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MAMMALS OF THE DARLING SCARP, NEAR PERTH

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INTRODUCTION

In a review of the information available on the Darling Scarp, Dell (1983) concluded that there was a need for comprehensive biological surveys as a precursor to conservation and management strategies. In 1984 the Western Australian Naturalists' Club began an intensive survey of a section of the Scarp consisting of natural bushland south of Welshpool Road at Lesmurdie. This survey examined various vertebrate communities and the flora of the area; a series of papers will present data on each of these groups. The Naturalists' Club and the W.A. Museum collaborated to census mammals, the results of which are included in this report.

METHODS AND STUDY SITES

An area south of Welshpool Road at Lesmurdie (Figure 1) was selected because it is relatively undisturbed and is continuous with the Jarrah, *Eucalyptus marginata*, woodland of the lateritic plateau.

Three types of metal traps were set in seven localities selected to represent the vegetational heterogeneity across the range of elevations from the base to the top of the scarp. Each trapline consisted of one cage trap (23x23x66cm), seven Elliotts (9x9x32cm) and two large Elliotts (16x15x45cm). The traps were spaced approximately 10 metres apart and usually under vegetation shelter. Traps were baited with peanut paste, oats and bacon (cages and large Elliotts also with apples) and run for five successive days (six days in May) during June, September and October 1984 and February, April, May and July 1985. During these sessions traps were checked for captures at dawn each morning. Sightings of species and observations on scats, tracks and diggings were recorded. Bats were not sampled and, because of the rocky nature of the area, pit-traps were not used. Accordingly some small marsupials were not adequately sampled. Data in text are presented as mean, \pm one standard deviation and (sample size).

In September 1985 additional localities were selected and large Elliott and cage traps were set to determine movement of bandicoots. Positions of the seven traplines and the bandicoot study sites (A-F) are indicated on Figure 1. A total of 2520 trapnights occurred over the study period. Detailed vegetation descriptions and a floristic list are being prepared by G.J. Keighery and will be published separately. Brief descriptions of the vegetation at each trapline are:—

Trapline 1: dense mixed heath with occasional stunted Marri, *Eucalyptus calophylla* trees surrounding exposed granite with mixed low herbs.

Trapline 2: open Wandoo, *E. wandoo*, woodland with exposed granite on higher parts and *Xanthorrhoea* and heath understorey on loamy slopes.

Trapline 3: upland seasonal swamp with *Melaleuca preissiana* trees over *Viminaria juncea*, *Paraserianthes lophantha* and *Lepidosperma* spp.

Trapline 4: Jarrah woodland over *Banksia grandis* and mixed open heath on lateritic plateau.

Trapline 5: dense mixed heath around small granite exposures with low herbs.

Trapline 6: creek slopes with stunted Marri woodland and dense mixed heath understorey.

Trapline 7: lower creek margins with open Wandoo woodland over *Hakea* spp. and *Acacia* spp. understorey with seasonal exotic grasses.

Sites A-E were located in dense mixed heath with occasional Marri and Wandoo trees and site F was in dense mixed heath with an overstorey of Marri and Wandoo along a creek.

RESULTS AND DISCUSSION

Five species of mammal (including two introduced species) were trapped; another three, two macropods and feral rabbit, were sighted. In addition Museum computer records were examined for the area between Darlington and Kelmscott to compile a list of 18 species of mammals known to occur in the Darling Scarp near Perth.

DASYURIDAE

Antechinus flavipes Yellow-footed Antechinus

A juvenile female weighing 21g was trapped in trapline 4 among laterite boulders in April. The Museum has a specimen from Darlington collected in 1979.

Dasyurus geoffroii Western Quoll

The Museum has four specimens from the Kalamunda area collected between 1950 and 1966. A road-kill was reported from Lesmurdie in 1986.

Phascogale tapoatafa Brush-tailed Phascogale

The Museum has six specimens from the Scarp between Darlington and Kelmscott collected between 1936 and 1984. Most were road-kills or brought in by domestic cats.



Figure 1: Aerial photograph taken 20 April, 1986 indicating position of mammal traplines (1-7, A-F).

Sminthopsis sp. Common Dunnart

The only Museum specimen is from Kelmscott in 1931.

PERAMELIDAE

Isoodon obesulus Southern Brown Bandicoot

Fifty individuals (33♂ 17♀) were trapped from all traplines. After the first trapping period all were individually marked to determine

subsequent recaptures. Significantly more males (X_1^2 5.12, $p < 0.05$) than females were captured over the entire study (Table 1) and they outnumbered females in all trips except in the midwinter period (June, July).

Bandicoots were trapped more frequently and in greater numbers (Table 1) in sites with dense heath understorey. Trapline 2 had the most open understorey and only one male was caught. Seven of the eight captures in trapline 4 were male; all were trapped at the beginning of the trapline in the transition between the lateritic plateau and the breakaway slopes. Female bandicoots were trapped more frequently in traplines located on lower slopes.

An examination of the condition of the pouch and teats in females, and the scrotum in males, suggested that females began to reproduce once they exceeded 500g in weight and males once they exceeded 750g in weight.

Females with pouch young were recorded during all trapping periods (Table 1) and only during April were the majority of females not carrying young. The mean litter size was 2.53 ± 0.77 (19) and the sex ratio was parity (14♂:14♀) of those litters that had the sex of all pouch young determined.

Adult males [1274 ± 233 (52) g] were significantly heavier than adult females [901 ± 149 (25) g], a trend that was consistent during all trapping periods. Adult females were heaviest in spring-autumn and lightest in winter, but these differences were not significant, and may in part be accounted for by weights that included those of attached pouch young.

Bandicoots moved considerable distances over the study area. The longest movements for males and females between the

Table 1 — Number of *Isodon obesulus* of each sex caught on the traplines during each trapping period. The final column is September 1985 when new sites A-F were trapped. The bracketed number is the percent survival of the sexes. The percentage of adult females carrying pouch young is also included.

Trapline	Trapping Period															
	June		Sept		Oct		Feb		Apr		May		July		Sept	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
1	1	—	1	3	—	1	—	4	1	5	1	2	2	—		
2	—	—	—	—	—	—	—	1	—	—	—	—	—	—		
3	1	1	1	2	—	4	1	2	—	1	—	1	1	—		
4	—	—	1	1	—	2	—	2	—	2	—	—	—	—		
5	1	—	1	4	1	3	2	2	2	—	2	1	1	1		
6	—	—	—	1	1	3	2	2	3	—	—	2	1	—		
7	—	—	—	—	—	2	—	2	1	1	—	2	—	1		
<hr/>																
TOTAL																
♀	3(0)		4(25)		2(50)		5(80)		5(40)		3(33)		3(0)		2(—)	
♂	1(0)		9(56)		10(60)		13(54)		7(43)		7(71)		2(0)		10(—)	
<hr/>																
♀ with																
pouch	60%		100%		100%		100%		20%		100%		66%		100%	
young																

various traplines being 800 m and 295 m respectively. Of the individuals that moved between traplines, males [252.1 ± 189.8 (24) m] moved significantly further ($p < 0.05$) than females [152.8 ± 49.1 (9) m].

The number of individuals captured in any period was low and, when coupled with the large distances moved by this species, (Table 1) variation in the proportion surviving between trips is difficult to interpret.

PHALANGERIDAE

Trichosurus vulpecula Brush-tailed Possum

An adult male greater than 2 kg weight was trapped on 12 February and an adult female weighing 1400 g was trapped on 30 October in trapline 2 in cages set at base of Wandoo trees. The female had previously carried pouch young but showed no signs of recent lactation.

BURRAMYIDAE

Cercartetus concinnus Western Pygmy Possum

Although the Museum has no records from the Scarp, there are a number of records from slightly further east on the Plateau at Bickley (Loaring 1954).

MACROPODIDAE

Macropus fuliginosus Western Grey Kangaroo

Groups of up to five animals were sighted during daytime in dense heath throughout the Scarp granite complex during each trapping survey.

Macropus irma Western Brush Wallaby

Single animals were seen in Wandoo woodland near trapline 2, Jarrah woodland near trapline 4 and base of breakaway near trapline 3 in May.

MURIDAE

Hydromys chrysogaster Water-rat

Specimens have been collected from Lesmurdie and Darlington. There are sight records from the Bickley Brook Reservoir.

Mus domesticus House Mouse

A total of 111 individuals were trapped from all traplines except trapline 4. After the first trapping period all were individually numbered to determine subsequent recapture. All captures are indicated in Table 2 together with percentage retrapped next trapping period. The longest period between first and last capture was 151 days (February and July) for a male. Except for one male which moved ca 100 metres between traplines 3 and 4 over four days in May, all recaptures were from the original traplines. This indicates that each trapline was sampling subsets of the population. The greatest distance moved by a male within a trapline was 80 metres compared to 60 metres by a female. The mean distance moved by males was 26.67 ± 26.1 (15) compared to 17.78 ± 19.86 (9) metres by females.

Excluding immature animals (< 10 g body weight) males [15.29 ± 2.50 (57g)] were heavier than females [13.8 ± 2.11 , (32 g)]. This can be compared to Berry (1981) who concluded that in two thirds of populations females were heavier, but in a third of natural populations males were heavier.

Table 2 — Number of *Mus domesticus* of each sex, plus unsexed individuals, caught on each trapline during different periods. Bracketed number is the percentage survival for each sex.

Trapline	Trapping Period													
	June		Sept		Oct		Feb		Apr		May		July	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
1	3	3	3	4	—	1	—	2	3	3	4	8	3	5
2	1	3	—	1	—	—	2	— 1?	—	1	1	4	—	3
3	—	1	—	1	—	—	—	4	2	6	3	7 1?	2	1 1?
4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	—	—	—	2	—	—	—	—	—	1	1	—	1	2
6	2	4 1?	—	—	—	—	1	2	2	3	2	—	2	1
7	1	1 2?	1	1 1?	—	—	1	1	1	—	1	1	1	2

TOTAL

♀	7(—)	4(0)	0 (0)	4(50)	8(25)	12(33)	9
♂	12(—)	9(0)	1 (0)	9(25)	14(29)	20(25)	14
?	3	1	0	1	0	1	1

The greater number of mature males was not expected in view of Berry's figures where females predominate in the mature component of populations particularly in the highest weight group. However, male activity patterns and their greater possible trapability may influence the number in our sample.

Pregnant *Mus* were trapped in June, May and July. Immatures were trapped in all sample periods except October. As the gestation period is ca 21 days, weaning period is ca 20 days and age to maturity (ie > 10g body weight) is ca 40 days (Berry 1981), it appears that this population bred on several occasions during the study period. The smallest individual (3.5g) was trapped on 3 April, indicating some breeding ca 45 days previously in mid-February. No rain was recorded in January or February, therefore this breeding was not in response to rain.

Table 2 shows a marked seasonality in numbers trapped with the spring (September/October) sample periods producing few animals. This mirrors the data in Chapman (1981) who considered that considerably more individuals, including very young, were trapped in autumn than spring.

Rattus rattus Black Rat

An adult male weighing 142g was trapped in trapline 3 on 13 February.

LEPORIDAE

Oryctolagus cuniculus European Rabbit

Dunghills and feeding scrapes were common around all exposed granite areas and throughout Wandoo woodland near trapline 2. Rabbits were frequently active during day time, but no warrens were sighted. Grasses and other exotics were abundant in all areas with signs of rabbits.

MOLOSSIDAE

Tadarida australis White-striped Mastiff-bat

A specimen has been collected at Glen Forest. This high-flying bat is frequently heard at night in the Kalamunda area.

VESPERTILIONIDAE

Chalinolobus gouldii Gould's Wattled Bat

Specimens have been collected at Darlington, Glen Forest, Kalamunda and Armadale. This bat is common in the region and is frequently seen at dusk.

Eptesicus regulus Pygmy Bat

Six specimens have been collected in the Kalamunda area and four at Armadale. In forest areas east of Kalamunda it is moderately common.

Nyctophilus geoffroyi Lesser Long-eared Bat

Specimens have been collected at Gooseberry Hill, Darlington and Kalamunda.

Nyctophilus cf. major Greater Long-eared Bat

Specimens have been collected at Kalamunda and Kelmscott.

CONCLUSIONS

Sites adjacent to the edge of the lateritic plateau had the highest number of mammal species; Yellow-footed Antechinus, Brush-tailed Possum and Black Rat were only captured here. There was little difference in number of Southern Brown Bandicoots and House Mice in the five traplines with dense heath understoreys. The plateau had no House Mice and Bandicoots were restricted to the breakaway edge. The more open site (trapline 2) had low bandicoot numbers.

One native mammal, the Southern Brown Bandicoot, and the introduced House Mouse were trapped in sufficient numbers to determine breeding seasons and movement. Bandicoots, especially males, were trapped over considerable distances. This may imply a larger home range in males as has been indicated in the Northern Brown Bandicoot, *Isodon macrourus* by Gordon (1974). Braithwaite (1983) stated that survival of individual Southern Brown Bandicoots in Victoria depended on possession and defence of an adequate territory. If the shorter distances moved by females in the Darling Scarp indicates that they have smaller territories than males we can extrapolate that they are more likely to be affected by fire than males. A wildfire during the summer of 1985-86 removed all heath vegetation and litter and would have severely dislocated the population.

Changes in terrestrial vertebrate communities in coastal south-western Australia since European settlement have been discussed by How *et al.* 1987. Populations of mammals had become small and often isolated; habitat fragmentation, fire, predation, competition and disease were seen as environmental factors threatening mammals with local extinction. On the Northern Swan Coastal Plain (Kitchener *et al.*, 1978) only 12, of the 33 species of native mammals that are known to have occurred there since settlement, were recorded during an intensive survey in the mid 1970s.

Loaring (1954) and Dell (1983) indicated that in the Darling Scarp a number of mammal species had become locally extinct as a consequence of the activities of man. These included the Numbat *Myrmecobius fasciatus*, Tammar Wallaby *Macropus eugenii*, and Quokka *Setonix brachyurus*. Other species including the Western

Quoll, Brush-tailed Phascogale and Brush-tailed Possum had declined into fragmented populations. In the early 1950s it was generally believed that some native mammals were undergoing a cycle of abundance. Loaring (1954) outlined increases taking place in the Darling Range; however Dell (1983) concluded that this presumed increase had not been sustained.

Continued urban development on or adjacent to the Darling Scarp increases the pressures on surviving native mammal populations both directly by habitat destruction and indirectly through increasing fire frequency and predation by cats. Careful management practices need to be adopted to ensure long-term survival of those mammal species currently surviving on the Darling Scarp.

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