. marginata, E. calophylla, E. patens, M. preissii*	11	minor valley	open forest	1979	2, 3
11	-	1	granitic outcrop	rock outcrop	-	2
12	*E. patens, E. calophylla, E. marginata*	11	minor valley	woodland	1979	2, 4
13	*E. marginata, E. calophylla*	2	lateritic upland	woodland	1977	2
14	*E. calophylla*	2	lateritic upland	open woodland	1977	2
15	-	2	granitic outcrop	rock outcrop	-	2
16	-	20	granitic outcrop	rock outcrop	-	2, 4
17	-	20	granitic outcrop	rock outcrop	-	2

KEY TO SURVEY TECHNIQUES

1 = trapline
2 = searching
3 = spotlight survey
4 = bird transect

Vegetation complex and topographic units based on Heddle et al (1978).

Structural classification based on Smith (1972).

APPENDIX 2

Jarrahdale Survey Trapping Results

TOPOGRAPHIC UNIT	MAJOR VALLEYS	MINOR VALLEYS				LATERITIC UPLANDS			GRANITIC OUTCROPS	TOTAL	
TRAPLINE SITE NUMBER	7	1	3	6	8	2	4	5	9		
SPECIES										T/TYPE	TOTAL
MAMMALS											
Felis catus		1*								1*	1
Rattus rattus			1+		1*	1+				1*2+	3
Antechinus flavipes	2+	1+				1+				4+	4
REPTILES											
Varanus gouldii				1*						1*	1
Tiliqua rugosa		1*		2*	3*	1+				1+6*	7
Egernia kingii				1+1*						1+1*	2
Egernia napoleonis		1+	1+	1+		1 3+	1 2+			2+8	10
Cryptoblepharus plagiocephalus								1		1	1
Ctenotus labillardieri	1	1					2			4	4
Morethia obscura	5	1	2			1	3			12	12
Leiolopisma trilineatum		1								1	1
Hemiergis initialis initialis	2					1	4			7	7
Lerista distinguenda	2									2	2
Amphibolurus ornatus									1+	1+	1
Aprasia pulchella			1							1	1
Menetia greyii		1								1	1

APPENDIX 2 (cont)

TOPOGRAPHIC UNIT	MAJOR VALLEYS	MINOR VALLEYS				LATERITIC UPLANDS			GRANITIC OUTCROPS	TOTAL	
TRAPLINE SITE NUMBER	7	1	3	6	8	2	4	5	9		
SPECIES										T/TYPE	TOTAL
AMPHIBIANS											
Crinia georgiana	4	3	5	4		3	3	1		23	23
Ranidella glauerti			2							2	2
Geocrinia leai				8				5		13	13
Unidentified crinia sp.			2							2	2
Limnodynastes dorsalis							1			1	1
Heleioporus inornatus		1	1	1						3	3
TOTALS Trapnights (captures)											
Box trap	25	30(1)	30	25(3)	25(4)	30	30	30		225(8)	
Breakback	50(2)	60(2)	60(2)	50(2)	50	60(6)	60(2)	60	100(1)	550(2)	99
Drift fence	10(12)	10(8)	10(14)	10(14)		10(6)	10(14)	10(2)		78(74)	

Trap Types *

Breakback +

All others were captured in pitfall traps in drift lines

Trapline sites 8 and 9 contained no driftline

Trapline 9 consisted of 20 breakback traps only.

APPENDIX 3

Weather Data

Weather records from Jarrahdale Forests Department Office for period of survey field work.

Date	Max Temp.	Min Temp.	Rainfall	Relative Humidity
17-10-81	26°	Not available	Not available	30%
18-10-81	Not available	Not available	5mm	21%
19-10-81	21°	3°	-	21%
20-10-81	19°	5°	-	40%
21-10-81	23°	9.5°	-	42%
22-10-81	19.5°	11°	-	44%
23-10-81	26°	12°	-	26%
24-10-81	29.5°	14.5°	-	16%
25-10-81	34°	15.5°	-	32%
26-10-81	19°	10°	17.8mm	56%
27-10-81	15°	11°	12.6mm	54%
18-03-82	28°	14°	-	34%
19-03-82	30°	16°	-	36%
20-03-82	34°	19°	-	40%
21-03-82	20°	12°	20.9mm	80%
22-03-82	18°	8°	-	62%

APPENDIX 4

Specimens Collected During the Survey

All animals collected as specimens are lodged in the Museum collection.

The following information details the specimens and corresponding accession numbers.

AMPHIBANS

Heleioporus eyeri	WAM R76262-64
Heleioporus inornatus	WAM R78076
" "	WAM R78085-10
" "	WAM R76265
" "	WAM R78074
Ranidella glauerti	WAM R78066
" "	WAM R78071
" "	WAM R78072
" "	WAM R78073
" "	WAM R78084
Lymnodynastes dorsalis	WAM R78027
" "	WAM R78065
" "	WAM R78075
Litoria adelaidensis	WAM R78077
" "	WAM R78078
Geocrinia leai	WAM R78028
Crinia georgiana	WAM R78010

REPTILES

Morethia obscura	WAM R78008
" "	WAM R78011
" "	WAM R78021
" "	WAM R78022
" "	WAM R78032
" "	WAM R78033
" "	WAM R78034
" "	WAM R78041
" "	WAM R78042
" "	WAM R78053
" "	WAM R78055
" "	WAM R78058
Cryptoblepharus plagiocephalus	WAM R78009
" "	WAM R78031
" "	WAM R78043
" "	WAM R78051
" "	WAM R78070
Egernia napoleonis	WAM R78012
" "	WAM R78013
Ampholurus ornatus	WAM R78014
" "	WAM R78026

APPENDIX 4 (Cont.)

REPTILES (cont.)

Diplodactylus polyophthalmus	WAM R78015
" "	WAM R78025
Phyilurus milii	WAM R78016
" "	WAM R78081
" "	WAM R78082
Menetia greyii	WAM R78017
" "	WAM R78018
" "	WAM R78061
" "	WAM R78080
Lerista distinguenda	WAM R78019
" "	WAM R78020
" "	WAM R78046
" "	WAM R78056
" "	WAM R78060
" "	WAM R78068
Ctenotus labillardieri	WAM R78023
" "	WAM R78024
Egernia kingii	WAM R78029
" "	WAM R78064
Hemiergis initialis initialis	WAM R78030
" " "	WAM R78045
" " "	WAM R78047
Ctenotus labillardieri	WAM R78035
Aprasia pulchella	WAM R78036
" "	WAM R78037
" "	WAM R78057
" "	WAM R78059
Ramphotyphlops australis	WAM R78038
" "	WAM R78044
Ctenotus delli	WAM R78039
" "	WAM R79040
" "	WAM R78054
" "	WAM R78067
" "	WAM R78069
Denisonia gouldii	WAM R78048
" "	WAM R78050
Pseudonaja affinis	WAM R78049
Denisonia nigriceps	WAM R78052
Phyllodactylus marmoratus	WAM R78062
Leiolopisma trilineatum	WAM R78063
" "	WAM R78079