A MAMMAL SURVEY OF STIRLING RANGE NATIONAL PARK:

REPORT TO THE WESTERN AUSTRALIAN HERITAGE COMMITTEE

B.G.MUIR, G.HAROLD & M.CAVANA

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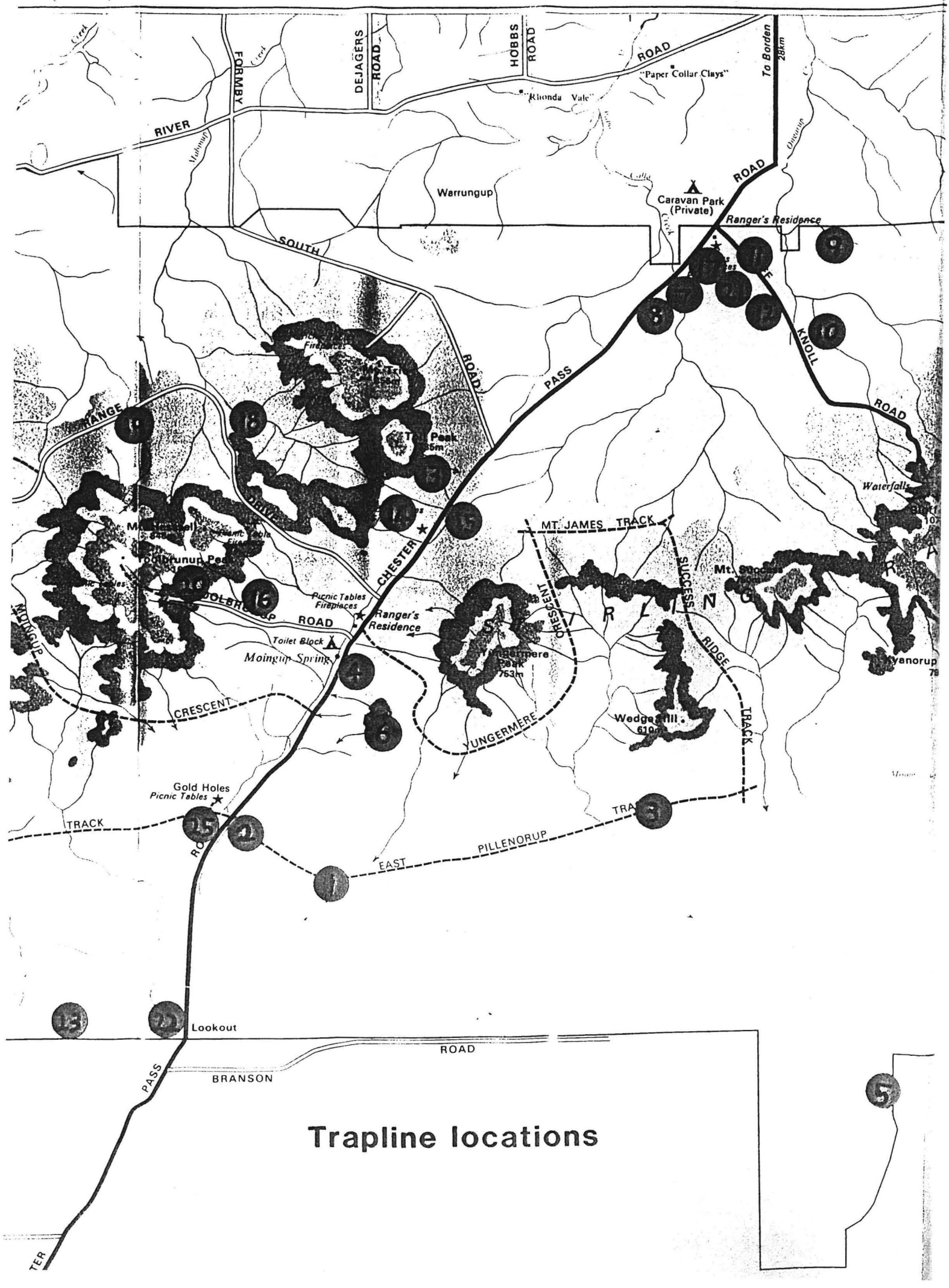
INTRODUCTION

The Western Australian Heritage Committee provided funds to the National Parks Authority of W.A. in 1984-85 for the purpose of investigation by biological survey the status of native mammals in Stirling Range National Park. The request for this assistance stemmed from interest and concern by the Authority on the apparent scarcity of certain mammals in the Park when it was known they were present on much smaller nearby reserves.

Early collecting work in the Mount Barker, Cranbrook and Stirling Range area by J.T. Tunney from about 1895 to 1910, recorded several species of mammals which it was thought were no longer present in the area. Some of these are now believed extinct or restricted to offshore islands. Their demise from the wheatbelt area was undoubtedly a combination of land clearing, introduced predators, increased fire frequency and disease. A few species persisted in the wheatbelt despite these odds, yet have not been recorded in the Park since Tunneys' work. This was unusual considering their being known from nearby reserves and even on some uncleared farmland. Examples of the latter were the Brush Kangaroo (Macropus irma), Short-nosed Bandicoot (Isoodon obesulus) and Echidna (Tachyglossis aculeatus). The Echidna is a prime example of the mysterious missing species, as the last known record in the area prior to this survey was in 1905, yet the animal is usually obvious, unmistakable and widespread throughout the wheatbelt. Further, the Echidna favours rocky outcrops and the Stirling Range provided what was considered an ideal habitat, yet it appeared rare or extinct in the Park.

It was felt that a biological survey by a competent field biologist was necessary to resolve the enigma of the missing species.


RIVER
FORMBY
DEJAGERS ROAD
HOBBS ROAD
ROAD
"Paper Collar Clays"
"Rhonda Vale"
To Borden 28km
Warrungup
Caravan Park (Private)
Ranger's Residence
SOUTH
ROAD
PASS
KNOLL
ROAD
RANGE
DRIVE
CHESTER
MT JAMES TRACK
Waterfalls
Picnic Tables Fireplaces
Ranger's Residence
Toilet Block
Moingup Spring
MOINGUP
CRESCENT
YUNGERMERE
CRESCENT
SUCCESS RIDGE
TRACK
Gold Holes
Picnic Tables
TRACK
EAST PILLENORUP
Lookout
ROAD
BRANSON
PASS
Trapline locations

THE SURVEYS

W.A. Heritage Committee funds were used to carry out three separate surveys. The large area of the Park made comprehensive survey impossible, therefore survey teams could only service representative habitats, five traplines at a time, each line for five nights. Additionally the lines take about one and a half days to install, so a two weeks trip with two sets of trap lines was usual. Mr. Greg Harold, amongst the best field survey biologists in Western Australia, was contracted to carry out the work. The National Parks Authority provided four-wheel drive transport and a field technician to assist Mr. Harold. Surveys were carried out between 8-23rd October 1984 (late winter conditions), 3-16th December 1984 (spring - early summer conditions) and 18th February - 5th March 1985 (summer conditions). Weather conditions determined the time of surveys: late winter and spring when numbers of animals are expected to be at their maximum, and when mobility as a result of breeding activity is maximised, spring to early summer to record breeding activity and summer when animals may be under stress from declining environmental conditions.

Trapping consisted of five lines comprising five, 0.5 m long, plastic pits buried in the ground adjacent to a 50 metre fence of flywire which served to guide passing animals into the pits. Small box traps called Elliot traps, and which capture animals alive, were also used. Tracks, droppings, opportunistic searching under debris and logs, spotlight and headtorch searches were also made. Additionally, local people and park visitors were interviewed to gain verbal records of some of the more obvious species. Trapline locations are shown on map 1 and their appropriate location described, together with a statement of habitat type in Table 1.

TRAPLINE NUMBER	LOCATION	HABITAT TYPE
1	9 km SE of Toolbrunup Pk	Tall Yate (Eucalyptus occidentalis) woodland on white sand
2	7 km SE " "	Wandoo (E.wandoo) woodland/sparse heath on clay
3	3 km SSE of Wedge Hill	Mallee/heath on brown loam
4	3 km WSW of Yungermere Pk	Marri (E. calophylla) woodland/heath on gravelly sand
5	9.5 km S of Kyanorup Eminence	Tall Melaleuca shrubs/shrubs on grey clay
6	7.5 km SE of Toolbrunup Pk	Stunted Jarrah (Emaginata)/heath on stony yellow-brown loam
7	8.5 km NW of Bluff Knoll	Wandoo woodland/stunted sparse shrubs on gravelly sandy loam
8	8.5 km NW of Bluff Knoll	Tallerack (E. tetragona) mallee/open heath on gravelly brown loam
9	6 km NNW of Bluff Knoll	Low shrub mallee/heath on grey sand
10	3.5 km NW of Bluff Knoll	Jarrah-Marri woodland
11	6.5 km NNW of Bluff Knoll	Casuarina grove/grasses on whitish sand
12	6 km NW of Bluff Knoll	Wandoo woodland/sparse shrubs on gravelly loam
13	2.5 km S of Toll Pk	Jarrah-Marri woodland/heath on white sand
14	5 km E of Toolbrunup Pk	Jarrah-Marri woodland/heath on white sand
15	2.5 km SSE of Toll Pk	Jarrah-Marri woodland/shrubland on gravelly loam
16	3.5 km W of Yungermere Pk	Stunted Jarrah-Marri/Banksia/heath on white sand
17	8 km NW of Bluff Knoll	Low mallee/heath on white gravelly loam
18	4 km W of Mt Trio	Open Marri/tall heath on white sand
19	4.5 km W of Toolbrunup Pk	Open Jarrah woodland/heath on white sand
20	4 km ESE of Toolbrunup Pk	Stunted Jarrah-Marri/Banksia/heath on white sand
21	8 km NW of Bluff Knoll	Shrub mallee/heath on gravelly loam
22	10.5 km S of Toolbrunup Pk	Shrub mallee/heath on greyish sand
23	10.5 km S of Toolbrunup Pk	Open shrub mallee/heath on greyish sand
24	7 km SE of Talyuberlup Pk	Open shrub mallee & Xanthorrhoea/heath on greyish sand
25	6 km SSE of Toolbrunup Pk	Open Jarrah woodland/heath on greyish sand
26	4 km E of Talyuberlup	Banksia woodland/Xanthorrhoea & heath on greyish sand

TABLE 1. Traplines, their locations and brief descriptions of the habitat types

RESULTS AND DISCUSSION

Table 2 summarises the mammal species which may have existed, or are known to have existed in the Stirling Range National Park. Records of those species prior to this survey are listed, and based on that information, and a knowledge of their biology, suspected status is given. Table 2 also records the number of individuals found during this survey, the habitat types where they were found, and estimates the availability of suitable habitat within the Park as determined from known habitat requirements and vegetation distribution as given by Beard (1978) in Map 2.

Using the above data estimates of probable current status have been made. Table 3 gives Kitchener et al.(1980) summary of the status of these species in the W.A. wheatbelt. The significance of this data is discussed below for each species.

Antechinus flavipes (Yellow Footed Antechinus)

Despite its wide use of habitat types, Kitchener et al.(1980) did not record it during surveys of the W.A. wheatbelt, and considered it extinct. This apparently reflects its true status and it can probably be considered extinct in the Stirling Range as well.

Bettongia lesueur (Burrowing Bettong)

The last record of this species from the W.A. wheatbelt was in 1935 (Kitchener ibid) and it is believed extinct. The Stirling Ranges, being the largest reserve in the wheatbelt, may have provided a stronghold but there is no evidence of its present existance.

Canis familiaris (Dingo)

The dingo almost certainly occurred in the Stirling Ranges despite its never being recorded. Wild dog control by agriculturalists and progressive clearing of land surrounding the Ranges has almost certainly led to its local extinction.

	SUSPECTED STATUS PRIOR TO THIS SURVEY	NUMBER OF INDIV. RECORDED	HABITATS WHERE FOUND DURING THIS SURVEY	AVAILABILITY OF HABITAT TYPES.	PROBABLE CURRENT STATUS
Antechinus flavipes	extinct	-		widespread	extinct
Bettongia lesueur	possibly extinct	-		moder.widespread	extinct
Canis familiaris	extinct	-		N/A	extinct
Pigmy possum	moderately common	1	Wandoo woodland	widespread	scarce
Chuditch	scarce but present	-		widespread	very scarce but present
short-nosed bandicoot	scarce but present	1 (1980)	swamp	scarce	present but scarce
tammar	possibly extinct	-		widespread	possibly extinct
western grey	common	many sightings	all types	N/A	common
brush wallaby	possibly extinct	10	Jarrah woodl. and mallee	widespread	common
numbat	possibly extinct	-		moder.widespread	extinct
Notoryctes typhlops	scarce but present	-		widespread	very scarce or absent
nailtail wallaby	extinct	-		widespread	extinct
western barred bandicoot	extinct	-		moder.widespread	extinct
red-tailed wambenger	scarce but present	-		moder.widespread	possibly extinct
brush-tail wambenger	possibly extinct	-		widespread	very scarce or extinct
Pseudomys albocinereus	uncertain	6	Banksia woodland	moder.scarce	moderately common
ringtail possum	very scarce	-		scarce	possibly extinct
rat[illegible]	scarce but present	-		widespread	present but scarce
[illegible]	scarce but present	1	Mallee over heath	widespread	present but scarce
[illegible]	common	2	Jarrah woodland	widespread	moderately common
[illegible]	uncertain	1	open mallee over heath	widespread	moderately common
[illegible]	common	1 (1979)	mallee over heath	widespread	present but scarce
[illegible]	common	76	all types	N/A	very common
[illegible]	scarce but present	unconfirmed	Wandoo woodland	widespread	present but scarce

Each species previously recorded
; Ranges, dates and circumstances
status of all species prior to
ndividuals recorded in this
; they were found. The
ltat in the National Park and
l on the latest knowledge is also
:ted to occur there and never
)ates following number of
ast known sighting as determined
:c. N/A means not applicable.
· called S.murina.
y called S.granulipes.

NATIVE MAMMAL SPECIES, EXCLUDING BATS, FOUND WITHIN HISTORIC TIME IN THE WESTERN AUSTRALIAN WHEATBELT. LISTING: STATUS IN THE WHEATBELT (WITH DATE OF LAST CAPTURE IN THE REGION FOR EXTINCT SPECIES), APPROXIMATE BODY WEIGHT (g), HEAD TO BODY LENGTH (mm), FEEDING TYPE, SMALLEST GEOGRAPHIC ISLAND AND/OR ISOLATED WHEATBELT RESERVE RECORDED FROM AND A MEASURE OF HABITAT SPECIALISATION

Species	*Status in wheatbelt*	*Weight (g)*	*Body length (mm)*	*Feeding type*	*Smallest area recorded from:*		*Number of habitat types*
					Continental island	*Wheatbelt reserve*	
Marsupialia							
Macropus fuliginosus	Common	30800	1500	herbivore	440000	36	20
M. robustus	Moderately common	22900	1400	herbivore	3200	158	12
M. irma	Uncommon	7300	780	herbivore	—	1142	13
M. eugenii	Rare	3600	570	herbivore	306	1415	1
Petrogale penicillata	Rare	3800	595	herbivore	93	—	?
Lagorchestes hirsutus	Extinct (1843)[a]	1500	380	herbivore	4300	—	?
Onychogalea lunata	Extinct (1908)[a]	1250	360	herbivore	—	—	?
Lagostrophus fasciatus	Extinct (1906)[a]	1250	410	herbivore	4300	—	?
Bettongia penicillata	Rare	1027	375	herbivore	809	1415	?
Potorous platyops	Extinct (c. 1875)[a]	700	340	herbivore	—	—	?
B. lesueur	Extinct (1935)[a]	630	375	herbivore	780[b]	—	?
Trichosurus vulpecula	Uncommon	1600	400	herbivore	780	447	6
Pseudocheirus peregrinus	Rare	970	325	herbivore	44500	—	?
Cercartetus concinnus	Rare	15	80	insectivore	450000	1361	1
Tarsipes spencerae	Moderately common	9	75	nectivore	—	1000	5
Isoodon obesulus	Rare	1250	390	omnivore	200	1415	?
Perameles bougainville	Extinct (1906)[a]	215	220	omnivore?	4300	—	?
Chaeropus ecaudatus	Extinct (1843)[a]	200	250	omnivore?	—	—	?
Macrotis lagotis	Extinct (1935)	1080	420	omnivore	—	—	?
Myrmecobius fasciatus	Rare	520	230	insectivore	—	1415	?
Dasyurus geoffroii	Rare	1040	380	carnivore	—	7808	3
Antechinus apicalis	Extinct (1843)	75	116	insectivore?	—	—	?
Phascogale calura	Moderately common	48	125	carnivore/ insectivore	—	447	8
Antechinus flavipes	Extinct (1843)	32	117	insectivore	95	—	?
Sminthopsis granulipes	Moderately common	27	90	insectivore	—	772	8
S. murina	Common	14	82	insectivore	34	34	15
S. crassicaudata	Common	13	80	insectivore	—	1000	1
Antechinomys spenceri	Rare	16	100	insectivore	—	—	?
Muridae							
Hydromys chrysogaster	Extinct (c. 1916)	580	320	omnivore	610	—	?
Leporillus sp.	Extinct (no modern specimen)	120–220	200	granivore	405	—	?
Rattus tunneyi	Extinct (1844)	84	150	granivore	25	—	?
Notomys longicaudatus	Extinct (1843)[a]	70?	175	granivore?	—	—	?
N. macrotis	Extinct (1843)[a]	40?	118	granivore?	—	—	?
N. mitchellii	Common	39	120	granivore	—	400	13
N. alexis	Moderately common	33	109	granivore	—	332	6
Pseudomys shortridgei	Extinct (1931)[a]	70	145	granivore	—	—	?
P. nanus	Extinct (1842)	39	90	granivore	20700	—	?
P. occidentalis	Moderately common	34	90	granivore	—	1974	9
P. gouldii	Extinct (1842)	31	90	granivore?	4300	—	?
P. albocinereus	Moderately common	23	80	granivore	188	772	5
P. hermannsburgensis	Rare	13	75	granivore	1133	332	1
Canidae							
Canis familiaris dingo	Rare	25000	715	carnivore	850	—	?
Tachyglossidae							
Tachyglossus aculeatus	Common	2015	425	insectivore	17190	36	22

[a] Also extinct on mainland W.A.
[b] A. A. Burbidge (pers. comm.)

Table 3. Modified from Kitchener et al. (1980)

Cercartetus concinnus (Pygmy Possum)

This species has always been present in low numbers and appears to be able to continue to persist without becoming abundant. Its status appears secure with present Park management.

Dasyurus geoffroii (Native Cat)

The Native Cat has never been common in the area, and is considered scarce elsewhere in the wheatbelt. The smallest reserve on which it has been recorded (Kitchener ibid) was 7,808 ha, some 14 times smaller than Stirling Range National Park. This, plus the presence of widespread suitable habitat suggest the Native Cat is almost certainly able to survive. Its confirmed presence as recently as 1965, supports this view although indications are that it may be very scarce.

Isoodon obesulus (Short-nosed Bandicoot)

The apparent absence of confirmed records of this species since 1900 is remarkable, as the animal is fairly mobile and easily seen. However, it should also be noted that the common Rabbit was also never officially recorded prior to this survey despite its obvious abundance. The fact that the "common tend to be ignored" may explain to some extent the absence of records, but this would not explain why skeletal material has never been collected. A confirmed sighting in 1980 and possible diggings identified in this survey suggest that the species is present, but indications are that it is scarcer than would be expected.

Macropus eugenii (Tammar Wallaby)

This species is quite rare in the wheatbelt (Kitchener ibid) and indications are that it is becoming scarcer, despite its ability to survive on quite small reserves. Absence of any confirmed records in the Stirling Ranges since 1907 suggest it may be locally extinct.

Macropus eugenii (Tammar Wallaby)...contd.

If so, its occurrance on smaller reserves may indicate that the Stirling Range National Park may have unsuitable habitat, yet physiognomically and floristically this is not the case. It is speculated that fire regimes within the Park may be affecting the species. This concept is developed further below.

Macropus fuliginosus (Grey Kangaroo)

This species is common and widespread throughout the National Park and surrounding farmlands, although confirmed records are few. Its status appears secure.

Macropus irma (Brush Wallaby)

The absence of confirmed records or sightings by National Park rangers since 1960 suggested the Brush Wallaby was extinct or extremely scarce in Stirling Ranges. During this survey however, 10 individuals were sighted, all in Jarrah-Marri woodland or mallee, both widespread vegetation types. The species is now considered common within the Park, and the present population may well be the largest remaining representative population outside the forest block.

Myrmecobius fasciatus (Numbat)

Numbat is now rare in the W.A. wheatbelt and it was hoped that it may have persisted in the Stirling Ranges both because of the size of the Park and the presence of suitable habitat, despite its not having been sighted since 1936. An expert on Numbats, Dr. A.Friend, examined the Park in 1984 and found no trace of the animals (pers. comm.). The present survey also failed to suggest their presence. It is assumed the Numbat is now extinct within the Stirling Ranges.

Notomys mitchellii (Mitchells Hopping Mouse)

N. mitchellii is common in the wheatbelt, being recorded from quite small reserves (400 ha) and numerous habitat types (Kitchener et al. 1980). It has never been recorded from the Stirling Ranges and this survey failed to disclose it. It can only be concluded the species is extremely scarce or absent.

Onychogalia lunata (Crescent Nailtail Wallaby)

The last record anywhere in the wheatbelt was at Cranbrook near the Stirling Ranges in 1908 and the species is now considered extinct throughout Australia.

Parameles bougainville (Western Barred Bandicoot)

This once widespread and common species is now extinct on the mainland of Australia, persisting only on Bernier and Dorre Islands at Shark Bay, Western Australia. The last known mainland record was near Cranbrook in 1900.

Phascogale calura (Red-tailed Wambenger)

Kitchener et al.(1980) consider P. calura to be moderately common in the wheatbelt, and found on small (<500 ha) reserves and in 8 different habitat types. There is thus little reason why it should not be present in Stirling Range National Park although it has not been recorded since 1929.

This survey sampled several suitable habitats unsuccessfully, and one must conclude the Wambenger is either extinct or in very low numbers, based on available data.

Phascogale tapoatafa (Brush-tailed Phascogale)

P. tapoatafa is not formally recorded by Kitchener (ibid) from the W.A. wheatbelt as it usually occurs in higher rainfall forested areas. It has however been frequently recorded at Cranbrook and in drier forested

(Brush-tailed Phascogale) .....contd.

areas near Perth and could therefore occur in Stirling Range National Park. The last known record in the vicinity was in 1968. No evidence was obtained of its presence during this survey and the species is possibly extinct, if it ever occurred in the ranges at all.

Pseudomys albocinereus (Ash-grey Mouse)

This species was considered moderately common by Kitchener (ibid) and was found on very small reserves (<800 ha) and in several different habitat types. It had never been recorded from the Stirling Ranges and its status prior to this survey was completely unknown. The present surveys found 6 individuals, all in Banksia dominated woodland. Although not a widespread habitat type, Banksia woodland is present at several places within the Park, hence P. albocinereus may be considered moderately common and its status secure.

Pseudocheirus peregrinus (Ring-tail Possum)

Considered rare in the wheatbelt (Kitchener ibid) and not recorded during Kitchener's surveys, this species was considered to be very scarce in the Stirling Range National Park. A record of the species from the area in 1977 encouraged the opinion that it may still persist. Careful examination of suitable habitats during these surveys failed to disclose any definite trace of possum (either P. peregrinus or T. vulpecula) and it is considered the species may be extinct within the Park.

Rattus fuscipes (Yellow-footed Rat)

R. fuscipes was not recorded in the wheatbelt by Kitchener but is known to be fairly widespread in forest country to the west and south. A record from the Stirling Ranges area exists from 1936 but there are no more recent reports. There is no reason why it should not be present and despite

(Yellow-footed Rat)....contd.

failure to locate it during these surveys it is still considered to be a possible inhabitant of the Park.

Setonix brachyurus (Quokka)

Kitchener et al. (1980) did not record Quokka anywhere during surveys of wheatbelt reserves, and the habitat of this species is generally swamps and dense forests further south and west. Quokka was however, recorded in the Stirling Ranges regularly but infrequently right up to the present survey. Interestingly, recent records were in mallee over heath, a much drier habitat than generally considered suitable for Quokka. Records elsewhere, for example Rottnest, also suggest that Quokka can survive in drier conditions. In the forest block, where the Quokka is fairly common its present distribution is mainly in low lying wetlands but some early records suggest it may have occurred throughout the forest. Perhaps too frequent fires in the forest have rendered that habitat unsuitable and populations have shrunk to the less frequently burned wetlands.

Sminthopsis sp. 1 (Dunnart)

This species in the complex previously known as S. murina, has been recorded regularly since the early 1900's. Kitchener (ibid) considered "S.murina" common and occupying almost all sizes of reserve and numerous habitat types. Its presence in the Stirling Ranges is confirmed by this survey and it is considered moderately common and secure in its conservation.

What about S. crassicaudatus? - listed as present in fieldguide booklet.

Sminthopsis sp. 2 (Dunnart)

Previously known as S. granulipes, it was never recorded in the Stirling Ranges prior to this survey although Kitchener (ibid) considers it moderately common in the wheatbelt. It occupied quite small reserves (< 800 ha) and several habitat types and could be expected to exist in Stirling Range. Despite the lack of confirmed records the species is considered to be moderately common.

Tachyglossus aculeatus (Echidna)

This conspicuous and easily recognised species had, surprisingly, not been confirmed to exist in the Park since 1905 yet suitable habitat was abundant. As a consequence of this survey it was found that wildlife photographer Mr. Bert Wells had captured and photographed an Echidna at Red Gum Pass in 1979. Scratchings and shallow burrows were also recorded during this survey.

The species is undoubtedly present but very scarce. Kitchener (ibid) recorded it as common, being found on reserves as small as 36 ha and in 22 different habitat types.

Tarsipes rostratus (Noolbenger)

T. rostratus has been recorded regularly since the early 1900's and was extremely common during this survey, 76 individuals being captured in several types of habitat. Kitchener (ibid) records it as moderately common but only on larger reserves (1,000 ha) and in only a few habitat types (5).

Trichosurus vulpecula (Brush-tail Possum)

Uncommon in the wheatbelt although on smaller reserves (447 ha) and six habitat types (Kitchener ibid), this species is common in forests to the south and west. The last record near the Stirling Ranges was in 1909 but the species is expected to be present. Only one unconfirmed sighting was made during this survey and indications are that the Brush-tail Possum may be extinct or extremely scarce in the Park.

CONCLUSIONS

This survey, having been conducted by a competent field biologist can, for most purposes be considered confident in its conclusions. There appears to be little doubt that Antechinus flavipes, Bettongia lesueur, Canis familiaris, Macropus eugenii, Myrmecobius fasciatus, Onychogalea lunata, Parameles bougainville and Phascogale tapoatafa are extinct in the Stirling Range National Park despite having been recorded in the area in the early 1900's. Further, it is now certain that Phascogale calura, and Pseudocheirus peregrinus may also be extinct in the Park although previously thought to be present in small numbers.

Results also indicate that Cercartetus concinnus and Notomys mitchellii are scarcer than expected and that Tachyglossus aculeatus is scarce rather than common as expected. The apparently uncommon species Isoodon obesulus, Rattus fuscipes, Setonix brachyurus and Trichosaurus vulpecula were confirmed as being very few in number.

On the positive side Macropus irma was thought to be possibly extinct in the Park but has now been confirmed as common, and Pseudomys albocinereus and Sminthopsis sp 2 (S. granulipes) previously of uncertain status, have been confirmed as moderately common.

The common species Macropus fuliginosus, Sminthopsis sp 1 (S. murina) and Tarsipes rostratus were confirmed as being abundant.

Dasyurus geoffroii, previously of uncertain status remains an enigma.

IMPLICATIONS FOR MANAGEMENT

The extreme scarcity of many species normally considered common elsewhere is of some concern. Only two possibilities exist, either the species were never present in any great number because of features peculiar to the Stirling Ranges or the present conditions in the Park are affecting the mammals detrimentally.

The lack of regular (or sometimes any) record of many species between the early 1900's and the present day suggest that many species may always have been scarce and that the phenomena may not be recent. However, as noted previously even rabbits were not officially recorded; it is therefore quite likely that presence of many species was overlooked.

The failure to record several species during this survey may reflect a decline in population numbers following several years of severe drought experienced in the region between 1977 and 1983 (Table 4), and may not be truly representative of the status of some species.

The alternative explanation that conditions are not suitable in the Park is also possible. However, vegetation physiognomy and floristics is not expected to have changed greatly since the early 1900's with the exception of changes caused by fire, and in more recent years dieback disease. Although dieback (Phytophthora cinnamomi) reduces the number of species and individuals in some groups of animals eg. birds (Ford and Bell 1982) there is no substantial evidence for mammals, and only a relatively small proportion of the Park is affected, mostly in the high tourist density areas.

Fire, on the other hand affects larger areas, all habitat types and areas away from tourist centres. Fire history records of the Park (Table 5) indicate that fires have occurred regularly in the Park since the 1960's and that various percentages from quite small areas (6-7%) up to large areas (up to 66%) have been burned. Current opinion on the effects of

Annual long term mean 509 mm

Year	Rainfall (mm)	Comparison to mean
1977	448	down 12%
1978	433	down 15%
1979	406	down 11%
1980	470	down 8%
1981	375	down 26%
1982	480	down 6%
1983	440 (approx.)	down 14%
1984	518	up 2%

Table 4: The annual long term mean rainfall at Cranbrook and the actual rainfall during the period 1977-1984. A comparison is given to the mean annual average, illustrating the percentage deficit in rainfall each year. Data from Bureau of Meteorology, Perth.

Interval	Proportion (%) burned
1945-1946	50
1960-1964	7
1965-1969	66
1970-1974	35
1975-1979	6
1980-1984	36

Table 5: Proportion of Stirling Range National Park burned during intervals from 1945 to 1984. Data from National Parks Authority records.

fire are contradictory (and controversial), but Table 5 suggests that if fire is a requirement of the fauna then there has been adequate burns to ensure their survival. On the other hand, if fire is considered detrimental then adequate bush has remained unburned to ensure suitable habitat for mammals. In short, no satisfactory explanation can be given, based on available data, for the apparent depauperacy of mammals. Further more detailed synecological and autecological research is necessary to solve the problem. There is little doubt however, that this present survey, funded by the Western Australian Heritage Commission, has permitted clarification of the status of many species and has greatly assisted in determining what direction future research must take.

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SUPPLEMENT TO THE REPORT

TO THE

WESTERN AUSTRALIAN HERITAGE COMMITTEE

During the course of surveys for mammals numerous captures and observations were made on reptiles in the Stirling Range National Park. As well as greatly enhancing knowledge of the Parks fauna (there had been no previous surveys) several interesting ecological questions were raised. For example, Ctenotus impar, C. gemmula and C. catenifer, three skinks which do not normally overlap in their distributions occur sympatrically in stunted Jarrah-Banksia over heath at trapline location 26 within the Park. Implications of such finds warrant further research.

As a sideline to the surveys one of us (G.H.) prepared a basic manuscript on reptiles of the National Park which it is hoped can be developed into a booklet suitable for publishing. The booklet will contain keys to identification of the reptiles and brief descriptions of the animals and their habitats. A copy of the hand-written draft is attached as part of this report, but is not to be reproduced in part or whole without permission of the author.

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The list of lizard species recorded in the park currently stands at twenty-five. It encompasses forms as tiny as Grey Skink Menetia greyii to relative giants of one and a half metres in Rosenbergs Monitor Varanua rosenbergi. Representatives of all five Australian lizard families are also included, ie Geckoes, Legless Lizards, Dragon Lizards, Monitor Lizards and Skinks. Members of the Legless Lizard family, Pygopodidae, can be easily mistaken for snakes. The small table below outlines the basic differences.

	Legless Lizards	Snakes
Belly scales	In two rows and only slightly larger than adjacent scales	In one row of large shields
Ear aperture	Prominant, except in the genus Aprosia	Absent
Tongue	Normal	Forked
Tail	Much longer than body except in the genus Aprosia. Capable of being dropped or broken	Much shorter than body Not capable of being dropped

All geckoes, legless lizards and most skinks have a novel method of distracting predators by dropping or discarding their tails in order to make an escape. Once dropped the tail wriggles and twists violently for a minute or two, and then gradually stops. This motion hopefully distracts the attacker from the body, allowing the lizard to make good its escape. In time tails regrow though never becoming as long or possessing the exact colour pattern as the original. Occasionally a tail is only fractured and another tail grows forming a fork. Even trident like tails are known.

Most lizard activity occurs in the warmer months of the year, especially spring and early to mid-summer. Most species are active during the daytime though the geckoes are mostly nocturnal and the legless lizards can be active at either time.

The text covers the twenty-five known species though the key covers others which may also be found in the future to inhabit the park. A key to the lizard families is also provided. Unfortunately some scientific terms were necessary in the keys, and to prevent confusion these have been illustrated.

GECKOS (GEKKONIDAE)

Wheatbelt Gecko - Diplodactylus granariensis
Very common. The most common gecko in the park and grows to a length of about 9 cm. It can sometimes be found under rocks and logs though also utilized are disused burrows and small hollow logs. It is coloured pale brown with a dark brown vertebral stripe which in many cases is broken up into discontinuous irregular patches.

Western Spiny Tailed Gecko - Diplodactylus spinigerus
Moderately common. Apparently confined to the mallee and heath areas of the park. The most obvious characteristic of this slender species is the two rows of soft spines along the tail. It grows to just over 10 cm and is greyish with a blackish wavy vertebral stripe which extends onto the tail. This gecko has a novel defensive mechanism whereby if attached by a predator, special glands in the tail can eject a clear straw coloured, highly viscous, smelly, unpalatable fluid to a distance of up to 50 cm. The result of this fluid striking a predator, especially on the face and mouth can cause great discomfort, deterring further attacks and giving the gecko sufficient time to escape. When handled gently by humans the fluid will not be ejected.

Marbled Gecko - Phyllodactylus marmoratus
Common. This gecko is irregularly patterned with dark brown and grey with a series of pale orange dashes down the tail and lower back. It inhabits trees and shrubs where it hides under pieces of bark and in crevices. It grows to about 10-12 cm.

LEGLESS LIZARDS (PYGOPODIDAE)

Pretty Worm Lizard - Aprasia pulchella
Uncommon. The Pretty Worm Lizard grows to about 15 cm and occurs in the Jarrah-Marri woodlands. Its habits are similar to the following species in that it is rarely seen due to its habit of spending most of its time beneath the soil and in rotten tree stumps, only coming to the surface on warm nights. The fore-body is reddish-brown gradually merging into grey towards the tail. Each scale on the upper surface of the body and tail bears a fine black dash. The head is dark grey.

Frys' Worm Lizard - Aprasia repens
Common. This slender legless lizard is of similar habits and size as the pre-ceeding species. It is coloured grey to brown above with a black dash on each scale, sometimes forming narrow stripes especially on the tail.

Southern Delma - Delma australia
Common. This thin legless lizard grows to about 20-25 cm long and is brown on the tail and body with a darker grey head. When chased it proceeds in a frantic series of leaps and bounds which makes capture very difficult. It inhabits shrubland and mallee and commonly can be found in abondoned stick ant nests, especially in winter.

Common Scaly-foot - Pygopus lepidopodus
Common. This stout species occurs in two colour forms, one mainly grey and the other grey with three longitudinal series of black edge orange dashes. It usually inhabits mallee and shrubby habitats. This species sometimes drops its tail even when handled very gently. Maximum length is about 40 cm.

DRAGON LIZARDS (AGAMIDAE)

Western Bearded Dragon - Pogona m. minor
Uncommon. Of the two dragon lizard species inhabiting the park this is by far the larger reaching a total length of about 30 cm. It can be encountered in most habitats, sometimes being sighted sunning itself on logs and low shrubs. Its colour ranges from grey to brown with darker blotches down the back.

Chapmans Dragon - Tympanocryptis adelaidensis chapmani
Moderately common, Confined to heath, shrubland and mallee on sandly soils. This attractive dragon lizard (see Plate....) is one of the smallest in the state, only growing to about 12 cm in total length.

MONITOR LIZARDS (VARANIDAE)

Rosenbergs Monitor - Varanus rosenbergi
Common. This is the largest species of lizard inhabiting the park, growing to just over 1 metre in length and can be found in most habitat types. It is brownish grey overall with narrow darker crossbands. Juveniles have much yellow on the throat and tail. Rosenbergs Monitor can often be approached closely though if handled bites savagely.

SKINK LIZARDS (SCINCIDAE)

"Southern Wood Skink" - Cryptoblepharus virgatus clarus
Uncommon. A small (up to 10 cm) species almost always found on dead logs and dead trees. It is speckled and spotted with grey and white with two white dorso-lateral stripes, i.e. the area where the back merges into the sides. The Stirling Range represents the northern limits for this skink.

"Chain Skink" - Cterotus catenifer
Moderately common. Found in sandy habitats vegetated with heath shrubs and Banksia woodland. The sides are black with white dots, dashes and blotches plus a broken chain like white stripe along the dorso-lateral region. The legs are finely dotted in black and pale brown. Adult size is about 12 cm. It is mainly active in spring and early summer.

"Gem Skink" - Cterotus gemmula
Moderately common. Found in sandy habitats vegetated with a variety of shrubby overstories and also Banksia woodland. This species is generally similar in appearance to the closely related Chain Skink though its possession of boldly blotched black and whitish hindlegs versus finely peppered, makes identification simple. The back is brown and the sides are black with a discontinuous dorso-lateral line of small white blotches. Also present are irregular white blotches and lines on the lower lateral region and the sides of the neck and face. Average adult size is 12-14 cm. The main period of activity appears to be in mid to late summer.

Eleven Striped Skink - Cterotus impar
Common. This handsome black and white striped skink inhabits shrublands heath, mallee and woodland on sandy substrates. When hotly pursued it eventually retreats to a shallow burrow as do most Cterotus species. It grows to about 14 cm.

Red Legged Skink - Cterotus labillardieri
The Red Legged Skink grows to about 15cm in total length and is moderately common. It occurs mainly in the rocky areas of the park and can often be seen basking along the edges of the Bluff Knoll track. It is coloured brown on the back with black sides. There is a white dorso-lateral stripe (ie where the sides merge with the back), and a white mid-lateral stripe, (ie the middle part of the sides). The entire lateral region is marked with white, especially the lower, and the sides of the face. The legs are blotched in black and reddish. The belly is yellow.

King's Skink - Egernia kingii
Probably moderately common. Its extremely secretive nature (sometimes nocturnal) makes accurate assessment of abundance difficult despite the fact that it grows to a total length of about 45-50cm. King's Skink is a very robust species with a savage bite. It is mainly dark brown to black overall, sometimes with pale spots and dashes. The preferred habitat is rocky hillslopes and watercourses.

Egernia p. pulchra
Very common. A moderately sized (up to about 25cm) robust bodied species found on the wooded slopes of the rocky areas. Its burrow systems are common and easily seen along the walk trails to the various peaks. It is reddish brown on the back with or without two wide black stripes which bear a series of white dots. The sides of the face and body, legs and tail are grey with black blotching. There is also a white ring around the eye.

Salmon Bellied Skink - Egernia napoleonis
Common. This robustly built skink can be often observed sitting on rocks and logs along the walk paths to the various peaks in the park. It is overall brown with three broken up stripes along the back plus one down the sides. The lips are white and the belly is a pinkish colour. Its average length is about 20-25cm.

Hemiergis i. initialis
Scarce, only one specimen known from the park. H. initialis is an elongate slender skink usually coloured reddish-brown above with 2-4 longitudinal rows of spots and a dark dorso-lateral stripe. The belly is orange-red. The one specimen collected came from under a log in low Yate woodland on the margin of a salt lake. It is abundant elsewhere in the State. Maximum size is about 9cm.

Perons Skink - Hemiergis p. peronii
Very common. A slender skink which grows to about 13cm and is often found under logs and fallen blackboys. The back is grey-brown, usually with two or more longitudinal rows of dark spots with the centre pair sometimes forming a vertebral stripe. The belly is bright yellow. Fingers and toes and 4 and 4.

Western Swamp Skink - Leiolopisma trilineatum
Very common. A small (average of 12cm) brown skink with a black upper lateral stripe. It is often seen basking on the edge of the tracks around the base of Bluff Knoll. It also inhabits sandy areas vegetated with mallee and heath. In the breeding season (spring-early summer) males get a pinkish-orange flush on the throat and sides of the face.

Lerista distinguenda
Common. Rarely seen due to its small size (up to about 9cm in total length) and its secretive nature. It can be found in rotten stumps, under logs and in dry leaf litter. It is bronzy brown on the back and has a black stripe down the side of the body.

Greys Skink - Menetia greyii
Common. This tiny skink only grows to about 7cm and is unique amongst the skinks occurring in the park due to its possession of four fingers and five toes. It is grey on the back with a dark grey or black stripe along the side of the body and can be found in most habitats.

Brown Litter Skink - Morethia obscura
Very common. The most common skink lizard in the park. It grows to about 11cm and can be found in most habitats except the rocky areas. M. obscura is dark grey to brown with small white edged black spots on the back and has grey-brown flanks. Breeding males (spring-early summer) have a pinkish-red flush on the throat and chin.

Bobtail - Tiliqua r. rugosa
Very common. This familiar skink can be found in most habitats throughout the park. It is omnivorous, ie it eats insect prey as well as vegetable matter, usually in the form of flowers.

So far eight species of snakes are definitely known to occur within the park. It is possible that another four species could one day be also found to occur there in view of known distribution patterns and habitat preferences. They are the Giant Blind Snake (Ramphotyphlops pinguis), Waites Blind Snake (R. waitii), Goulds Black-headed Snake (Rhinoplocephalus gouldii) and the Semi-collared Snake (Notechis minor) and in the accompanying key, these have been included. Some scientific terminology has been used in the key and to alleviate misunderstandings, illustrations have been provided. Of the twelve species included the identification of the Blind Snakes will provide the layman and indeed many professionals with problems. To count midbody scale rows of this genus is very difficult due to their small size and shine which necessitates the use of a hand lens if not a microscope. Of the two blunt headed species (see couplet 3 in the key). R. pinguis is by far the stouter as an adult, though young individuals are easily confused with R. australia. Identification of all other species should be relatively simple.

Apart from the Carpet Python (Python spilotes imbricatus) all the snake species found in the park are venomous though only two are classified as being dangerous to man. These are the Dugite (Pseudonaja a. affinis) and the Western Tiger Snake (Notechis scutatus occidentalis) and should definitely be left alone.

Carpet Python - Python spilotes imbricatus

Uncommon. This snake is the only non-venomous snake in the park. It is characteristically patterned with numerous large irregular pale brown blotches edged with black on a brownish background. Towards the tail the black edges of the brown blotches tend to invade the brownish background colour leading to a two toned pattern. This snake lives in trees where it feeds upon birds and arboreal mammals. It grows to about 3 metres.

Southern Blind Snake - Ramphotyphlops australis

Common. As in the case with all blind snakes, R. australis is very infrequently encountered. It is a relatively stout species and grows to about 25cm on average. It can sometimes be found living inside rotten embedded tree stumps, under logs and in abondoned stick-ant nests. Above it is a purplish brown with a white undersurface. The demarcation line between the two colours is very ragged.

Crowned Snake - Notechis coronatus

Moderately common. The usual adult size of this species is about 30cm though maximum size is about half as long again. The head is a steely grey colour with a black collar which extends forwards through the eye and onto the nose. The upper top is white and the body is a brownish green. It can be found in most habitats throughout the park, sometimes seen basking during the day. Its bite produces a small amount of local pain.

Bardick - Notechis curtus

Very common. This species is easily distinguished from other small species occurring in the park due to its dumpy build and thin neck. In all others except the Carpet Python the head and neck are more or less the same width. The Bardick can grow up to about 60cm though most specimens are only half that length. Its colour ranges from reddish brown to olive brown. The belly is usually coloured similarly to the upper surface, though paler. It is an aggressive snake when molested and does not hesitate to bite. While not regarded as being dangerous, the bite from a large specimen would cause localised swelling and pain.

Western Tiger Snake - Notechis scutatus occidentalis

Moderately common. This familiar snake is the most dangerous snake in the park. It is mainly black above and yellow beneath and grows to about 1.5 metres. Its diet consists mainly of frogs though lizards and mice are also taken.

Dugite - Pseudonaja a. affinis

Common. A large (up to 1.8 metres) dangerous species. Most specimens are a shade of brown with occasional black flecks and can be found in most habitats. They feed upon lizards and small mammals, especially the introduced mouse (Mus musculus) which after being struck, is then constricted until all movement ceases and then eaten head first.

Rhinoplocephalus bicolor

Scarce, only one specimen known from the park. This small snake grows to an average adult size of 40cm and while possessing venom glands, appears to be very reluctant to bite. It is essentially bluish-grey above and on the head with pale orange flanks. Until recently this species was considered to be quite rare though in the last five years many have been found in abandoned stick-ant nests in winter around the Albany area.

Black-striped Snake - Rhinoplocephalus nigriceps

Common. This small snake grows to nearly 60cm though most specimens are only two thirds that length. It can be found in most habitats in the park. The head is black as is the central region of the back with the sides of the body being orange. The entire snake has a very glossy appearance. Though not an aggressive or very venomous species, it does not hesitate to bite if handled.

So far twelve species of frogs are known to occur in the Park. Another two could be expected to also be present in view of known distributions and habitat preferences. They are Leas Frog (Geogrinia leai) and The Inornate Burrowing Frog (Heleioporus inornatus), and due to their possible presence have been included in the key but not in the text.

The best time of the year to see and record frogs is in the early winter period immediately after the first rtains when night time temperatures are still relatively high. It is at this time that males begin calling from creek beds and flooded areas in order to attract a mate and consequently frogs become concentrated in these areas. During this early winter breeding period, choruses of calling males can be heard nightlyt along most creeks. Sometimes they include up to six or seven species and provide the student with a good opportunity to become familiar with individual species and their calls. In fact some species are almost impossible to identify to species level without hearing the call. Some of the Heleioporus species are in this category as are the two species of Ranidella. In the key to the identification of Stirling Range Frogs an attempt has been made to use as few technical terms as possible though in some cases where this could not be done, illustrations have been provided for further classification.

Slender Tree Frog - Litoria adelaidensis

Common. This slender (up to 5 cm) brown or sometimes pale green tree frog can often be heard calling along the larger creeks. Its call has been referred to as a harsh grating screech. During the day it rests in low vegetation. The main distinguishing characteristics of this species are the red spots on the back of the thighs and the dark brown and white stipes down the side of the body and head. Breeding begins in early spring and the spawn is laid in the water as an irregular mass attached to vegetation.

- Litoria cyclorhynchus

Moderately common. A large (up to 7-8 cm) slender bodied tree frog usually encountered in the vicinity of watercourses. It is pale brown with golden or brown edged green blotches. The call resembles that of a wood being sawn in the distance.

Quacking Frog - Crinia georgiana

Very common. A squat large headed frog with a variable colouration of greys and browns to nearly black, often with an elaborate pattern. A bright red patch in the grain is always present as is a red or golden upper eyelid. Grows to about 3.5 cm. The call is a loud "quack quack quack".

Spotted Burrowing Frog - Heleioporus albopunctatus

Common. A stout black or chocolate brown frog with cream to pale yellow spots which favours sandy habitats. The call is a short high pitched "coo" which is repeated at slightly more than one per second. As with other members of this genus the eggs are laid out of water as a foam nest in a burrow. Here the tadpoles develop until the burrow is flooded permitting their access to open water. Maximum size is 8.5 cm.

Moaning Frog - Heleioporus eyrei

Common. A stout brown frog with irregular patches of pale grey or yellowish grey. It often has a small yellowish patch over the tympanum (ear opening). The preferred habitat is sandy soils usually in the vicinity of watercourses. Its call has been described as a long and rising moan, hence its common name. Egg laying is similar to H.albopunctatus. Maximum size is just over 6 cm.

Marbled Burrowing Frog - Heleioporus psammophilus

Moderately common. Mainly found in the vicinity of watercourses in sandy areas. As with all members of the genus Helioporus, it is a very robust species. It grows to about 6 cm and is brown or grey with greyish to yellowish marblings. The flanks are dotted with white. Egg laying is the same as that in H. albopunctatus. The call sounds like a high pitched lighting plant or outboard motor.

Banjo Frog - Limnodynastes dorsalis

Very common. A robust frog with grey to brown and dark green back pattern with a pale stipe down the centre of the back. The grain colour is crimson. Its call, a loud "bonk" like a banjo string being plucked can often be heard coming from the larger creeks. Maximum size is about 7 cm.

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Turtle Frog - Myobatrachus gouldii

Common. A most aptly named frog (see plate.....). It can be found in sandy habitats supporting shrubland, woodland and mallee. It can sometimes be found under logs, often in association with termites which it eats in large quantities. Two specimens disected contained nearly 500 each. The development of the tadpole is spent entirely within the egg capsule in moist sand, not in water as is the case with many other frog species. Maximum size is 5 cm.

Humming Frog - Neobatrachus pelobatoides

Moderately common. Irregularly coloured in two tones or yellow and green. Often with an indication of a fine red mid-dorsal stripe. The Humming Frog, as is often the case with burrowing species is robustly built. Its call is a long low pitched trill or hum which carries for a short distance only. Grows to about 4-5 cm.

Gunthers Toadlet - Pseudophryne guentheri

Common. This is a small (up to 33 mm) squat, robust bodied species which can sometimes be found under logs and stones alongside creeks. It is patterned irregularly with patches of grey and brown. The belly has irregular patches of black. The call consists of a short grating squelch and is made from a small burrow. The eggs are laid after late summer or early winter rain in a burrow where the tadpoles develop, only becoming free swimming after the burrow has been flooded by follow-up winter rains.

Glauerts Froglet - Ranidella glauerti

Common. Similar to the following species in colouration, i.e. patches and lines of brown, grey, whitish and black. It is a small frog only growing to a total length of 24 mm and prefers areas of permanent moisture. Its call has been likened to that of a pea being dropped in a tin can.

Bleeting Froglet - Ranidella pseudinsignifera

Very common. Due to its small size (up to 25 mm) and nondescript colouration this species is not often seen though in winter. Its call, a four pulsed bleet, is heard nightly along most creeks.