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Feeding ecology of the raptor guild of the Canberra Region

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We studied the feeding ecology of twelve species of breeding raptors near Canberra, providing the first report of the food habits of a full raptor guild. There was no major dominant prey species for the overall guild. Some raptors had a very specialized diet: Black-shouldered Kites *Elanus axillaris* (House Mice *Mus musculus*); Australian Hobbies *Falco longipennis* (flying prey – birds, insects, and bats); and Peregrine Falcons *Falco peregrinus* (birds). Whistling Kites *Haliastur sphenurus* and Brown Falcons *Falco berigora* had the most diverse diet, with prey from five or more major taxa, including some unusual prey in the falcon's diet such as molluscs. White-bellied Sea-Eagles *Haliaeetus leucogaster* captured a variety of prey of aquatic origin but in different proportions from what has previously been reported, with birds as the main food source, followed by fish and reptiles. Wedge-tailed Eagles *Aquila audax* had a diverse diet based on macropods, large birds, and lagomorphs. Little Eagles *Hieraaetus morphnoides* preyed mainly on mammals and birds, especially European Rabbits *Oryctolagus cuniculus*. The role of how large killed prey vs carrion is brought to the nest needs to be studied for Wedge-tailed Eagles and Whistling Kites. Both *Accipiter* species (Brown Goshawks *A. fasciatus* and Collared Sparrowhawks *A. cirrocephalus*) had similar diets to what has been reported previously, with a particularly high number of insects. Nankeen Kestrels *Falco cenchroides* and Southern Boobooks *Ninox boobook* (the two hollow-nesters) had similar diets based on insects (by number), birds (by biomass), and reptiles of similar size. Birds were the most important prey group for the overall guild, and geometric mean prey weight suggested a size selection in how the raptors are dividing this resource, with Wedge-tailed Eagles taking the heaviest prey. There were five cases of intraguild predation.

Keywords: Raptor, guild, diet, Canberra, intra-guild predation

INTRODUCTION

There have been several studies on the food habits of raptor communities on all continents (Jaksic 1983; Jaksic and Braker 1983; Jaksic and Delibes 1987; Marti *et al.*1993a,b; Pande *et al.* 2018), yet there are only two serious studies that explore the diet of breeding guilds in Australia: one by Baker-Gabb (1984a) and one by Aumann (2001). Though these studies have provided important information on the food habits of Australian raptor guilds, both are for arid areas – central Australia (Aumann 2001) and north-western Victoria (Baker-Gabb 1984a). Other studies have dealt with non-breeding raptors (Baker-Gabb 1984b) or have sample sizes greatly biased towards one species (Corbett *et al.* 2014). Hence, information on the food habits of raptor guilds from non-arid areas is missing.

Here, we explore the feeding ecology of the raptor guild near Canberra, temperate south-eastern Australia, describing the diet of the twelve breeding species. The trophic structure of the guild, the dietary overlap between species and how they aggregate into different feeding sub-guilds (*sensu* Root 1967), habitat selection patterns, as well as the relationships of this guild with other Australian raptor guilds, will be explored in other papers.

METHODS

Study area

The study is part of our long-term monitoring of the raptor community in the Australian Capital Territory (ACT) and adjoining parts of New South Wales (Southern Tablelands) (34º50' – 35º47'S, 148º40' – 149º50'E; see Fuentes *et al.* 2007, Fuentes and Olsen 2015, Olsen *et al.* 2008, 2010, 2014, and Olsen 1992 for more details on the area, methods and species). The present study includes data from the 2002 and 2003 breeding seasons.

Food collections and diet estimation

We estimated diet by direct observations of prey brought to the nest and analysing pellets and prey remains collected during the 2002 and 2003 breeding seasons from inside and under stick nests, tree hollows, cliff ledges, and under roosts. Some segments of this dataset have been previously published on single species or two-way comparisons (Fuentes *et al.* 2007; Olsen *et al.* 2006a, 2008, 2010). Remains and pellets were separated, and each pellet was placed in an individual zip-lock bag. The prey identification analysis was performed in the laboratory by the late A.B. Rose (Associate, Australian Museum). Prey remains were identified by comparing feathers, bones, feet, beaks, scales and other remains with collections and museum specimens when necessary. We followed Brunner and Coman (1974) for microscopic identification of mammalian hair. Some bones were identified by morphological comparison with museum specimens and a photographic key of humerus bones of families of non-passerine birds. The humerus is often the strongest bone because it bears the stress of flight and is often the only unbroken bone in Peregrine Falcon *Falco peregrinus* prey remains (W. Boles pers. comm.). We also included observations of kills and prey consumed *in situ*, if these items were not reflected in the prey remains and pellets collected that day or the following one.

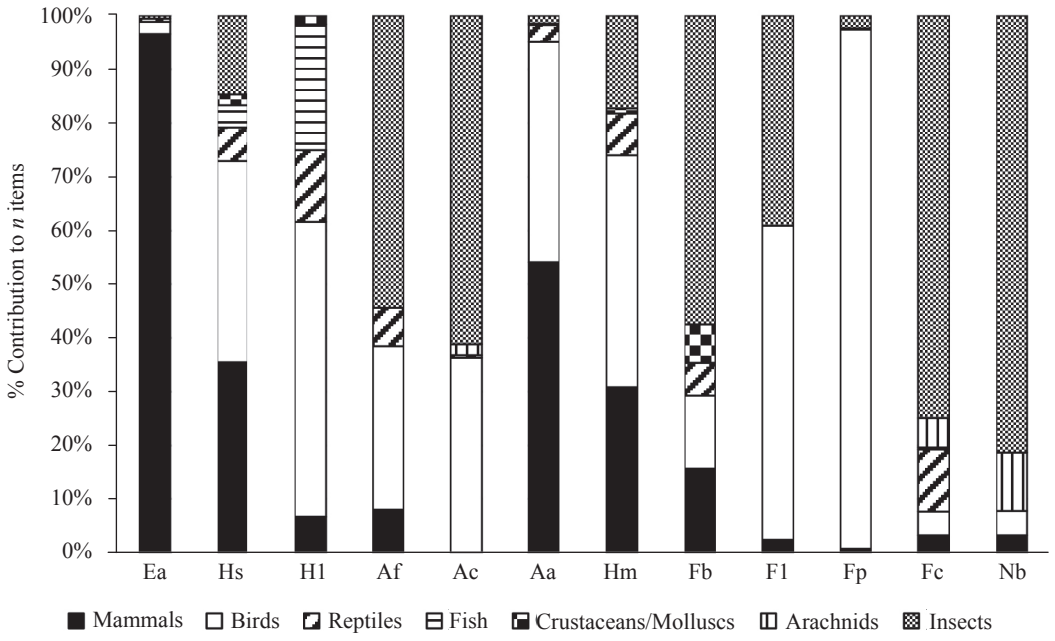

Figure 1. *Percentage of items contribution to the diet of the raptor guild in the Canberra Region, 2002–03.* Ea *Elanus axillaris;* Hs *Haliastur sphenurus;* Hl *Haliaeetus leucogaster;* Af *Accipiter fasciatus;* Ac *Accipiter cirrocephalus;* Aa *Aquila audax;* Hm *Hieraaetus morphnoides;* Fb *Falco berigora;* Fl *Falco longipennis;* Fp *Falco peregrinus;* Fc *Falco cenchroides;* Nb *Ninox boobook* .

We identified and counted body parts to estimate the minimum number of prey items (MNI) in a pooled sample of pellets, prey remains and observations; the use of all these methods minimise biases in food estimations (Collopy 1983; Seguin *et al.* 1998; Simmons *et al.* 1991). We did not assume that one casting represented one prey item, because adults and nestlings share prey and more than one species was often found in a single casting.

Thus, we estimated the contribution to dietary mass by multiplying the MNI by the average weight in each prey category. The mean or median weights of most prey were taken from the literature (see Appendix 1). The weight of some species that show wide variation from average size was estimated based on the actual prey remains found at the nests to improve the accuracy of estimates (Steenhof 1983; Marti 1987). This was the case for Eastern Grey Kangaroos *Macropus giganteus*, European Rabbits *Oryctolagus cuniculus* and Long-necked Turtles *Chelodina longicollis* – whose weight was estimated based on the size of the shells found, using a length-weight relationship developed from data for 98 turtles collected by A. Georges (unpublished data), which is: 10^((Shell Length*0.007812723) + 1.319686019), among others. Similarly, the weight of prey items not identified to species level was determined by A.B. Rose based on the remains (undetermined birds, reptiles, etc.), to make biomass calculations more accurate. The weight of fish was estimated from the size of their gill covers (opercle bones) and backbones, using a reference collection of skeletal parts from fish of known size and weight (see Appendix 1).

As in other papers on the same project (see Methods above), we applied correction factors following Baker-Gabb (1984a) and Brooker and Ridpath (1980), and assumed that the raptors wasted or discarded 50%, 33%, 17% and 9% of the biomass of very large (>10 kg), large (>300 g), medium (75–300 g) and small (<75 g) mammals respectively; 20%, 12% and 5% of large, medium and small birds; and 5% of reptiles. We also included fish and invertebrates in the last category. Following the rationale of Baker-Gabb (1984a), we used an upper limit of consumed tissue of 500 g, except for the smaller Nankeen Kestrel *Falco cenchroides* and Southern Boobook *Ninox boobook*, where a 300 g maximum was applied. We calculated geometric mean prey weights (GMPW) following Marti (1987) and estimated a ratio of prey size relative to predator size by dividing the GMPW by the average weight of both sexes for each raptor species, to account for size dimorphism.

RESULTS

We identified 3,977 prey items from 473 collection-days. In the whole sample of prey items, the most common major taxa were insects (38.2%, n = 1,519), followed by birds (34.2%, n = 1,359) and mammals (19.9%, n = 793; see Appendix 2). Detritus and other vegetable material, likely to represent stomach contents of some prey, represented only 0.6% of the total (n = 23) and were eliminated from the subsequent analysis (see Gil and Pleguezuelos 2001). Figure 1 shows the dietary contribution of the total number of items for the 12 species of raptors; the percentage contribution to biomass is shown in Figure 2.

Black-shouldered Kite *Elanus axillaris*

The Black-shouldered Kite had the most specialized diet of the local guild, eating almost exclusively mammals (96.6% by number and 75.8% biomass). The vast majority of these were rodents, particularly House Mouse *Mus musculus* (95.8% by number and 65.1% biomass: Appendix 2).

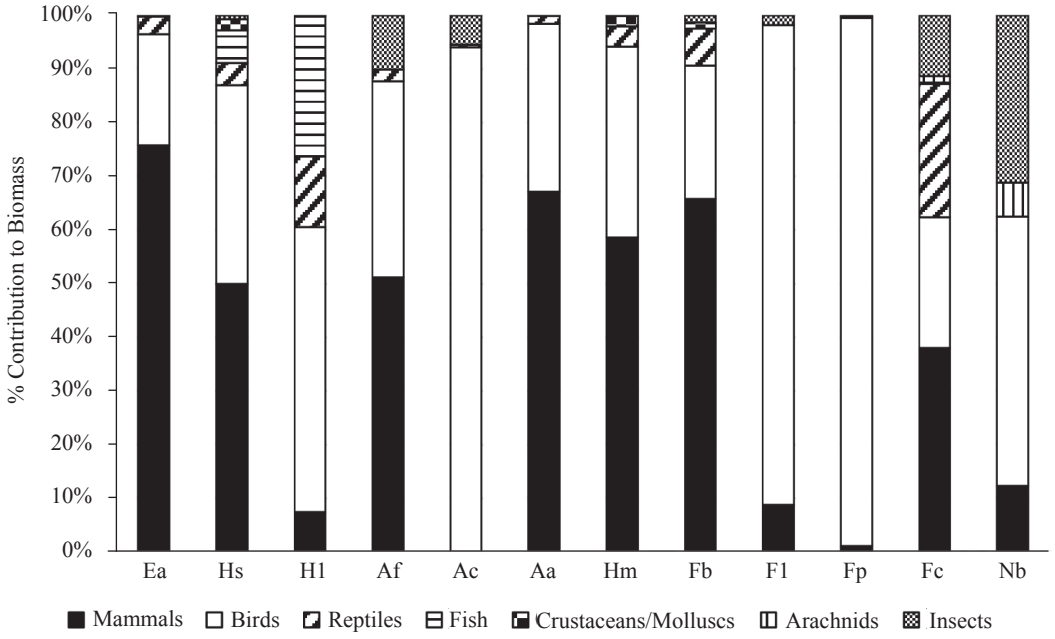

Figure 2. *Percentage biomass contribution to the diet of the raptor guild in the Canberra Region, 2002 – 03. Species codes as in Fig. 1.*

Whistling Kite *Haliastur sphenurus*

Whistling Kites captured 21 different prey species (6 mammals, 8 birds, 3 reptiles, 1 fish, 1 crustacean and 3 insects: Appendix 2). Birds (37.5%, *n* = 18) and mammals (35.4%, *n* = 17) dominated the diet by number, but the contribution of mammals was greater when biomass was considered (49.9% of the total). The European Rabbit was the main prey species both by number and biomass (20.8% and 30.3% respectively).

White-bellied Sea-Eagle *Haliaeetus leucogaster*

Animals of aquatic origin dominated the diet of this raptor. Birds were the main taxa represented with 55.0% of the total items and 53.0% of the biomass (*n* = 33); most of them were ducks and egrets, among which the Australian Wood Duck *Chenonetta jubata* was the main prey species with 23.3 and 26.1% by number and biomass, respectively (*n* = 14). Two other taxa contributed considerably to the diet: fish (23.3% number and 26.1% biomass) and reptiles (13.3% and 13.2%). The two reptile species taken were the aquatic Eastern Water Dragon *Intellagama lesueurii* and the Long-necked Turtle (Appendix 2).

Brown Goshawk *Accipiter fasciatus*

Invertebrates and birds dominated the diet of the local Brown Goshawks by number of items (54.4% and 30.4% respectively: Figure 1), but mammals (51.1%) and birds (36.6%) contributed the most to dietary biomass. The European Rabbit was the species contributing the most to biomass consumed (51.0%, *n* = 19). Other important prey items were the Red-eye Cicada *Psaltoda moerens* (*n* = 70), followed by Christmas Beetles *Anoplognathus* sp. (*n* = 34), Crimson Rosellas *Platycercus elegans* (*n* = 12) and unidentified skinks (Family Scincidae) (*n* = 11) (Appendix 2). This species was responsible for a case of intraguild predation, with the goshawks preying on a Southern Boobook.

Collared Sparrowhawk *Accipiter cirrocephalus*

Two taxa dominated by item number at the Collared Sparrowhawk territories: insects (61.2%, *n* = 128) and birds (36.4%, *n* = 76), but only birds contributed significantly to the biomass consumed (94.1%). Insects most taken were beetles (*n* = 105), while the most important prey bird by number was the House Sparrow *Passer domesticus* with 8.6% of the total items and 10.3% of the biomass (*n* = 18). Four more species had high contributions to biomass: Crested Pigeon *Ocyphaps lophotes* (15.7%), Crimson Rosella *Platycercus eximius* (15.1%), Eastern Rosella (12.4%), and Common Starling *Sturnus vulgaris* (6.4%).

Wedge-tailed Eagle *Aquila audax*

The diet of Wedge-tailed Eagles was dominated by mammals and birds, in that order, by number (54.0 and 41.2% respectively) and biomass (67.1 and 31.3%). The Eastern Grey Kangaroo (14.4% of items and 18.1% biomass, *n* = 75) and the European Rabbit (16.3% of items and 20.6% biomass, *n* = 85) were the most important prey species overall. Among the birds, ground-feeding species were the most frequent: Australian Magpie *Gymnorhina tibicen* (*n* = 33), Galah *Eolophus roseicapilla* (*n* = 25) and Australian Wood Duck (*n* = 21) (Appendix 2). We found three cases of intraguild predation: the eagles killed and brought to the nest one Peregrine Falcon, one Australian Hobby *Falco longipennis* and one Brown Falcon *Falco berigora*.

Little Eagle *Hieraaetus morphnoides*

Mammals and birds were the most important taxa, by number of items and biomass, in the diet of the Little Eagle. From a total of 39 prey categories (32 species plus other taxa), the European Rabbit was the most abundant prey type (23.1% by number and 44.4% of biomass, *n* = 24), followed by parrots (16.3% by number, 11.3% biomass, *n* = 17) and ground-feeding medium to large passerines (12.5% by number, 11.9% biomass, *n* = 13) (Appendix 2).

Nankeen Kestrel *Falco cenchroides*

We collected 39 dietary samples (pellets etc.) from 20 Kestrel territories (n = 499 prey items; 29 nest-years). Insects provided the most prey items (n = 374, 74.9% MNI), but the biomass contribution was divided across mammals, birds, reptiles and insects. Cicadas, coleopterans and orthopterans were the most numerous animals captured, whereas rabbits (32.0%), skinks/lizards (20.3%) and Eastern Rosellas (7.4%) provided most of the biomass (Appendix 2).

Brown Falcon *Falco berigora*

There were six major taxa in the diet of the Brown Falcon: mammals, birds, reptiles, molluscs, crustaceans and insects. Although insects dominated by number of items (57.5%), mammals and birds dominated the biomass contribution (65.8 and 24.8 % respectively). By number, the most important prey species were Christmas Beetles (19.7 %, n = 58), cicadas (12.2%, n = 36), European Rabbit (6.5%, n = 19), Little Basket Shell *Corbicula australis* (4.8%, n = 14) and House Mouse (3.7%, n = 11) but, of these, only rabbit contributed strongly to dietary biomass (39.1 % of the total).

Australian Hobby *Falco longipennis*

Birds and insects dominated the diet of the Australian Hobby; the two taxa combined provided 97.6% of the total number of items. However, by biomass, birds provided the vast majority (89.5% of biomass), followed by mammals (8.7%) and insects (1.8%). Coleopterans and cicadas were important in terms of numbers, but not in dietary mass. Common Starlings (n = 24, 15.1% biomass), Eastern Rosellas (n = 11, 9.7% biomass) and House Sparrows (n = 10) were the most common bird species (Appendix 2).

Peregrine Falcon *Falco peregrinus*

This species had a very specialized diet, eating almost exclusively birds (96.7% by number and 98.5% biomass). Three species provided half the number of items and biomass: the Common Starling (19.1% of number, 7.7% biomass, n = 128), Galah (16.6% of number, 27.2% biomass, n = 111) and Rock Dove *Columba livia* (11.4% of number, 17.1% biomass, n = 76) (Appendix 2). Another case of intraguild predation was a Nankeen Kestrel consumed by Peregrines.

Southern Boobook *Ninox boobook*

Invertebrates (insects and arachnids) were the most important prey items by number to the diet of Boobooks (92.2%). Birds (50.3%) and insects (31.2%) were the main contributors to the dietary mass, particularly coleopterans (22.7%), Eastern Rosellas (10.8%) and Crested Pigeons (9.5%) (Appendix 2).

Geometric mean prey weight (GMPW) and prey/predator ratio

Table 1 shows GMPW of the 12 species of raptors as well as the predator weight and prey/predator ratio; the GMPW of the major taxa is also included. Wedge-tailed Eagles captured the heaviest prey at 1,440.9 g, followed by the White-bellied Sea-Eagle at 826.7 g. Collared Sparrowhawks, Nankeen Kestrels and Southern Boobooks had the lowest GMPW of 5.9, 3.9 and 2.8 g respectively. Exploration by taxa showed some interesting trends: mean mammalian prey of Wedge-tailed Eagles was 5809.7 g, followed by the Little Eagle with 1544.6 g in the same category. Bird prey was well represented in a wide range of GMPW by the different species, with the White-bellied Sea-Eagle capturing the heaviest birds at 629.2 g, followed by the Wedge-tailed Eagle (312 g), three species in the 140–190 g interval (Little Eagle, Peregrine and Brown Falcons), the Nankeen Kestrel (62.4 g), and finally, the Australian Hobby and Brown Goshawk at 53–52 g, followed by the Sparrowhawk and Southern Boobook with the lightest avian prey at 41 g.

DISCUSSION

The diet of the Black-shouldered Kite is well documented, and the birds studied here had a similar diet to previous records. Baker-Gabb (1984b) found that 95–98% of prey items captured by these kites were House Mice, and subsequently Tsang *et al.* (2017) reported 92% mice in the diet of the species around Canberra; Read (2005) and Debus *et al.* (2006) also reported 100% of the same prey species in pellets. This level of specialization is in line with findings for the closely related kites of the genus *Elanus* (Jaksic and Delibes 1987), with some exceptions (Pande *et al* 2018). We found an unusual food for this species, the Sulphur-crested Cockatoo *Cacatua galerita*. We found remains of at least one of these cockatoos inside three pellets in the same collection. The remains in the pellets were not only feathers, but leg bones and claws, eliminating the possibility of the kites swallowing loose feathers from the ground. This finding does not preclude the possibility of the kites taking the cockatoo as carrion, though Marchant and Higgins (1993) did not report scavenging for this species. Closely related kites of the genus *Elanus* only had one guild companion in studies around the world: the Barn Owl *Tyto alba* (Scheibler and Christoff 2007), also sharing a strong dependence on House Mice in a guild of specialized rodent eaters. In the ACT, since Barn Owls are present but not confirmed breeding, the kite is alone in its food preferences and thus not a member of any sub-guild.

The diet of the Whistling Kite was similarly diverse to that reported elsewhere (Marchant and Higgins 1993). As in most studies, birds and mammals predominated (Debus 1983; Baker-Gabb 1984a,b; Marchant and Higgins 1993; Barker 2004; Fuentes *et al* 2005), although insects were not as common as reported by Aumann (2001). Debus (1983) and Aumann (2001) indicated a large degree of between-nest variation in the diet of Whistling Kites, which is usually a function of local differences in habitat and prey availability. Therefore, since our results are based on two territories only, they need to be taken with caution. The diet reported here highlights the foraging habits of a species known to be a versatile scavenger and opportunistic hunter (Aumann 2001), as well as a pirate (Marchant and Higgins 1993), and now including frugivory (Fitzsimons and Leighton 2021). Some items could have been robbed from nearby pairs of Collared Sparrowhawks, Brown Goshawks, Little Eagles and Brown Falcons. The large variability in prey size is also an indicator of this versatility (Appendix 2). Whistling Kites are reported to kill prey up to 240 g (Marchant and Higgins 1993); therefore, some of the large prey items discussed above (such as possums, hare, adult rabbit, sheep and large birds) are likely to have been brought to the nest as carrion or stolen from others. The 240 g estimate is based on one observation by Sullivan (1988) and seems rather conservative. Even if we use the 500 g cut-off point (based on observations by E. Fuentes and J. Olsen who saw a Whistling Kite catch and kill a 500 g rabbit)

to separate carrion and killed items, carrion contributed about 75% to the total dietary mass consumed at these two kite nests. This finding is not consistent with the foraging habits reported for breeding kites, which indicate that the Whistling Kite relies mainly on live prey during the breeding season (Marchant and Higgins 1993). The results of Debus (1983) and those reported here suggest that a more complete evaluation of the use of carrion by breeding adults and, more importantly, nestlings, is necessary to better understand the reproductive ecology of the Whistling Kite. It is also possible that these kites can kill larger prey than previously thought, another aspect that requires further evaluation.

There are few accounts of the feeding habits of inland White-bellied Sea Eagles (see also Olsen *et al* 2006a, 2010, 2013; Debus 2008; Corbett *et al.* 2014). Smith (1985) found, for Great Barrier Reef islands, that fish was the dominant prey type (59% of items), while aquatic birds were also common (37%). The diet reported here was the reverse, with aquatic birds (mainly ducks) being the most common prey group, followed by fish. This trend was observed in the early 1990s in the study area (Olsen *et al.* 2006a). Debus (2008) also reported a large contribution of birds (>50%) in prey remains, but also a contradiction between this number and what was observed in prey deliveries, probably related to the differential persistence of bird and fish remains under nests. The contribution of reptiles (turtles and water dragons) was also greater for inland birds, but less than at Kapalga, Northern Territory, where the Northern Long-necked Turtle *Chelodina rugosa* contributed 53% of items (Corbett *et al.* 2014). The diet at the Canberra Sea-Eagle territories showed no single species dominance, and preliminary data for various coastal marine/estuarine locations in Australia, reviewed by Debus (2017), show a similarly diverse diet (mammals, birds, reptiles, fish including eels, carrion). Debus (2017) also reported high diversity between marine locations, and also that Sea-Eagles captured some locally abundant prey items such as flying-foxes *Pteropus* sp. The closely related Bald Eagle *Haliaeetus leucocephalus* has been shown to have a broader food niche on the coast than inland (Marti *et al.* 1993a), suggesting that similar comparisons between coastal and inland populations of White-bellied Sea-Eagles are worth investigating.

There is some information on the diet of the Brown Goshawk in the Canberra Region, mostly derived from very small samples (Olsen *et al.* 2006b, 2018). However, the food habits of different Australian populations are well studied and the diet reported here reflects the diversity of the prey base described for this goshawk elsewhere. In Victoria, the diet was dominated by rabbits (Baker-Gabb 1984a,b), as it was in the ACT in the early 1990s (Olsen *et al* 2006b), whereas birds were the main prey group in Tasmania (Olsen *et al.* 1990) and the wet tropics (Burton and Olsen 1997). Conversely, the diet in the Kimberley, NT (Aumann *et al*. 2016) and southwest of the Northern Territory (Aumann 2001) was more diverse, with similar contributions of mammals, birds, reptiles and invertebrates. Our study reports a somewhat different diet dominated by insects and birds by number. The Canberra Brown Goshawks obtained most of their dietary mass from a wide range of bird and mammals (89.5%), rabbits being the most important species (51.0% biomass), similar to the findings of studies summarized by Marchant and Higgins (1993), e.g. Aumann (1988) who found differences between territories according to differential prey availability.

It has been argued that the Collared Sparrowhawk is a small-bird specialist throughout its range (Aumann 2001). Though the results of Olsen *et al.* (2018), incorporated in the present study, indicate that birds are important in the diet of this *Accipiter*, we found an unusually high number of insects compared to previous accounts (Marchant and Higgins 1993, Aumann 2001). Coleopterans were particularly important in this respect, providing 50.2% of the total number of items. In terms of prey biomass, birds provided the vast majority (94.0%), mainly through Crested Pigeons, rosellas and House Sparrows, in agreement with previous observations of breeding pairs in the ACT (Metcalf 1981; Metcalf and Metcalf 1986) and elsewhere.

The diet of the Wedge-tailed Eagle reported here is representative of what is known for this species. The studies summarized by Marchant and Higgins (1993) and Debus (2017) show that this large *Aquila* is a generalist predator that consumes mainly medium-sized mammals, carrion, large birds and large reptiles. Lagomorphs were the main prey items of the species in the dry inland of Western Australia (Brooker and Ridpath 1980), Mildura, Vic. (Baker-Gabb 1984a), western New South Wales (Sharp *et al.* 2002) and near Melbourne (Hull 1986). Though large macropods were common as Wedge-tail Eagle prey in some areas, most reports of this pattern come from arid areas (Brooker and Ridpath 1980). Locally, the diet was well described by Leopold and Wolfe (1970), but, as our study shows, the eagles have shifted from a rabbit-based to a more diverse diet based on macropods-birds-rabbits (see discussion below and extensive analysis by Fuentes *et al.* 2007 and Fuentes and Olsen 2015), and they did this across a span of three breeding seasons with high reproductive success (1.22 young fledged per active nest: Fuentes 2005). This pattern contrasts with findings in arid areas of Australia where Wedge-tailed Eagles show a strong dependence on medium-sized mammals, such as rabbits (Aumann 2001).

The main prey item of the Little Eagle in this study was the European Rabbit. The studies summarized by Marchant and Higgins (1993) and Debus (2017) showed a similar trend, contrasting with that reported by Aumann (2001) for central Australia, where 82% of the biomass came from reptiles. Birds were of limited importance to the diet of this eagle in the arid Northern Territory (around 10%: Aumann 2001), but in the present study birds were the most common group by number (43.3 %) and second by biomass (35.6%), similarly to what was found in the tropics (Aumann *et al.* 2016). This pattern is common in other eagles of the genus *Hieraaetus* (e.g. Booted Eagle *H. pennatus*: Martínez and Calvo 2005). Our study also provided a rare observation of fish (one European Carp *Cyprinus carpio*) in the diet of this eagle; only one case has been reported before, by Aumann *et al.* (2016), and possibly the result of piracy against species like the Whistling Kite.

The Brown Falcon has been described as an opportunistic and generalist predator (Marchant and Higgins 1993: Aumann 2001; McDonald *et al.* 2012; Corbett *et al.* 2014) with a broad diet (McDonald *et al.* 2003, 2012), attributes that were confirmed by the present study. Our findings are similar to those reported by Aumann (2001) and McDonald *et al.* (2012), but contrasts with the findings of McDonald *et al.* (2003) and Baker-Gabb (1984b) who reported most prey items to be mammals and birds, with a minimal contribution from invertebrates. The occurrence of the Water Snail *Glyptophysa gibbosa* as Brown Falcon prey, though

Figure 1. *Growth of two Peregrine Falcons nestlings in the 2004 breeding season with accumulated prey remains towards the end of the nestling period.* Photos: Jerry Olsen and Esteban Fuentes.

not new (see Marchant and Higgins 1993) is worth mentioning, and future research could try to unravel how they capture such unusual prey.

Although the diet of the Australian Hobby is poorly known compared to other Australian raptors, the degree of similarity between the few studies is remarkable, and this study was no exception. Previous accounts (Debus *et al.* 1991; Aumann 2001; Olsen *et al.* 2006b, 2008; Aumann *et al.* 2016; Morley 2020) found that small birds dominated the diet, followed by insects. Our findings in the Canberra region were similar, confirming that the Australian Hobby is an aerial predator specialising in small fast-flying birds such as Common Starlings, House Sparrows and rosellas, and flying insects such as beetles and cicadas, and, to a lesser extent, bats.

It is well known that the Peregrine Falcon specializes on avian prey (Jaksic and Delibes 1987). The food habits described here agree with previous reports for Australia (Pruett-Jones *et al.* 1981; Marchant and Higgins 1993; Rose 2001) and the Canberra Region (Olsen 1992; Olsen and Rehwinkel 1995; Olsen and Tucker 2003; J. Olsen *et al.* 2004, 2006b, 2008; P. Olsen *et al.* 1993; Debus 2022). Three species, Rock Dove, Galah and Common Starling, have been the mainstay of the diet of the Canberra Peregrines since at least the early 1990s (see prey remains in Figure 3; Olsen *et al.* 2006b); they provided 67.3% of total items and 65.4% of biomass between 1990 and 1993 as well as 45.6% and 50.9% respectively in the present study. There appear to be long-term trends in the abundance of specific prey categories, but this is within the scope of a forthcoming publication.

Most reports on the diet of the Nankeen Kestrel in Australia indicate that the vast bulk of the prey items are invertebrates (Olsen *et al.* 1979, Baker-Gabb 1984a; Bollen 1991; Aumann 2001, Leach *et al.* 2015; Tsang *et al.* 2017). However, there is considerable variation between reports, perhaps related to two factors: location and the methodology of prey collection/analysis used. At Lake Cowal, NSW, Olsen *et al.* (1979) found a diet dominated by House Mice (>75% by number). In contrast, near Goulburn, NSW, the Grass Skink *Lampropholis guichenoti* provided 53% of the number of items (Bollen 1991). Reptiles were also important in central Australia, providing 26% of the items and 88% of the biomass (Aumann 2001), and they provided 10.7% of the items in the ACT (Tsang *et al.* 2017). Our study found that insects provided most of the prey items (74.9%), but mammals, birds, reptiles and insects were all important in terms of biomass, suggesting that Nankeen Kestrels in the Canberra area have a comparatively diverse diet. In this regard the species shows some similarity with the American Kestrel *Falco sparverius* which is also an insect/vertebrate generalist, both contrasting with the more specialized Common Kestrel *F. tinnunculus* which is more of a mammal specialist (Jaksic and Delibes 1987). Prey mass was very similar to that reported by Tsang *et al.* (2017); they reported a total GMPW of 6.6 g compared with our 3.94 g. When groups were considered, there was a similar mass of prey types for mammals (83.1 vs 93.07) and birds (55.5 vs 62.43), though slightly smaller for reptiles taken in the present study (39.2 vs 25.0).

The diet of the Southern Boobook in the ACT was found to be similar to that reported by Higgins (1999) and König and Weick (2009). Insects provided most of the prey items (81.3 %), similar to the findings of Penck and Queale (2002) and most studies summarized by Higgins (1999). In terms of biomass, however, birds were the most important prey for the Canberra owls, agreeing with the reports of Campbell and Rose (1996) and McNabb (2002), who concluded that vertebrates provide most of the dietary mass. Results from this and other studies should be taken with caution, however, since there is some controversy on the effect of the origin of the prey remains and the methods of prey identification on the estimation of the diet in Southern Boobooks (see discussion by Trost *et al.* 2008, and Olsen 2011).

Table 1

Predator weight compared to GMPW of all prey and main taxa. Most samples sizes n ≥50 individual prey items. *Italics* indicate small sample sizes where 49 >*n*>15 individuals.

Species	GMPW (g)	Predator weight (g)	Prey/Predator ratio	GMPW (g) mammals	GMPW (g) birds	GMPW (g) reptiles
Black-shouldered-Kite	**15.15**	**271**	0.06	15.00		
Whistling Kite	**235.37**	**770**	0.31			
White-bellied Sea-Eagle	**826.75**	**3300**	0.25		*629.17*	
Brown Goshawk	**9.43**	**440**	0.02	*547.78*	59.67	*17.57*
Collared Sparrowhawk	**5.92**	**172**	0.03		41.80	
Wedge-tailed Eagle	**1442.5**	**3458**	0.42	5809.74	312.23	
Little Eagle	**181.77**	**841**	0.22	*1544.57*	188.57	
Nankeen Kestrel	**3.94**	**175**	0.02	*93.07*	*62.43*	25.00
Brown Falcon	**10.50**	**553**	0.02	344.74	*142.99*	*42.13*
Australian Hobby	**18.14**	**250**	0.07		53.52	
Peregrine Falcon	**129.31**	**745**	0.17		143.80	
Southern Boobook	**2.68**	**283**	0.01	*18.14*	*41.85*	

The GMPW and prey/predator ratio of different species showed some interesting cases when we calculated for each prey taxonomic group separately. The Australian Hobby and Brown Goshawk captured similar-sized birds (around 140 g). A closer analysis of the prey, however, showed Hobbies to focus on species abundant in open areas, and Goshawks on bush, forest and edge species, such as the Common Starling, Striated Pardalote *Pardalotus striatus* and the Superb Fairy-wren *Malurus cyaneus*. The Black-shouldered Kite and Southern Boobook take similar sized mammals (15–18 g), but the kite takes almost exclusively House Mice whereas the owl takes other rodents as well as bats. The Nankeen Kestrel and the Southern Boobook show similar GMPW and both species capture many insects and similar sized birds (40–60 g), but the kestrel captures much larger mammals (93.1 g compared to 18.1 g for the owl) and some unusually large birds for its size (64.1 g), having the largest avian prey to predator ratio of the guild (0.36: Table 1). There is a clear overlap in the food habits of these species, which are also the two main hollow-nesters of the guild. Although asynchronous in their habits, these similarities warrant closer comparison of diet, foraging and nesting habitats. In an unusual display of diet overlap within the guild, Peregrines, Brown Falcons and Little Eagles captured similar-sized birds (140–180 g). Although we only had three sufficiently large samples to calculate reptilian GMPW, it is noteworthy that the three species captured reptiles of very different size, with the Brown Falcon capturing the largest items (42.1 g) followed by the Nankeen Kestrel (25.0 g) and Brown Goshawk (17.6 g). Further research should explore the degree of dietary overlap between species and the trophic structure of the community, and how this guild compares to other Australian guilds and the role of intraguild predation on the structure of the community.

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Appendix 1

Average mass per item used in biomass calculations on the diet of different raptors near Canberra. Biomass sources: Fuentes *et al.* (2007), Olsen *et al.* (2004, 2006a,b, 2008, 2010, 2013, 2018), Olsen and Tucker (2003) and literature cited therein; estimates from prey remains collected at nests; J. Olsen unpublished data; and average weight of animals brought to Kippax Veterinary Hospital, Holt, ACT.

Common and Scientific Name	Mass per item (g)
MAMMALS	
Short-beaked Echidna *Tachyglossus aculeatus*	3,500
Antechinus sp. *Antechinus* sp.	36
Common Dunnart *Sminthopsis murina*	17
Southern Brown Bandicoot *Isoodon obesulus*	775
Long-nosed Bandicoot *Perameles nasuta*	975
Common Ringtail Possum *Pseudocheirus peregrinus*	900
Mountain Possum *Trichosurus caninus*	3,500
Common Brushtail Possum *Trichosurus vulpecula*	2,625
Tamar Wallaby *Macropus eugenii*	5,000
Eastern Grey Kangaroo *Macropus giganteus*	34,300–40,000
EGK juvenile	14,500–17,500
Common Wallaroo *Macropus robustus*	29,000
Red-necked Wallaby *Macropus rufogriseus*	16,850
Swamp Wallaby *Wallabia bicolor*	15,000
Swamp Wallaby juvenile	3,000
Macropods undetermined *Macropus* sp.	29,580
Juvenile macropods undetermined	14,100
White-stripped Freetail-Bat *Tadarida australis*	36
Bent-wing Bat *Miniopterus schreibersii*	15
Gould's Wattled Bat *Chalinolobus gouldii*	14
Eastern Broad-nosed Bat *Scotorepens orion*	11
Other bats Chiroptera	19
Broad-toothed Rat *Mastacomys fuscus*	122
House Mouse *Mus musculus*	17
House Mouse juvenile	8
Black Rat *Rattus rattus*	280
Black Rat juvenile	95
Red Fox *Vulpes vulpes*	9,000
Red Fox juvenile	3,000
Cat *Felis catus*	4,200
European Rabbit *Oryctolagus cuniculus*	1,500–2,500
European Rabbit juvenile	400–900
Brown Hare *Lepus capensis*	4,000–4,200
Brown Hare juvenile	2,000
Horse *Equus caballus*	200,000 (carrion)
Sheep *Ovis aries*	50,000
lamb	15,000
Cattle *Bos taurus*	200,000 (carrion)
BIRDS	
Stubble Quail *Coturnix pectoralis*	105
Domestic Fowl *Gallus gallus*	925
Painted Button-quail *Turnix varius*	93
Little Black Cormorant *Phalacrocorax sulcirostris*	865
Hoary-headed Grebe *Poliocephalus poliocephalus*	240
Australasian Grebe *Tachybaptus novaehollandiae*	165
Pacific Black Duck *Anas superciliosa*	1,070
Grey Teal *Anas gracilis*	504
Australian Wood Duck *Chenonetta jubata*	800
Freckled Duck *Stictonetta naevosa*	910
Buff-banded Rail *Gallirallus philippensis*	180
Purple Swamphen *Porphyrio porphyrio*	795
Eurasian Coot *Fulica atra*	545
Cattle Egret *Bubulcus ibis*	365
Little Egret *Egretta garzetta*	300
Egret sp. Ardeidae	333
Rufous Night Heron *Nycticorax caledonicus*	800
Straw-necked Ibis *Threskiornis spinicollis*	1,300
Ibis sp. Threskiornithidae	1,217
Masked Lapwing *Vanellus miles*	325
Lesser Golden Plover *Pluvialis fulva*	148
Silver Gull *Chroicocephalus novaehollandiae*	333
Whiskered Tern *Chlidonias hybrida*	90
Gull-billed Tern *Sterna nilotica*	230
Brown Goshawk *Accipiter fasciatus*	440
Peregrine Falcon *Falco peregrinus*	745
Australian Hobby *Falco longipennis*	250
Brown Falcon *Falco berigora*	553
Nankeen Kestrel *Falco cenchroides*	175
Rock Dove *Columba livia*	308
Rock Dove juvenile	290
Peaceful Dove *Geopelia placida*	53
Bar-shouldered Dove *Geopelia humeralis*	130
Common Bronzewing *Phaps chalcoptera*	333
Brush Bronzewing *Phaps elegans*	204
Crested Pigeon *Ocyphaps lophotes*	200
Crested Pigeon juvenile	150
Yellow-tailed Black Cockatoo *Zanda funerea*	729
Gang-gang Cockatoo *Callocephalon fimbriatum*	250
Galah *Eolophus roseicapilla*	335
Little Corella *Cacatua sanguinea*	540
Sulphur-crested Cockatoo *Cacatua galerita*	804
Musk Lorikeet *Glossopsitta concinna*	70
Little Lorikeet *Glossopsitta pusilla*	40
Australian King-Parrot *Alisterus scapularis*	243
Princess Parrot *Polytelis alexandrae*	105
Budgerigar *Melopsittacus undulatus*	30
Swift Parrot *Lathamus discolor*	65
Crimson Rosella *Platycercus elegans*	130
Crimson Rosella juvenile	119
Eastern Rosella *Platycercus eximius*	105
Eastern Rosella juvenile	100
Rosella sp. *Platycercus* sp.	118
Australian Ringneck *Barnardius zonarius*	166
Red-rumped Parrot *Psephotus haematonotus*	63
Blue Bonnet *Northiella haematogaster*	85
Parrot undetermined Psittaciformes	113–349
Pallid Cuckoo *Heteroscenes pallidus*	83
Fan-tailed Cuckoo *Cacomantis flabelliformis*	50
Black-eared Cuckoo *Chalcites osculans*	30
Horsfield's Bronze Cuckoo *Chalcites basalis*	23
Southern Boobook *Ninox boobook*	283
Southern Boobook juvenile	202
Tawny Frogmouth *Podargus strigoides*	315
White-throated Needletail *Hirundapus caudacutus*	116
Laughing Kookaburra *Dacelo novaeguineae*	345

Common and Scientific Name	Mass per item (g)
Sacred Kingfisher *Todiramphus sanctus*	40
Oriental Dollarbird *Eurystomus orientalis*	134
Superb Fairy-wren *Malurus cynaeus*	11
Fairy-wren sp. *Malurus* sp.	9
Spotted Pardalote *Pardalotus punctatus*	9
Striated Pardalote *Pardalotus striatus*	12
Yellow-rumped Thornbill *Acanthiza chrysorrhoa*	9
Thornbill sp. *Acanthiza* sp.	7
Red Wattlebird *Anthochaera carunculata*	111
Little Wattlebird *Anthochaera chrysoptera*	68
Noisy Friarbird *Philemon corniculatus*	109
Noisy Miner *Manorina melanocephala*	75
Yellow-faced Honeyeater *Caligavis chrysops*	17
White-eared Honeyeater *Nesoptilotis leucotis*	22
Fuscous Honeyeater *Ptilotula fusca*	16
White-naped Honeyeater *Melithreptus lunatus*	14
Eastern Spinebill *Acanthorhynchus tenuirostris*	11
Scarlet Honeyeater *Myzomela sanguinolenta*	8
Honeyeater sp. Meliphagidae	15
White-browed Babbler *Pomatostomus superciliosus*	40
Rose Robin *Petroica rosea*	8
Flame Robin *Petroica phoenicea*	13
Scarlet Robin *Petroica boodang*	13
Red-capped Robin *Petroica goodenovii*	9
Eastern Yellow Robin *Eopsaltria australis*	20
Robin sp. Petroicidae	13–25
Golden Whistler *Pachycephala pectoralis*	25
Rufous Whistler *Pachycephala rufiventris*	25
Grey Fantail *Rhipidura albiscapa*	8
Leaden Flycatcher *Myiagra rubecula*	20
Magpie-lark *Grallina cyanoleuca*	90
Magpie-lark juvenile	70
Olive backed Oriole *Oriolus sagittatus*	100
Black-faced Cuckoo-shrike *Coracina novaehollandiae*	105
White-bellied Cuckoo-shrike *Coracina papuensis*	70
Masked Woodswallow *Artamus personatus*	38
White-browed Woodswallow *Artamus superciliosus*	35
Dusky Woodswallow *Artamus cyanopterus*	39
Woodswallow sp. Artamidae	37
Grey Butcherbird *Craticus torquatus*	350
Australian Magpie *Gymnorhina tibicen*	329
Magpie juvenile	198
Pied Currawong *Strepera graculina*	270
Grey Currawong *Strepera versicolor*	300
Currawong sp. *Strepera* sp.	285
Australian Raven *Corvus coronoides*	645
Australian Raven juvenile	500
Little Raven *Corvus mellori*	541
Raven sp. *Corvus* sp.	593–630
Raven juvenile	541
White-winged Chough *Corcorax melanorhamphos*	334
Welcome Swallow *Hirundo neoxena*	15
Tree Martin *Petrochelidon nigricans*	14
Brown Songlark *Cincloramphus cruralis*	54
House Sparrow *Passer domesticus*	27
Sparrow sp. *Passer* sp.	25
European Goldfinch *Carduelis carduelis*	21–22
Double-barred Finch *Taeniopygia bichenovii*	20
Finch sp. Estrildidae	25
Red-browed Finch *Neochmia ruficauda*	11
Diamond Firetail *Stagonopleura guttata*	15
Silvereye *Zosterops lateralis*	10
Bassian Thrush *Zoothera lunulata*	105
Common Blackbird *Turdus merula*	95
Common Starling *Sturnus vulgaris*	75
Starling juvenile	60
Common Myna *Acridotheres tristis*	80
Small passerine undetermined Passeriformes	25–30
Other birds undetermined	*
REPTILES	
Jacky Lizard *Amphibolurus muricatus*	30
Small dragon lizard *Amphibolurus* sp.	30
Eastern Water Dragon *Intellagama lesueurii*	370
Bearded Dragon *Pogona barbata*	340
Dragon sp. Agamidae	*
Eastern Blue-tongued Skink *Tiliqua scincoides*	400
Blue-tongued skink *Tiliqua* sp.	400
Shingleback *Trachydosaurus rugosus*	590
Striped Skink *Ctenotus robustus*	20
Cunningham's Skink *Egernia cunninghami*	20
Skink sp. Scincidae	10–20
Eastern Brown Snake *Pseudonaja textilis*	300
Red-bellied Black Snake *Pseudechis porphyriacus*	300–500
Small-eyed Snake *Rhinoplocephalus nigrescens*	300
Small snake sp. Suborder Serpentes	150
Long-necked Turtle *Chelodina longicollis*	677
FISH	
Golden Perch *Macquaria ambigua*	1,000
Redfin *Perca fluviatilis*	550
European Carp *Cyprinus carpio*	1,000–2,500
Fish undetermined	*
MOLLUSCS	
Little Basket Shell *Corbicula australis*	10
Garden Snail *Helix aspersa*	10
Water Snail *Glyptophysa gibbosa*	10
CRUSTACEANS	
Crayfish (yabbie) *Cherax* sp.	50
ARACHNIDS	
Huntsman spider *Isopeda* sp.	3
Wolf spider Lycosidae	3
Other spiders Arachnida	3
Scorpions Scorpionidae	3
INSECTS	
Christmas Beetle *Anoplognathus olivieri*	2
Christmas Beetle *Anoplognathus porosus*	2
Christmas Beetle *Anoplognathus viriditarsus*	2
Christmas beetles *Anoplognathus* sp.	2
Brown Beetle Scarabaeidae	2
Scarab Subfamily Dynastinae	2
Other scarab beetles Scarabaeidae	2
Carab beetle Carabidae	2
Copterus cerambycid *Copterus thoracicus*	2
Longicorn Beetle Cerambycidae	2
Cerambycid beetle Cerambycidae	2
Diamond Weevil *Chrysolophus spectabilis*	2

Common and Scientific Name	Mass per item (g)
Weevil Curculionidae	2
Chrysomelid beetle Chrysomelidae	2
Diaphonia beetle *Diaphonia dorsalis*	2
Click Beetle Elateridae	2
Black Beetle *Heteronychus arator*	2
Geotrupidae: Melonthini *Heteronyx* sp.	2
Stag Beetle Lucanidae *Lamprisma latreille*	2
Dung Beetle *Onthophagus australis*	2
Passalid beetle Passalidae	2
Longicorn *Phorocantha tricuspa*	2
Longicorn *Phorocantha semipunctata*	2
Phorocantha beetle *Phorocantha* sp.	2
Repsimus beetle *Repsimus aeneus*	2
Tenebrionid beetle Tenebrionidae	2
Other beetles Coleoptera	2
Cicada *Cicadetta* sp.	2
Red-eye Cicada *Psaltoda moerens*	2
Cicadellid bug *Ledromorpha planirostris*	2
Bugs Hemiptera	2
Bugs Heteroptera Hemiptera (Heteroptera)	2
Ants Hymenoptera	2
Flying ants Hymenoptera	2
Epicoma moth *Epicoma contristis*	2
Common Brown Butterfly *Heteronympha merope*	2
Butterfly/moth Lepidoptera	2
Mantid Lepidoptera Mantodea	2
Cockroach Blattoidea	2
Acridid grasshopper Acrididae	2
Mole cricket Orthoptera: Gryllotalpidae	2
Grasshoppers Orthoptera	2
Other insects undetermined Insecta	2

* Estimated weights when bones or remains made it possible; when not, the average of all categories within the undetermined taxa. For example, if the category was Rosella undetermined, the average weight of Crimson and Eastern Rosellas – the two potential species in that category – in that particular species was considered.

Appendix 2

Number and percentage of prey items and percentage biomass of the different prey categories taken by twelve species of raptors breeding in the Canberra region in 2002–2003.

Black-Shouldered Kite (*n* = 5 nest-years and 4 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
European Rabbit (juveniles)	*Oryctolagus cuniculus*	2	0.6	7.4
House Mouse	*Mus musculus*	271	76.3	58.2
House Mouse juvenile		69	19.4	7.0
Black Rat	*Rattus rattus*	1	0.3	3.2
BIRDS				
Sulphur-crested Cockatoo*	*Cacatua galerita*	1	0.3	6.9
Crimson Rosella	*Platycercus elegans*	1	0.3	1.6
Superb Fairy-wren	*Malurus cyaneus*	1	0.3	0.1
Double-barred Finch	*Taeniopygia bichenovii*	1	0.3	0.3
Other birds undetermined		4	1.1	11.8
REPTILES				
Dragon lizard	Agamidae	2	0.6	3.2
INSECTS				
Beetle	Coleoptera	1	0.3	0.0
Grasshopper	Orthoptera	1	0.3	0.2
	TOTAL	**355**	**100**	**100**

*Probably carrion

Whistling Kite (*n* = 2 nest-years and 2 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Red-necked Wallaby	*Macropus rufogriseus*	1	2.1	3.0
Common Brushtail Possum	*Trichosurus vulpecula*	2	4.2	6.1
Black Rat	*Rattus rattus*	1	2.1	1.4
Brown Hare	*Lepus capensis*	1	2.1	3.0
European Rabbit	*Oryctolagus cuniculus*	8	16.7	24.3
European Rabbit juvenile		2	4.2	5.9
Sheep	*Ovis aries*	2	4.2	6.1
BIRDS				
Hoary-headed Grebe	*Poliocephalus poliocephalus*	1	2.1	1.3
Australian Wood Duck	*Chenonetta jubata*	2	4.2	6.1
Buff-banded Rail	*Gallirallus philippensis*	1	2.1	1.0
Rock Dove	*Columba livia*	3	6.3	4.5
Galah	*Eolophus roseicapilla*	2	4.2	3.3
Sulphur-crested Cockatoo	*Cacatua galerita*	3	6.3	9.1
Noisy Miner	*Manorina melanocephala*	1	2.1	0.4
Australian Magpie	*Gymnorhina tibicen*	1	2.1	1.6
Other birds undetermined		4	8.3	9.8
REPTILES				
Cunningham's Skink	*Egernia cunninghami*	1	2.1	0.1
Eastern Brown Snake	*Pseudonaja textilis*	1	2.1	1.7
Eastern Blue-tongued Skink	*Tiliqua scincoides*	1	2.1	2.3
FISH				
Redfin	*Perca fluviatilis*	1	2.1	3.0
Other fish		1	2.1	3.0
CRUSTACEANS				
Crayfish	*Cherax* sp.	1	2.1	2.1
INSECTS				
Beetle	Coleoptera	1	2.1	0.4
Red-eye Cicada	*Psaltoda moerens*	2	4.2	0.1
Mole cricket	Orthoptera: Gryllotalpidae	4	8.3	0.2
	TOTAL	**48**	**100**	**100**

White-bellied Sea Eagle (*n* = 6 nest-years and 4 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
European Rabbit	*Oryctolagus cuniculus*	4	6.7	7.5
BIRDS				
Australasian Grebe	*Tachybaptus novaehollandiae*	1	1.7	0.5
Pacific Black Duck	*Anas superciliosa*	5	8.3	9.3
Australian Wood Duck	*Chenonetta jubata*	14	23.3	26.1
Freckled Duck	*Stictonetta naevosa*	2	3.3	3.7
Eurasian Coot	*Fulica atra*	3	5.0	4.9
Little Egret	*Egretta garzetta*	1	1.7	0.9
Masked Lapwing	*Vanellus miles*	1	1.7	1.0
Galah	*Eolophus roseicapilla*	2	3.3	2.0
Pied Currawong	*Strepera graculina*	2	3.3	1.8
White-winged Chough	*Corcorax melanorhamphos*	1	1.7	1.0
Other birds undetermined		1	1.7	1.9
REPTILES				
Eastern Water Dragon	*Intellagama lesueurii*	3	5.0	3.9
Long-necked Turtle	*Chelodina longicollis*	5	8.3	9.3
FISH				
Golden Perch	*Macquaria ambigua*	3	5.0	5.6
European Carp	*Cyprinus carpio*	9	15.0	16.8
Other fish		2	3.3	3.7
CRUSTACEANS				
Crayfish	*Cherax* sp.	1	1.7	0.2
	TOTAL	**60**	**100**	**100**

Brown Goshawk (*n* = 18 nest-years and 13 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
European Rabbit	*Oryctolagus cuniculus*	3	1.14	8.5
European Rabbit juvenile		16	6.08	42.5
House Mouse	*Mus musculus*	2	0.76	0.2
BIRDS				
Crested Pigeon	*Ocyphaps lophotes*	1	0.38	1.0
Crimson Rosella	*Platycercus elegans*	7	2.66	4.5
Crimson Rosella juvenile		5	1.90	3.0
Eastern Rosella	*Platycercus eximius*	7	2.66	3.7
Eastern Rosella juvenile		2	0.76	1.0
Red-rumped Parrot	*Psephotus haematonotus*	2	0.76	0.7
Parrots undetermined	Psittaciformes	1	0.38	0.6
Southern Boobook	*Ninox boobook*	1	0.38	1.4
Tawny Frogmouth	*Podargus strigoides*	1	0.38	1.4
Oriental Dollarbird	*Eurystomus orientalis*	3	1.14	2.0
Superb Fairy-wren	*Malurus cyaneus*	6	2.28	0.4
Striated Pardalote	*Pardalotus striatus*	7	2.66	0.5
Red Wattlebird	*Anthochaera carunculata*	1	0.38	0.6
Magpie-lark	*Grallina cyanoleuca*	1	0.38	0.4
Magpie-lark juvenile		4	1.52	1.5
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	2	0.76	1.0
Robin sp.	Petroicidae	2	0.76	0.1
Grey Butcherbird	*Cracticus torquatus*	2	0.76	3.2
Red-browed Finch	*Neochmia ruficauda*	3	1.14	0.2
Common Starling	*Sturnus vulgaris*	6	2.28	2.4
Starling juvenile		1	0.38	0.3
Common Myna	*Acridotheres tristis*	1	0.38	0.4
Other birds undetermined		14	5.32	6.4
REPTILES				
Jacky Lizard	*Amphibolurus muricatus*	1	0.38	0.2
Dragon lizard	Agamidae	7	2.66	0.8
Skink sp.	Scincidae	11	4.18	1.2
INSECTS				
Chrysomelid beetle	Chrysomelidae	4	1.52	0.0
Christmas Beetle	*Anoplognathus viriditarsus*	18	6.84	0.4
Other Christmas beetles	*Anoplognathus* sp.	16	6.08	0.5
Scarab beetle	*Diaphonia dorsalis*	3	1.14	0.1
Scarab beetle	Scarabaeidae	1	0.38	0.1
Stag Beetle Lucanidae	*Lamprisma latreille*	3	1.14	0.2
Other beetles	Coleoptera	20	7.60	1.6
Cicada	*Psaltoda moerens*	70	26.62	6.3
Moth	Lepidoptera	1	0.38	0.1
Grasshopper	Acrididae	7	2.66	0.8
	TOTAL	**263**	**100**	**100**

Collared Sparrowhawk (*n* = 10 nest-years and 8 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
BIRDS				
Crested Pigeon	*Ocyphaps lophotes*	4	1.9	15.7
Crimson Rosella	*Platycercus eximius*	5	2.4	12.8
Crimson Rosella juvenile		1	0.5	2.3
Eastern Rosella	*Platycercus elegans*	6	2.9	12.4
Superb Fairy-wren	*Malurus cynaeus*	2	1.0	0.5
Red Wattlebird	*Anthochaera carunculata*	3	1.4	6.6
Noisy Friarbird	*Philemon corniculatus*	1	0.5	2.1
Fuscous Honeyeater	*Ptilotula fusca*	1	0.5	0.3
White-browed Babbler	*Pomatostomus superciliosus*	2	1.0	1.7
Eastern Spinebill	*Acanthorhynchus tenuirostris*	1	0.5	0.2
Flame Robin	*Petroica phoenicea*	1	0.5	0.3
Grey Fantail	*Rhipidura fuliginosa*	2	1.0	0.3
Brown Songlark	*Cincloramphus cruralis*	1	0.5	1.1
House Sparrow	*Passer domesticus*	18	8.6	10.3
Sparrow sp.	*Passer* sp.	1	0.5	0.5
European Goldfinch	*Carduelis carduelis*	8	3.8	3.7
Diamond Firetail	*Stagonopleura guttata*	4	1.9	1.3
Common Blackbird	*Turdus merula*	2	1.0	3.7
Common Starling	*Sturnus vulgaris*	4	1.9	6.4
Other birds undetermined		9	4.3	11.7
MOLLUSCS				
Garden Snail	*Helix aspersa*	1	0.5	0.2
ARACHNIDS				
Huntsman spider	Sparassidae	1	0.5	0.1
Spider	Arachnida	3	1.4	0.2
INSECTS				
Christmas Beetle	*Anoplognathus porosus*	4	1.9	0.2
Christmas Beetle	*Anoplognathus viriditarsus*	4	1.9	0.2
Other Christmas beetles	*Anoplognathus* sp.	41	19.6	1.7
Stag Beetle	*Lamprisma aurata*	1	0.5	0.0
Black Beetle	*Heteronychus arator*	7	3.3	0.3
Scarab beetle	Scarabaeidae	4	1.9	0.2
Other beetles	Coleoptera	44	21.1	1.9
Cicada	*Psaltoda moerens*	14	6.7	0.6
Bugs	Hemiptera (Heteroptera)	2	1.0	0.1
Insects undetermined	Insecta	7	3.3	0.3
	TOTAL	**209**	**100**	**100**

Wedge-tailed Eagle (*n* = 45 nest-years and 32 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Short-beaked Echidna	*Tachyglossus aculeatus*	3	0.58	0.7
Southern Brown Bandicoot	*Isoodon obesulus*	2	0.38	0.5
Long-nosed Bandicoot	*Perameles nasuta*	1	0.19	0.2
Common Ringtail Possum	*Pseudocheirus peregrinus*	2	0.38	0.5
Mountain Possum	*Trichosurus caninus*	1	0.19	0.2
Common Brushtail Possum	*Trichosurus vulpecula*	11	2.12	2.7
Tamar Wallaby	*Macropus eugenii*	4	0.77	1.0
Red-necked Wallaby	*Macropus rufogriseus*	3	0.58	0.7
Eastern Grey Kangaroo	*Macropus giganteus*	46	8.85	11.1
EGK juvenile		29	5.58	7.0
Wallaroo	*Macropus robustus*	5	0.96	1.2
Swamp Wallaby	*Wallabia bicolor*	10	1.92	2.4
Swamp Wallaby juvenile		1	0.19	0.2
Other macropods	*Macropus* sp.	3	0.58	0.7
Juvenile macropods		4	0.77	1.0
House Mouse	*Mus musculus*	2	0.38	0.0
Black Rat	*Rattus rattus*	3	0.58	0.3
European Rabbit	*Oryctolagus cuniculus*	84	16.15	20.3
European Rabbit juvenile		1	0.19	0.2

(continued overleaf)

Wedge-tailed Eagle (*n* = 45 nest-years and 32 territories) (continued)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS (continued)				
European Rabbit	*Oryctolagus cuniculus*	84	16.15	20.3
European Rabbit juvenile		1	0.19	0.2
Brown Hare	*Lepus capensis*	30	5.77	7.3
Red Fox	*Vulpes vulpes*	6	1.15	1.5
Red Fox juvenile		5	0.96	1.2
Cat	*Felis catus*	1	0.19	0.2
Sheep	*Ovis aries*	15	2.88	3.6
lamb		8	1.54	1.9
Horse	*Equus caballus*	1	0.19	0.2
BIRDS				
Domestic Fowl	*Gallus gallus*	2	0.38	0.5
Pacific Black Duck	*Anas superciliosa*	1	0.19	0.2
Australian Wood Duck	*Chenonetta jubata*	21	4.04	5.1
Purple Swamphen	*Porphyrio porphyrio*	1	0.19	0.2
Straw-necked Ibis	*Threskiornis spinicollis*	1	0.19	0.2
Ibis sp.	Threskiornithidae	1	0.19	0.2
Peregrine Falcon	*Falco peregrinus*	1	0.19	0.2
Australian Hobby	*Falco longipennis*	1	0.19	0.1
Brown Falcon	*Falco berigora*	1	0.19	0.2
Rock Dove	*Columba livia*	10	1.92	1.2
Crested Pigeon	*Ocyphaps lophotes*	1	0.19	0.1
Yellow-tailed Black Cockatoo	*Zanda funerea*	3	0.58	0.7
Galah	*Eolophus roseicapilla*	25	4.81	3.2
Sulphur-crested Cockatoo	*Cacatua galerita*	10	1.92	2.4
Musk Lorikeet	*Glossopsitta concinna*	1	0.19	0.0
Crimson Rosella	*Platycercus elegans*	15	2.88	0.8
Crimson rosella juvenile		1	0.19	0.1
Eastern Rosella	*Platycercus eximius*	8	1.54	0.4
Rosella sp.	*Platycercus* sp.	1	0.19	0.1
Red-rumped Parrot	*Psephotus haematonotus*	1	0.19	0.0
Parrots undetermined	Psittaciformes	1	0.19	0.1
Tawny Frogmouth	*Podargus strigoides*	3	0.58	0.4
Thornbill sp.	*Acanthiza* sp.	1	0.19	0.0
Laughing Kookaburra	*Dacelo novaeguineae*	3	0.58	0.4
Red Wattlebird	*Anthochaera carunculata*	2	0.38	0.1
Noisy Miner	*Manorina melanocephala*	1	0.19	0.0
Magpie-Lark	*Grallina cyanoleuca*	3	0.58	0.1
Australian Magpie	*Gymnorhina tibicen*	28	5.38	3.6
Australian Magpie juvenile		5	0.96	0.4
Pied Currawong	*Strepera graculina*	1	0.19	0.1
Grey Currawong	*Strepera versicolor*	1	0.19	0.1
Currawong	*Strepera* sp.	1	0.19	0.1
Australian Raven	*Corvus coronoides*	12	2.31	2.9
Australian Raven juvenile		4	0.77	0.8
Little Raven	*Corvus mellori*	2	0.38	0.4
Raven sp.	*Corvus* sp.	6	1.15	1.5
Juvenile raven		2	0.38	0.4
White-winged Chough	*Corcorax melanorhamphos*	4	0.77	0.5
Common Starling	*Sturnus vulgaris*	10	1.92	0.3
Other birds undetermined		18	3.46	2.9
REPTILES				
Eastern Water Dragon	*Intellagama lesueurii*	1	0.19	0.2
Bearded Dragon	*Pogona barbata*	1	0.19	0.2
Small dragon	Agamidae	3	0.58	0.0
Large dragon	Agamidae	1	0.19	0.2
Eastern Blue-tongued Skink	*Tiliqua scincoides*	2	0.38	0.4
Blue-tongued skink	*Tiliqua* sp.	2	0.38	0.4
Cunningham's Skink	*Egernia cunninghami*	3	0.58	0.0
Skink sp.	Scincidae	2	0.38	0.0
Red-bellied Black Snake	*Pseudechis porphyriacus*	1	0.19	0.2
CRUSTACEANS				
Crayfish	Decapoda: Reptantia	1	0.19	0.0
INSECTS				
Red-eye Cicada	*Psaltoda moerens*	8	1.54	0.0
	TOTAL	**520**	**100**	**100**

Little Eagle (*n* = 9 nest-years and 5 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Eastern Grey Kangaroo	*Macropus giganteus*	2	1.92	3.8
Black Rat	*Rattus rattus*	1	0.96	0.9
European Rabbit	*Oryctolagus cuniculus*	12	11.54	22.9
European Rabbit juvenile		12	11.54	21.5
Brown Hare	*Lepus capensis*	2	1.92	3.8
Sheep	*Ovis aries*	2	1.92	3.8
Cattle	*Bos taurus*	1	0.96	1.9
BIRDS				
Australian Wood Duck	*Chenonetta jubata*	1	0.96	1.9
Brown Goshawk	*Accipiter fasciatus*	1	0.96	1.3
Rock Dove	*Columba livia*	1	0.96	0.9
Galah	*Eolophus roseicapilla*	5	4.81	5.1
Sulphur-crested Cockatoo	*Cacatua galerita*	1	0.96	1.9
Swift Parrot	*Lathamus discolor*	1	0.96	0.2
Crimson Rosella	*Platycercus elegans*	5	4.81	2.2
Crimson Rosella juvenile		2	1.92	0.8
Eastern Rosella	*Platycercus elegans*	3	2.88	1.1
White-browed Babbler	*Pomatostomus superciliosus*	1	0.96	0.1
Magpie-Lark	*Grallina cyanoleuca*	4	3.85	1.2
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	3	2.88	1.1
Australian Magpie	*Gymnorhina tibicen*	3	2.88	3.0
Pied Currawong	*Strepera graculina*	2	1.92	1.8
Australian Raven	*Corvus coronoides*	1	0.96	1.9
Raven sp.	*Corvus* sp.	1	0.96	1.8
White-winged Chough	*Corcorax melanorhamphos*	2	1.92	2.2
Other birds undetermined		8	7.69	6.9
REPTILES				
Small dragon lizard	*Amphibolurus* sp.	1	0.96	0.1
Eastern Blue-tongued Skink	*Tiliqua scincoides*	1	0.96	1.4
Shingleback	*Trachydosaurus rugosus*	1	0.96	1.9
Cunningham's Skink	*Egernia cunninghami*	3	2.88	0.2
Skink sp.	Scincidae	2	1.92	0.1
FISH				
Carp	*Cyprinus carpio*	1	0.96	1.9
INSECTS				
Longicorn Beetle	*Phoracantha* sp.	1	0.96	0.0
Christmas Beetle	*Anoplognathus* sp.	2	1.92	0.0
Black Beetle	*Heteronychus arator*	1	0.96	0.0
Scarab beetle	Scarabaeidae	1	0.96	0.0
Other beetles	Coleoptera	5	4.81	0.0
Red-eye Cicada	*Psaltoda moerens*	4	3.85	0.0
Common Brown Butterfly	*Heteronympha merope*	1	0.96	0.0
Grasshopper	Orthoptera	3	2.88	0.0
	TOTAL	**104**	**100**	**100**

Nankeen Kestrel (*n* = 29 nest-years and 20 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Antechinus sp.	*Antechinus* sp.	1	0.20	0.5
Swamp Wallaby	*Wallabia bicolor*	1	0.20	4.8
European Rabbit	*Oryctolagus cuniculus*	2	0.40	9.6
European Rabbit juvenile		5	1.00	21.4
House Mouse	*Mus musculus*	7	1.40	1.8
BIRDS				
Crimson Rosella	*Platycercus eximius*	1	0.20	1.8
Eastern Rosella	*Platycercus elegans*	5	1.00	7.4
Red-rumped Parrot	*Psephotus haematonotus*	2	0.40	1.9
Australian Magpie	*Gymnorhina tibicen*	1	0.20	4.2
Brown Songlark	*Cincloramphus cruralis*	1	0.20	0.8
House Sparrow	*Passer domesticus*	5	1.00	2.0
European Goldfinch	*Carduelis carduelis*	1	0.20	0.3
Common Starling	*Sturnus vulgaris*	2	0.40	2.1
Unidentified small bird		1	0.20	0.3
Other birds undetermined		3	0.60	3.4
REPTILES				
Jacky Lizard	*Amphibolurus muricatus*	14	2.81	6.4
Dragon lizard	Agamidae	8	1.60	3.6
Skink sp.	Scincidae	34	6.81	10.3
Small snake	Suborder Serpentes	2	0.40	4.5
MYRIAPODS				
Millipede	Diplopoda	1	0.20	0.0
MOLLUSCS				
Garden Snail	*Helix aspersa*	1	0.20	0.2
ARACNIDS				
Huntsman Spider	*Isopeda* sp.	6	1.20	0.3
Wolf Spider	Lycosidae	1	0.20	0.0
Spider	Arachnida	20	4.01	0.9
INSECTS				
Christmas Beetle	*Anoplognathus porosus*	7	1.40	0.2
Christmas Beetle	*Anoplognathus olivieri*	1	0.20	0.0
Christmas beetle	*Anoplognathus* sp.	32	6.41	1.0
Repsimus Beetle	*Repsimus aeneus*	3	0.60	0.1
Black Beetle	*Heteronychus arator*	21	4.21	0.6
Longicorn beetle	Cerambycidae	2	0.40	0.1
Dung Beetle	*Onthophagus australis*	5	1.00	0.2
Click beetle	Elateridae	2	0.40	0.1
Diaphonia Beetle	*Diaphonia dorsalis*	1	0.20	0.0
Scarab beetle	Scarabaeidae	91	18.24	2.8
Carab beetle	Carabidae	1	0.20	0.0
Weevil	Curculionidae	11	2.20	0.3
Geotrupidae: Melonthini	*Heteronyx* sp.	20	4.01	0.6
Other beetles	Coleoptera	83	16.63	2.5
Red-eye Cicada	*Psaltoda moerens*	34	6.81	1.0
Bugs	Hemiptera	2	0.40	0.1
Flying ants	Hymenoptera	14	2.81	0.4
Epicoma moth	*Epicoma contristis*	1	0.20	0.0
Butterflies/moths	Lepidoptera	4	0.80	0.1
Mole Cricket	Orthoptera	1	0.20	0.0
Acridid grasshoppers	Acrididae	2	0.40	0.1
Grasshoppers	Orthoptera	36	7.21	1.1
	TOTAL	**499**	**100**	**100**

Brown Falcon (*n* = 26 nest-years and 19 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Antechinus sp.	*Antechinus* sp.	2	0.68	0.3
Common Dunnart	*Sminthopsis murina*	1	0.34	0.1
Common Ringtail Possum	*Pseudocheirus peregrinus*	1	0.34	2.1
Eastern Grey Kangaroo	*Macropus giganteus*	2	0.68	4.1
EGK juvenile		1	0.34	2.1
Swamp Wallaby	*Wallabia bicolor*	2	0.68	4.1
House Mouse	*Mus musculus*	11	3.74	0.7
Black Rat	*Rattus rattus*	1	0.34	1.0
European Rabbit	*Oryctolagus cuniculus*	12	4.08	24.7
European Rabbit juvenile		7	2.38	14.4
Brown Hare juvenile	*Lepus capensis*	3	1.02	6.2
Sheep	*Ovis aries*	3	1.02	6.2
BIRDS				
Painted Button-quail	*Turnix varius*	1	0.34	0.4
Australian Wood Duck	*Chenonetta jubata*	2	0.68	4.1
Galah	*Eolophus roseicapilla*	2	0.68	2.2
Crimson Rosella	*Platycercus eximius*	2	0.68	0.9
Crimson Rosella juvenile		1	0.34	0.4
Eastern Rosella	*Platycercus elegans*	7	2.38	2.7
Rosella sp.	*Platycerus* sp.	2	0.68	0.9
Red-rumped Parrot	*Psephotus haematonotus*	4	1.36	1.0
Parrot	Psittaculidae	1	0.34	0.5
Southern Boobook juvenile	*Ninox boobook*	1	0.34	1.0
Australian Magpie	*Gymnorhina tibicen*	4	1.36	4.3
Common Starling	*Sturnus vulgaris*	4	1.36	1.0
Small bird		1	0.34	0.3
Other birds undetermined		8	2.72	5.5
REPTILES				
Jacky Lizard	*Amphibolurus muricatus*	4	1.36	0.5
Eastern Water Dragon	*Intellagama lesueurii*	1	0.34	1.6
Dragon lizard	Agamidae	1	0.34	0.8
Striped Skink	*Ctenotus robustus*	1	0.34	0.1
Skink sp.	Scincidae	8	2.72	0.3
Brown Snake	*Pseudonaja textilis*	2	0.68	2.3
Red-bellied Black Snake	*Pseudechis porphyriacus*	1	0.34	1.2
MOLLUSCS				
Little Basket Shell	*Corbicula australis*	14	4.76	0.5
Garden Snail	*Helix aspersa*	4	1.36	0.2
Water Snail	*Glyptophysa gibbosa*	1	0.34	0.0
CRUSTACEANS				
Crayfish (yabbie)	*Cherax* sp.	2	0.68	0.4
INSECTS				
Dung Beetles	*Onthophagus australis*	6	2.04	0.0
Christmas Beetle	*Anoplognathus porosus*	26	8.84	0.2
Christmas Beetle	*Anoplognathus viriditarsus*	3	1.02	0.0
Christmas beetle	*Anoplognathus* sp.	29	9.86	0.2
Lucanid beetle	*Lamprisma latreille*	2	0.68	0.0
Repsimus Beetle	*Repsimus aeneus*	1	0.34	0.0
Weevil	Curculionidae	6	2.04	0.0
Black Beetle	*Heteronychus arator*	17	5.78	0.1
Scarab beetles	Scarabaeidae	7	2.38	0.1
Tenebrionid beetle	Tenebrionidae	1	0.34	0.0
Cerambycid beetle	Cerambycidae	1	0.34	0.0
Passalid beetle	Passalidae	1	0.34	0.0
Other beetles	Coleoptera	16	5.44	0.1
Red-eye Cicada	*Psaltoda moerens*	36	12.24	0.3
Cockroach	Blattodea	2	0.68	0.0
Grasshoppers	Orthoptera	15	5.10	0.1
	TOTAL	**294**	**100**	**100**

Australian Hobby (*n* = 10 nest-years and 6 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
European Rabbit	*Oryctolagus cuniculus*	1	0.40	4.9
European Rabbit juvenile		1	0.40	3.2
Gould's Wattled Bat	*Chalinolobus gouldii*	3	1.21	0.4
Bat undetermined	Chiroptera	1	0.40	0.2
BIRDS				
Stubble Quail	*Coturnix pectoralis*	1	0.40	0.9
Galah	*Eolophus roseicapilla*	2	0.81	5.2
Budgerigar	*Melopsittacus undulatus*	5	2.02	1.4
Crimson Rosella	*Platycercus elegans*	4	1.61	4.5
Crimson Rosella juvenile		2	0.81	2.0
Eastern Rosella	*Platycercus eximius*	6	2.42	5.4
Eastern Rosella juvenile	*Platycercus* sp.	5	2.02	4.3
Australian Ringneck	*Barnardius zonarius*	2	0.81	2.8
Red-rumped Parrot	*Psephotus haematonotus*	2	0.81	1.2
Parrot	Psittaculidae	6	2.42	5.8
Tawny Frogmouth	*Podargus strigoides*	1	0.40	2.5
Sacred Kingfisher	*Todiramphus sanctus*	1	0.40	0.4
Spotted Pardalote	*Pardalotus punctatus*	3	1.21	0.2
Striated Pardalote	*Pardalotus striatus*	3	1.21	0.3
Red Wattlebird	*Anthochaera carunculata*	1	0.40	1.0
Noisy Miner	*Manorina melanocephala*	8	3.23	5.1
Yellow-faced Honeyeater	*Caligavis chrysops*	2	0.81	0.3
Eastern Spinebill	*Acanthorhynchus tenuirostris*	1	0.40	0.1
Flame Robin	*Petroica phoenicea*	1	0.40	0.1
Magpie-lark juvenile	*Grallina cyanoleuca*	3	1.21	2.3
Olive backed Oriole	*Oriolus sagittatus*	1	0.40	0.9
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	1	0.40	0.9
White-bellied Cuckoo-shrike	*Coracina papuensis*	1	0.40	0.6
White-browed Woodswallow	*Artamus superciliosus*	6	2.42	1.9
Dusky Woodswallow	*Artamus cyanopterus*	1	0.40	0.4
Woodswallow sp.	*Artamus* sp.	2	0.81	0.7
Australian Magpie	*Gymnorhina tibicen*	1	0.40	2.6
Magpie Juvenile		1	0.40	1.7
Welcome Swallow	*Hirundo neoxena*	1	0.40	0.1
Tree Martin	*Hirundo nigricans*	1	0.40	0.1
Brown Songlark	*Cincloramphus cruralis*	2	0.81	1.0
House Sparrow	*Passer domesticus*	10	4.03	2.5
European Goldfinch	*Carduelis carduelis*	3	1.21	0.6
Sparrow sp.	*Passer* sp.	4	1.61	0.9
Finch sp.	Estrildidae	1	0.40	0.2
Diamond Firetail	*Stagonopleura guttata*	1	0.40	0.1
Silvereye	*Zosterops lateralis*	1	0.40	0.1
Common Blackbird	*Turdus merula*	1	0.40	0.8
Common Starling	*Sturnus vulgaris*	20	8.06	12.8
Starling juvenile		4	1.61	2.2
Small passerine		7	2.82	1.9
Other birds undetermined		16	6.45	10.5
INSECTS				
Christmas Beetle	*Anoplognathus porosus*	32	12.90	0.6
Christmas beetles	*Anoplognathus* sp.	23	9.27	0.4
Chrysomelid beetle	Chrysomelidae	1	0.40	0.0
Stag Beetle	*Lamprisma latreille*	1	0.40	0.0
Diaphonia beetle	*Diaphonia dorsalis*	1	0.40	0.0
Scarab beetle	Scarabaeidae	2	0.81	0.0
Cerambycid beetle	*Phorocantha* sp.	2	0.81	0.0
Other beetles	Coleoptera	13	5.24	0.2
Cicada	*Cicadetta* sp.	1	0.40	0.0
Red-eye Cicada	*Psaltoda moerens*	17	6.85	0.3
Mantid	Mantodea	2	0.81	0.0
Cockroach	Blattoidea	1	0.40	0.0
Other insects	Insecta	1	0.40	0.0
	TOTAL	**248**	**100**	**100**

Peregrine Falcon (*n* = 38 nest-years and 21 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
Broad-toothed Rat	*Mastacomys fuscus*	1	0.15	0.1
European Rabbit	*Oryctolagus cuniculus*	2	0.30	0.9
Gould's Wattled Bat	*Chalinolobus gouldii*	2	0.30	0.0
BIRDS				
Little Black Cormorant	*Phalacrocorax sulcirostris*	1	0.15	0.5
Pacific Black Duck	*Anas superciliosa*	2	0.30	0.9
Grey Teal	*Anas gracilis*	2	0.30	0.7
Australian Wood Duck	*Chenonetta jubata*	5	0.75	2.3
Cattle Egret	*Bubulcus ibis*	1	0.15	0.3
Little Egret	*Egretta garzetta*	5	0.75	1.1
Egret sp.	Ardeidae	1	0.15	0.2
Rufous Night Heron	*Nycticorax caledonicus*	1	0.15	0.5
Straw-necked Ibis	*Threskiornis spinicollis*	1	0.15	0.5
Lesser Golden Plover	*Pluvialis fulva*	1	0.15	0.1
Silver Gull	*Chroicocephalus novaehollandiae*	1	0.15	0.2
Whiskered Tern	*Chlidonias hybrida*	1	0.15	0.1
Gull-billed Tern	*Sterna nilotica*	1	0.15	0.2
Nankeen Kestrel	*Falco cenchroides*	1	0.15	0.1
Rock Dove	*Columba livia*	75	11.21	16.9
Rock Dove juvenile		1	0.15	0.2
Peaceful Dove	*Geopelia placida*	1	0.15	0.0
Bar-shouldered Dove	*Geopelia humeralis*	1	0.15	0.1
Common Bronzewing	*Phaps chalcoptera*	1	0.15	0.2
Brush Bronzewing	*Phaps elegans*	2	0.30	0.3
Crested Pigeon	*Ocyphaps lophotes*	6	0.90	1.0
Yellow-tailed Black Cockatoo	*Zanda funerea*	1	0.15	0.5
Gang-gang Cockatoo	*Callocephalon fimbriatum*	34	5.08	6.8
Galah	*Eolophus roseicapilla*	111	16.59	27.2
Little Corella	*Cacatua sanguinea*	1	0.15	0.4
Sulphur-crested Cockatoo	*Cacatua galerita*	1	0.15	0.5
Little Lorikeet	*Glossopsitta pusilla*	2	0.30	0.8
Australian King-Parrot	*Alisterus scapularis*	1	0.15	0.2
Princess Parrot	*Polytelis alexandrae*	1	0.15	0.1
Crimson Rosella	*Platycercus elegans*	28	4.19	2.9
Crimson Rosella juvenile		4	0.60	0.4
Eastern Rosella	*Platycercus eximius*	45	6.73	3.8
Eastern Rosella juvenile		4	0.60	0.3
Rosella sp.	*Platycercus* sp.	1	0.15	0.1
Australian Ringneck	*Barnardius zonarius*	1	0.15	0.1
Red-rumped Parrot	*Psephotus haematonotus*	12	1.79	0.7
Blue Bonnet	*Northiella haematogaster*	1	0.15	0.1
Parrot	Psittaciformes	1	0.15	0.2
Pallid Cuckoo	*Heteroscenes pallidus*	2	0.30	0.1
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	1	0.15	0.0
Black eared Cuckoo	*Chalcites osculans*	1	0.15	0.0
Horsfield's Bronze Cuckoo	*Chalcites basalis*	1	0.15	0.0
White-throated Needletail	*Hirundapus caudacutus*	1	0.15	0.1
Sacred Kingfisher	*Todiramphus sanctus*	2	0.30	0.1
Oriental Dollarbird	*Eurystomus orientalis*	1	0.15	0.1
Spotted Pardalote	*Pardalotus punctatus*	3	0.45	0.0
Striated Pardalote	*Pardalotus striatus*	3	0.45	0.0
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	1	0.15	0.0
Red Wattlebird	*Anthochaera carunculata*	13	1.94	1.2
Little Wattlebird	*Anthochaera chrysoptera*	1	0.15	0.1

(continued overleaf)

Peregrine Falcon (*n* = 38 nest-years and 21 territories) (continued)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
BIRDS (continued)				
Noisy Friarbird	*Philemon corniculatus*	1	0.15	0.1
Noisy Miner	*Manorina melanocephala*	6	0.90	0.4
Yellow-faced Honeyeater	*Caligavis chrysops*	4	0.60	0.1
White-eared Honeyeater	*Nesoptilotis leucotis*	1	0.15	0.0
White-naped Honeyeater	*Melithreptus lunatus*	1	0.15	0.0
Eastern Spinebill	*Acanthorhynchus tenuirostris*	1	0.15	0.0
Scarlet Honeyeater	*Myzomela sanguinolenta*	2	0.30	0.0
Honeyeater	Meliphagidae	2	0.30	0.0
White-browed Babbler	*Pomatostomus superciliosus*	1	0.15	0.0
Rose Robin	*Petroica rosea*	1	0.15	0.0
Scarlet Robin	*Petroica boodang*	1	0.15	0.0
Red-capped robin	*Petroica goodenovii*	1	0.15	0.0
Eastern Yellow Robin	*Eopsaltria australis*	3	0.45	0.1
Robin sp.	Petroicidae	1	0.15	0.0
Golden Whistler	*Pachycephala pectoralis*	1	0.15	0.0
Rufous Whistler	*Pachycephala rufiventris*	1	0.15	0.0
Leaden Flycatcher	*Myiagra rubecula*	1	0.15	0.0
Magpie-Lark	*Grallina cyanoleuca*	10	1.49	0.8
Olive backed Oriole	*Oriolus sagittatus*	1	0.15	0.1
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	4	0.60	0.3
White-bellied Cuckoo-shrike	*Coracina papuensis*	3	0.45	0.2
Masked Woodswallow	*Artamus personatus*	1	0.15	0.0
White-browed Woodswallow	*Artamus superciliosus*	3	0.45	0.1
Dusky Woodswallow	*Artamus cyanopterus*	3	0.45	0.1
Australian Magpie	*Gymnorhina tibicen*	12	1.79	2.9
Pied Currawong	*Strepera graculina*	3	0.45	0.6
Grey Currawong	*Strepera versicolor*	1	0.15	0.2
Australian Raven	*Corvus coronoides*	16	2.39	7.3
Little Raven	*Corvus mellori*	1	0.15	0.4
Welcome Swallow	*Hirundo neoxena*	2	0.30	0.0
Brown Songlark	*Cincloramphus cruralis*	2	0.30	0.1
European Goldfinch	*Carduelis carduelis*	1	0.15	0.0
Red-browed Finch	*Neochmia temporalis*	2	0.30	0.0
Silvereye	*Zosterops lateralis*	6	0.90	0.1
Bassian Thrush	*Zoothera lunulata*	1	0.15	0.1
Common Blackbird	*Turdus merula*	2	0.30	0.2
Common Starling	*Sturnus vulgaris*	119	17.79	7.1
Starling juvenile		9	1.35	0.5
Other birds undetermined		26	3.89	3.9
REPTILES				
Small-eyed Snake	*Rhinoplocephalus nigrescens*	1	0.15	0.3
INSECTS				
Brown Beetle	Scarabaeidae	4	0.60	0.0
Diamond Weevil	*Chrysolophus spectabilis*	1	0.15	0.0
Christmas beetle	*Anoplognathus* sp.	2	0.30	0.0
Other beetles	Coleoptera	2	0.30	0.0
Red-eye Cicada	*Psaltoda moerens*	6	0.90	0.0
Grasshopper	Orthoptera	1	0.15	0.0
	TOTAL	**669**	**100**	100

Southern Boobook (*n* = 15 nest-years and 9 territories)

PREY SPECIES		# of items	% items	% Biomass
Common Name	**Scientific Name**			
MAMMALS				
House Mouse	*Mus musculus*	4	0.58	1.8
House Mouse juvenile		2	0.29	0.4
Black Rat juvenile	*Rattus rattus*	1	0.15	2.3
Gould's Wattled Bat	*Chalinolobus gouldii*	1	0.15	0.4
Bent-wing Bat	*Miniopterus schreibersii*	1	0.15	0.4
Broad-nosed Bat	*Scotorepens orion*	1	0.15	0.3
White-striped Bat	*Tadarida australis*	1	0.15	1.0
Other bats undetermined	Chiroptera	11	1.61	5.6
BIRDS				
Crested Pigeon	*Ocyphaps lophotes*	1	0.15	5.6
Crested Pigeon juvenile		1	0.15	3.9
Crimson Rosella	*Platycercus eximius*	1	0.15	3.4
Eastern Rosella	*Platycercus elegans*	3	0.44	8.2
Eastern Rosella juvenile		1	0.15	2.6
Fairy-wren sp.	*Malurus* sp.	1	0.15	0.3
White-browed Babbler	*Pomatostomus superciliosus*	1	0.15	1.1
Grey Fantail	*Rhipidura albiscapa*	1	0.15	0.2
Magpie-lark	*Grallina cyanoleuca*	2	0.29	4.7
Red-browed Finch	*Neochmia temporalis*	4	0.58	1.2
Silvereye	*Zosterops lateralis*	1	0.15	0.3
Sparrow	Passeridae	1	0.15	0.7
Common Starling	*Sturnus vulgaris*	3	0.44	5.8
Starling juvenile		1	0.15	1.7
Common Myna	*Acridotheres tristis*	1	0.15	2.1
Other passerines	Passeriformes	5	0.73	3.5
Other birds undetermined		3	0.44	5.1
ARACHNIDS				
Huntsman Spider	*Isopeda* sp.	5	0.73	0.3
Wolf spider	Lycosidae	59	8.61	3.2
Other spiders	Arachnida	10	1.46	0.6
Scorpion	Scorpionidae	1	0.15	0.1
INSECTS				
Christmas Beetle	*Anoplognathus viriditarsus*	2	0.29	0.1
Christmas beetle	*Anoplognathus* sp.	119	17.37	6.7
Scarab	Subfamily Dynastinae	7	1.02	0.4
Scarab beetle	Scarabaeidae	78	11.39	4.4
Carab beetle	Carabidae	4	0.58	0.2
Longicorn Beetle	*Phorocantha tricuspa*	1	0.15	0.1
Longicorn Beetle	*Phorocantha semipunctata*	8	1.17	0.4
Longicorn Beetle	*Phorocantha* sp.	43	6.28	2.4
Longicorn Beetle.	Cerambycidae	27	3.94	1.5
Copterus Cerambycid	*Copterus thoracicus*	1	0.15	0.1
Weevil	Curculionidae	8	1.17	0.4
Click beetle	Elateridae	3	0.44	0.2
Dung beetle	*Onthophagus australis*	8	1.17	0.4
Other beetles	Coleoptera	97	14.16	5.4
Bug	Hemiptera: Homoptera	3	0.44	0.2
Cicada	*Psaltoda moerens*	5	0.73	0.3
Cicadellid bug	*Ledromorpha planirostris*	1	0.15	0.1
Ants	Hymenoptera	2	0.29	0.1
Moths	Lepidoptera	74	10.80	4.1
Grasshoppers	Orthoptera	65	9.49	3.6
Cockroach	Blattoidea	1	0.15	0.1
	TOTAL	**685**	**100**	**100**