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Predation of the Julia Creek dunnart (*Sminthopsis douglasi*) and other native fauna by cats and foxes on Mitchell grass downs in Queensland

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Abstract. Examination of the stomach contents of cats (*Felis catus*) and foxes (*Vulpes vulpes*) collected on Mitchell grass downs in north-western Queensland revealed that the diet of cats consists largely of native vertebrate fauna whereas that of foxes is largely carrion and insects. Mammals, followed closely by reptiles, made the largest contributions to the diet of the cats. Five species of small mammals, one of which – the Julia Creek dunnart (*Sminthopsis douglasi*) – is listed as threatened, and 15 species of reptiles, two of which – the striped skink (*Ctenotus agrestis*) and the bearded dragon (*Pogona henrylawsoni*) are endemic to the region – fell prey to the cats. Foxes appear to pose less of a threat to the native fauna than cats, provided carrion remains readily available.

Additional keywords: *Ctenotus agrestis*, *Leggadina forresti*, *Mirafra javanica*, *Planigale ingrami*, *Pogona henrylawsoni*, *Rattus villosissimus*, *Sminthopsis macroura*, *Turnix velox*.

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Introduction

An understanding of the potential impact of introduced predators on small mammal populations, especially of those species that are not widely distributed or abundant, is necessary for the formulation of species management plans. The Julia Creek dunnart (*Sminthopsis douglasi*) has a limited distribution in north-western Queensland and is listed as endangered by the *Environment Protection and Biodiversity Conservation Act 1999*, and as near threatened in a more recent assessment of its status by the International Union for Conservation of Nature Red List (IUCN 2010). It is a small (mass up to 70 g), carnivorous, nocturnal marsupial that rests during the day in cavities in the grass-covered, cracking soils of Mitchell grass downs country (Woolley 2008). Four other species of small terrestrial mammals, namely two dasyurids (*Sminthopsis macroura* and *Planigale ingrami*) and two rodents (*Rattus villosissimus* and *Leggadina forresti*), are known, from remains found in owl pellets (Woolley 2010), to occur within the range of the Julia Creek dunnart.

Following the rediscovery of the Julia Creek dunnart by Woolley (1992) a field study was commenced in 1995 to investigate its habitat requirements and other aspects of its biology (Mifsud 1999). In the course of that study the extent to which introduced predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*) were preying on the Julia Creek dunnart and other native fauna was investigated and is reported here. These introduced predators are known to prey on a wide variety of native fauna in other areas of Australia (Dickman 1996) and both have been implicated in the extinction and decline of some Australian mammals (Burbidge and McKenzie 1989; Short and Smith 1994; Johnson 2006). Thus the aim of this study was to assess, in an area not previously studied, the impact of predation by cats and foxes on the fauna with particular reference to a threatened species, the Julia Creek dunnart.

Materials and methods

Study area

The study was carried out on properties in the vicinity of the town of Julia Creek, Queensland, all within the known range of the Julia Creek dunnart. At the same time, live-trapping using Elliott traps was conducted on some of the properties (Toorak, Proa and Minamere to the south of Julia Creek, and Lyrian to the north) by Mifsud (1999).

Collection of cats and foxes

Most cats and foxes were shot from a vehicle while spotlighting at night, using a high-velocity centre-fire rifle. No fixed route was followed. Some were obtained opportunistically; they were either shot during the day or provided by landholders and a professional kangaroo shooter.

Examination and analysis of stomach contents

Specimens were taken to a field laboratory where the sex, coat colour (of cats), standard measurements (including body weight and length of body, tail and hind foot) and reproductive condition of females were recorded (Mifsud 1999). The stomach of each animal was removed and the contents sorted macroscopically. Material of diagnostic value was washed and placed in 70% ethanol. Conservative counts of the number of individual prey items were made on the basis of the body parts found in the stomach. Specimens that could not be identified at the time of sorting were either later compared with reference specimens collected in the study area, or sent to the Queensland Museum for identification. Carrion was identified from traces (e.g. skin, claws) of the donor and/or the presence of maggots. Some cats and foxes were shot while feeding on a carcass.

The percentage frequency of occurrence of each prey group (mammal, bird, reptile and invertebrate) and carrion was calculated by dividing the number of stomachs containing the group or carrion by the total number of stomachs in the sample. Within the prey groups frequency of occurrence was calculated at the species level (for vertebrates) and category (for invertebrates). A value, estimated from field records, reference collections and the literature, was assigned for the mean body weight of all dietary items other than carrion. This was multiplied by the number of that item in the sample to obtain the contribution of the item, and the relevant group, to the biomass. This method gives a maximum mass contribution for each prey species because it assumes that the entire animal is consumed. The use of mean body weight for estimating the biomass contribution of a prey species is considered to be more reliable than weighing the mass of the items in the stomach, because weight loss through partial digestion is not known (Tideman *et al*. 1994; Paltridge *et al*. 1997). Carrion was excluded from the biomass calculations because the amount of the carcass consumed was not known.

Results

Collection of cats and foxes

A total of 199 cats (105 males and 94 females) and 57 foxes (30 males and 27 females) were collected in four areas within the known range of the Julia Creek dunnart in north-western Queensland (Fig. 1). Thirty-four of the cats and five of the foxes were obtained opportunistically. More cats than foxes were

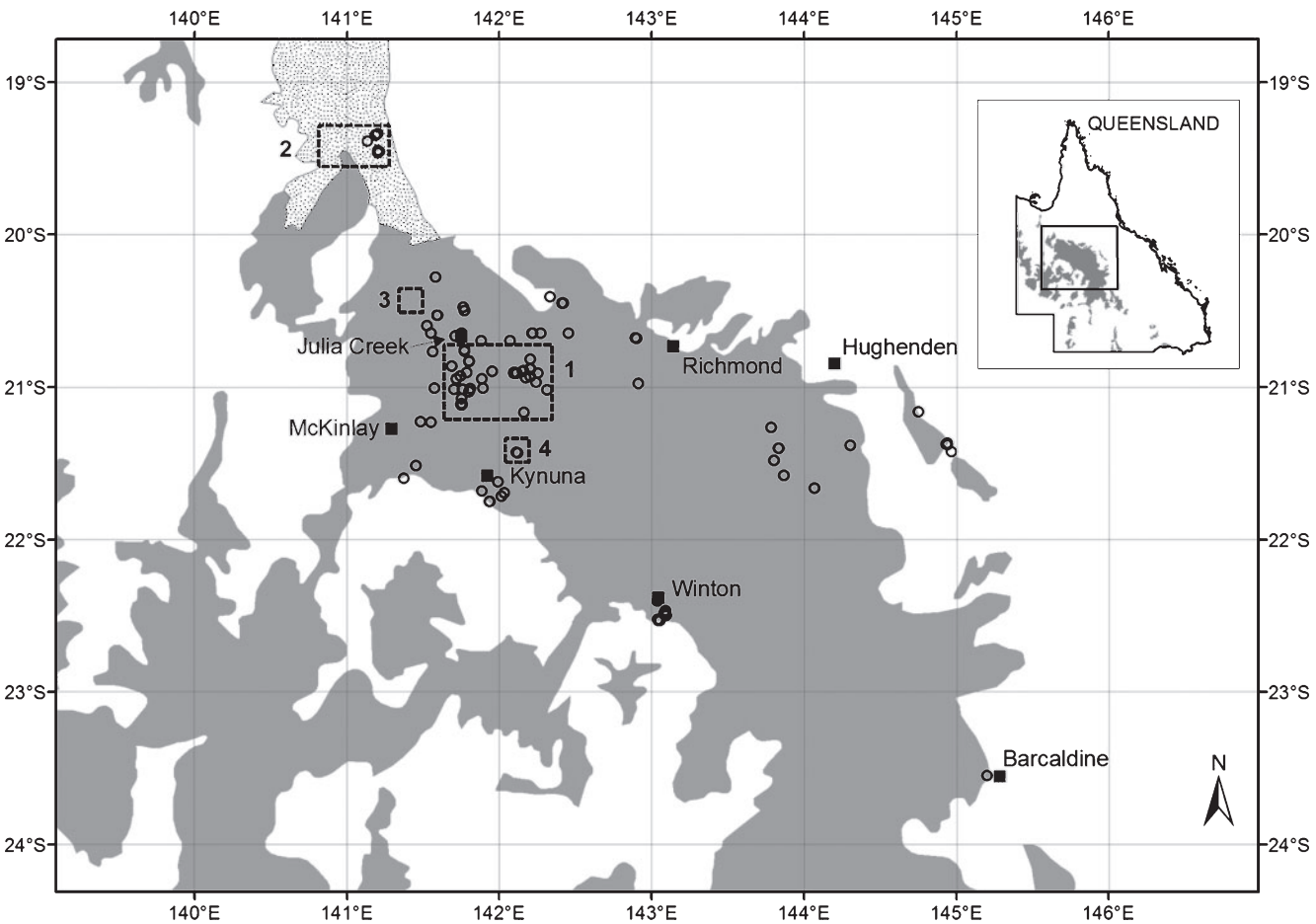

Fig. 1. Locality records (○) for the Julia Creek dunnart in Queensland to August 2009. Grey shaded areas represent the extent of the Mitchell grass (*Astrebla* spp.) tussock grasslands as defined by AUSLIG (1990). The stippled area is classified as *Dicanthium sericeum* (blue grass) tussock grassland (see text). Cats and foxes were collected within the boxed Areas 1–4.

Table 1. Collection of predators and mammals preyed upon by cats and foxes in Areas 1–4
The figures in parentheses are the number of predators collected by spotlighting

Area	Year	No. of hours spotlighting	No. of predators		*Sminthopsis douglasi*		*Sminthopsis macroura*		*Planigale ingrami*		*Rattus villosissimus*		*Leggadina forresti*	
			Cats	Foxes	Cats	Foxes	Cats	Foxes	Cats	Foxes	Cats	Foxes	Cats	Foxes
1	1995	159.5	70 (59)	20 (19)	1	0	2	0	31	0	98	4	1	0
	1996	179.0	90 (68)	29 (25)	17	0	19	3	79	1	3	0	3	0
	1997	93.0	11 (10)	6 (6)	0	0	0	0	0	0	0	0	0	0
2	1995	23.0	26 (26)	0	0	–	0	–	12	–	4	–	0	–
3	1996	3.5	1 (1)	0	0	–	0	–	1	–	0	–	0	–
4	1996	4.0	1 (1)	2 (2)	0	0	0	0	0	0	0	0	0	0
	Total	462	199	57	18		21		123		109		4	

obtained in each year of the study (Table 1). Most predators (171 cats and 55 foxes) were obtained in Area 1, which encompassed Toorak and Proa (Fig. 2*a*). Twenty-six cats were obtained in Area 2, which encompassed Lyrian (Fig. 2*b*), 1 cat in Area 3 and 1 cat and 2 foxes in Area 4. Cats and foxes were collected from April 1995 to November 1997 (Fig. 3). Fewer predators were collected by spotlighting in 1997 than in the two previous years (Table 1) and the effort to collect them was greater (roughly 1 every 9 hours in 1997 compared with 1 every 2 hours in 1995 and 1996). The hours spent spotlighting per month ranged from 3.5 to 69.5. No predators were collected by spotlighting in October 1996 (15.5 h) and July 1997 (18.5 h). After January 1996 all spotlighting was carried out in Area 1, mostly on Toorak and Proa.

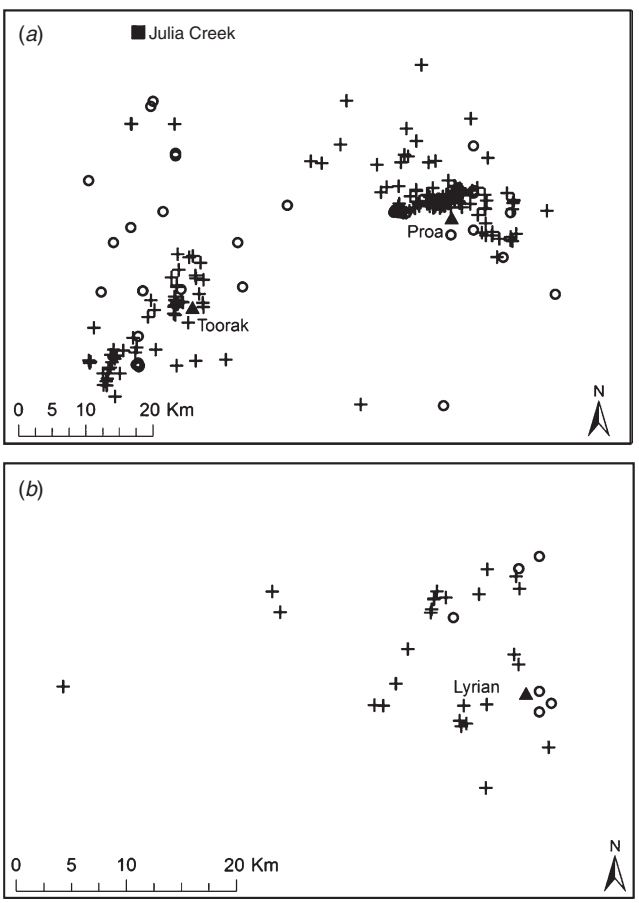

Fig. 2. The distribution of cats (+) and foxes (○) collected in relation to the properties (▲) on which small mammals were trapped. (*a*) Area 1: Toorak and Proa; (*b*) Area 2: Lyrian.

Prey of cats

The stomachs of 12 cats were empty, giving a sample size of 187. Items found in the stomachs included mammals (5 species), birds (12 species), reptiles (15 species), invertebrates (centipedes, spiders and insects) and carrion (Table 2). Both the frequency of occurrence of each prey group and the contribution of each (except carrion) to the total biomass is shown in Table 2. Mammals and reptiles were eaten more frequently than birds and made the largest contributions to the biomass of prey consumed. Invertebrates were found frequently in the stomach samples but made only a small contribution to the biomass, and carrion was found infrequently. The biomass (excluding carrion) of the entire sample, calculated from the body weight assigned to individual prey items, was 22.954 kg.

Cats preyed upon *Sminthopsis douglasi* (representing 6.6% of all mammals), *S. macroura* (7.7%), *Planigale ingrami* (45.4%), *Rattus villosissimus* (38.7%) and *Leggadina forresti* (1.5%). *R. villosissimus* was the most important prey item by weight, comprising 7.98 kg of the 9.53 kg of mammalian prey found in the sample (Table 2). In some instances up to three species, or several individuals of a species (e.g. up to 11 *P. ingrami* or 7 *R. villosissimus*), were found in a single stomach. In Area 1, where most cats were collected, differences were seen in the number of prey species found in the stomach samples in each year of the study (Table 1). Almost all *R. villosissimus* were taken in 1995. The numbers of the other species eaten by the cats were greater in 1996 than in 1995. No mammals were found in the stomachs of the much smaller number of cats collected in Area 1 in 1997. In Area 2, where 26 cats were collected in October 1995, the only species eaten was *P. ingrami*. In Area 3 one *P. ingrami* was found in the stomach of the only cat collected there and, in Area 4, no mammals were found in the stomachs of the two cats.

Birds were the least important vertebrate prey group, with the lowest values for both frequency of occurrence and biomass contribution (Table 2). Of the 12 species preyed upon,

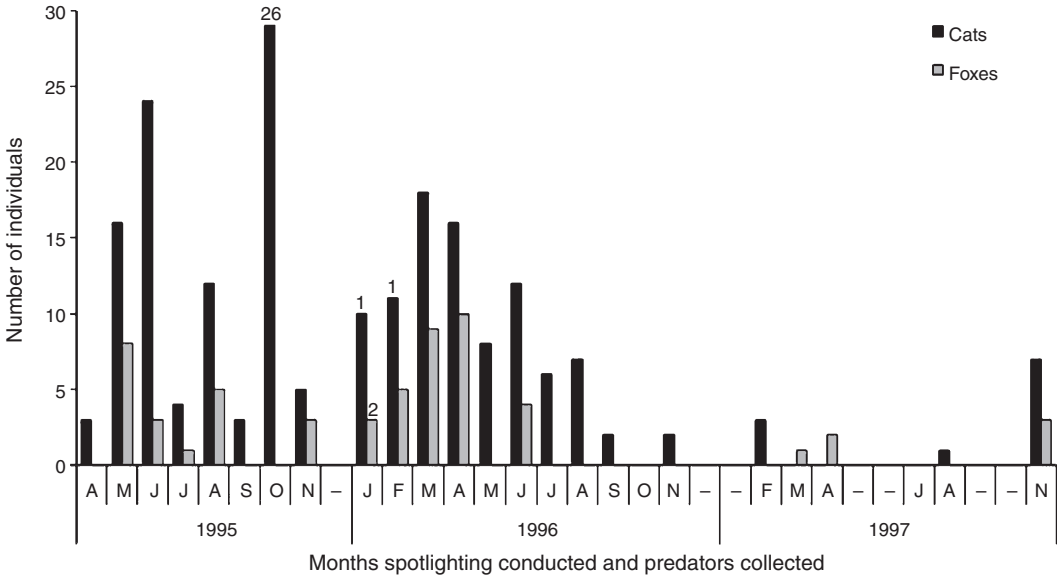

Fig. 3. Months of collection of cats and foxes. Most were collected in Area 1. The figures above the columns indicate the number of individuals obtained in Areas 2–4. (October 1995: 26 cats, Area 2; January 1996 : 1 cat and 2 foxes, Area 4; February 1996: 1 cat, Area 3).

the little button quail (*Turnix velox*) and the singing bushlark (*Mirafra javanica*), both ground-nesting species, were the most frequently eaten (Table 2).

Reptiles preyed upon included lizards and highly venomous snakes. The most frequently eaten species were the agamids *Pogona henrylawsoni* and *Tympanocryptis tetraporophora* and the skink *Ctenotus agrestis* (Table 2). Stomachs containing several species and individuals were common, with one containing the remains of five snakes (two species) and five lizards (four species).

The invertebrates eaten most frequently were centipedes and grasshoppers. Carrion was largely derived from sheep and kangaroo carcasses, with single occurrences of varanid lizard and domestic chicken.

Prey of foxes

The stomachs of five foxes were empty, giving a sample size of 52. Items found in the stomachs included mammals (3 species), birds (1 species), reptiles (4 species), invertebrates (centipedes and insects) and carrion (Table 3). Invertebrates and carrion formed larger components of the diet by frequency of occurrence than vertebrate prey items, and insects contributed more to the biomass (1.908 kg) than vertebrate prey items (933 g) (Table 3). Reptiles were preyed upon more frequently than mammals or birds. The biomass of the entire sample, calculated from the body weight assigned to prey items, was 2.841 kg.

Mammalian prey items included small numbers of *R. villosissimus* in Area 1 in 1995 and both *S. macroura* and *P. ingrami*, also in Area 1, in 1996 (Table 1). The only species of bird found as prey was the ground-nesting singing bushlark (*Mirafra javanica*), and the most frequently eaten reptile was the agamid lizard *Tympanocryptis tetraporophora.* Grasshoppers and centipedes were the invertebrates most frequently found in the stomachs (Table 3).

Animals consumed as carrion included sheep, pig, kangaroos (*Macropus rufus* and *M. giganteus*), and lizards (*Varanus spenceri*). Fox stomachs that contained only carrion were common, with eight containing sheep and another seven containing kangaroo. When both carrion and prey were found in the stomachs, carrion was always the major component.

Availability of mammalian prey

The live-trapping study by Mifsud (1999) provided a measure of the availability of small mammals in areas where cats and foxes were collected. Trapping was carried out at frequent intervals throughout each year of the study on Toorak and Proa, but only in November–December 1995 and March 1996 on Minamere (all properties in Area 1) and in October 1995 on Lyrian (Area 2). The five species of small mammals preyed upon were all trapped in Area 1 in the course of Mifsud's (1999) study but only *P. ingrami* in Area 2 (Table 4). Trapping success was generally very low. The Julia Creek dunnart was trapped on both Toorak and Proa and trapping success was greater on Proa in each year of the study. *S. macroura* was also trapped on these properties and trapping success was higher at Toorak in both 1996 and, especially, 1997 when more were trapped in areas on Toorak where they had been much less trappable in previous years (Mifsud 1999). Small numbers of *P. ingrami* were trapped in each year. Most *R. villosissimus* were trapped in 1995 and *L. forresti* was trapped only in 1997. No mammals were trapped on Minamere.

Discussion

The diet of feral cats on Mitchell grass downs in Queensland consisted almost entirely of native fauna, with mammals, followed closely by reptiles, making the largest contributions. In contrast, the diet of foxes consisted largely of carrion and

Table 2. Frequency of occurrence of items and biomass of prey items in the stomachs of 187 cats
n = number of stomachs containing the prey item or carrion

Group/prey item/assigned weight (g)	*N*	No. of individuals	Frequency of occurrence (%)	Item (g)	Biomass Group (kg)	% of total
Mammals	**110**	**271**	**58.8**	–	**9.547**	**41.5**
Sminthopsis douglasi (35)	11	18	5.9	630		
Sminthopsis macroura (17)	14	21	7.5	357		
Planigale ingrami (4)	62	123	33.1	492		
Rattus villosissimus (76)	53	105	28.3	7980		
Leggadina forresti (22)	4	4	2.1	88		
Birds	**39**	**50**	**20.9**	–	**3.508**	**15.3**
Turnix velox (54)	6	6	3.2	324		
Coturnix pectoralis (80)	1	1	0.5	80		
Stiltia isabella (130)	1	1	0.5	130		
Porphyrio porphyrio (500)	1	1	0.5	500		
Phaps histrionica (200)	3	3	1.6	600		
Ocyphaps lophotes (adult 150)	3	3	1.6	450		
Ocyphaps lophotes (chick 20)	1	2	0.5	40		
Melopsittacus undulatus (60)	2	3	1.1	180		
Taeniopygia guttata (12)	4	6	2.1	72		
Mirafra javanica (32)	13	16	6.9	512		
Cinclorhamphus mathewsi (80)	4	5	2.1	400		
Cinclorhamphus cruralis (80)	2	2	1.1	160		
Artamus leucorhynchus (60)	1	1	0.5	60		
Reptiles	**94**	**184**	**50.3**	–	**7.221**	**31.5**
Pseudechis australis (50)	2	2	1.1	100		
Suta suta (20)	11	14	5.9	280		
Demansia sp. (9)	2	2	1.1	18		
Demansia rimicola (10)	3	4	1.6	40		
Pygopus schraderi (20)	3	3	1.6	60		
Ramphotyphlops unguirostris (10)	3	3	1.6	30		
Tiliqua multifasciata (90)	4	5	2.1	450		
Ctenotus robustus (18)	4	4	2.1	72		
Ctenotus agrestis (8)	18	24	9.6	192		
Proablepharus kinghorni (3)	1	2	0.5	6		
Pogona henrylawsoni (83)	37	63	19.8	5229		
Amphibolurus sp. (80)	2	2	1.1	160		
Tympanocryptis tetraporophora (13)	29	40	15.5	520		
Gehyra variegata (4)	7	10	3.7	40		
Diplodactylus tessellatus (4)	5	6	2.6	24		
Invertebrates	**105**	**657**	**56.1**	–	**2.678**	**11.7**
Centipedes (8)	48	163	25.7	1304		
Spiders (2)	12	21	6.4	42		
Grasshoppers (3)	80	440	42.8	1320		
Crickets (0.5)	3	6	1.6	3		
Cicadas (0.25)	1	26	0.5	6.5		
Caterpillar (2)	1	1	0.5	2		
Carrion	**16**	–	**8.5**	–		
Sheep	8	–	4.3	–		
Kangaroo	7	–	3.7	–		
Varanid	1	–	0.5	–		
Domestic fowl	1	–	0.5	–		

insects. Both cats and foxes are generally considered to be opportunistic predators, with the level of predation primarily dependent on the availability and abundance of prey (see May and Norton 1996 for a summary of the diets and impacts of these feral predators). Rabbits, which form a large component of the diet of both cats and foxes in other parts of Australia (Woolley *et al*. 1985; Catling 1988; Read and Bowen 2001), were not present in the study area. Carrion was readily available in the form of carcasses of sheep on grazing properties, and kangaroos, at dumps left by professional kangaroo shooters as well as road-kill animals. This resource was greatly utilised by the foxes but not by the cats, which have been found by others (e.g. Bayly 1978; Paltridge *et al*. 1997), to scavenge less than foxes.

In arid areas where there are no rabbits, native rodents such as *Rattus villosissimus* form a major component of the diet of

Table 3. Frequency of occurrence of items and biomass of prey items in the stomachs of 52 foxes
n = number of stomachs containing the prey item or carrion

Group/prey item/assigned weight (g)	*N*	No. of individuals	Frequency of occurrence (%)	Item (g)	Biomass Group (kg)	% of total
Mammals	**7**	**8**	**13.5**	–	**0.359**	**12.6**
Sminthopsis macroura (17)	3	3	5.8	51		
Planigale ingrami (4)	1	1	1.9	4		
Rattus villosissimus (76)	3	4	5.8	304		
Birds	**5**	**5**	**9.6**	–	**0.160**	**5.6**
Mirafra javanica (32)	5	5	9.6	160		
Reptiles	**13**	**17**	**25.0**	–	**0.414**	**14.6**
Ramphotyphlops unguirostris (10)	4	4	7.7	40		
Ctenotus agrestis (8)	1	1	1.9	8		
Pogona henrylawsoni (83)	2	3	3.8	249		
Tympanocryptis tetraporophora (13)	8	9	15.4	117		
Invertebrates	**32**	**508**	**61.5**	–	**1.908**	**67.2**
Centipedes (8)	19	77	36.5	616		
Grasshoppers (3)	21	430	40.4	1290		
Moth (2)	1	1	1.9	2		
Carrion	**29**	–	**55.7**	–		
Sheep	18	–	34.6	–		
Kangaroo	11	–	21.1	–		
Varanid	2	–	3.8	–		
Pig	1	–	1.9	–		

Table 4. Trapping success for small mammals

Year	Area	Property	No. of trap-nights	No. of individuals trapped (% trapping success)				
				Sminthopsis douglasi	*Sminthopsis macroura*	*Planigale ingrami*	*Rattus villosissimus*	*Leggadina forresti*
1995	1	Toorak	17 300	1 (0.006)	3 (0.2)	3 (0.02)	23 (0.13)	0
		Proa	2550	1 (0.04)	2 (0.8)	0	2 (0.08)	0
		Minamere	1000	0	0	0	0	0
	2	Lyrian	3150	0	0	1 (0.03)	0	0
1996	1	Toorak	4500	0	7 (0.16)	1 (0.02)	0	0
		Proa	19 640	34 (0.17)	16 (0.08)	15 (0.08)	0	0
		Minamere	750	0	0	0	0	0
1997	1	Toorak	5600	2 (0.04)	113 (2.02)	3 (0.05)	0	2 (0.04)
		Proa	11 010	62 (0.56)	8 (0.07)	1 (0.01)	0	0

cats (Dickman 1996; Paltridge *et al*. 1997). *R. villosissimus* is well known to be an irruptive species but no irruption was observed in the course of the study and the last known irruption in the area occurred in 1974 (Woolley 1992). Most of the *R. villosissimus* preyed upon by cats and foxes were taken in 1995 (Table 1), the only year in which this species was trapped (Table 4). Only small numbers of the other rodent, *Leggadina forresti*, were eaten by cats (one in 1995 and three in 1996), and this species was trapped only in 1997, suggesting that it was uncommon at the time of the study. More dasyurids (*S. douglasi*, *S. macroura* and *P. ingrami*) were eaten, mostly by cats, in the second year of the study when trapping success for these species (especially *S. douglasi*) was higher than in 1995. While no *S. douglasi* were found in the stomachs of foxes in the course of this study they have since been found as fox prey in other locations on Mitchell grass downs (Mifsud, unpub. obs.). *P. ingrami* was trapped in relatively small numbers (probably because of its small size and ability to enter and leave the Elliott traps without springing them) in both Areas 1 and 2 but it was the most frequently preyed upon, and possibly the most abundant, of the small mammals. This species was also found in much larger numbers (28% of the total number of mammals) than both *S. douglasi* (4.2%) and *S. macroura* (6.0%) in owl pellets collected on the downs (Woolley 2010). The extent of predation on mammals in 1995 and 1996 appears to be related to their availability as measured by trapping success. When *R. villosissimus* was no longer available the numbers of other mammals eaten increased.

In the third year of the study no mammals were taken by the cats and foxes collected in Area 1 even though four of the prey species appeared, from the trapping results, to be available. Trapping success for one (*S. macroura*) was higher than in previous years. The absence of mammals in the diet of the predators may be accounted for, at least in part, by the relatively small number of predators (10 cats and 6 foxes) collected in 1997. The effort to collect them was greater than in

earlier years (see above), perhaps because their numbers had been reduced by culling and, in the case of foxes, as a result of 1080 baiting by the landholder on Proa. However, sighting of cats and foxes from a low clearance vehicle was made difficult by the growth of roadside vegetation following good rains in the summer of 1996–97 and this may have led to lower numbers being collected. The rains also led to an increase in ground cover (documented by Mifsud 1999) which may have decreased the hunting success of predators for small mammals.

Julia Creek dunnarts were preyed upon by cats in Area 1, but not in Area 2, where the dunnarts were rediscovered on Lyrian (Woolley 1992). They were not trapped on Lyrian in October 1995, when trapping success for the only species of mammal (*P. ingrami*) collected over 11 nights was low (0.03%), in contrast to results from years before the present study. In the same trapping area, over 8 nights in June 1994, two species, *S. douglasi* (0.15% trapping success) and *P. ingrami* (0.15%), were collected by Mifsud (unpub. obs) and, over 9 nights in April 1992, three species, *S. douglasi* (0.3%), *S. macroura* (0.05%) and *P. ingrami* (0.05%), were collected by Woolley (1992). Seasonal factors may have affected trapping success but these results suggest a decline in mammal numbers in the trapping area, for which cats may have been responsible. Cat numbers appeared to be high in Area 2 (26 cats collected in 23 h) in October 1995.

The availability of native fauna other than mammals was not monitored but birds, reptiles and invertebrates such as centipedes and grasshoppers appeared to be plentiful. Among the most frequently preyed upon birds (*Mirafra javanica* and *Turnix velox*) and reptiles (*Pogona henrylawsoni*, *Tympanocryptis tetraporophora* and *Ctenotis agrestis*) no seasonality was seen in the months in which they were preyed upon. Centipedes (*Ethmostigmus rubripes* and *Scolopendra morsitans*) were mostly found in the diet of cats and foxes from January to April. In these months centipedes were observed at night on the surface following rain, sometimes emerging in large numbers from cracks in the ground when rain was falling. Grasshoppers (various acridids including the spur-throated locust (*Austracris guttulosa*)) were found in cat stomachs throughout the year and in fox stomachs mostly in the months of January–April.

The distribution of the Julia Creek dunnart, established in part by the finding of its remains in pellets of the barn owl (*Tyto alba*) from 22 localities by Woolley (2010) and a further two in the present study, lies largely within the Mitchell Grass Downs bioregion of Queensland (Thackway and Cresswell 1995). It extends into the Gulf Uplands in the northernmost part of its range (Area 2) where blue grass (*Dicanthium sericeum*) is the dominant tussock grass but Mitchell grass is also present, and into the Desert Uplands in the east, in an outlier of Mitchell grass downs. Wilson (1999) lists 27 species of rare and threatened fauna in the Mitchell Grass Downs bioregion but of these only one, the Julia Creek dunnart, formed a component of the diet of the cats collected in the course of the present study.

Several species of reptiles are endemic to the Mitchell Grass Downs of Queensland and among them a striped skink, *Ctenotus agrestris*, and the downs bearded dragon (*Pogona henrylawsoni*) were identified as frequent prey items of cats. *P. henrylawsoni* was preyed upon in Areas 1, 2 and 4, and 20 of 63 were taken by the cats collected in Area 2 in October 1995. The bearded dragon was observed to be active on warm evenings but its habit of basking on fence posts may make it easy prey during the day. Hunting by cats does not seem to be entirely nocturnal; a cat shot at 1020 hours, with little in its stomach, was found to have an intact *Planigale ingrami* still partly in the oesophagus.

This study of the diet of introduced predators (cats and foxes) suggests that they may have an impact on the native fauna of the Mitchell Grass Downs, with one threatened mammal (the Julia Creek dunnart) and two endemic reptiles (a striped skink and the downs bearded dragon) being preyed upon. Provided kangaroo shooting and grazing continue to provide a supply of carrion, cats pose a greater threat to these species than foxes. Natural predators such as the barn owl also prey on the same suite of small mammals on the downs and they take dasyurid marsupials (*S. douglasi*, *S. macroura* and *P. ingrami*) in proportionally similar numbers to cats. The extent of predation on these small mammals by other potential predators that occur in the region, such as large snakes and varanid lizards and a nocturnal raptor, the letter-winged kite (*Elanus scriptus*), which is known to prey on dasyurid marsupials (Pavey *et al.* 2008), is not known. The limited distribution of *S. douglasi* places it at greater risk of extinction by predation than its much more widely distributed congener, *S. macroura*.

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