Department of Conservation and Land Management - Western Australia

A BIOLOGICAL SURVEY OF MIRIMA NATIONAL PARK

DECEMBER 1993 - JANUARY 1994

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ECOLOGIST
KIMBERLEY REGION

CONTENTS

ADDENDUM

Rare or Endangered Species

Flora

1.
Family: MIMOSACEAE

Species: *Acacia richardsii*

Status: Priority 3 (CALM)

Taxa which are known from several populations, at least some of which are not believed to be under immediate threat.

Fauna

1.
Aviceda subcristata **Pacific Baza**

Status: Threatened (CALM)

Presumed to be extinct or in imminent danger of extinction; dependent on or restricted to habitats that are vulnerable and/or subject to factors that may cause its decline; very uncommon, even if widespread.

2.
Irediparra gallinacea **Comb-crested Jacana**

Status: Reserve (CALM)

Have been recently removed from the list of threatened fauna; have a restricted distribution, are uncommon or are declining in range and/or abundance, but do not meet listing as threatened fauna; there is insufficient information for the Committee to make an assessment of their status.

3.
Hydromys chrysogaster **Water Rat**

Status: Reserve (CALM)

Have been recently removed from the list of threatened fauna; have a restricted distribution, are uncommon or are declining in range and/or abundance, but do not meet listing as threatened fauna; there is insufficient information for the Committee to make an assessment of their status.

ACKNOWLEDGMENTS

The greatest contribution to this study was by Kyle Armstrong, a volunteer who placed and monitored most of the pit traps. Other recordings, including some mist netting for bats, were also undertaken by Kyle.

Apart from the general flora collection work undertaken over the years, the Regional Manager, Chris Done, also assisted in the description of the pit trap sites. Kevin Kenneally from the Western Australian Herbarium assisted by supplying a list of existing plant collections and plants collected during the survey were identified by the Herbarium. Allan Thomson and Russell Gueho from the East Kimberley District also contributed with general fauna observations.

Laurie Smith from the Museum of Western Australia identified frogs and reptiles which could not be identified in Kununurra. Norah Cooper from the mammal department of the Museum of Western Australia undertook the identification of some small mammals. Staff at the Museum of Western Australia also took the time to search for previous fauna records for the park. This data has been incorporated into this document and the staff are thanked for their help.

Brice Wells, an ornithologist from Wyndham, provided some bird species records during his search in the park for the Gouldian Finch.

The Mirima National Park map was prepared by Michelle McCahon who worked for CALM as a volunteer.

Cover Photo: Looking towards the town of Kununurra from near the north east corner of Mirima National Park.

Looking south from the north west corner of the park.

ABSTRACT

During the months December 1993 to April 1994 a brief biological survey was undertaken of the Mirima National Park (formerly Hidden Valley National Park). This park is adjacent to the town of Kununurra. This report presents the findings of that survey as well as including records obtained at other times.

147 species of flora from 54 families have been recorded.

15 species of frog, and 45 reptiles species have been recorded for the park. The ornate frog Limnodynastes ornatus *accounted for approximately half of all the individual animals trapped. Whilst known to be in Western Australia the western brown snake is the second specimen to be handled by the Museum of Western Australia.*

22 mammal species are noted for the Mirima National Park with 4 of these being introduced.

It is intended that this report will form the basis for further data compilation.

INTRODUCTION

The decision to undertake a small scale biological survey of the park came about because of a statement in the publication 'Nature Conservation Reserves in the Kimberley' that no fauna surveys had been undertaken. Further to this there was a need to collate existing biological information about the park.

It was also felt that undertaking some form of a survey during the wet season could be of interest.

Existing flora knowledge of the park is summarised in the publication mentioned above as;

> 'The valley floors are dominated by Northern Woollybutt (*Eucalyptus miniata*) and Long-fruited Bloodwood (*Eucalyptus polycarpa*) over shrubs such as *Cajanus reticulatus*, *Planchonia careya*, *Grevillea heliosperma*, *G. refracta* and *Pouteria sericea*. the rock walls support the Boab (*Adansonia gregorii*) and the figs *Ficus leucotricha* and *F. platypoda*, and Turkey Bush (*Calytrix exstipulata*). Undescribed species of *Lindernia* and *Platysace* are known from fissures in the gorge walls. Both appear to be endemic to the area. in the sandy areas subject to seasonal flooding the fern *Platyzoma microphyllum* is common, along with *Haemodorum parviflorum* and numerous ephemeral species such as *Stylidium*, *Urticularia*, *Byblis* and *Drosera*.
>
> The park supports a mosaic of upland tall grass savanna and woodland; in particular the *Eucalyptus dichromophloia** sub-alliance in valleys and *Triodia pungens*, with low open eucalypt overstorey on the hills.
>
> Eucalypts found in the area include Variable-barked Bloodwood (*E. dichromophloia*), Darwin Stringybark (*E. tetrodonta*), Long-fruited Bloodwood (*E. polycarpa*), and Kalumburu White Gum (*E. herbertiana*). There is an impressive, almost pure stand of Woollybutt (*E. miniata*) growing on red sand in the north-west corner of the park.
>
> Other tree species include the Boab (*Adansonia gregorii*), Wild Mango (*Buchanania obovata*), Emu Apple (*Owenia vernicosa*) and several species of *Terminalia*, including *T. latipes*. Wattles such as *Acacia tumida* and *A. plectocarpa*, are common, as is the attractive shrub Kimberley Heather (*Calytrix exstipulata*). A geographically restricted plant, *Echinochloa macrandra*, has been recorded nearby and it is likely that it occurs within the park, along Lily Creek.

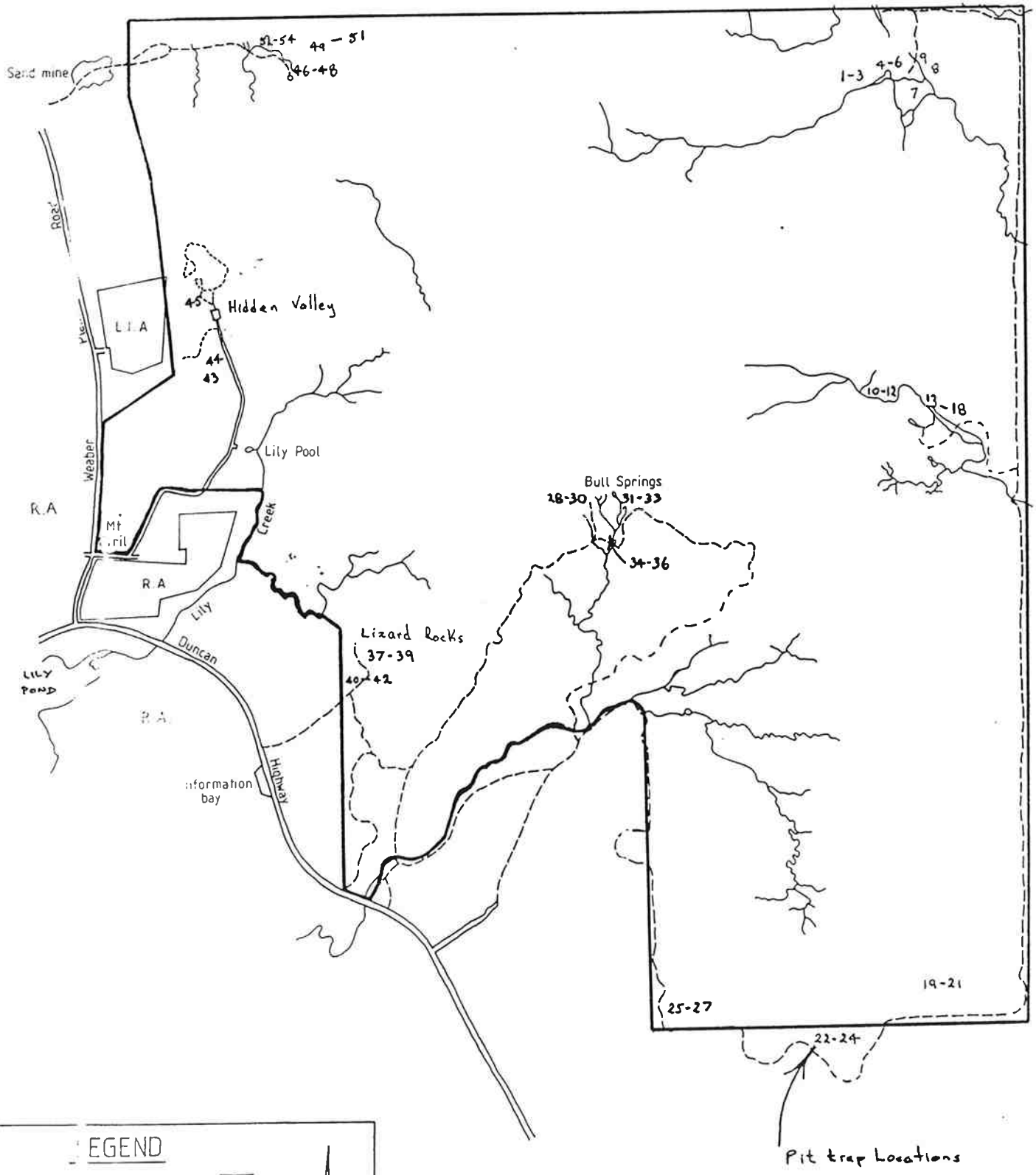
* The name *Eucalyptus dichromophloia* is no longer used ('Flora of the Kimberley'). The name *Eucalyptus drysdalensis* has been used for this plant in this survey.

CLIMATE

The park experiences the climate of the dry tropics with an annual rainfall at Kununurra of approximately 700 mm. The amount of rain which falls and its timing can be highly variable with rain being expected from October through to March. Rainfall events can have a high energy component with large amounts of water being deposited on the land surface in a short period of time.

The coolest, rain-free months are around June and July (July Max. 29.9^{o}C average, Min. 14.0^{o}C average) with the hottest and most humid months being October to December (November Max. 38.9^{o}C average, Min. 24.3^{o}C average).

MIRIMA (HIDDEN VALLEY) NATIONAL PARK



LEGEND

Main Roads

Tracks

Waterways

Boundary

Light Industrial Area L.I.A

Residential Area R.A

N

MAP 1.

LOCATION
(See Map 1)

Mirima National Park is located immediately adjacent to the eastern side of the town of Kununurra, a town with a population of approximately 4000 people. This last figure can increase dramatically during the tourist season.

LANDSCAPE

The overall landscape of the park is one of a raised undulating plateau with escarpments on the east, west and south. These escarpments are most prominent on the southern and western boundaries with the south west and western boundaries exhibiting a band of gorges and valleys. It is these latter areas which receive the most attention from tourists.

AREA

The current size of the park is 2067.93 hectares, however two additions totalling approximately 600 hectares have been proposed.

MANAGEMENT AND PUBLIC USE

The park is vested in the National Parks and Nature Conservation Authority and is managed by the East Kimberley District (Kimberley Region) of the Department of Conservation and Land Management. A National Park Ranger has specific duties with respect to the park with other staff undertaking work as required. The types of facilities provided include a good quality gravel access road, walk trails, location signs and information boards, a toilet, carparks and firebreaks. Some strategic prescribed burning is undertaken in an attempt to prevent a large fire affecting the whole of the park. The main area of threat is seen to be the eastern side of the park which borders pastoral country. There is no burning for strictly `environmental' reasons such as habitat enhancement.

Discussions are under way with people representing the traditional owners of the land near Kununurra with a view to entering into some form of joint management.

Public use of the park is varied. Generally speaking the tourist season coincides with the dry season extending from around the start of April to the end of September. Tourist use of the park includes individuals and organised groups, primarily accessing the main valley immediately adjacent to the town of Kununurra. This valley, known as 'Hidden Valley', is what attracts by far the majority of people to the park. The Purnululu National Park is well known for the distinctive grandeur of the `bee-hive' formations of the landscape and the Mirima National Park has often been described as a `mini-Bungles'. A small, but very scenic, pool adjacent to the main valley is also frequented by tourists as the pool can last for an extended period of time following the wet season.

People from Kununurra use the park extensively and cover a larger area than tourists. Legal use is usually bushwalking. The activities which at times cause concern are dog exercising and four wheel drive vehicles and trail bikes creating unwanted tracks.

Traditional Aboriginal use of the park has been extensive. Paintings, rock carving and rock overhangs where people have camped in the past can be found throughout the park. There are certain areas which are important for Aboriginal law and public access to these areas is a sensitive issue in the management of the park. One such area is the scenic pool mentioned above and thought is currently being given to providing access to an alternative attraction within the park and gradually discouraging public access to this area. (At the time of completing this report Mirima National Park was subject to a Native Title claim registered with the National Native Title Tribunal by the Miriuwung and Gajerrong peoples.)

PLANT LIST

(* = From WA. Herbarium - CALM database, # = Introduced)

ADIANTACEAE

Cheilanthes pumilio * (R. Br.) F. Muell.

PLATYZOMATACEAE

Platyzoma microphyllum R.Br. **Braid Fern**

ACANTHACEAE

Dicliptera armata * F. Muell.

AIZOACEAE

Trianthema patellitecta * A.M. Prescott
T. pilosa * F. Muell.

AMARANTHACEAE

Amaranthus sp.

Gomphrena sp.

Ptilotus exaltatus Nees **Tall Mulla Mulla**
P. polystachyus *(Gaudich.) F. Muell.

ANACARDIACEAE

Buchanania obovata * Engl. **Wild Mango**

APIACEAE

*Platysace rupestris * (?)*
*P. sp. A **

APOCYNACEAE

Carissa lanceolata R. Br. **Conkerberry**

Wrightia saligna (R. Br.) F. Muell. ex Benth.

ASCLEPIADACEAE

Calotropis procera # (Aiton) W.T. Aiton **Calotrope**

Cynanchum pedunculatum * R. Br.

*Sarcostemma viminale * (?)*

ASTERACEAE

Blumea diffusa * R. Br. ex Benth.

Pterocaulon sphacelatum * (Labill.) F. Muell.

BIXACEAE

Cochlospermum fraseri Planchon — **Kapok Tree**

BOMBACACEAE

Adansonia gregorii F. Meull. — **Boab**

BORAGINACEAE

Ehretia saligna R. Br. — **False Cedar**

BYBLIDACEAE

Byblis liniflora * Salisb.

CAESALPINIACEAE

Erythrophleum chlorostachys * (F. Muell.) Baillon — **Cooktown Ironwood**

Lysiphyllum cunninghamii (Benth.) de Wit — **Bauhinia**

Senna venusta * (F. Muell.) B. Randell

CAPPARACEAE

Cleome cleomoides * (F. Murll.) Iltis
C. viscosa * L. — **Mustard Bush**

CARYOPHYLLACEAEA

Polycarpaea fallax * Pedley

COMBRETACEAE

Terminalia canescens (DC.) Radlk. ex T. Durand
T. hadleyana W. Fitzg.
T. latipes Benth.

CONVOLVULACEAE

Bonamia media * (F. Muell.) H. Hallier

CUSCUTACEAE

Cuscuta sp. — **Dodder**

DROSERACEAE

Drosera ordensis A. Lowrie, sp. nov.

EUPHORBIACEAE

Flueggea virosa (Roxb. ex willd.) Voigt

Petalostigma quadriloculare F. Muell — **Quinine Bush**

GOODENIACEAE

Goodenia aff. sepalosa *
G. bicolor * F. Muell. ex Benth.

Scaevola browniana * Carolin

HERNANDIACEAE

Gyrocarpus americanus Jacq. — **Helicopter Tree**

LECYTHIDACEAE

Planchonia careya (F. Muell.) Knuth — **Cocky Apple**

LOBELIACEAE

Lobelia dioica * R. Br.

LOGANIACEAE

Mitrasacme exserta * F. Muell.
M. scrithicola * *(?)*

LORANTHACEAE

Amyema sp. — **Mistletoe**

Dendrophthoe acacioides * (Cunn. ex Benth.) Tieghem

LYTHRACEAE

Rotala diandra * (F. Muell.) Koehne

MELIACEAE

Owenia vernicosa F. Muell. — **Emu Apple**

MENISPERMACEAE

Tinospora smilacina Benth. — **Snakevine**

MIMOSACEAE

Acacia holosericea Cunn. ex Don
A. humifusa Cunn. ex Benth.
A. platycarpa * F. Muell. — **Ghost Wattle**
A. plectocarpa Cunn. ex Benth.
A. richardsii * Maslin
A. translucens Cunn. ex Hook. — **Poverty Bush**
A. tumida F. Muell. ex Benth. — **Pindan Wattle**
A. wickhamii Benth.

MORACEAE

Ficus leucotricha (Miq.) Miq.	**Rock Fig**
F. platypoda (Miq.) Cunn. ex Miq.	**Rock Fig**

MYRTACEAE

Calytrix exstipulata DC.	
Eucalyptus aspera * F. Muell	**Roughleaf Range Gum**
E. brachyandra * F. Muell.	**Tropical Red Box**
E. confertiflora F. Muell.	**Roughleaf Cabbage Gum**
E. drysdalensis D.J. Carr & S.G.M. Carr	
E. ferruginea Schauer	
E. herbertiana * Maiden	**Kalumburu White Gum**
E. miniata * Cunn. ex Schauer	**Northern Woollybutt**
E. polycarpa F. Muell.	**Longfruit Bloodwood**
E. tectifica F. Muell.	**Darwin Box**
E. tetrodonta F. Muell.	**Darwin Stringybark**
E. sp. E	**Ghost Gum**
Melaleuca dealbata ?	
M. viridiflora Sol. ex Gaertner	
Verticordia cunninghamii Schauer	
Xanthostemon sp.	

NYMPHAEACEAE

Nymphaea violacea * Lehm.	

PAPILIONACEAE

Cajanus latisepalus * (S.T. Reynolds & Pedley) Maesen	
C. reticulatus * (Dryander) F. Muell.	
Crotalaria sp. A *	
Desmodium filiforme * Zoll. & Moritzi	
Galactia tenuiflora * (Klein ex Willd.) Wight & Arn.	
Indigofera haplophylla * F. Muell.	
Jacksonia thesioides (Cunn.) Benth.	**Broom Bush**
Sesbania formosa (F. Muell.) N. Burb	**White Dragon Tree**
Tephrosia phaeosperma * F. Muell. ex Benth.	
T. rosea * F. Muell. ex Benth.	**Flinders River Poison**
T. virens * Pedley	
Zornia prostrata * S.T Reynolds & A.E. Holland	

PASSIFLORACEAE

Passiflora foetida # L.	**Wild Passionfruit**

PROTEACEAE

Grevillea agrifolia * Cunn. ex R. Br.	**Blue Grevillea**
G. erythroclada * W. Fitzg.	**Needleleaf Grevillea**
G. heliosperma * R. Br.	**Rock Grevillea**
G. pteridifolia Knight	**Kimberley Christmas Tree**
G. refracta * R. Br.	**Silverleaf Grevillea**
Persoonia falcata R. Br.	**Snottygobble**

RUBIACEAE

Canthium sp. A *

Gardenia megasperma F. Muell.

Spermacoce auriculata F. Muell.
S. exserta * Benth.

SAPINDACEAE

Atalaya hemiglauca * (F. Muell.) F. Muell. ex Benth.	**Whitewood**
A. variifolia * (F. Muell.) F. Muell. ex Benth.	

Distichostemon hispidulus * (Endl.) Baillon

SAPOTACEAE

Pouteria sericea (Aiton) Baehni

SCROPHULARIACEAE

Lindernia cleistandra * W. R. Barker

Stemodia sp.

STERCULIACEAE

Brachychiton sp.

Helicteres cana * (Schott & Endl.) Benth.

STYLIDIACEAE

Stylidium floodii * F. Muell.

TILIACEAE

Corchous sp. *

Grewia sp.

Triumfetta plumigera * F. Muell.
T. sp. U *

URTICACEAE

Utricularia sp.

VERBENACEAE

Clerodendrum sp.

Vitex glabrata R. Br.

VITACEAE

Ampelocissus acetosa (F. Muell.) Planchon — **Native Grape**

Cayratia trifolia (L.) Domin

ANTHERICACEAE

Thysanotus chinensis * Benth.

CYPERACEAE

Crosslandia setifolia * W. Fitzg.

Cyperus cunninghamii * (C.B. Clarke) C. Gardner
C. cuspidatus * Kunth
C. microcephalus * R. Br.
C. pulchellus * R. Br.
C. sexflorus * R. Br.
C. zollingeri * Steudel

Scleria brownii * Kunth

HAEMODORACEAE

Haemodorum ensifolium * F. Muell.
H. parviflorum Benth.

PANDANACEAE

Pandanus sp.

POACEAE

Aristida hygrometrica * R. Br. — **Northern Kerosene Grass**

Cymbopogon dependeus * B. Simon
C. procerus * (R. Br.) Domin — **Scentgrass**

Echinochloa macrandra P.W. Michael & Vick.

Eriachne ciliata * R. Br. — **Slender Wanderrie Grass**
E. melicacea * F. Muell.

Pennisetum polystachion * ?

Plectrachne bynoei * C.E. Hubb.

Setaria apiculata * (Scribner & Merr.) Schumann **Pigeon Grass**

Sorghum stipoideum * C. Gardner & C.E. Hubb **Native Annual Sorghum**

Themeda sp.

Triodia pungens R. Br. **Soft Spinifex**

Whiteochloa biciliata * Lazarides **Mauve Sandgrass**

Yakirra majuscula * (F. Muell. ex Benth.) Lazarides & R. Webster
Y. pauciflora * (R. Br.) Lazarides & R. Webster

TACCACEAE

Tacca leontopetaloides (L.) Kuntze

FLORA

The sources for the compilation of a flora list and to use in the description of the pit trap sites were as follows:

A brief outline of the flora of the Park is contained in the CALM publication `Nature Conservation Reserves of the Kimberley' and this has been reproduced in this document.

A list of flora specimens from the Park kept at the WA. Herbarium was supplied and was incorporated into this document. Where taxon have been named which are not in the publication `Flora of the Kimberley' these names have been followed by a question mark.

Named specimens from the Kimberley Regional herbarium have been included in the document, however, there are a number of specimens which have either not been named or have undergone name changes which have not been included. This herbarium is based primarily on the work by Chris Done (Manager - Kimberley Region - CALM)

Plants were collected at the time of survey or shortly after and were sent to the Western Australian Herbarium (CALM). Advice was received that there was value in concentrating on the plants which `do things' during the wet, therefore emphasis was placed on the small annuals which rapidly germinate, flower, seed and then disappear. Some collections of fungi and other groups was also made.

A number of the more common plants which have not been collected as held specimens were also documented.

A problem which was encountered were inconsistencies in the adoption of species names. The Genera *Eucalyptus* remains the main area of confusion. Where there was a lack of clear direction the original names have been adopted.

147 taxa of from 54 families have, to date, been recorded for the park. It is highly likely that this list can be added to substantially. This is particularly so for the more `herbaceous' plants, as was mentioned previously.

Whilst no rare flora have been identified in the park it does encompass a good representative sample of the general area's flora. The new carnivorous species *Drosera ordensis* has been identified from the park. More work is required to determine the distribution of this species.

The subtle but distinct variety of habitats in the park is reflected in the types of plant so far identified. These include plants associated with woodlands, sandstone outcrops, damplands, shaded rock crevices and watercourses. A wide range of species are found within the park.

By far the majority of the flora are distributed widely across the Kimberley with many of these being identified with the top end of Australia. Other species are also found in Asia and the tropical areas of the world. Species that are more `localised' in their distribution are:

Trianthema patellitecta	- East Kimberley and the west of the Northern Territory.
Platysace sp. A.	- East Kimberley and part of the Northern Territory.
Acacia richardsii	- " "
Eucalyptus aspera	- East Kimberley across the top of Australia.
Eucalyptus drysdalensis	- East Kimberley extending into the Northern Territory.
Crotalaria sp. A	- East Kimberley.
Lindernia cleistandra	- East Kimberley extending into the Northern Territory.
Triumfetta sp. U	- Possibly endemic to the Kununurra/Carr Boyd area.

Gardenia megasperma whilst being found throughout the park has only one collection from near Kununurra registered with the W.A. Herbarium.

SITES SUMMARY

Individual site descriptions are given in Appendix 1.

Physical characteristics

Appendix 2 gives the summary of the physical characteristics of the sites.

The sites exhibited the following physical characteristics;

The soils of Mirima National Park are derived from sandstone and appear to result because of the action of water. All sites had relatively coarse sandy soils with 5 sites also having a proportion of sandstone `gravel'.

The soils reflected the colours of the sandstone itself with overall colours ranging from red, orange, grey orange, brown orange, grey brown, brown and grey. The most common soil colour was grey with orange being the next most common.

49 of the sites were flat with the rest being on slight slopes.

At the time of the survey 9 sites were located near dry creek beds, however given the climatic conditions, some may have flowed briefly during the survey. 10 sites were near creeks which had pools of water in them. The importance of the presence of water to the results of the pit trapping exercise is looked at in the general discussion session.

17 sites were located near the base of steep or vertical sandstone escarpments.

Vegetation structure

Muir's vegetation classification system was adopted for the majority of sites but where there was an association which was either complex or formed a very narrow band (eg. riparian) this was clearly described.

A quick list of the obvious flora at each of the sites was made, however, expertise in the herbaceous species is lacking so further work by other people may place more emphasis on these. In most cases where `spinifex' is noted this is used as a general term for what might be two or three distinct species.

The summary of the descriptions can be seen in Appendix 3. The dominant vegetation structure for all the sites was an open to very open woodland over either sparse spinifex or a spinifex/grass mixture (46% of sites). Other vegetation associations at each of the sites in descending order of occurrence are; sparse spinifex (24%), mid-dense spinifex (9%), dense grass (7%), sparse scrub (7%), riverine (4%) and sparse grass (2%).

For specific species, spinifex species occurred at 78% of the sites and these were the most noticeable of all species. Other major taxa were *Tacca leontopetaloides* (46%), E*rythrophleum chlorostachys* (37%), grass species (35%), *Adansonia gregorii* (22%), *Tinospora smilacina*, *Owenia vernicosa* and *Persoonia falcata* (17%), *Eucalyptus miniata* and *Buchanania obovata* ((15%). A total of ten species of eucalypt were recorded at the sites.

At first glance the vegetation of Mirima National Park gives the impression of uniformity being obviously dominated by a woodland savanna with a mix of spinifex and grasses. On closer inspection differences in the structure of the vegetation becomes apparent with the species present in the dominant vegetation association changing throughout the park. The riparian, spring and escarpment faces are all different in their vegetation structure and are very important in adding to the diversity of the species present.

FAUNA

In selecting the sites the overall aim of the survey of documenting as many species as possible was kept in mind. This meant that as great a variety of representative habitats was sampled as was possible. The criteria which limited the placement of the pit traps were; access; the presence of rugged sandstone cliffs, gorges, boulder outcrops and the shallow soil over sandstone. The result is that the main habitat types which were not sampled in this survey to any great extent are the sandstone cliffs and narrow, shallow soil gorges. It is recognised that these, at least visually, constitute discrete habitat types.

A variety of techniques were employed but by far the greatest emphasis was placed on pit trapping.
54 pit trap lines were placed at the locations shown on Map 1. The selection of sites was aimed at sampling as many potentially different habitats as was possible. Most pit lines comprised two pit traps (40cm deep PVC pipe) at either end of a `fence' of flywire 7 metres long by 20-30 centimetres high. Traps 22, 23, 24, 26 and 27 were metal bins and trap 51 used plastic ice cream containers. The former were used because of lack of resources, the latter because of a lack of soil.

Very few problems were encountered in maintaining the pit traps, however a few did have `meat' ants in them. There was also a suspicion that a number of animals were collected because they may have been predating on animals already in the traps. For example a sacred kingfisher was collected from a trap at Site 1.

At the end of the programme all pit traps were left in place but were filled with soil. If an opportunity presents itself then the traps may be opened at some stage during the dry season.

Apart from general field observations whilst undertaking other activities the following was done:

> One evening was spent spotlighting however it was felt that the lack of animal activity did not warrant the effort involved. This was based on the amount of work required to place and maintain the pit traps. If time becomes available in the future then further efforts will be made in this regard.
>
> Some effort was made to mist net bats. Woodlands and caves were targeted.

Elliott traps were borrowed for a short period of time from the Pilbara Region of CALM. These had limited success in terms of mammals but did trap skinks and one species of varanid.

The following lists are compiled from recent sightings which are outside the survey time period, pit trap results and general observations during the survey. Where pit trap information is given the numbers printed along side and under the species name stand for total numbers collected along with the numbers of each in individual traps. For example;

Cylorana australis [8]
3(1), 5(1), 16(1), 17(4), 18(1)

Total number of animals is 8 with one collected at trap 3, one collected at trap 5, one collected at trap 16 etc..

Species names for frogs, geckos, pygopods, skinks, snakes, dragons and monitors are as is used in the Western Australian Museum series of publications on these groups of animals. Common names, where applicable, are a combination of those used in the above publications and `Reptiles and Amphibians of Australia' by Harold Cogger.

Mammal species and common names are as is used in the `Complete Book of Australian Mammals' edited by Ronald Strahan.

Statements concerning possible range extensions of species and other observations are made when comparing the data to these publications.

AMPHIBIANS

Cyclorana australis [8] **Giant Frog**
3(1) 5(1), 16(1), 17(4), 18(1).

Seen while frog call recording at Site 2. Also observed at Site 49 (2/2/94).

Cyclorana longipes [28] **Long-footed Frog**
5(3), 6(1), 7(2), 8(1), 11(1), 13(1), 14(2), 15(1), 17(1), 18(1), 20(1), 22(2), 23(6), 26(1), 31(1), 38(1), 48(1), 50(1).

Limnodynastes ornatus [1509] **Ornate Frog**
4(12), 5(4), 6(3), 7(2), 8(2), 10(113), 11(40), 12(22), 13(134), 14(260), 15(385), 16(49), 17(153), 18(155), 19(2), 21(1), 28(1), 29(13), 30(12), 31(57), 32(21), 34(2), 35(17), 36(11), 41(2), 42(4), 44(8), 45(6), 47(1), 48(2), 50(6), 51(1), 53(7), 54(1).

Picked up on access track near sand spring at middle spring (1200hrs - 23/12/93). Hot and humid day. No water nearby. The most abundant animal trapped with approximately sixty five percent of all numbers of animals recorded.

Picked up on access track near sand spring at Site 18(1200hrs - 23/12/93). Hot and humid day. 80 metres to water.

Litoria caerulea **Green Tree Frog**
5(1), 14(3), 16(1), 17(2), 31(1), 32(1), 44(1), 53(1).

Observed near Bull Spring.

Litoria coplandi **Copland's Rock Frog**

This species was recorded by Griffin, P. in 1989.

Litoria inermis **Peters' Frog**

This species has been recorded by Davies, M. et al in 1978.

Litoria meiriana **Rockhole Frog**

At `Top Spring' Site 2 (21/12/93). At times in very large numbers. Found in the pools and on rock surfaces. Also present at sites 15 and 51. Specimen from Site 4 identified by the WA. Museum.

Litoria pallida [2] **Pale Frog**
17(2).

Collected from near Sites 4, 17 and 32. This animal has also been recorded by Davies, M. et al in 1980.

Litoria rothii **Roth's Tree Frog**

Seen while frog call recording at Site 5, and heard at site 18 (1/2/94). Also recorded by Kenneally, K.F. in 1982.

Litoria wotjulumensis [1] **Wotjulum Frog**

Seen while frog call recording at Site 5, and Site 32. Heard at Lily Pool. Single animal pit trapped at Site 4.

Megistolotis lignarius [8] **Woodworker Frog**
2(1), 4(2), 7(2), 12(1), 13(1), 23(1).

Notaden melanoscaphus [10] **Northern Spadefoot Toad**
6(1), 8(2), 9(1), 14(1), 21(1), 22(2), 24(1), 33(1).

Ranidella bilingua [2] **Bilingual Froglet**
28(1), 32(1).

Uperoleia borealis [88] **Northern Toadlet**
1(1), 2(1), 4(18), 5(4), 6(3), 8(1), 10(3), 11(3), 12(7), 13(11), 14(3), 15(6), 16(7), 17(1), 18(3), 19(1), 20(2), 23(1), 26(5), 27(3), 30(2), 45(1), 51(1).

Seen while frog call recording at Site 5. Also recorded by Davies, M. et al in 1979.

Uperoleia lithomoda [172] **Stonemason's Toadlet**
1(1), 2(2), 4(8), 5(3), 6(2), 7(1), 8(2), 9(1), 10(5), 11(6), 12(4), 13(9), 14(2), 15(4), 16(3), 17(2), 18(1), 19(27) 20(23) 21(26), 23(1), 25(4), 26(15), 27(3), 28(2), 29(1), 30(5), 34(1), 35(2), 36(3), 37(1), 40(1), 51(1).

REPTILES

Gekkonidae

Diplodactylus stenodactylus [111]
1(4), 2(3), 5(1), 6(1), 7(3), 8(12), 9(4), 12(1), 14(1), 16(3), 17(1), 18(1), 19(4), 20(12), 21(11), 22(1), 23(4), 25(2) 28(1), 29(1), 31(1), 34(2), 35(2), 36(1), 37(4), 38(2), 39(5), 40(12), 42(1), 46(2), 47(3), 48(1), 53(2), 54(2).

Gehyra australis [1] **Northern Dtella**

Single animal pit trapped at Site 52. This species was also recorded by Harold, G. et al in 1984.

Gehyra nana [2]
25(1), 27(1).

Heteronotia binoei [32] **Bynoe's Gecko**
4(3), 6(1), 13(1), 14(1), 16(2), 22(2), 24(5), 25(6), 27(1), 34(2), 37(1), 41(3), 42(10, 43(1), 45(1), 48(1).

This animal was also recorded by Harold, G. et al in 1984

Pygopodidae

Delma borea [4]
19(1), 39(1), 44(2).

This species was also recorded by Butler, W.H. in 1970.

Lialis burtonis [7] **Burton's Snake-lizard**
10(1), 14(1), 16(1), 32(1), 39(1), 48(1), 53(1).

Seen when spotlighting (18.30 hrs) on triodia near escarpment `lizard rocks'. Orange/brown dorsal and white/cream ventral.

Pygopus nigriceps [2] **Hooded Scaly-foot**
25 (1),36(1).

Agamidae

Chelosania brunnea **Chameleon Dragon**

Single specimen seen near Lily Creek at the end of March 1994.

Chlamydorsaurus kingii **Frilled Lizard**

On stump directly adjacent to Bull Spring (near Site 11/3 - 14/12/93). Also on eastern boundary on three occasions (27/12/93, 2/1/94, and 6/1/94)

Ctenophorus isolepis [1] **Military Dragon**

Single animal trapped at Site 2. A number of animals possibly of this species seen at this location and near Site 18/1-3. This dragon is confined mainly to arid desert environments and is found in the south and east Kimberley `mainly on spinifex sandplains and dunes'.

Diporiphora magna [5]
2(1), 3(1), 9(1), 16(1), 41(1).

This animal was also recorded by Harold, G. et al in 1980.

Gemmatophora gilberti

Seen downstream from site 2.

Varanidae

Varanus acanthurus **Ridge-tailed Monitor**

Near site 8. Spinifex over red sand valley (28/12/93). Caught in Elliott traps.

Varanus panoptes

Next to access track on the southern boundary (26/12/93), SE boundary (4/1/94), near Site 27 (15/1/94), near Site 45 (19/1/94), and in the vicinity of site 51 (31/1/94). Single animal pit trapped at Site 36.

Varanus sp aff mertensi?,

Seen while frog call recording at Site 2.

Varanus scalaris [8] **Spotted Tree Monitor**
1(1), 16(1), 19(4), 20(2).

Varanus tristis

Single animal pit trapped at Site 35. Also caught in pit traps.

Scincidae

Carlia amax [9]
13(2), 29(3), 31(1), 32(2), 50(1).

Carlia foliorum [3]
16(1), 20(1), 22(1).

Carlia johnstonei [1]
13(1).

It is now to be expected that this species of skink can be found in most of the north and east Kimberley and can often be found in moist environments such as small rainforest pockets. The nearest verified recording of this species is at Point Spring Nature Reserve some forty kilometres north of Kununurra where it is to be found in a small patch of rainforest. This is a range extension where previously the distribution was noted as; `Subhumid zone of northwest Kimberley, far north of W. Aust.

Carlia triacantha [4]
16(3), 17(1).

Cryptoblepharus plagiocephalus [6]
5(1), 16(2), 26(1), 34(2).

Ctenotus inornatus [10]
5(1), 6(1), 10(1), 14(1), 25(2), 27(1), 30(1), 46(1), 48(1).

This species was also recorded by Harold, G. et al in 1980.

Ctenotus piankai [7]
23(2), 26(4), 35(1).

This animals distribution was previously described as; `Arid sandy country from southern Kimberley south to Marilla and the Great Victoria Desert'. Some records come from the Purnululu National Park and areas near Lake Argyle.

Ctenotus saxatilis [36]
6(2), 10(1), 12(3), 14(1), 16(5), 24(1), 25(1), 27(1), 31(1), 32(2), 42(1), 43(1), 44(2), 45(3), 46(1), 48(4), 50(2), 51(1), 52(2), 53(1).

Distribution has previously been stated as; `Northern arid zone of W. Aust. with some records from the Purnululu National Park.

Also caught in Elliott traps.

Ctenotus tantillus [61]
5(1), 6(4), 7(8), 8(3), 9(1), 10(1), 13(1), 14(1), 18(1), 19(4), 20(2), 21(2), 22(1), 23(2), 25(2), 26(4), 27(1), 28(1), 30(10), 35(3), 36(2), 37(2), 40(3), 42(2), 51(1), 52(3), 53(3), 54(1).

In sandy soil next to escarpment (near Site 5 - 22/12/93)

Glaphyromorphus isolepis [39]
4(1), 6(2), 11(1), 14(1), 16(3), 17(9), 20(1), 22(1), 27(2), 31(1), 32(3), 33(8), 34(1), 35(2), 44(1), 45(2).

Lerista bipes [59]
1(1), 9(3), 12(2), 15(1), 20(1), 21(1), 22(1), 25(3), 27(8), 29(2), 32(2), 35(3), 37(2), 38(4), 39(3), 40(3), 41(7), 42(5), 43(1), 46(1), 51(2).

Menetia greyii [3]
19(1), 21(2).

Previously recorded from the Lake Argyle area.

Morethia ruficauda [12]
4(1), 13(2), 27(3), 32(1), 33(1), 40(1), 41(1), 42(1), 48(1).

Seen at site 25 (28/12/93).

Notoscincus ornatus [2]
1(1), 19(1).

Omolepida branchialis

Seen adjacent to walk track (28/1/94). Sandstone present. Woodland - *Adansonia gregorii*, *Acacia tumida*, *Grevillea agrifolia*, *Terminalia latipes*.

Previously recorded from the Lake Argyle area.

Proablepharus tenuis [5]
1(1), 2(1), 14(2), 29(1).

Tiliqua scincoides **Eastern Blue-tongued Lizard**

Caught in Elliott traps.

SNAKES

Typhlopidae

Ramphotyphlops diversus [7]
9(1), 34(1), 36(2), 41(1), 45(1), 53(1).

Ramphotyphlops sp.

Two specimens which were not able to be identified were collected at Sites 21 and 41.

Boidae

Aspidites melanocephalus **Black-headed Python**

Not seen during the survey but has been seen in the park previously.

Morelia childreni **Children's Python**

Seen while frog call recording at Site 5. Single animal pit trapped at Site 30.

Morelia olivacea **Olive Python**

Not seen during the survey but has been seen in the park previously.

Colubridae

Dendrelaphis punctulatus **Australian Bronzeback**

A single animal was released in the park after capture at Kununurra.

Elapidae

Demansia atra **Lesser Black Whipsnake**

This animal was recorded by Griffin, P, et al in 1981.

Demansia olivacea **Olive Whipsnake**

An animal was found on the eastern boundary track.

Pseudonaja ingrami **Ingram's Brown Snake**

A single animal was pit trapped at Site 26.

Whilst this animal is known from the `black-soil plains of the northern interior of the Northern Territory and northwestern interior of Queensland it had previously been known to be in Western Australia from a single specimen also recorded from Kununurra.

Pseudonaja nuchalis **Gwarda**

Not seen during the survey but has been seen in the park previously.

Vermicella roperi [2] **Northern Shovel-nosed Snake**
19(1), 22(1).

This animal was also recorded by Bush, B. in 1983.

15 species of frog have been recorded for the park. During the survey period the ornate burrowing frog (*Limnodynastes ornatus*) was by far the most abundant with two taxa from the *Uperoleia* genus being the next most abundant.

4 species of gecko, 3 species of legless (or snake) lizards, 5 species of dragon, 5 (possibly 6) monitors, 17 species of skink, and 11 species of snake have been recorded.

BIRD LIST

A bird list exists for Mirima National Park **and its environs** and as such includes areas like Lily Pond which is to the south of the park and is an extension of Lake Kununurra, the permanent water of Lake Kununurra and the Ord River, the irrigation scheme, and the town site of Kununurra. The following list, however, is for those birds which have been recorded within the boundaries of the park as shown on map 1.

Anhinga melanogaster	**Darter**
Phalacrocorax melanoleucos	**Little Pied Cormorant**
Ardea novaehollandieae	**White-faced Heron**
Ardea picata	**Pied Heron**
Ardeola ibis	**Cattle Egret**
Egretta alba	**Great Egret**
Egretta garzetta	**Little Egret**
Egretta intermedia	**Intermediate Egret**
Nycticorax caledonicus	**Rufous Night Heron**
Dupetor flavicollis	**Black Bittern**
Xenorhynchus asiaticus	**Black-necked Stork**
Elanus notatus	**Black-shouldered Kite**
Aviceda subcristata	**Pacific Baza**
Milvus migrans	**Black Kite**
Hamirostra melanosternon	**Black-breasted Buzzard**
Haliastur sphenurus	**Whistling Kite**
Accipiter cirrhocephalus	**Collared Sparrowhawk**
Aquila audax	**Wedge-tailed Eagle**
Falco peregrinus	**Peregrine Falcon**
Falco cenchroides	**Australian Kestrel**
Coturnix australis	**Brown Quail**
Turnix velox	**Little Button-quail**
Gallinula ventralis	**Black-tailed Native-hen**
Porphyrio porphyrio	**Purple Swamphen**
Fulica atra	**Eurasian Coot**
Grus rubicundus	**Brolga**
Irediparra gallinacea	**Comb-crested Jacana**
Vanellus miles	**Masked Lapwing**
Geopelia placida	**Peaceful Dove**
Geopelia cunneata	**Diamond Dove**
Geopilia humeralis	**Bar-shouldered Dove**
Ocyphaps lophotes	**Crested Pigeon**
Petrophassa albipennis	**White-quilled Rock-Pigeon**
Petrophassa plumifera	**Spinifex Pigeon**
Calyptorhynchus magnificus	**Red-tailed Black-Cockatoo**
Cacatua roseicapilla	**Galah**
Cacatua sanguinea	**Little Corella**
Trichoglossus rubritorquis	**Red-collared Lorikeet**
Psitteuteles versicolor	**Varied Lorikeet**
Aprosmictus erythropterus	**Red-winged Parrot**
Nymphicus hollandicus	**Cockatiel**
Melopsittacus undulatus	**Budgerigar**
Platycercus venustus	**Northern Rosella**
Cuculus pallidus	**Pallid Cuckoo**
Cuculus variolosus	**Brush Cuckoo**
Chrysococcyx basalis	**Horsefield's Bronze-Cuckoo**
Eudynamis scolopacea	**Common Koel**
Scythrops novaehollandiae	**Channel-billed Cuckoo**

Centropus phasianinus	**Pheasant Coucal**
Ninox novaeseelandiae	**Southern Boobook**
Tyto alba	**Barn Owl**
Podargus strigoides	**Tawny Frogmouth**
Dacelo leachii	**Blue-winged Kookaburra**
Halcyon pyrrhopygia	**Red-backed Kingfisher**
Halcyon sancta	**Sacred Kingfisher**
Merops ornatus	**Rainbow Bee-eater**
Eurystomus orientalis	**Dollarbird**
Cecropis nigricans	**Tree Martin**
Cecropis ariel	**Fairy Martin**
Anthus novaeseelandiae	**Richard's Pipit**
Motacilla flava	**Yellow Wagtail**
Coracina novaehollandiae	**Black-faced Cuckoo-shrike**
Coricina papuensis	**White-bellied Cuckoo-shrike**
Lalage sueurii	**White-winged Triller**
Pachycephala rufiventris	**Rufous Whistler**
Myiagra inquieta	**Restless Flycatcher**
Rhipidura rufiventris	**Northern Fantail**
Rhipidura leucophrys	**Willie Wagtail**
Pomatostomus temporalis	**Grey-crowned Babbler**
Acrocephalus stentoreus	**Clamorous Reed-Warbler**
Megalurus timoriensis	**Tawny Grassbird**
Malurus melanocephalus	**Red-backed Fairy-wren**
Smicrornis brevirostris	**Weebill**
Gerygone olivacea	**White-throated Gerygone**
Daphoenositta chryzoptera	**Varied Sittella**
Climacteris melanura	**Black-tailed Treecreeper**
Philemon argenticeps	**Silver-crowned Friarbird**
Philemon citreogularis	**Little Friarbird**
Entomyon cyanotis	**Blue-faced Honeyeater**
Manorina flavigula	**Yellow-throated Miner**
Lichenostomus virescens	**Singing Honeyeater**
Lichenostomus unicolor	**White-gaped Honeyeater**
Lichenostomus plumulus	**Grey-fronted Honeyeater**
Lichenostomus flavescens	**Yellow-tinted Honeyeater**
Melithreptus albogularis	**White-throated Honeyeater**
Lichmera indistincta	**Brown Honeyeater**
Ramsayornis fasciatus	**Bar-breasted Honeyeater**
Conophila rufogularis	**Rufous-throated Honeyeater**
Certhionyx pectoralis	**Banded Honeyeater**
Dicaeum hirundinaceum	**Mistletoebird**
Pardalotus rubricatus	**Red-browed Pardalote**
Pardalotus striatus	**Striated Pardalote**
Neochmia ruficauda	**Star Finch**
Neochmia phaeton	**Crimson Finch**
Poephila guttata	**Zebra Finch**
Poephila bichenovii	**Double-barred Finch**
Poephila personata	**Masked Finch**
Poephila acuticauda	**Long-tailed Finch**
Lonchura castaneothorax	**Chestnut-breasted Mannikin**
Oriolus sagittatus	**Olive-backed Oriole**
Chlamydera nuchalis	**Great Bowerbird**
Grallina cyanoleuca	**Australian Magpie-lark**
Artamus personatus	**Masked Woodswallow**
Artamus cinereus	**Black-faced Woodswallow**
Artamus minor	**Little Woodswallow**
Cracticus nigrogularis	**Pied Butcherbird**

Gymnorhina tibicen **Australian Magpie**
Corvus orru **Torresian Crow**

186 species of avifauna have been recorded from within the boundaries of the park in recent times. It is to be expected that this number can be substantially added to. The location of the park adjacent to Kununurra, the irrigation area and permanent water will, in all likelihood, lead to recordings of birds which might not have otherwise been expected.

Birds which might be considered to be uncommon are the pacific baza, peregrine falcon, black-tailed native-hen and the barn owl. Whilst the channel-billed cuckoo, yellow wagtail and the common koel appear from distribution maps to be uncommon this has been attributed to the lack of observers during the `wet' when the birds enter Australia.

The little button-quail is at the northern edge of its distribution.

MAMMALS

Dasyuridae

Sminthopsis macroura **Stripe-faced Dunnart**

Single animal was pit trapped at site 13.

This animal is known from much of central and northern Australia. Its presence in Mirima is towards its most northern limit of distribution.

Planigale ingrami [4] **Long-tailed Planigale**
30(1), 32(1), 38(1), 48(1).

Macropodidae

Onychogalea unguifera **Northern Nailtail Wallaby**

On the Museum of Western Australia data base.

Petrogale sp.

Very active rock wallaby glimpsed at times. This is most likely to be the short-eared rock - wallaby *Petrogale brachyotis.*

Macropus agilis **Agile Wallaby**

Not seen during the survey but has been seen in the park previously.

Macropus robustus **Common Wallaroo**

On the Museum of Western Australia data base.

Macropus antilopinus **Antilopine wallaroo**

In woodland with triodia present near escarpment. Also near Site 4 (2/1/94), Site 8 (6/1/94) and Site 11 (16/1/94).

Pteropodidae

Pteropus sp.

Seen while frog call recording at Site 2 and Site 11. Animal was in flight and it was difficult to distinguish whether it was the little red or black flying fox. It is most likely that both animals are present in the park.

Rhinolophidae

Hipposideros ater **Dusky Horseshoe-Bat**

On the Museum of Western Australia data base.

Emballonuridae

Taphozous georgianus **Common Sheathtail-bat**

Mist netted from a cave at the southern end of the park (2/2/94).

Vespertilionidae

Nycticeius balstoni **Western Broad-nosed Bat**

On the Museum of Western Australia data base.

Eptesicus pumilus **Little Cave Eptesicus**

This species has in the past been referred to as *Eptesicus pumilus caurinus*, *Eptesicus caurinus* and *Vespadalus caurinus*.

One individual mist netted from a shallow cave near 'lizard rocks' (29/1/94). Two individuals mist netted from woodland adjacent to Bull Springs (30/1/94). Another individual netted over water at site 6 (1/2/94).

Muridae

Hydromys chrysogaster **Water-rat**

On the Museum of Western Australia data base.

Pseudomys nanus [3] **Western Chestnut Mouse**
6(1), 20(1), 35(1)

Pseudomys delicatulus [12] **Delicate Mouse**
7(1), 8(1), 20(3), 21(1), 23(1), 34(2), 35(1), 36(1), 39(1)

Leggadina forresti **Forrest's Mouse**

On the Museum of Western Australia data base.

Rattus villosissimus **Long-haired Rat**

On the Museum of Western Australia data base.

Rattus rattus **Black Rat**

On the Museum of Western Australia data base.

Canidae

Canis familiaris **Dingo**

Young dingo seen on several occasions on the eastern boundary at night and observed near middle spring turn-off in the morning (6/1/94). Footprints seen regularly on eastern boundary. A pair was also observed at Site 17 (2/2/94).

Felidae

Felis catus **Cat**

Seen regularly in the park.

Equidae

Equus asinus **Donkey**

Seen regularly on the eastern side of the park. Numbers appear to increase toward the end of the dry season when animals enter the park seeking water from the springs.

Bovidae

Bos taurus **Cattle**

Seen regularly on the eastern side of the park. Numbers appear to increase toward the end of the dry when animals enter the park seeking water from the springs. These animals cause significant vegetation damage to areas surrounding the springs. Two springs have been fenced to try to reduce this damage.

22 species of mammals with 4 of these being introduced have been recorded. During the survey trapping period 13 species of mammal were noted

In summary a total of 82 species of vertebrate animals other than birds have been noted for the Mirima National Park.

It does appear that undertaking the survey during the `wet' season contributed to the number of species collected. This is particularly so for the period toward the end of that part of the season described as the `build-up' when there can be sudden episodic downpours to which species such as frogs respond very rapidly. Whilst not quantified it was felt that following rain the trapping result would provide mainly frog species and after a few days without rain an increase in the number of skink species would be noticed. After further rain the trapping response would once again swing back toward frogs.

APPENDIX 1

Site Descriptions

Sites 1, 2 and 3 are on a sandy `plateau' approximately 300 metres west of: 15° 46' 25"S
128° 46' 07"E

Site 1

Pale orange sand with sandstone gravel. Flat area.

Very open woodland (*Eucalyptus tetrodonta*, *E. ferruginea*, *Erythrophleum chlorostachys*) over mid dense spinifex (*Triodia pungens ?*).

Other plants:
Adansonia gregorii
Persoonia falcata
Tinospora smilacina
Tacca leontopetaloides
Wrightia saligna
Petalostigma pubescens
Brachychiton sp.
Senna sp.

Site 2

Orange/grey sand. Flat area 15 metres from dry creek.

Very open woodland (no dominant) over very sparse spinifex (*Triodia pungens* ?).

Other plants:
Erythrophleum chlorostachys
Cochlospermum fraseri
Tacca leontopetaloides
Tinospora smilacina

Site 3

Pale orange/brown sand. Flat area.

Very open woodland (no dominant) over mid dense spinifex (*Triodia pungens* ?)/grass (*Sorghum sp.*).

Other plants:
Adansonia gregorii
Eucalyptus ferruginea
E. drysdalensis
Wrightia saligna
Haemodorum sp.
Cochlospermum fraseri
Buchanania obovata
Tacca leontopetaloides
Tinospora smilacina

Sites 4, 5 and 6 are adjacent to creek and spring, west of:
15° 46' 25"S
128° 46' 07"E

Site 4

Grey sand. Alluvial flat area adjacent to creek.

Low riverine vegetation with no dominant.

Other plants:
Buchanania obovata
Erythrophleum chlorostachys
Eucalyptus aspera
Xanthostemon sp.
Calytrix sp.
Owenia vernicosa
Vitex glabrata

Site 5

Pale grey sand. Flat area at base of sandstone 20 metres from spring.

Sparse spinifex (*Triodia pungens ?*)/ herbs.

Other plants:
Acacia richardsii

Erythrophleum chlorostachys
Terminalia canescens

Site 6

Pale orange sand. Sloping creek bank.

Tall grass (*Sorghum sp.*).

Sites 7, 8 and 9 are spread out east of the spring and east and south east of: 15^{O} 46' 25"S
128^{O} 46' 07"E

Site 7

Orange/grey sand. Flat area.

Very open woodland (*Erythrophleum chlorostachys*) over mid dense low grass (*Sorghum sp.*).

Site 8

Pale orange sand. Flat area approximately 100 metres from spring.

Very open woodland (no dominant) over sparse spinifex (*Triodia pungens ?*).

Other plants:
Acacia translucens
Calytrix sp.
Petalostigma pubescens

Site 9

Orange sand. Flat area.

Very open woodland (*Eucalyptus ferruginea, Eucalyptus tetrodonta*) over mid-dense spinifex (*Triodia pungens ?*)/grass (*Sorghum sp.*).

Other plants:
Tinospora smilacina
Wrightia saligna
Erythrophleum chlorostachys

Sites 10, 11 and 12 are located in a shallow valley approximately 300 metres along a creek west of:
15° 46' 10"S
128° 47' 03"E

Site 10

Grey sand. Alluvial flat near dry creek.

Very open woodland (*Eucalyptus drysdalensis, Erythrophleum chlorostachys*) over sparse spinifex (*Triodia pungens ?*).

Other plants:
Haemodorum sp.

Site 11

Grey sand. Alluvial flat near dry creek.

Very open woodland (*Eucalyptus drysdalensis*) over sparse spinifex (*Triodia pungens* ?)/*Haemodorum sp.*.

Other plants:
Tacca leontopetaloides
(Cassia sp.)

Site 12

Grey sand. Alluvial flat near dry creek.

Sparse spinifex (*Triodia pungens* ?).

Other plants:
Haemodorum sp.

Sites 13, 14 and 15 are located just downstream from a permanent spring.

Site 13

Grey sand. Narrow alluvial creek flat adjacent to sandstone escarpment. 10 metres to very dense *Acacia sp.*/grass in creek.

Mid dense spinifex (*Triodia pungens ?*) with *Pandanus sp.* nearby.

Other plants:
Clerodendrum sp.
Ampelocissus acetosa

Site 14

Grey sand. Top of creek bank approximately 10 metres to dense grass in creek.

Buchanania obovata thicket over dense grass (*Sorghum sp.*).

Other plants:
Eucalyptus tetrodonta
Persoonia falcata
Acacia tumida

Site 15

Grey sand. On creek bank approximately 5 metres from dense grass in creek which has small pools.

Sparse spinifex (*Triodia pungens* ?).

Other plants:
Acacia sp.
Tacca leontopetaloides
Persoonia falcata
Eucalyptus polycarpa

GPS reading near Sites 16, 17 and 18: 15° 46' 10"S
128° 47' 03"E

Site 16

Light grey sand. Flat area 20 metres from a pool.

Very open woodland (*Eucalyptus polycarpa*) with some riverine components (*Pandanus sp.*) over mid-dense grass (*Sorghum sp.*).

Other plants:
Eucalyptus tetrodonta
Grewia sp.

Site 17

Light grey sand. Creek bank approximately 5 metres from pool.

Dense tall grass (*Sorghum sp.*).

Other plants:
Acacia plectocarpa
Melaleuca dealbata ?
Erythrophleum chlorostachys

Site 18

Pale yellow/grey sand. On gentle slope.

Very open woodland (*Acacia platycarpa ?*) over sparse spinifex (*Triodia pungens ?*).

Other plants:
Petalostigma quadriloculare
Haemodorum sp.

Sites 19, 20 and 21 are approximately 100 metres north of: 15° 48' 03"S
128° 47' 05"E
This area was burnt late in the 1993 dry season. Indications are that it was a 'hot' fire.

Site 19

Orange sand. Flat area.

Very open woodland (no dominant) over sparse grass (*Sorghum sp.*).

Other plants:

Petalostigma pubescens
Erythrophleum chlorostachys
Tinospora smilacina
Adansonia gregorii

Site 20

Orange sand. Flat area.

Very open woodland (no dominant) over sparse grass (*Sorghum sp.*).

Other plants:
Petalostigma pubescens
Erythrophleum chlorostachys
Tinospora smilacina
Persoonia falcata
Atalaya sp.

Site 21

Orange sand. Flat area.

Open woodland (*Erythrophleum chlorostachys*) over sparse grass (*Sorghum sp.*). Nearby are *Lysiphillum cunninghamii* and *Eucalyptus tetrodonta*.

Other plants:
Petalostigma pubescens
Wrightia saligna
Tinospora smilacina

Sites 22, 23 and 24 are in a valley west of: 15° 48' 05"S
128° 46' 44"E

Site 22

Red sand. Valley flat underneath the canopy of a large boab.

Open woodland (no dominant) over low scrub (*Wrightia saligna*).

Other plants:
Persoonia falcata
Gyrocarpus americanus
Tacca leontopetaloides
Ampelocissus acetosa
Flueggea virosa

Site 23

Red sand. Valley flat.

Mid-dense spinifex (*Triodia pungens* ?).

Other plants:
Erythrophleum chlorostachys
Persoonia falcata

Site 24

Reddy/brown sand. Adjacent to sandstone escarpment underneath *Eucalyptus miniata*.

Dense herb/spinifex (*Triodia pungens* ?).

Other plants:
Erythrophleum chlorostachys
Adansonia gregorii
Tacca leontopetaloides
Ampelocissus acetosa

Sites 25, 26 and 27 are located north of: 15° 47' 56"S
128° 46' 20"E

Site 25

Orange sand. Flat area at base of sandstone 'bee-hive'.

Open low woodland (*Eucalyptus miniata*) over sparse spinifex (*Triodia pungens*).

Other plants:

Erythrophleum chlorostachys
Clerodendrum sp.
Tacca leontopetaloides

Site 26

Orange sand. At base of sandstone 'bee-hives'.

Sparse spinifex (*Triodia pungens ?*)

Other plants:
Tacca leontopetaloides
Gyrocarpus americanus
Owenia vernicosa
Eucalyptus miniata

Site 27

Light grey sand with sandstone rubble. In narrow, short, steep sided gorge in `bee-hives'.

Wide variety of plants.

Other plants:
Vitex glabrata
Ampelocissus acetosa
Tacca leontopetaloides
Triodia pungens ?
Passiflora foetida
Owenia vernicosa
Timonius timon

Sites 28, 29 and 30 are located north of the Bull Spring track 'turn-around' at: 15° 46' 25"S
128° 46' 07"E

Site 28

Pale grey/brown sand with sandstone gravel. On flat at bottom of escarpment.

Sparse spinifex (*Triodia pungens ?*).

Other plants:
Tacca leontopetaloides
Eucalyptus aspera
E. miniata
Buchanania obovata
Cochlospermum fraseri

Site 29

Pale grey sand. Flat area adjacent to dry creek and escarpment.

Complex grass/herbs.

Other plants:
Tacca leontopetaloides
Haemodorum sp.
Ampelocissus acetosa
Triodia pungens ?
Adansonia gregorii
Buchanania obovata
Erythrophleum chlorostachys

Site 30

Pale yellow sand. Flat area 20 metres from creek adjacent to bottom of escarpment.

Sparse spinifex (*Triodia pungens ?*).

Other plants:
Tacca leontopetaloides
Terminalia latipes

Sites 31,32 and 33 are located east of the Bull Spring track 'turn-around' at: 15° 46' 25"S
128° 46' 07"E

Site 31

Very pale orange/grey sand. Flat area near dry creek and at base of escarpment.
Mid-dense spinifex (*Triodia pungens ?*).

Other plants:
Terminalia canescens
Melaleuca viridiflora
Eucalyptus confertiflora
Buchanania obovata
Adansonia gregorii

Site 32

Grey sand. On creek edge slope. Creek has a flowing water downstream from permanent spring. Dense grasses directly adjacent to creek.

Low woodland (scattered *Eucalyptus polycarpa*) over open grassland (*Sorghum sp.*).

Other plants:
Triodia pungens ?
Adansonia gregorii
Tacca leontopetaloides
Pandanus sp.
Terminalia latipes
Ficus sp.
Erythrophleum chlorostachys

Site 33

Grey sand. Riverine environment. At edge of dense grass edged water filled creek and grass slope.

Low woodland (scattered *Eucalyptus polycarpa, Pandanus sp.*) over open grassland (*Sorghum sp.*).

Other plants:
Buchanania obovata
Tacca leontopetaloides
Tinospora smilacina
Acacia holosericea ?
Terminalia latipes

Sites 34, 35 and 36 are located east of: 15° 46' 33"S
128° 46' 09"E

Site 34

Pale brown sand. Flat area.

Sparse scrub to 4 metres (*Flueggea virosa*) over very sparse grass (*Themeda sp.*).

Other plants:
Eucalyptus tectifica
Lysiphyllum cunninghamii
Carissa lanceolata
Adansonia gregorii
Gyrocarpus americanus
Triodia pungens ?

Site 35

Grey sand. Flat area near creek which has a number of very small pools in it.

Mid-dense spinifex (*Triodia pungens* ?).

Other plants:
Sorghum sp.
Tacca leontopetaloides
Eucalyptus sp. E.
Persoonia falcata
Acacia tumida
Adansonia gregorii
Tinospora smilacina
Gyrocarpus americanus
Owenia vernicosa
Petalostigma pubescens

Site 36

Pale orange/brown sand. On a sandy rise 40 metres east of the creek described for 12/2.

Sparse spinifex (*Triodia pungens* ?).

Other plants:
Ampelocissus acetosa
Lysiphyllum cunninghamii
Acacia tumida
Sorghum sp.

Sites 37, 38 and 39 are located near an area generally known as lizard rocks. All sites are on the valley floor surrounded by steep, picturesque escarpments and sandstone outcrops.
37 is approximately 100 metres east of: 15° 46' 55"S
128° 45' 31"E
38 is halfway between 37 and 39.
39 is approximately 100 metres east of: 15° 46' 59"S
128° 45' 27"E

Site 37

Orange sand. On valley floor.

Mid-dense spinifex (*Triodia pungens?*).

Other plants:
Buchanania obovata
Persoonia falcata

Site 38

Orange sand.

On valley floor. Open woodland (*Eucalyptus nunida*) over sparse spinifex (*Triodia pungens?*).

Other plants:
Goodenia browniana

Site 39

Pale orange sand. On valley floor adjacent to large 'beehive' sandstone outcrop.

Sparse spinifex (*Triodia pungens?*)

Other plants:
Clerodendrum sp.
Erythrophleum chlorostachys
Eucalyptus aspera
E. brachyandra
E. miniata
Calytrix exstipulata
Ficus leucotricha
Scaevola browniana

Sites 40, 41 and 42 are located west of: 15° 47' 02"S
128° 45' 24"E

Site 40

Red sand flat.

Very sparse spinifex

Other plants:
Eucalyptus tetrodonta
Scaevola browniana

Site 41

Grey sand. At base of 'beehive' sandstone outcrop.

Sparse spinifex (*Triodia pungens?*)

Other plants:
Eucalyptus miniata
Owenia vernicosa
Sorghum sp.

Site 42

Orange sand. At base of 'beehive' sandstone outcrop.

Sparse spinifex/grass (*Triodia pungens?*, *Sorghum sp.*)

Other plants:
Ficus sp. x5
Eucalyptus miniata
E. cliftoniana
Terminalia latipes

Sites 43, 44 and 45 are in the valley which is used by tourists. There is a formed road which is heavily used.
43 is located just west of: 15° 46' 02"S
128° 45' 03"E
44 is approximately 100 metres north of 43.
45 is located 100 metres north of: 15° 45' 53"S
128° 45' 02"E

Site 43

Pale orange/brown sand. Top of the valley on the floor.

Sparse scrub (*Grevillea agrifolia, Acacia richardsii*) over very sparse spinifex (*Triodia pungens?*)

Other plants:
Vitex glabrata
Tacca leontopetaloides
Persoonia falcata
Clerodendrum sp.

Site 44

Dark grey sand. On valley floor.

Near a stand of boabs (*Adansonia gregorii*) with a mid-dense assemblage of grasses and herbs both perennial and annual.

Other plants:
Buchanania obovata
Scaevola browniana
Tacca leontopetaloides
Melaleuca viridiflora?

Site 45

Grey sand. On valley floor adjacent to a large sandstone rock.

Mid-dense spinifex (*Triodia pungens?*).

Other plants:
Tacca leontopetaloides
Haemodorum sp.
Melaleuca viridiflora?

Sites 46, 47 48 are located east of: 15° 45' 07"S
128° 45' 14"E

Site 46

Light brown/orange sand. Flat and alluvial in origin.

Sparse scrub to 2.5 metres (*Grevillea refracta, Acacia tumida, Acacia translucens*) over very sparse spinifex (*Triodia pungens*).

Other plants:

Site 47

Similar vegetation to Site 46 but slightly thicker. Soils same as Site 46.

Site 48

Light brown/orange sand. Flat and alluvial in origin.

Mid-dense spinifex (*Triodia pungens*).

Other plants:

Tacca leontopetaloides

Sites 49,50 and 51 are located north east of Site 48, following creek-line up steep escarpment.

Site 49

Red, gravelly sand. Top of the escarpment.

Open low woodland to 4 metres (*Cochlospermum fraseri*) over mid-dense spinifex (*Triodia pungens*).

Other plants:
Adansonia gregorii
Tacca leontopetaloides
Eucalyptus tectifica

Site 50

Red sand with small sandstone rubble on sandstone. Near dry creek and adjacent to steep escarpment.

Very small patch of sparse low woodland to 5 metres (*Santalum lanceolatum, Terminalia canescens, T. latipes, Adansonia gregorii, Eucalyptus aspera, Gyrocarpus americanus*) with scrub to 2.5 metres (*Grevillea refracta, Cochlospermum fraseri, Acacia tumida*) over very sparse grass/spinifex (*Sorghum sp., Triodia pungens?*).

Other plants:

Site 51

Shallow light brown sand.

Very sparse spinifex (*Triodia pungens*).

Other plants:
Eucalyptus aspera

Site 52

Orange/grey sand. Flat area near a dry creek.

Sparse spinifex (*Triodia pungens?*)

Other plants:
Eucalyptus drysdalensis
Tacca leontopetaloides
Grevillea refracta
Owenia vernicosa

GPS reading on track in between Site 53 and 54:
15° 45' 06"S
128° 45' 12"E
Valley of alluvial sands.

Site 53

Orange/grey sand. Flat area.

Sparse spinifex (*Triodia pungens*?)

Other plants:
Wrightia saligna
Sorghum sp.
Eucalyptus drysdalensis
Flueggea virosa

Site 54

Light brown/orange sand. Slight mound.

Low woodland (*Acacia tumida*) with very sparse understorey without a dominant.

Other plants:
Scaevola browniana
Haemodorum sp.
Triodia pungens?

APPENDIX 2 PHYSICAL CHARACTERISTICS

(*X* = Pale)

	Soil		Colour						
	Sand	Gravel	Red	Orange	Or/grey	Gre/brown	Or/brown	Brown	Grey
Site									
1	X	X		*X*					
2	X				X				
3	X						*X*		
4	X								X
5	X								*X*
6	X			*X*					
7	X				X				
8	X			*X*					
9	X			X					
10	X								X
11	X								X
12	X								X
13	X								X
14	X								X
15	X								X
16	X								*X*
17	X								*X*
18	X				*X*				
19	X			X					
20	X			X					
21	X			X					
22	X		X						
23	X		X						
24	X		X						
25	X			X					
26	X			X					
27	X	X							*X*
28	X	X				*X*			
29	X								*X*
30	X								*X*
31	X				*X*				
32	X								X
33	X								X
34	X							*X*	
35	X								X
36	X						*X*		
37	X			X					
38	X			X					
39	X			*X*					
40	X		X						
41	X								X
42	X			X					
43	X						*X*		
44	X								X
45	X								X
46	X						*X*		
47	X						*X*		
48	X						*X*		
49	X	X	X						
50	X	X	X						
51	X							*X*	
52	X				X				
53	X				X				
54	X						*X*		
No.	54	5	6	13	6	1	7	2	19

APPENDIX 2 (CONT.)

Physical Characteristics

Site	Slope	Flat	Dry creek near	Near water	Near scarp
1		X			
2		X	X		
3		X			
4		X	X		
5		X		X	X
6	X			X	
7		X			
8		X			
9		X			
10		X	X		
11		X	X		
12		X	X		
13		X		X	X
14		X		X	
15		X		X	
16		X		X	
17		X		X	
18	X				
19		X			
20		X			
21		X			
22		X			
23		X			
24		X			X
25		X			X
26		X			X
27		X			X
28		X			X
29		X	X		X
30		X	X		X
31		X	X		X
32	X			X	
33	X			X	
34		X			
35		X		X	
36		X			
37		X			
38		X			
39		X			X
40		X			
41		X			X
42		X			X
43		X			
44		X			
45		X			X
46		X			
47		X			
48		X			
49		X			X
50		X			X
51		X			X
52		X	X		
53		X			
54	X				
No.	5	49	9	10	17

APPENDIX 3 GENERAL VEGETATION STRUCTURE SUMMARY

	Vegetation									
	Open woodland	Very open woodland	Sparse scrub	Sparse grass	Mid dense grass	Dense grass	Sparse Spinifex	Mid dense spinifex	Dense spinifex	Riverine
Site										
1		X						X		
2		X					X			
3		X						X		
4										X
5							X			
6						X				
7		X			X					
8		X					X			
9		X						X		
10		X					X			
11		X					X			
12							X			
13								X		X
14	X					X				
15							X			
16		X			X					X
17						X				
18		X					X			
19		X		X						
20		X		X						
21	X			X						
22	X		X							
23								X		
24						X			X	
25	X						X			
26							X			
27	X						X			
28							X			
29						X				
30		X		X						
31								X		
32	X			X						
33		X			X					X
34			X	X						
35								X		
36							X			
37								X		
38	X						X			
39							X			
40							X			
41							X			
42				X			X			
43			X				X			
44		X			X					
45								X		
46			X				X			
47			X				X			
48								X		
49	X							X		
50	X		X							
51							X			
52							X			
53							X			
54	X									
No.	10	15	6	6	4	5	25	10	1	4

APPENDIX 4 TRAPPING DATES

		SITES								
		1-9	10-15	16-18	19-21	22-24	25-27	28-36	27-45	46-54
DATE										
December	23	X								
	24	X		X						
	25	X	X	X	X					
	26	X	X	X	X					
	27	X	X	X	X					
	28	X	X	X	X		X			
	29	X	X	X	X	X	X			
	30	X	X	X	X	X	X			
January	1	X	X	X	X	X	X			
	2	X	X	X	X	X	X			
	3	X	X	X	X	X	X			
	5	X	X	X	X	X	X			
	6		X	X	X	X	X			
	7		X		X	X	X			
	8					X	X			
	9					X	X			
	10					X	X			
	11					X				
	12									
	13									
	14									
	15							X		
	16							X		
	17							X		
	18							X		
	19							X	X	
	20							X	X	X
	21							X	X	X
	22							X	X	X
	23							X	X	X
	24							X	X	X
	25							X	X	X
	26							X	X	X
	27							X	X	X
	28							X	X	X
	29								X	X
	30								X	X
	31								X	X
February	1								X	X
	2									X