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BREEDING, DIET AND HABITAT PREFERENCE OF *PHASCOGALE CALURA* (GOULD, 1844) (MARSUPIALIA: DASYURIDAE) IN THE SOUTHERN WHEAT BELT, WESTERN AUSTRALIA

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ABSTRACT

Phascogale calura, once widely distributed in Australia, is now confined to the southern Wheat Belt where it is considered an endangered species. Information, based on trapping surveys and Museum records, is presented on its breeding, diet and relative abundance in different habitats.

Phascogale calura is an opportunistic feeder taking a wide range of insects with a preference for those $<$ 10 mm in length, small birds and small mammals, particularly *Mus musculus*. It appears to feed extensively on the ground. Females usually give birth to eight young between mid-June and mid-August. Young are weaned before the end of October. There appears to be a post-mating mortality in males. They were most abundant in denser and taller climax vegetation communities within the frequently adjacent *Eucalyptus wandoo* and *Casuarina huegeliana* alliances. The former alliance has abundant *Gastrolobium* and *Oxylobium* species of poison plants.

Phascogale calura probably survives in nature reserves in the Western Australian Wheat Belt and in Dryandra State Forest because poison plants in these reserves buffer vegetation from effects of domestic stock and feral animals. These reserves, being nature sanctuaries, are also protected to some extent from frequent burning.

INTRODUCTION

The Red-tailed Wambenger *Phascogale calura* (Gould, 1844), a small dasyurid marsupial, originally had a wide but apparently patchy distribution in Australia. It has been collected from the Canning Stock Route, Western Australia; 16 km from Darling Junction, Victoria; Alice Springs, Barrow Creek and Tennant Creek, Northern Territory and Adelaide, South Australia (Krefft 1866, Thomas 1888, Wood Jones 1923, Parker 1973). Its present distribution is restricted to south-western Western Australia.

Despite its inclusion in the International Union for the Conservation of Nature and Natural Resources 'Red Book' of rare species, little published information is available on any aspects of the biology of *P. calura*, save for Krefft's (1866) comments that the species is nocturnal, generally found by natives in hollow limbs of trees and eats mice and small birds in captivity. McKenzie *et al.* (1973), Kitchener and Chapman (1977, 1978) and Morris

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and Kitchener (1979) provide some brief notes on specimens collected by them in the Wheat Belt.

Extensive mammal surveys have been conducted in Western Australia in the last decade in regions where *P. calura* is known to have occurred: the Wheat Belt (Kitchener *et al.* 1980) and desert (Burbidge *et al.* 1976, Burbidge and Fuller 1980) as well as in the Goldfields region (R. How and

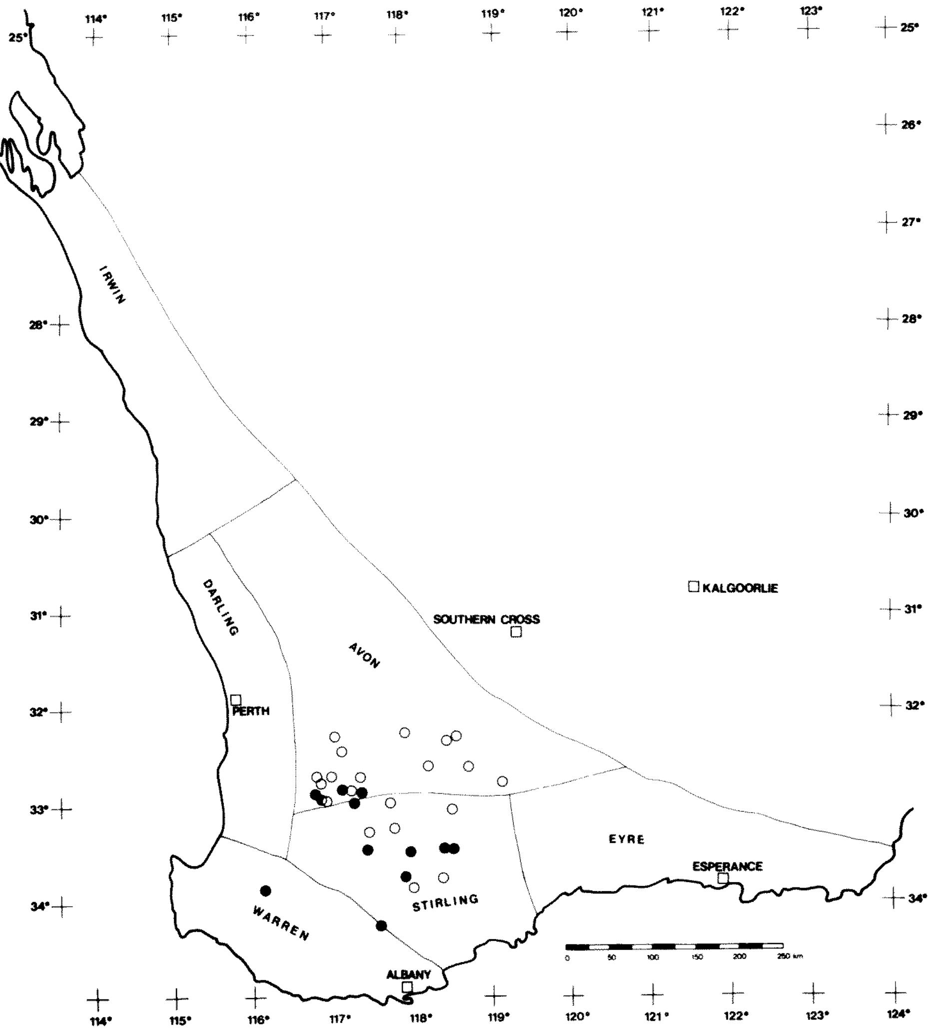

Fig. 1: Localities of *Phascogale calura* from modern records in the Western Australian Museum, shown in relation to the vegetation sub-provinces of Gardner and Bennetts (1956). The unshaded circles are for specimens collected since 1960.

N.L. McKenzie pers. comms) and coastal regions (Bannister 1969, Kitchener and Chapman 1975, Chapman and Kitchener 1976, Burbidge *et al.* 1980) where it could be expected to occur.

These surveys allow for a reasonably accurate definition of the species' present distribution in Western Australia (see **Fig. 1**).

This paper presents additional information on this little-studied species, particularly its diet, habitat preference and reproduction. Use is made of the data in the above-mentioned reports, specimens in the Western Australian Museum and personal communications, to suggest possible reasons for its range contraction.

OBSERVATIONS

Size and Age

Adult males are significantly larger than adult females (**Table 1**). These measurements and weights are from females collected between August to September and judged to be parous from condition of uteri, teats, mammary glands, pouch, or from presence of young in pouch; and males collected immediately prior to the breeding season (March-April), when estimated to be at least eight months old and with greatest diameter of the scrotum exceeding 12 mm.

Individuals smaller than the minimum values given for each sex in **Table 1**, but with approximate adult body proportions are categorized as subadults; others were classed as juveniles.

TABLE 1

Mean, standard error, and range for tail, body and pes lengths and weights of adult male and adult female *Phascogale calura*. t — test values comparing male and female values shows males to be significantly larger and heavier than females.

	Tail length (mm)	Body length (mm)	Pes length (mm)	Weight (gm)
♂♂	N = 9 140.6±1.3 (134.0-145.0)	N = 9 113.3±2.14 (104.6-122.0)	N = 9 23.7±0.4 (22.3-25.1)	N = 6 60.0±4.4 (39.0-68.0)
♀♀	N = 8 131.5±2.86 (119.2-144.0)	N = 8 101.0±1.8 (92.9-104.7)	N = 8 21.8±0.3 (20.8-22.9)	N = 6 42.5±1.6 (37.5-48.0)
t	3.04	4.32	4.27	3.74
Significance	$.010 > p > .005$	$p < .001$	$p < .001$	$.005 > p > .001$

Seasonal Captures

Results of trapping are compared for four reserves in the Wheat Belt which were trapped using the same methods and approximately equal effort (Kitchener and Chapman 1977, 1978; Morris and Kitchener 1979). These data are presented in **Table 2** and show that about equal numbers of adult females were caught in autumn and spring. Slightly more adult males than females were caught in autumn and no males were caught in spring. Subadults were caught only in autumn.

TABLE 2

Number of adult (A) and subadult (S) male and female *Phascogale calura* trapped in four Wheat Belt reserves during autumn and spring. Number of trapnights is recorded.

Nature reserve	March-April			September-November		
	No. trapnights	♂♂	♀♀	No. trapnights	♂♂	♀♀
Yornaning	1526	8 A	5 A, 1 S	1200	0	7 A
Dongolocking	1800	2 A	2 A	1732	0	1 A
Bendering	940	5 A	1 S	840	0	0
West Bendering	1300	1 A	4 A, 2 S	1640	0	2 A
Totals	5566	16 A	11 A, 4 S	5412	0	10 A

Additional adults (11 ♂♂, 19 ♀♀) have been collected in other months from different localities (A.A. Burbidge, N.L. McKenzie and A. Bradley, and WAM records). No adult males are recorded from August to January, although one juvenile male was collected in September and four subadult males in December; 10 adult females were collected in August and one in November.

These few captures may indicate either a differential seasonal trapability between sexes, or a post-mating mortality of males such as occurs in at least six *Antechinus* species (Lee *et al.* 1977).

Period of Births

There are few records of females with pouch young; these are listed in **Appendix I.** These observations indicate that females normally give birth to eight young between mid-June and mid-August. This period of births tends to be confirmed, first by the observation that the reproductive tracts of four females, collected between 27 March and 28 April, showed no indication of reproductive activity (from the appearance of uteri and teats only one of these appeared to be parous), and second, because seven females collected between 7 September and 21 October were, from appearance of mammary glands, teats and uteri, still weaning young or had recently done so when collected.

Diet

Stomach contents of 26 *P. calura* were examined for arthropods by M.C. Calver and J.N. Dunlop, Murdoch University; the mammal hairs were identified by W.K. Youngson, Department of Fisheries and Wildlife. Mastication is thorough and most arthropod remains are too fragmented for detailed identification. However, 94 individual prey items were allocated to nine arthropod orders. These orders, followed by the number of stomachs in which they occurred, are as follows: Myriapoda (2), Araneida (4), Isoptera (1), Blattodea (8), Hemiptera (3), Orthoptera (4), Coleoptera (8), Hymenoptera — wasps (1) and Formicidae (1) and Diptera (2). These observations suggest that cockroaches and beetles are favoured food items. The range of items eaten indicates that they are not specialized feeders. Most of the identified invertebrates were small, with more than half less than 10 mm in length. Six of the stomachs had clumps of hair which seemed to be too large to have been swallowed merely from grooming. In five of these stomachs there were hairs of feral mice *Mus musculus*. The other stomach contained only hairs of the European Rabbit *Oryctolagus cuniculus*, which from the length and thickness of guard hairs were thought to be from a juvenile. One stomach also contained a bird feather. Kitchener and Chapman (1978) also suggest that the species is an opportunistic feeder: separately, termites and cockroaches formed a large proportion of stomach contents of two specimens and lepidopteran larvae appeared in the diet only during spring. It occasionally eats birds. Culver and Dunlop report that most stomachs contain only a single or several individuals of a range of prey items. For example, one stomach contained two spiders, one myriapod, one beetle and two cockroaches which further suggest that the species is an opportunistic feeder.

Of particular interest is the observation that cockroaches, grasshoppers, myriapods and beetles make up 31 of the 94 invertebrate individuals recorded, suggesting that *P. calura* feeds extensively on the ground. This is supported by the observation that phascogales apparently predate heavily on the ground-dwelling *M. musculus*. The occurrence of juvenile rabbit fur in a stomach suggests that *P. calura* may take carrion.

Relative Abundance

The relative abundance of this species in different habitats was evaluated from trapping data from the four reserves listed earlier in **Table 1.** Because these reserves were trapped between November 1972 and March 1976 using different trapping efforts, population numbers between reserves and number of individuals captured in particular habitat types are not directly comparable. Instead, after grouping spring and autumn trapping data for each trapline, abundance of individuals between sampled habitats was compared using an abundance index (AI):

$$AI = 10^4 \sum_{n=1}^{4} Pi \Big/ \sum_{n=1}^{4} Ti$$

where P = proportion of individuals caught in a habitat in reserve i.
T = total number of trapnights in a habitat in all reserves.
i = number of reserves when i = one to four.

Habitat is used here to denote any structural, floristic or pedological character considered.

The vegetation classification used throughout is that of Muir (1977b) and the descriptions of the vegetation and soils in all traplines are in Muir (1977a and b, 1978, and 1979). Nomenclature for plants follows Beard (1970).

Vegetation Structure: AI values and trapping effort in each of the vegetation life form/height classes and corresponding canopy cover density groupings (LFD) in the appendix were compiled by treating each vegetation stratum in each trapline separately. These values show that although *P. calura* was captured in 60 per cent of the LFDs trapped (in 17 of the 47 traplines) a restricted habitat preference is suggested.

Total AI values for the life form/height class in **Appendix II** suggest that low trees were preferred to mallees and shrubs, with tall shrubs preferred to lower (< 1.5 m high) shrubs. Of the ground covers, low bunch grass was favoured relative to mat plants, sedges and herbaceous species. Canopy cover totals in this appendix indicate a preference towards denser vegetation. This trend is supported by the grouped data for shrubs, mallees and trees, which have AI values and number of trapnights (in brackets) as follows: dense 9.2 (960), mid-dense 4.6 (8384), sparse 2.3 (8982) and very sparse 1.5 (5900) — although there is one LFD grouping, sparse trees < 5 m high, which notably reverses this trend. In this instance, this LFD (*Acacia lasiocalyx*) is associated with a mid-dense understratum of *Casuarina campestris* which is almost certainly the stratum being used by phascogales.

With the ground covers there is no trend towards denser vegetation. When values for mat plants, grasses, herbaceous species, sedges, ferns and mosses are grouped, the AI values are as follows: dense 0 (720), mid-dense 6.9 (2400), 3.8 (1780) and 5.9 (660).

Floristics: AI values were calculated for each dominant plant genus in the upper stratum and lower stratum (where present), and for both strata combined (**Table 3**). These values suggest that *Casuarina* spp. (*C. huegeliana*, *C. campestris* and *C. acutivalvis* in that order) were a most important habitat, whether present in either the upper or lower stratum. *Acacia* (*A. lasiocalyx*) was only dominant in the upper stratum and this appeared equally preferred to *Eucalyptus* spp. (*E. wandoo* favoured). Interestingly, no captures were recorded in *Eucalyptus* when it formed an understory only. Mixed shrub assemblages were little favoured and none were captured in vegetation associations dominated by a mixed shrub assemblage < 1.0 m high. Associations dominated by *Dryandra* spp., *Banksia* sp. or *Melaleuca* sp. were not favoured.

Associations with a shrub layer dominated by the poison bushes *Gastrolobium* spp. (*G. crassifolium*, *G. spinosum* most favoured) had the highest AI value (8.8) of the shrubs and trees. Of the ground cover, the grass *Spartochloa scirpoides* was most favoured, followed by the mat plants Cyperaceae gen. nov. and *Wilsonia* sp., mixed sedges, the herb *Borya nitida* and the sedges *Lepidosperma angustatum* and *Lomandra effusa*.

TABLE 3

Phascogale calura abundance indices and number of trapnights (in brackets) for vegetation floristic groupings on Wheat Belt reserves (for explanation see text).

Dominant plant genera/structure	Vegetation stratum upper	lower	upper and lower
Casuarina (> 2 m)	6.5 (2406)	6.2 (1750)	6.4 (4156)
Acacia (> 2 m)	6.0 (820)	—	6.0 (820)
Eucalyptus (> 2 m)	3.4 (5380)	0 (660)	3.1 (6040)
Melaleuca (> 0.5 m)	0 (60)	3.2 (740)	3.0 (800)
Low mixed shrubs (< 1.0 m)	0 (772)	2.3 (5328)	2.0 (6100)
Tall mixed shrubs (1.0-1.5 m)	1.5 (740)	1.5 (3720)	1.5 (4460)
Dryandra (0.1-4.0 m)	0.4 (1260)	—	0.4 (1260)
Banksia (2.0-4.0 m)	0 (360)	—	0 (360)
Gastrolobium (1.0-2.0 m)	—	8.8 (510)	8.8 (510)
Olearia (< 0.5 m)	—	0 (240)	0 (240)
Blackboys (*Xanthorrhoea*)	—	0 (280)	0 (280)
Mat plants (Cyperaceae, *Wilsonia*)	—	4.1 (580)	4.1 (580)
Grass (*Spartochloa*)	—	13.4 (500)	13.4 (500)
Sedges (*Lomandra*)	—	1.3 (80)	1.3 (80)
(*Lepidosperma*)	—	1.2 (640)	1.2 (640)
(Mixed)	—	4.7 (1280)	4.7 (1280)
Herbs (*Borya*)	—	3.3 (1800)	3.3 (1800)

Soils: The AI values, followed by trapping effort, for the soil texture groupings were as follows: sand 0 (1632), loamy sand 11.5 (62), clayey sand 9.4 (576), loam (> 80% gravel content) 1.8 (280), sandy loam 2.3 (3220), fine sandy loam 3.0 (2770), light sandy clay loam 0 (260), sandy clay loam 8.2 (1020), sandy clay loam (> 80% gravel content) 0 (240), silty clay loam 14.2 (120), heavy clay 4.6 (240).

There was no clear preference for soil groupings, although silty clay loams had the highest AI value followed by loamy sand and clayey sand. None were collected on sand and relatively few on loam except where the clay content was high.

DISCUSSION

The contraction in the distribution of *P. calura* following European settlement of Australia would not appear to involve dietary specialization because of the wide range of prey items taken by the species.

Limited data presented suggest that habitat preference may be an important factor in this contraction. From Museum trapping records the species appears to prefer a denser vegetation or vegetation with a continuous foliage stratum of the following species: *Eucalyptus wandoo*, *E. accedens*, *E. gardneri*, *E. falcata* and *Gastrolobium* spp. (*E. wandoo* alliance of Aplin, 1979) and the *Casuarina huegeliana* alliance of Aplin (1979). These plant species frequently occur together as adjacent associations or as a community. Apart from the capture by McKenzie *et al.* (1975) of a single *P. calura* in a different, but structurally similar vegetation type, all the additional captures (**Appendix III**) were in vegetation which was both structurally and floristically similar to that of the Museum records. In all instances surveyed by me, captures of *P. calura* were in climax vegetation: Yornaning Nature Reserve has not been burnt for about 40 years; and the youngest association in which they were captured in Dongolocking, West Bendering and Bendering Nature Reserves is about 40, 25 and 10-20 years, respectively. Further, the captures in Tutanning Nature Reserve were in an association which had not been burnt for about 40 years (N.L. McKenzie, pers. comm.). They were, however, captured at Dryandra State Forest Reserve in associations burnt as recently as one year previous to the trapping, although these were controlled prescribed burns and as such were 'cool' fires which left much of the vegetation in the middle and upper strata intact (A.A. Burbidge, pers. comm.).

On release in the field *P. calura* have been tracked to a hollow limb of a mallee and hollows of fallen logs (A. Chapman and A.A. Burbidge, pers. comms). These observations, taken in conjunction with those of Krefft (1866), suggest that hollow logs and trunks are probably the natural rest sites of the species. Certainly climax (and senescent) vegetation afford more opportunities for such rest sites and a continuous vegetation canopy would assist its movement through foliage as suggested by Kitchener and Chapman (1978).

The high abundance index of *P. calura* with the poison plants (*Gastrolobium* spp.) warrants further investigation. Aplin (1973) states that mortalities in sheep and goats, probably attributable to *Gastrolobium oxylobioides*, was first recorded in 1837 from Guildford, Western Australia. It is now known that all species of domestic animals are susceptible to monosodium fluoroacetate, the toxic element in *Gastrolobium* and *Oxylobium* (Papilionaceae), following ingestion of the plant. Death usually occurs within a few hours of eating the plant. Only three of the 34 species of poison plants in these two genera are found outside the South Western Vegetation Province (Aplin 1973). Interestingly, unlike their close eastern Australian relatives, the South-West vertebrate species which have been examined (*P. calura* not included) have evolved methods for detoxifying monosodium fluoroacetate (Oliver, King and Mead 1977). Christensen (1980) speculates that foxes and other exotic predators on native mammals may also suffer secondary poisoning after eating native fauna which have fed on these plants. It is for these reasons that Main (1979) states that areas with concentrations of poison plants 'have never been invaded by wandering domestic stock nor occupied by feral animals . . . As a consequence the plant assemblages and animal communities that are present (in areas with abundant poison plants) are singularly free from unwanted alien weeds or pest species.'

It is, then, unlikely to be coincidental that the recent distribution of *P. calura* (since 1960 — see **Fig. 1**) encompasses the southern part of the Avon and the northern part of the Stirling sub-provinces of Gardner and Bennetts (1956) (or western part of the Roe sub-province of Beard [1979]).

Numbers of poison plant species in each of the vegetation sub-provinces of Gardner and Bennetts (1956) are available from Aplin (1973). The expected number of species of poison plants in these sub-provinces was estimated, first, by converting the area of each sub-province to the power 0.15, to accord with the expression of the relationship between species richness and area for mainland situations (see MacArthur and Wilson 1967). The expected number for each sub-province was, then, obtained by multiplying the sum of the species of poison plants in each sub-province by the proportion of the transformed sub-province area over the sum of transformed areas for each sub-province. The observed followed by expected values of poison plants in each sub-province is: Avon (23, 14.8), Stirling (18, 14.0), Darling (13, 13.3), Eyre (12, 14.0), Irwin (12, 14.5) and Warren (6, 13.4). These values show that only the Avon and Stirling sub-provinces have more species than expected, indicating that these two sub-regions are particularly rich in poison plant species. The difference between the observed and expected values are significant for the Avon ($X^2 = +4.57$, $0.05 > p > 0.025$) and Warren ($X^2 = -4.07$, $0.05 > p > 0.025$) sub-provinces.

Relative to other small mammals in the South-West *P. calura* appears to be relatively fecund (Baynes 1980) with most females having from 6-8 young per year. However, if *P. calura* males are semelparous then this may conceivably be a factor in the decline of the species because its distribution encompassed semi-arid and sub-tropical habitat with unpredictable climate. As noted by Lee *et al.* (1977) the success of this mode of reproduction depends on the species being able to reliably time, as well as maximize, its reproductive effort to coincide with the period when most young survive. Lee *et al.* (1977) state that in all *Antechinus* species with semelparous males, mating is in winter or early spring with litters being weaned between November and January to correspond with the spring flush of insects. These *Antechinus* species occur only in areas receiving reliable rainfall of at least 600 mm annually. These authors state that unpredictable environments would militate against semelparity because 'the only insurance against reproductive failure is the capacity of some females to breed in a second and very occasionally a third year.'

In conclusion, *P. calura* may persist in Western Australian Wheat Belt nature reserves because some of these reserves are protected from too frequent burning. Also they are protected by poison plants from direct and indirect effects on vegetation of grazing and browsing by exotic fauna that has been noted elsewhere in Australia (Wilcox 1960, Gentilli 1961, Newsome 1975). Thus these reserves favour the retention of floristically and structurally rich climax vegetation communities which would appear to favour the species resting site requirements and aerial capabilities. Wilcox (1960) has shown that grazing on the Wandarrie grass associations of the sandier soils of the mulga (*Acacia aneura*) zone has resulted in the loss of the tree and shrub-layers in many areas. Such changes would be inimical to *P. calura* and probably played a role in the extinction of this species in the arid and semi-arid parts of its range.

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APPENDIX I

Records of *Phascogale calura* with pouch young.

Reference	Locality	No. adults	Date collected	No. young	Crown-rump length (mm)	Notes
WAM No. 9907	Dragon Rocks Nature Reserve	1	3 August 1972	8	7.2	teats slender, 2.9 mm long, uteri only partially involuted, pouch and mammaries moderately developed
WAM No. 8069	Dumbleyung	1	22 August 1967	8	8.9	as above
A.A. Burbidge (pers. comm.)	Dryandra State Forest	4	22-25 June 1971	6-8	small unfurred	—
A. Bradley (pers. comm.)	Yornaning Nature Reserve	5	2 August 1980	8	<6.0	two other females had no pouch young
Krefft (1866)	Victoria	1	early June	8	small	—

APPENDIX II

Phascogale calura abundance indices and trapping efforts (in brackets) for vegetation structural groupings on four Wheat Belt reserves (see text for explanation). The total and sub-total values for the broad life form/height and canopy cover groups were calculated as for the values within the matrix.

Life form/height class	Canopy cover: Dense 70-100%		Mid-dense 30-70%		Sparse 10-30%		Very sparse 2-10%		Totals	
Trees > 30 m										
Trees 15-30 m			0	(360)			0	(380)	4.8	(6426)
Trees 5-15 m			8.8	(3296)	0	(1780)	0	(280)		
Trees < 5 m					0	(230)	17.0	(100)		
Mallee tree form					13.8	(80)			2.6	(2200)
Mallee shrub form	12.1	(140)	0	(620)	2.2	(1300)	0	(60)		
Shrubs > 2 m	9.5	(760)	2.4	(700)	4.7	(600)	1.7	(1000)		
Shrubs 1.5-2.0 m			7.1	(240)	3.1	(1100)	1.3	(1360)		
Shrubs 1.0-1.5 m			0	(720)	0.6	(800)	1.4	(800)	2.2	(15600)
Shrubs 0.5-1.0 m			0	(940)	0	(892)	3.4	(500)		
Shrubs 0.0-0.5 m	0	(60)	4.0	(1508)	2.0	(2200)	0.4	(1420)		
Sub-totals	9.2	(960)	4.6	(8384)	2.3	(8982)	1.5	(5900)	2.9	(24226)
Mat plants							4.8	(580)	4.8	(580)
Hummock grass										
Bunch grass > 0.5 m									13.4	(500)
Bunch grass < 0.5 m					13.4	(500)				
Herbaceous spp.	0	(360)	6.5	(920)	0	(480)			3.4	(1760)
Sedges > 0.5 m			8.0	(560)	0	(280)			5.3	(2200)
Sedges < 0.5 m	0	(360)	9.4	(640)	0	(280)	13.8	(80)		
Ferns					0	(240)			0	(520)
Mosses, Liverworts			0	(280)						
Sub-totals	0	(720)	6.9	(2400)	3.8	(1780)	5.9	(660)	4.9	(5560)
Totals	5.3	(1680)	5.1	(10784)	2.0	(10762)	1.9	(6560)		

APPENDIX III

Other habitat observations for *Phascogale calura.*

Reference	Locality	Date	Vegetation		No. *P. calura* captured	Notes
			Floristics	Structure		
A.A. Burbidge (pers. comm.)	Dryandra State Forest	22-25 June 1971	*Eucalyptus accedens* *E. wandoo* *Gastrolobium microcarpum* *Bossiaea eriocarpa* *Casuarina huegeliana*	'Woodland'	5	Burnt 1-8½ years previously
N. McKenzie (pers. comm.)	Tutanning Nature Reserve	22-24 May 1975	*E. wandoo* *C. huegeliana* *Oxylobium parvifolium* *Astroloma prostratum* *A. epacridis* *Dryandra ferruginea*	Low woodland A Low scrub B Mixed dwarf scrub D	3	Not burnt for at least 40 years
As above	As above	As above	*E. wandoo* *C. huegeliana* *D. sessilis* *Xanthorrhoea reflexa* *G. spinosum* *Banksia sphaerocarpa* *D. ferruginea*	Open low woodland A Scrub Heath A Dwarf scrub D	2	As above
WAM Nos 7134-5, 7137	Near Mooterdine	28-29 April 1964	*Casuarina* sp.	'Thicket'	3	—
7140			Mallet (*Eucalyptus* spp.) and *G. trilobum*	'Woodland'	2	—
WAM Nos 7136, 7139	Near Contine	30 November and 7 December 1964	*E. wandoo* and mallet Mallet and *Dryandra* sp.	'Woodland' 'Woodland'	1 1	—
McKenzie *et al.* 1975	Dragon Rocks Nature Reserve	3 August 1972	*E. salmonophloia* *Acacia merrallii*	Forest Shrub mallee	1	Not burnt for at least 20 years