EAST OF THE FRANKLAND

A BIOLOGICAL SURVEY

A report on a biological survey of the area of Vacant Crown Land situated immediately east of the Frankland River and north of Roe Road. This report is prepared for submission as the assignment topic for promotional exams 1981.

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Cover Photograph

Early morning mist rising from the Frankland River.

SUMMARY

A brief biological survey of the large tract of Vacant Crown Land east of the Frankland River and north of Roe Road.

It was unique from the aspect of flora with the most western occurrence of Albany Blackbutt *(Eucalyptus staerii)* and the south western extremity of wandoo *(Eucalyptus wandoo)*. Large tracts of land were also found to contain myrtaceous thickets comprising mainly of *Beaufortia sp.*

Fauna of the area is also unique especially with the occurrence of the Muellers snake *(Rhinhoplocephalus bicolor)* which extends its range again and also the capture of our rarest snake, the little brown *(Elapognathus minor)*. With these considerable areas of flowering *Beaufortia sp.* there appears to be a large population of the Honey Possum *(Tarsipes spencerae)*.

CONTENTS

INTRODUCTION

A biological survey of the area was undertaken over a period of 9 days in the autumn of 1981. In addition to collecting information on the fauna of the area, a collection of the flora was also made. The area of this report covers approximately 35,000 ha and is bounded by the Frankland River in the west, Private property in the north, Rocky Gully - Nornalup Road in the east and Roe Road in the south (Fig. 2). It encompasses the forest blocks of Hiker, Gully, Karara and Northumberland.

The majority of the area is vacant crown land with a strip of approximately 1.6 km on the eastern side of the Frankland River being State Forest. This forest along the Frankland River is the only true timber producing section in the area and all the Open Forest (jarrah/marri) is contained here. The remainder comprises mainly poor quality and unmerchantable forest.

Most of the area consists of soils which are unsuitable for agricultural purposes and has a fine hydrological balance. This indicates any clearing may cause an increase in salinity making the stream flows unsuitable for either agricultural or irrigation purposes.

This report looks at the plant and animal communities of the area surveyed with the possibility of the area being dedicated as a flora and fauna reserve.

FIGURE 1

FIGURE SHOWING LOCATION OF SURVEY AREA

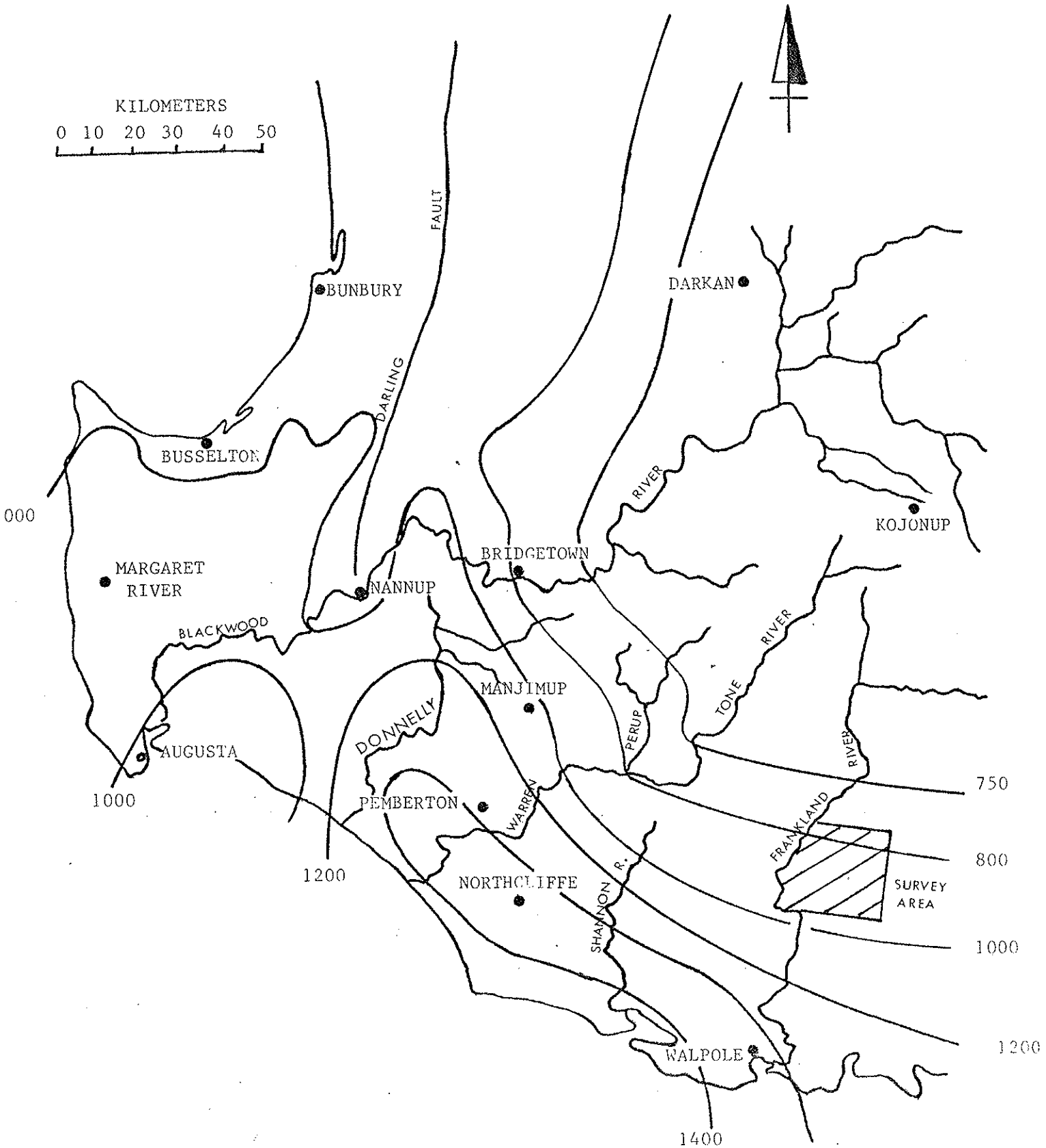
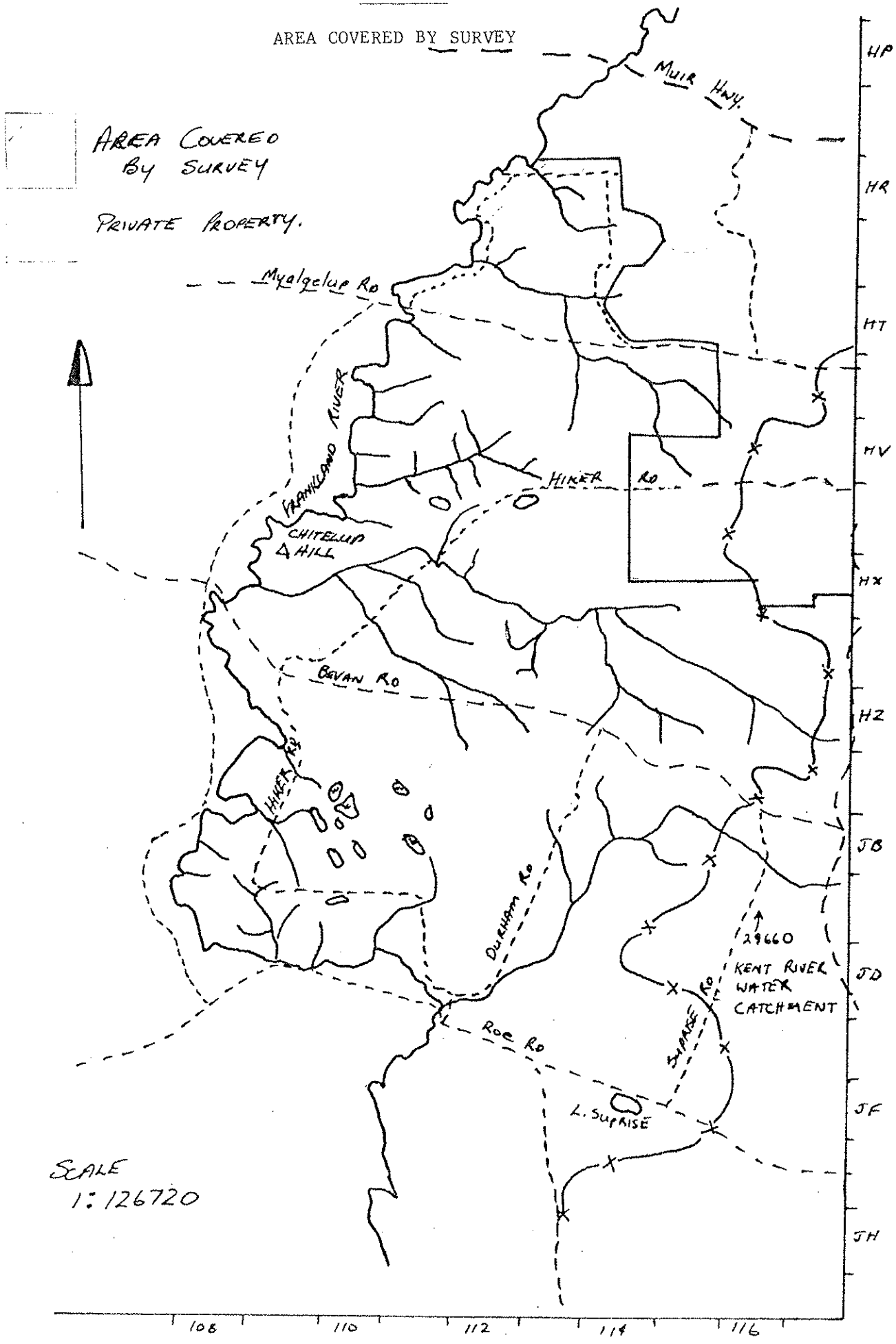


FIGURE 2

AREA COVERED BY SURVEY



CLIMATE

The climate of the Frankland River Valley is mediterranean type, with mild winters and warm to hot dry summers. The survey area falls within the 800 mm to 1 000 mm isohyet, with rainfall decreasing steadily inland (Fig. 1). During summer months the area is under influence of high evaporation, with annual evaporation rates of 800 mm to 1 000 mm, on a north south transect of the area. High evapo-transpiration from deep-rooted perennial trees and shrubs dry soils to considerable depths. At the same time many seepages and streams dry up leaving surface crusts of limonite, sodium chloride and other constituents leached from soils (Smith, 1951).

Smith (1951) postulates, sub-recent arid period is probably responsible for the shrinkage of the drainage basin of the Frankland River system and for the presence of lunettes and sandhills in major drainage lines. The blockage of certain drainage lines in this way has allowed cyclic salts to accumulate in low-lying situations.

The Frankland River survey area is drained primarily by the Frankland River. The river is seasonal and occurs as large permanent pools after periods of drying. The survey area is further drained by small tributaries flowing east west after heavy winter rains. Many of these tributaries together with the Frankland River have their origins in agricultural land cleared for cropping and grazing, several were sampled for total dissolved salts (T.D.S.). The Frankland River has a mean estimated salinity level of 7 000 mg/l. Tributaries sampled were along Nornalup, Myalgalup Road and have levels of 650 mg/l, 2 700 mg/l, 4 100 mg/l, 2 500 mg/l and 2 450 mg/l respectively. Severe salt scald existed in some creeks on the boundary of the area where they drained agricultural land, indicating the region is salt sensitive and finely balanced.

PHYSIOGRAPHY & GEOLOGY

The area is characterised by several types of topography and landform. The western boundary of the survey area is dominated by the Frankland River itself. The Frankland River is steeply incised, with interlocking spurs, characteristic of a young river valley, this area supports high quality forest. The deeply incised valley quickly gives way to more rounded hills eastwards from the main valley. Much of the area is characterised by low rounded undulating hills separated by broad, flat drainage lines which are

subject to flooding during winter rains. These drainage lines often form a large expanse of sedgeland flats which are waterlogged by heavy winter rains.

South of Bevan Road on some of the more steeply graded hills, large granite outcrops extrude from the general rounded topography. These granite outcrops are isolated and probably the remnants of a complex of large granite monadnocks which have formed Mt. Roe, Mt. Mitchell and Granite Peak.

The area is underlain by Pre-Cambrian Granite Gneiss, these rocks are overlain by sands from the Quanternary period and tertiary sedimentary deposits.

SOILS

There are several soil distinct patters of the Frankland River valley outlined in a survey of the Frankland Valley by Smith (1951). The main drainage line has fertile soil of duplex yellow sandy loam and loams. These soils support high quality jarrah forest or riverine forest. This soil type is only a thin ribbon throughout the area and quickly gives way to gravelly soils which are less fertile.

The higher more uplifted areas where remnant of the duricrust exist have brown to grey gravelly sandy loams similar to the Bangalup Association described by Smith (1951). These soils support open jarrah forest and mixed jarrah/marri forest in the deeper sandy loams.

In the northern sector of the study area several isolated valleys of wandoo *(Eucalyptus wandoo)* occur where clay soils are shallow and well drained.

The lower slopes soils are podsolic grey sands, these soil types are associated with open woodlands of *Banksia littoralis, Banksia ilicifolia, Eucalyptus staerii, Eucalyptus decipiens,* Melaleuca woodlands of *Melaleuca cuticularis, Melaleuca preissiana* and *Melaleuca rhaphiophylla.*

Where the grey sands are subject to winter waterlogging and thick layer of peaty humis occurs on the surface layer. These soils support woodlands of Melaleucas, Banksia sp. also sedgelands and open heath vegetation.

THE FLORA

The Frankland River survey area comprising some 35,000 ha has rich and diverse flora associated with the various forest types.

The area similar to that of Mitchell/Hay river survey, Christensen (1980 unpublished), is located close to the botanical districts of Warren and Darling (Fig. 3). Unlike the Mitchell/Hay river survey, the area does not support *E. occidentalis, E. decurva, E. anceps, Banksia occidentalis* and *B. prostrata.* Species typical of the Stirling botanical district. This is probably due to the area being located west of the Mitchell survey. Karri *(E. diversicolor)* is absent from the region, as the area being within the 800 mm to 1 000 mm isohyet places it outside the normal distribution zone for karri.

The vegetation types in the study area have been classified according to the structural system used by Smith (1973). A more complete list of vegetation species recorded can be found in Appendix 1.

VEGETATION FORMATIONS & ASSOCIATIONS

OPEN FOREST

The open forest is composed of jarrah or mixed jarrah/marri. This forest type is mainly found growing higher in the landscape on the gravelly sandy loams or loam soils of the more incised drainage lines. The understorey species area; *Banksia grandis, Persoonia longifolia, P. elliptica* and *Hakea lasiantha.* Scrub species recorded included *Macrozamia reidlei, Podocarpus drouyniana, Hakea elliptica, Agonis parviceps, Xanthorrhoea preissii, X. gracilis, Adenanthos obovata, A. cuneata, Bossiaea linophylla, B. ornata* and *Grevillea sp.*

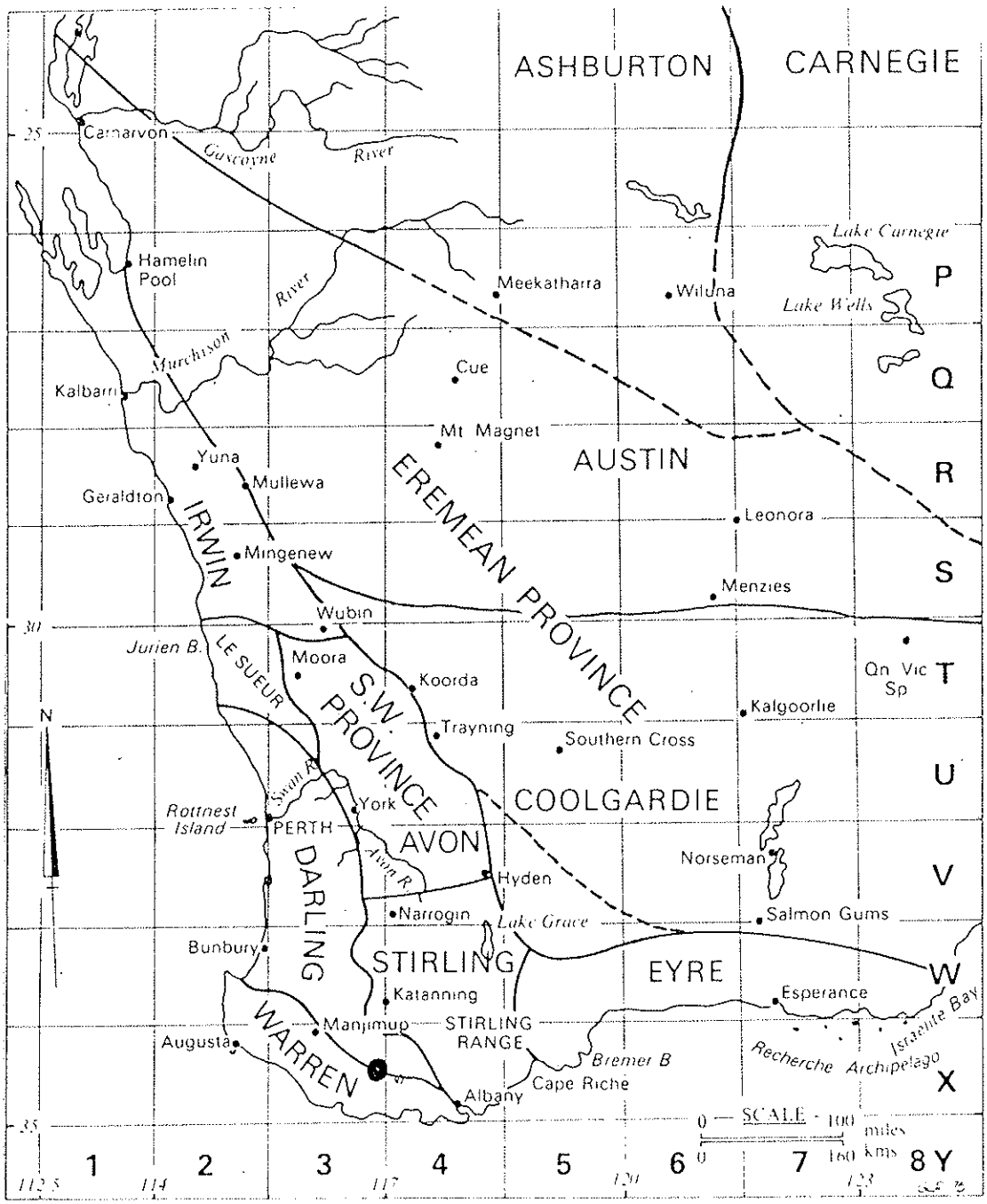
LOW WOODLAND

Several areas of low woodland occur where the soils are slightly elevated and better drained. Low woodlands of *E. staerii* occur along Surprise Road where the grey sands are free from winter waterlogging and mixed with a moderate proportion of lateritic gravel. A small area of *Banksia illicifolia*

FIGURE 3

MAP OF BOTANICAL DISTRICTS OF THE SOUTH WEST

(From Blackwall & Grieve 1954 - 65)



● Approx. location of area

PLATE 1: Open forest of jarrah *(E. marginata)* and marri *(E. calophylla)* along the Frankland River.

PLATE 2: Wandoo woodland *(E. wandoo)* found only in the north of the area.

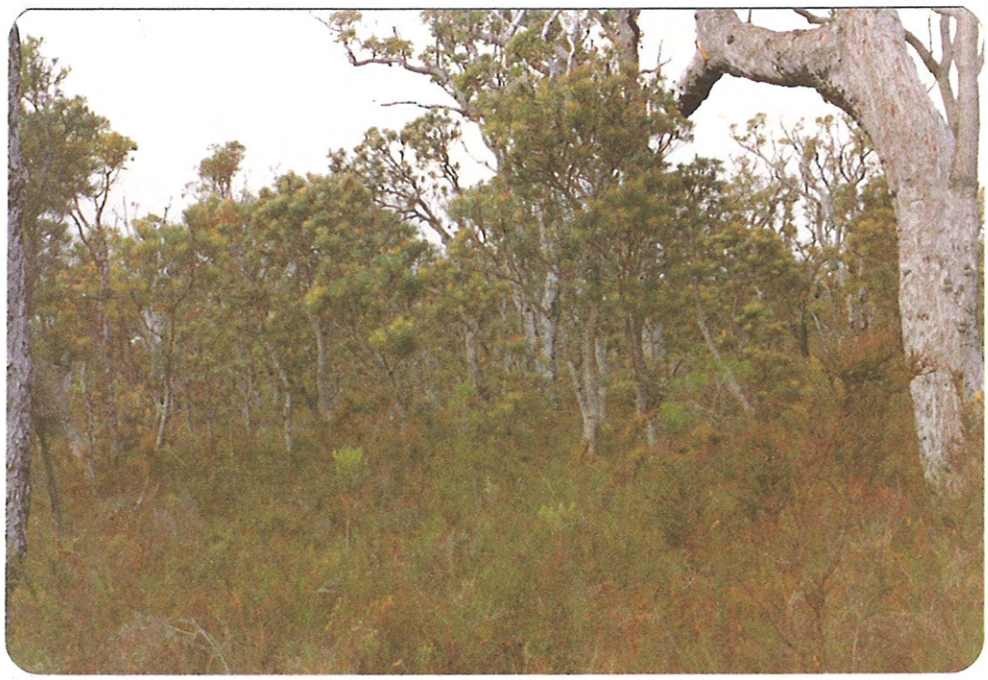


PLATE 3: Low woodland of jarrah *(E. marginata)* and banksia along Roe Road.

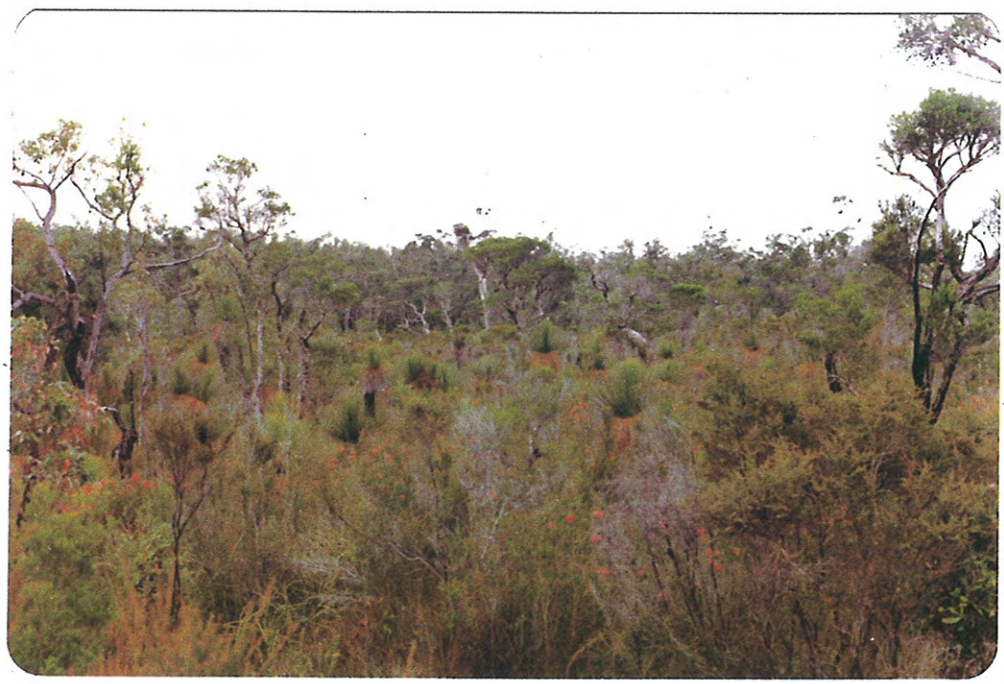


PLATE 4: Low open woodland of jarrah *(E. marginata)* and paperbark *(Melaleuca sp.)* Durham Road.

on similar soil type. The scrub species in association with *E. staerii* and *B. illicifolia* are *Anarthria scabra, Cyathochaete avenacea, Adenanthos obovata, A. cuneata, Kunzea recurva* and *Hypocalymma strictum.*

LOW OPEN WOODLAND

Low open woodlands of *E. marginata, E. patens* and *E. decipiens*, exhibiting very poor growth habits exist as isolated areas on the open flats and shallow drainage patterns. The soils are grey peaty sands, heavily leached but generally free of winter waterlogging. Understorey comprises of *Anarthria scabra, Beaufortia sparsa, Dasypogon bromeliaefolius, Banksia quercifolia* and *Conospermum flexuosum.*

Low open woodlands of *Melaleuca sp.* occur on the winter waterlogged flats. The soils are either grey sands or clay soils covering laterite close to the surface. *Melaleuca cuticularis* occurs on the latter soils with sedgeland scrub species. *Melaleuca preissiana* and *M. rhaphiophylla* generally prefer the deeper grey sands where heath/sedgeland vegetation is more common. Scrub species of *Anarthria scabra, Cyathochaete avenacea, Restio sp. Casuarina humilis, Petrophile diversifolia, P. linearis, Viminaria sp.* and *Hakea ceratophylla* occur on the clay soils. While *Beaufortia sparsa, Anarthria scabra, Banksia quercifolia, Kunzea recurva* and *Leptospermum firmum* occur on the grey sands.

SEDGELANDS AND OPEN HEATH

The open flats support both sedgeland and open heath vegetation types. In some areas the vegetation types are typical sedgeland and heathland, as described by Smith (1973), while in others the vegetation is intermixed and is difficult to determine whether the formations should be called heath or sedgeland. Generally, though sedgeland existed on waterlogged soil and open heath occurs on the deeper grey sands which are better drained. *Evandra aristata, Restio sp. Anarthria scabra, Kunzea recurva* and *Gahnia trifida* are species common on sedgeland and *Beaufortia sparsa, Adenanthos obovata, Anarthria scabra, Andersonia sp.* and *Banksia quercifolia* are common on open heath.

RIVERINE

Riverine is a forest type associated with the major rivers and drainage pattern where soils are generally fertile loams or sandy clay loams, supporting

PLATE 5: Low woodland of Albany Blackbutt *(E. staerii)* that extends to the west of Durham Road.

PLATE 6: Paperbark swamp *(Melaleuca sp.)* on Surprise Road. The only permanent water besides the Frankland River.

high quality open jarrah forest and occasionally closed jarrah forest. Major species are *E. marginata, E. calophylla* and *E. rudis.* Understorey species are *Banksia grandis, B. littoralis, Hakea oleifolia.* Scrub species recorded are *Bossiaea linophylla, Oxylobium lanceolatum* and *Lepidospermum sp.* The riverine consists of only a small ribbon of vegetation along main river, quickly giving way to open jarrah/marri forest.

There are several isolated vegetation associations that occur only as small areas.

Granite outcrops occur south of Bevan Road on several of the more elevated hills. These areas are usually small but contain several species not found elsewhere in the area. Some of these species are *Cheilanthes tenuifolia, Dryandra formosa* and *Hemigenia sp.*

A melaleuca low open forest off Surprise Road occurring with the only permanent water outside the Frankland River itself. This area showed evidence of Water Rats *(Hydromys chrysogaster). Melaleuca sp.* and *Cosmelia rubra* were the main species found growing on the peaty soils.

Closed scrub containing species *Pultenea reticulata, Agonis parviceps, Hakea ceratophylla, H. ruscifolia, Acacia myrtifolia* and *A. browiana* occur throughout the area as isolated pockets.

PLATE 7: Granite Outcrop. Typical of those occurring within the area.

PLATE 8: Low open woodland/sedgeland of paperbark and Monocot sp. typical of the area north of Bevan Road.

THE FAUNA

Data on the fauna of the area was collected using a variety of methods. Trapping with, box traps, breakbacks, pits and pits with drift fences. Spotlighting, shooting, scat collection, observation and searching techniques were all used. Museum records were also examined for mammal records for the area and the close vicinity. Forests Department records from surveys previously carried out in the near vicinity were also examined for other mammal records.

Due to the short time available it was not possible to make complete collection and and the lists are therefore not complete from any group of animals. The birds in particular with only 55 species being recorded is not complete.

There is nothing remarkable about the vertebrate fauna of the area except for a northerly influence with the presence of four skinks *Leiolopisma trilineatum, Lerista distinguenda, Morethia obscura* and *Menetia greyii*. The range of the Muellers snake *(Rhinhoplocephalus bicolor)* has again been extended by Forests Department surveys with it being recorded in the area and the capture of the Little brown snake *(Elapognathus minor)* is a first for large scale Departmental surveys and certainly extends the range of this our rarest small snake.

PLATE 9: Drift Fence. Note the number of flowering *Beaufortia sp.*

PLATE 10: Honey Possum *(Tarsipes spencerae)*. This animal was trapped readily in areas shown in Plate 9 above.

THE FAUNA

MAMMALS

I. Order Marsupilia

A. Family Macropodidae

1. Western Grey Kangaroo *(Macropus fuliginosus)*

This species is common throughout the area. It was sighted frequently during the day and at night on spotlight surveys.

2. Brush Wallaby *(Macropus irma)*

This species occurs in the area but it does not appear to be common. Only four animals were sighted in the open forest vegetation type. There is a museum record for this species from the Muir Highway, to the north of the area. (16418 Feb. 1912).

3. Tammar Wallaby *(Macropus eugenii)*

This species was not recorded and the only suitable habitat for it was to the north of Myalgelup Road in Melaleuca thickets of an unnamed creek system. Museum records exist for this animal 15 - 20 km to the north west of the area at Lake Muir, this record is from Feb. 1912 (16441, 41, 43).

4. Quokka *(Setonix brachyurus)*

No colonies were located but the presence of this animal cannot be ignored. Melaleuca swamp thickets identical to those in which this species was found in Crossing Block to the south of the area (F.D. survey 1978) exist particularly to the east and west of Surprise Road. Similar thickets were also found to the east of Hiker Road (south) of Bevan Road.

B. Family Phalangeridae

5. Common Brush-tailed possum *(Trichosurus vulpecula)*

Although none were sighted (Spotlight surveys) or trapped there appears

to be a low population within the area with the presence of "possum trees" located along the Frankland River. Museum records exist for 15 - 20 km of the area but are prior to 1930.

6. Western Ringtail Possum *(Pseudocheirus peregrinus)*

No animals were located or sighted on spotlight surveys. No Museum records exist for the area.

7. Honey Possum *(Tarsipes spencerae)*

This animal appears to be common in the area. A total of nine individuals were caught. All were within *Beaufortia sp.* flats in the southern region except for one which was trapped in the *Adenanthus cuneata* flat just south of Myalgelup Road.

8. Pygmy Possum *(Cercartetus concinnus)*

This species was not located in the area and there are no museum records for the immediate vicinity.

C. Family Peramelidae

9. Short-nosed Bandicoot *(Isoodon obesulus)*

The characteristic diggings made by this animal were seen around Melaleuca thickets on Surprise and Roe Roads. No individuals were caught. Forests Department surveys to the south in 1978 did yield this species and Museum records do exist for 15 - 20 km of the area. (M 18170, 81, 97, 98).

D. Family Dasyuridae

10. The Mardo *(Antechinus flavipes)*

Only one specimen was hand caught but suitable habitats for this species occurs in several locations. There are no Museum records for the immediate area.

11. Brush-tailed Phascogale *(Phascogale tapoatafa)*

This is a very ellusive animal to either trap or see during spotlight surveys. No specimens were collected during the survey but its

presence cannot be discounted as most museum records for it have come from the vicinity of major roads in the south west.

12. Common Dunnart *(Sminthopsis murina)*

Although only one specimen was collected, numerous nests were observed belonging to this species whilst searching. It does not appear to be as common here as it is further west. Museum records exist to the south of the area from 1977 (M 18162, 63, 83, 84, 92).

13. Western Native Cat *(Dasyurus geoffroii)*

No specimens were collected and there are no museum records for the area. Its presence cannot be discounted as suitable habitats do exist within the area.

II. Order Rodentia

E. Family Muridae

14. Western Water Rat *(Hydromys chrysogaster)*

No specimens were collected. However one animal was observed "swimming" in the Frankland River early in the morning. Evidence was also sighted for this species on a permanent pool near Surprise Road. There are no museum records for the area.

15. Southern Bush Rat *(Rattus fuscipes)*

This was the common small mammal of the area. It was trapped in all areas where dense ground cover existed. Museum records exist for 15 km to the west of the area (M 9873; 1971).

III. Order Chiroptera

F. Family Vesperitilionidae

16. Tasmanian Pipistrelle *(Pipistrellus tasmanienis)*

No specimens were collected. However museum records exist for 15 - 20 km to the south of the area collected in 1977 (M 18178).

17. Little Bat *(Eptesicus regulus)*

Four specimens were collected. Three from open forest jarrah/marri and one from jarrah/banksia woodland along Hiker Road.

18. Goulds Wattled Bat *(Chalinolobus gouldii)*

One specimen was collected in jarrah/marri forest along side farming properties in the north. This is the first record sent to the museum for the area.

19. Chocolate Bat *(Chalinolobus morio)*

No specimens collected but museum records exist for just south of the area collected in 1977 (M 18179, 88).

20. Lesser Long-eared Bat *(Nyctophilus geoffroyi)*

No specimen collected although again museum records exist to the south of the area collected in 1977 (M 18182).

21. White-striped Bat *(Tadarida australis)*

No specimens collected. Sounds heard emitted by a high flying bat believed to be this species was heard in all areas of the survey. There are no museum records for the area.

22. Dingo *(Canis familiaris)*

There are no museum records for the near area. However 4 individuals were sighted by Forests Department survey in 1972 near Lake Surprise. Tracks believed to belong to the animal were also observed along Hiker Road which had recently been re-formed by graders.

Introduced Eutherian Mammals

23. European Fox *(Vulpes vulpes)*

One individual was sighted on a spotlight survey. Foot prints were observed throughout the area especially on sandy sites.

24. Feral Cat *(Felis cattus)*

One animal was sighted on a spotlight survey.

25. Rabbit *(Oryctolagus cuniculus)*

One individual sighted on spotlight survey near farmland in the north of the area. Piles of scats of this species were observed in several places.

26. Rat *(Rattus rattus)*

One individual was caught in the dense vegetation of a dry seasonal creek bed that flows into the Frankland River.

27. House Mouse *(Mus musculus)*

Three individuals were caught in pit traps. One in the wandoo, one in the sedgeland flats and one in the low open woodland.

28. Horse *(Equus caballus)*

No animals were sighted but evidence was present in the form of scats and prints especially along the Frankland River. These were frequently over our vehicle tracks of the previous day.

In summary a total of 12 native mammals were recorded within the area. These with a further 9 species which are almost certain to occur there make a combined total of 21 species of native fauna. The mammal fauna is therefore impressive and compares with some of the best in the southern forested areas. Trapping data and a list of species is prescribed in Appendix 2.

BIRDS

Bird sightings and calls were recorded at all times, particularly in the early mornings whilst checking trap lines.

The quantitative data in each forest type or in the area as a whole is only approximate and no attempt has been made to compare between forest types. Autumn is not the best time of the year for bird records and apart from the Frankland River there were no permanent wetlands in the area. These two factors could acccount for the relatively short list of birds, 55 species.

All birds recorded were allocated to a major vegetation type and are listed according to the RAOU list of 1978 (Appendix 3).

PLATE 11: The Red-eared Firetail Finch *(Emblema oculata)*. Now on the List of Rare & Protected Fauna.

Birds of the Open Forest

A total of forty four species of birds were recorded in this vegetation type.

The most commonly recorded being the seed/fruit eating Psittaciformes, namely the White-tailed Black Cockatoo, Western Rosella, Purple-crowned Cockatoo and the Port Lincoln Ringneck. Red-tailed Black Cockatoos although widespread in the southern forest are not commonly recorded, one flock of nine individuals were observed feeding amongst the marri along the banks of the Frankland River.

Two species that are relatively common in the southern forest areas have never been recorded so plentifully as on the survey, they are the Tawny Frogmouth and the Australian Owlet-nightjar. On one spotlight survey covering 16 km 13 individual Frogmouths and 7 Owlet-nightjars were observed with the majority of both species being along the edges of the road.

The Western Thornbill appeared to be quite common throughout the area in this vegetation type with 54 individuals being observed. The relative abundance of this species (Western Thornbill) with relative high sightings of the Grey Fantail together with reasonable recordings of the Inland Thornbill (24 individuals), the White-browed Scrub Wren (19 individuals) and the White-breasted Robin (11 individuals) suggests that the area is in transition between southern and northern forest bird assembleages.

The more open nature of the understorey vegetation plus the "rough" bark of the marri and jarrah trees provided the ideal feeding habitat for the Varied Sittella and this bird was frequently seen feeding on tree trunks, branches and fallen timber on the ground. The two "flower peckers" i.e. Spotted and Striated Pardalotes were commonly observed feeding amongst the foliage of the tree species and were often seen feeding in association with the two Thornbills (Inland and Western).

Birds of the Lowland

This vegetation type comprises of the Low Open Woodland, the Heathland and Sedgelands. In all only 30 species of bird were recorded which is unusually low for the particular vegetation types covered.

Honeyeaters abounded within the vegetation types covered here with the Western Spinebill and the New Holland being most plentifull in areas

where *Beaufortia sp, Banksia sp,* the paperbark *(Meleleuca sp.)* and *Agonis sp.* were flowering. In all only three honeyeaters were observed in the vegetation type and the absence of the Tawny Crowned and Brown Honeyeaters and also the Little Wattle bird was most surprising.

Five individual Red-eared Fire-tails* were observed in the Heath country along Durham Road. This species has been found to be more common in the densely vegetated creeks within the heavier timbered high open forest (karri) in the south-west area (Forests Department unpublished data).

Tree Martins and Dusky Woodswallows were surprisingly common in this vegetation type. Numerous sightings of both species were observed flying low over the Heath and Sedgelands and returning to rest on the scattered jarrah and paperbarks in the vicinity.

The open nature of this forest type appeared to be the ideal habitat for the diurnal birds of prey. This was not so with only two specimens being observed here, they were the Marsh Harrier and the Australian Kestrel.

Two Brown Quails were caught in box traps (Appendix 7) and a further 15 individuals were sighted in the sedgeland that abounded along Hiker Road (Plate 8). Another Brown Quail was seen in the open forest along Hiker Road in the southern part of the area.

* This species is on the List of Rare and Protected Fauna, S.W.A.N.S. 1978.

Birds of the River

The only permanent waterway in the area was the Frankland River. Being inaccessible most of its course only a limited amount of time was spent observing birds in this situation.

The two most common birds seen were the Pacific Black Duck and the Dater. A pair of Musk Duck were the only recorded interesting species of bird seen in this situation. One waterbird seem from a distance and believed to be the Chestnut teal was also seen on the river. However it was not possible to get close enough to make a positive identification before the bird flew away.

In all only 10 species of bird were seen on the Waterways and two of these, the Grey Fantail and the Australian Raven, are forest species not normally associated with open expanses of water.

REPTILES

A total of 18 species were collected (Appendix 4), one goanna, one gecko, ten skinks and six snakes. The Long-necked tortoise was not collected however it is known to exist in the Frankland River

The Muellers snake *(Rhinhoplocephalus bicolor)* collected just south of Myalgelup Road further extends the range of this species. Previously it has not been recorded so far inland.

The most interested reptile species found during the survey was the Little Brown snake *(Elapognathus minor)*. This is the first time that this snake has been found on biological surveys by this Department. The area where it was found was a densely vegetated Agonis and Callistomen Gully

Most of the species of reptiles collected are typical of the southern forest areas. However again four species of skinks collected have previously been found by Forests Department surveys to more common in the more northern type jarrah or along the west coastal areas. These species are *Leiolopisma trilineatum, Lerista distinguenda, Morethia obscura* and *Mentia greyii* and were found in the open forest jarrah/marri, wandoo woodland and the more open low woodland scrubby jarrah Banksia areas.

AMPHIBIA

Nine species of frogs were collected during the survey with one species of *Ranidella* of the insignifera group remains unidentified. The common frog of the area is the burrowing frog *(Heleioporus eyrei)* (Appendix 5).

As mentioned in the Mitchell River Report (Christensen, 1980) the presence of *Pseudophryne guntheri* suggests some indication of a northern jarrah forest influence as this species may be more common in the more northern drier jarrah forest than in the south.

FISH

A total of 6 species have been collected in the area (Appendix 6). The presence of the Mud minnow *(Lepidogalaxias salamandroides)* is significant in that it extends the range of this species the furtherest inland from all

PLATE 12: The Little Brown snake *(Elapognathus minor)*. Our rarest small snake.

PLATE 13: The Muellers snake *(Rhinhoplocephalus bicolor)*. This species range was again extended during the survey.

other areas where it has been collected.

Large numbers of the Mosquito Fish *(Gambusia affinis)* were collected in the Frankland River and it appears to be the major small fish in this river. All other specimens were taken from small tributaries of the Frankland and Kent Rivers.

Fish specimens were collected in the main during a major survey of the distribution of the Mud minnow in the south west.

DISCUSSION

The results of the survey, considering the short period of time available and the size of the area are encouraging. A total of 12 native mammals were found, a further 9 possible occurring within the area, 6 introduced species of mammals, 55 birds, 18 reptiles, 9 amphibia and 6 fish.

There is only a rough estimation of the abundance of the larger mammals, no reliable estimates of populations or densities of small mammals, and has almost certainly failed to some species of mammals, birds and reptiles that occur there.

It does provide a useful source of information to assist in any planning of operations in the area and gives a base for any future fauna work which may be undertaken.

The diversity of the flora that occurs here is typical of the Warren botanical district with the drier parts of the northern sector more typical of the Darling/Avon, and some portions of the eastern sector closely related to the Stirling botanical district. The occurrence of Albany Blackbutt *(E. staerii)* was associated with the slightly deeper grey sandy soils that were not subjected to waterlogging. This is the furtherest west that this species has been found by Department surveys. The extension of wandoo *(E. wandoo)* into the northern section of the area is the most south-western extension of this species. It occurs on the shallower sandy-clay soils and added further diversity to the range of habitats that are available throughout the area. The large expanses of flats containing *Beaufortia sps.* that were flowering at the time of the survey was the ideal habitat for the Honey Possum *(Tarsipes spencerae)*, what was not expected were the two species of snake also trapped in this situation, the Crowned *(Denisonia coronata)* and the Little Brown *(Elapognathus minor)*, the other small snake, the Muellers *(Rhinhoplocephalus bicolor)*, was also found in similar habitat whilst searching.

The variety of the fauna of an area is usually associated with the diversity of the flora of that area. This was no exception for the area covered by this survey. These unique values of both flora and fauna would be in danger if the area were to be 'opened up' for agriculture. Flora and fauna associations of such diveristy are not always easy to find and steps should be taken to ensure their protection.

CONCLUSION

In the main the area covered by this survey has poor soils and a finely balanced hydrological cycle. These two factors suggest that if any further clearing for agriculture is carried out then the streams of the area may become too saline for that land use.

As the only true timber producing section is a narrow strip along the Frankland River, the extent to which this land use can be carried out is limited.

The diversity of the flora and the fauna found to be associated with these poor quality forests and soils suggests the area should be dedicated as a flora and fauna reserve.

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APPENDIX 1

LIST OF FLORA SPECIES RECORDED DURING THE SURVEY

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
POLYPODIACEAE					
Lindsaya linearis	*				*
Pteridium esculentum	*	*			*
Cheilanthes tenuifolia					*
Adiatum aethiopium	*				
CYCADACEAE					
Macrozamia reidlei	*	*			*
PODOCARPACEAE					
Podocarpus drouyniana	*	*			*
SCHEUCHZERIACEAE					
Triglochin sp.	*				
GRAMINAE					
Amphipogon sp.	*				
CYPERACEAE					
Cyathochaete avenacea	*	*	*		
Lepidosperma effusum	*				
Lepidosperma tetraquentrum	*				
Lepidosperma longitudinale	*		*	*	
Lepidosperma angustatum	*	*			
Lepidosperma leptostachyum	*	*			
Mesomelaena tetragona	*		*	*	
Evandra aristata			*	*	
Gahnia trifida	*		*	*	
RESTIONACEAE					
Anarthria scabra			*	*	
Loxocarya flexuosa	*	*			
Loxocarya fasciculata	*				
Restio sp.	*		*	*	
JUNCACEAE					
Juncus acutus			*	*	
LILIACEAE					
Dianella revolutus	*				
Agrostocrinum scabrum	*				
Borya nitida					*
Johnsonia lupulina	*		*		
Stypandra grandiflora	*			*	

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
XANTHORRHOECEAE					
Xanthorrhoea preissii	*	*	*		*
Xanthorrhoea gracilis	*		*		
Kingia australis	*		*		
Dasypogon bromeliaefolius	*	*	*	*	
HAEMODORACEAE					
Anigosanthos flavida	*				
IRIDACEAE					
Patersonia sp.	*		*		
ORCHIDACEAE					
Pterostylis vittata	*				
Cryptostylis ovata	*				
Caladenia aphylla	*				
Caladenia flava	*				
CASUARINACEAE					
Casuarina humilis	*	*	*		
Casuarina decussata	*				
PROTEACEAE					
Dryandra nivea	*	*			
Dryandra formosa					*
Hakea ruscifolia		*	*	*	
Hakea amplexicaulis	*	*			
Hakea ambigua	*	*			
Hakea varia	*				
Hakea oliefolia	*				
Hakea florida	*	*	*	*	
Hakea lissocarpa	*	*			
Hakea undulata	*				
Hakea ceratophylla	*	*	*	*	
Hakea lasiantha	*	*			
Petrophile diversifolia			*	*	*
Petrophile linear			*	*	
Banksia ilicifolia		*	*	*	
Banksia littoralis	*		*	*	
Banksia sphaerocarpa				*	
Banksia grandis	*	*			
Banksia quercifolia		*	*	*	
Adenanthos obovata	*	*	*	*	*
Adenanthos luneata		*	*	*	
Persoonia longifolia	*	*			
Persoonia elliptica	*				
Synaphaea sp.	*	*	*	*	
Franklandia fucifolia		*	*	*	
Grevillea quercifolia	*	*			
Grevillea brevicuspis	*	*			*
Grevillea brownii	*				*
SANTALACEAE					
Leptomeria cunninghamii	*	*			

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
OLEACEAE					
Olax phyllanthi	*	*			
LORANTHACEAE					
Nuytsia floribunda		*	*	*	
LAURACEAE					
Cassytha sp.	*				
PITTOSPORACEAE					
Billardiera varifolia	*	*			
Billardiera multiflora	*				
MIMOSACEAE					
Acacia divergens	*				
Acacia extensa	*	*	*		
Acacia myrtifolia	*	*	*		
Acacia pulchella	*				
Acacia browniana	*	*			
Acacia nervosa	*				
Acacia hastulata	*				
Acacia saligna		*	*		*
Acacia stenoptera		*	*		
PAPILIONACEAE					
Brachysema sericeum	*	*			
Brachysema sp.	*	*			
Oxylobium lanceolatum	*				
Burtonia sp.	*				
Jacksonia sp.	*				
Viminaria juncea			*	*	
Pultenea reticulata	*		*	*	
Daviesia incrassata	*	*			
Daviesia cordatum	*				
Daviesia horrida	*	*			
Daviesia cuneata	*				
Spirilobium medium	*				
Hovea elliptica	*				
Hovea chorizema	*				
Bossiaea linophylla	*				
Bossiaea ornata	*	*	*		
Gastrolobium forrestii					
Gastrolobium bilobum	*				
Chorizema rhombeum	*				
RUTACEAE					
Boronia spathulata			*	*	
Boronia lanuginosa				*	
Crowea dentata	*				

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
TREMANDRACEAE					
Tremandra stelligera	*				
Tetratheca setigera	*				
Tetratheca affinis	*				
Platythecca verticillata	*				
POLYGALACEAE					
Comesperma confertum	*		*		
Comesperma flexuosum	*	*	*		
MYRTACEAE					
Actinodium cunninghamii				*	
Calythrix sp.	*				
Astartea fasicularis	*			*	
Hypocalymma strictum	*	*	*		
Hypocalymma cordifolium	*				
Agonis parviceps	*				
Agonis linearifolia	*				
Leptospermum crassipes			*	*	
Leptospermum firmum			*	*	
Kunzea recurva	*	*	*		*
Callistemon speciosus				*	
Beaufortia decussata		*			
Beaufortia sparsa		*	*	*	
Calothamnus sp.			*	*	
Melaleuca cuticularis			*	*	
Melaleuca thymoides	*	*			
Melaleuca preissiana			*	*	
Melaleuca rhaphiophylla			*	*	
Melaleuca viminea	*	*			
Eucalyptus marginata	*	*	*		
Euclayptus staerii		*			
Eucalyptus patens	*	*	*		
Eucalyptus calophylla	*				
Eucalyptus wandoo		*			
Eucalyptus rudis	*		*	*	
Eucalyptus decipiens		*	*	*	
Eucalyptus megacarpa	*				
SAPINDACEAE					
Dodonea attenuata	*		*		
RHAMNACEAE					
Trymalium spathulatum	*				
Trymalium ledifolium	*	*			
STERCULIACEAE					
Hibbertia amplexicaulis	*	*			
Hibbertia glaberimma		*			
Hibbertia inconspicua	*				
Hibbertia montana	*	*			

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
THYMELAEACEAE					
Pimelia sp.	*				
GOODENIACEAE					
Goodenia eatoniana	*				
HALORRHAGACEAE					
Halorrhagis rotundifolia	*				
APIACEAE					
Xanthosia candida	*	*			
Xanthosia heugelii	*	*			
Xanthosia rotundifolia	*	*			
Pentalpis silvatica	*				
EPACRIDACEAE					
Astroloma pallidum	*	*			
Astroloma ciliatum	*				
Leucopogon australis	*	*			
Leucopogon oxycedrus	*				
Leucopogon capitellatus	*				
Leucopogon propinquus	*				
Lysinema ciliatum			*	*	
Andersonia sp.	*	*	*	*	
Cosmelia rubra			*		
Styphelia tenuiflora		*			
RUBIACEAE					
Opercularia hispidula	*				
GENTIANACEAE					
Villarsia sp.	*				
STYLIDIACEAE					
Stylidium amoenum	*		*		
Stylidium imbricatum			*	*	
Stylidium adnatum			*	*	
ASTERACEAE					
Olearia sp.	*				
Craspedia sp.	*				
Helichrysum ramosum	*				
Helipterum cotula	*				
Gnaphalium luteoalbum	*				
Gnaphalodes uliginosum	*				
Cortula coronopifolia	*				
EUPHORBIACEAE					
Phyllanthus calycinus	*				

SPECIES	OPEN FOREST & RIVERINE	WOODLAND	LOW OPEN WOODLAND	OPEN HEATH & SEDGELAND	GRANITE OUTCROP
LOGANIACEAE					
Logania serpyllifolia	*				
PODOCARPACEAE & CUPRESSACEAE					
Actinostrobus pyramidalis				*	
AMARANTACEAE					
Ptilotus manglesii	*				
LOBELIACEAE					
Lobelia rhombifolia	*				
AIZOACEAE					
Carpobrotus sp.	*				

APPENDIX 2

MAMMALS (AFTER RIDE 1970)

MAMMALS RECORDED ON SURVEY

SPECIES	OPEN FOREST	WOODLAND	LOW WOODLAND & SEDGELAND/ HEATHLAND	RIVER & WETLANDS
Western Grey Kangaroo *(Macropus fuliginosus)*	SO	SO	SO	
Western Brush Wallaby *(Macropus irma)*	S			
Brush-tailed Possum *(Trichosurus vulpecula)*	O			
Honey Possum *(Tarsipes spencerae)*	O		O	
Short-nosed Bandicoot *(Isoodon obesulus)*			T	
Mardo *(Antechinus flavipes)*	S			
Common Dunnart *(Sminthopsis murina)*	O	O	S	
Western Water Rat *(Hydromys chrysogaster)*				S
Southern Bush Rat *(Rattus fuscipes)*	T	T	T	
Little Bat *(Eptesicus pumilus)*	T	T		
Goulds Wattle Bat *(Chalinolobus gouldii)*	T			
Dingo *(Canis familiaris)*		O	O	
Fox *(Vulpes vulpes)*	SO	O	O	
Cat *(Felis cattus)*	SO	O	O	
Rabbit *(Oryctolagus cuniculus)*	SO	O	O	

SPECIES	OPEN FOREST	WOODLAND	LOW WOODLAND & SEDGELAND/ HEATHLAND	RIVER & WETLANDS
Ship Rat *(Rattus rattus)*	T			
House Mouse *(Mus musculus)*		T	T	
Horse *(Equus caballus)*	O	O		

T - Trapped or shot

S - Sighted (Daylight or spotlight, includes those caught while searching)

O - Other Evidence (Prints, scats, nests, fur etc.)

Native mammals not recorded on the survey, but almost certain to occur within the area.

Quokka *(Setonix brachyurus)*	M
Brush-tailed Phascogale *(Phascogale tapoatafa)*	
Western Native Cat *(Dasyurus geoffroii)*	
Greater Long-eared Bat *(Nyctophilus geoffroyi)*	M
Lesser Long-eared Bat *(Nyctophilus timoriensis)*	M
Chocolate Bat *(Chalinolobus morio)*	M
Tasmanian Pipistrelle *(Pipistrellus tasmaniensis)*	M
White Striped Bat *(Tadarida australis)*	

M - W.A. Museum records within 15 km of the area

One other native mammal could possible occur within the area for which there is limited areas of suitable habitat.

Tammar Wallaby
(Macropus eugenii)

APPENDIX 3

BIRD LIST (AFTER RAOU LIST)

NAME	JARRAH/MARRI	LOWLAND	RIVER
Emu *(Dromaius novaehollandiae)*	6	6	
Great Cormorant *(Phalacrocorax carbo)*	1		5
Darter *(Anhinga melanogaster)*			12
White-faced Heron *(Ardea novaehollandiae)*			1
Black Bittern *(Dupetor flavicollis)*			1
Pacific Black Duck *(Anas superciliosa)*			24
Maned Duck *(Chenonetta jubata)*			1
Musk Duck *(Biziura lobata)*			2
Brown Goshawk *(Accipiter fasciatus)*	1		
Wedge-tailed Eagle *(Aguila audax)*	2		
Marsh Harrier *(Circus aeruginosus)*		1	
Australian Kestrel *(Falco cenchroides)*		1	
Brown Quail *(Coturnix australis)*	1	17	
Eurasian Coot *(Fulica atra)*			1
Brush Bronzewing *(Phaps elegans)*	8		
Purple-crowned Lorikeet *(Glossopsitta porphyrocephala)*	45		

NAME	JARRAH/MARRI	LOWLAND	RIVER
White-tailed Black Cockatoo *(Calyptorhynchus baudini)*	167	14	
Red-tailed Black Cockatoo *(Calyptorhynchus mangificus)*	9		
Western Rosella *(Platycercus icterotis)*	52	24	
Red-capped Parrot *(Purpureicephalus spurius)*	1		
Port Lincoln Ringneck *(Barnardius zonarius)*	44	2	
Fan-tailed Cuckoo *(Cuculus pyrrhophanus)*	3	1	
Horsfield's Bronze Cuckoo *(Chrysococcyx basalis)*	1		
Tawny Frogmouth *(Podargus strigoides)*	15		
Australian Owlet-nightjar *(Aegotheles cristatus)*	7		
Laughing Kookaburra *(Dacelo novaeguinae)*	11	2	
Tree Martin *(Cecropis nigricans)*	3	33	
Richard's Pipit *(Anthus novaeseelandiae)*		2	
Black-faced Cuckoo-shrike *(Coracina novaehollandiae)*	3	15	
Splendid Fairy-Wren *(Malurus splendens)*	18	9	
Western Gerygone *(Gerygone fusca)*	43	1	
Inland Thornbill *(Acanthiza apicalis)*	24	2	
Western Thornbill *(Acanthiza inornata)*	54	9	
Yellow-rumped Thornbill *(Acanthiza chrysorrhoa)*	10		

NAME	JARRAH/MARRI	LOWLAND	RIVER
White-browed Scrub-wren *(Sericornis frontalis)*	19	8	
Scarlet Robin *(Petroica multicolor)*	41	3	
Western Yellow Robin *(Eopsaltria griseogularis)*	7		
White-breasted Robin *(Eopsaltria georgiana)*	11	1	
Grey Fantail *(Rhipidura fuginosa)*	37	12	2
Restless Flycatcher *(Myiagra inquieta)*	3		
Golden Whistler *(Pachycephala pectoralis)*	23	5	
Grey Shrike-thrush *(Colluricincla harmonica)*	3		
Varied Sittella *(Dapheonositta chrysoptera)*	11	8	
Spotted Pardalote *(Pardalotus punctatus)*	15		
Striated Pardalote *(Pardalotus striatus)*	24		
Silvereye *(Zosterops lateralis)*	9	1	
White-naped Honeyeater *(Melithreptus lunatus)*	6		
Western Spinebill *(Acanthorhynchus superciliosus)*	32	55	
New Holland Honeyeater *(Phylidonyris novaehollandiae)*	26	53	
Red Wattle Bird *(Anthochaera carunculata)*	93	25	
Red-eared Firetail *(Emblema oculata)*		5	
Dusky Woodswallow *(Artamus cyanopterus)*	2	52	

NAME	JARRAH/MARRI	LOWLAND	RIVER
Grey Currowong *(Strepera versicolor)*	25	4	
Australian Magpie *(Gymnorhina tibicen)*	4		
Australian Raven *(Corvus coronoides)*	32	14	1

APPENDIX 4

REPTILES (AFTER STORR, W.A. MUSEUM IDENTIFICATION)

REPTILES RECORDED ON SURVEY

SPECIES	OPEN FOREST	WOODLAND	LOW WOODLAND & SEDGELAND/ HEATHLAND
GOANNAS			
(Varanus gouldii)	S	S	
GECKOES			
Marbled Gecko *(Phyllodactylus marmoratus)*	S	S	
SKINKS			
Bobtail *(Tiliqua rugosa)*	O	O	
Smiths skink *(Egernia napoleonis)*	TS	TS	TS
Frys skink *(Egernia pulchra pulchra)*		TS	
Red-legged skink *(Ctenotus labillardieri)*	TS	T	TS
(Ctenotus catenifer)	TS	TS	TS
Burrowing skink *(Hemiergis peronii peronii)*	TS	TS	TS
New Holland skink *(Leiolopisma trilineatum)*	T	T	
(Lerista distinguenda)	S	T	
Greys skink *(Menetia greyii)*	S	T	
(Morethia obscura)	T	T	
SNAKES			
Blind Snake *(Ramphotyphlops australis)*		S	
Dugite *(Demansia nuchalis affinis)*	S	S	S

SPECIES	OPEN FOREST	WOODLAND	LOW WOODLAND & SEDGELAND/ HEATHLAND
SNAKES (cont)			
Western Tiger Snake *(Notechis scutatus occidentalis)*	S		
Crowned Snake *(Denisonia cornata)*		T	
Little Brown Snake *(Elapognathus minor)*		T	
Mueller's Snake *(Rhinoplocephalus bicolor)*		T	

APPENDIX 5

FROGS (W.A. MUSEUM IDENTIFICATION)

FROGS RECORDED ON SURVEY

SPECIES	OPEN FOREST	WOODLAND	LOW WOODLAND & SEDGELAND/ HEATHLAND
Gunthers toadlet *(Pseudophryne guntheri)*		T	T
Moaning Frog *(Heleioporus eyrei)*	T	T	T
(Heleioporus inornatus)			T
Banjo Frog *(Limnodynastes dorsalis)*	T		
Slender Tree Frog *(Litoria adelaidensis)*		T	
(Crinia georgiana)	S	T	
(Geocrinia leai		T	
(Ranidella glauerti)	T		
(Ranidella pseudinsignifera)		T	
(Ranidella sp.) 4 individuals	T	T	T

APPENDIX 6

FISH & CRUSTACEANS (W.A. MUSEUM IDENTIFIED)

Fish collected pre survey.

Striped Minnow
(Galaxiella munda)

Common Minnow
(Galaxias occidentalis)

Mud Minnow
(Lepidogalaxias salamandroides)

Night Fish
(Bostockia porosa)

Western Pygmy Perch
(Edelia vittata)

Mosquito Fish
(Gambusia affinis)

Marron
(Cherax tenuimanus)

Koonac
(Cherax preisii)

APPENDIX 7

TRAPPING RESULTS

SPECIES	OPEN FOREST				WOODLAND				LOW WOODLAND & SEDGELAND/HEATHLAND			
	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence
MAMMALS												
Ruttus fuscipes		4				5				3		
Tarsipes spencerae								2				7
Rattus rattus		1										
Mus musculus						2		1				
REPTILES												
Egernia napoleonis		1				3	2			1		
Egernia pulchra pulchra										1	1	
Ctenotus labillardieri			3			1	2			1	7	1
Ctenotus catenifer			1				2				3	1
Hemiergis peronii peronii			2					1			3	1
Leiolopisma trilineatum				1			1					
Lerista distinguenda				1			2					

APPENDIX 7 (cont)

SPECIES	OPEN FOREST				WOODLAND				LOW WOODLAND & SEDGELAND/HEATHLAND			
	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence
Menetia greyii							1					
Moretia obscura				2				1				
Denisonia cornata												2
Elapoganthus minor								1				
Rhinoplocephalus bicolor								1				
FROGS												
Pseudophryne guntheri											1	14
Heleioporus eyrei			1				1	8			1	9
Heleioporus inornatus												8
Limnodynastes dorsalis				1								
Litoria adelaidensis							1					
Crinia georgiana			1									1
Geocrinia leai											1	
Ranidella glauerti			1									

APPENDIX 7 (cont)

SPECIES	OPEN FOREST				WOODLAND				LOW WOODLAND & SEDGELAND/HEATHLAND			
	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence	Box	Breakback	Pit	Drift Fence
Ranidella pseudinsignifera											1	
Ranidella sp.											1	3
BIRDS												
Coturnix australis									2			
	Ø	6	9	5	Ø	11	12	15	2	6	19	48

Total Catches - 133 (Box - 2
Breakback - 23
Pit - 40
Drift Fence - 68)

Trap Percentage - Box - 0.6%
Breakback - 4.8%
Pit - 3.1%
Drift Fence - 30.0%(per pit)

LIDDELOW, G. L.
A report on a
biological survey of
the area of vacant

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