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The Breeding Biology and Diet of the Masked Owl *Tyto novaehollandiae* Near Eden, New South Wales

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Summary: In forested environments, the Masked Owl *Tyto novaehollandiae* is a highly cryptic species whose presence is easily overlooked, except for short periods early in the breeding season when it becomes more vocal and its presence is readily detected. The results of three successful breeding attempts are reported in which laying occurred between late March and mid-July. Two young were fledged on one occasion and at least one young was fledged on two other occasions. Masked Owls in one territory bred successfully in the same nest hollow during 1990 and 1994. The owls either did not nest during the three intervening years or they did so in an unlocated tree. The habitat for the owls was dry open-forest in rugged terrain interspersed with narrow bands (*c.* 100 m wide) of tall, wet riparian forest. One nest tree was located in one of these riparian zones and was surrounded by a large area of mainly unlogged forest, although there were several recently logged areas nearby. The diet of these owls consisted almost entirely of small native ground-dwelling or scansorial mammals, none of which is dependent on continuous areas of old-growth forest. At least two of the main prey species are characteristically abundant in riparian forest with a dense understorey or ground layer. In contrast to other studies, no introduced species were recorded in the diet. The apparent rarity of the Masked Owl is difficult to explain given its dietary flexibility and ability to use disturbed habitats.

The Masked Owl *Tyto novaehollandiae* has been reported as breeding at fewer than 20 localities in New South Wales and at only five since 1980 (Debus & Rose 1994). In Victoria, only four breeding localities have been reported, including one record made after 1980 (Peake et al. 1993). The meagre data on the breeding biology of the Masked Owl were reviewed by Schodde & Mason (1980), Hollands (1991), Debus (1993), Olsen & Marples (1993), Peake et al. (1993) and Debus & Rose (1994). The subspecies *T. n. novaehollandiae* extends across southern mainland Australia north to the Pilbara and to at least Mackay (Schodde & Mason 1980) and was considered by Debus (1993) to be one of the least-known owl taxa in mainland Australia. Hollands' (1991) data probably refer to the northern mainland subspecies *T. n. kimberli*, while the observations of Hill (1955) and Mooney (1993) refer to the Tasmanian subspecies *T n. castanops*. Like other *Tyto* species the Masked Owl breeds opportunistically at any time of the year but there is a tendency for mainland clutches to be laid from autumn to early spring (*cf.* spring in Tasmania, Hill 1955). One to four eggs may be laid but it is rare for more than two young to fledge. Nests are usually in large hollows within the trunk or near-vertical spouts of tall eucalypt trees.

The Masked Owl is primarily a bird of coastal and sub-coastal open forests and woodlands and adjacent clearings, but on the mainland its distribution extends far inland in riparian woodlands with hollow trees or in other vegetation types where caves may provide alternative daytime shelter and nesting sites (Debus 1993). A recurring element in the description of habitat for this species, based mainly on records of road-killed birds, is that the owls frequently occupy disturbed and fragmented environments consisting of open forest or woodland and land cleared for agricultural purposes (Hollands 1991; Peake et al. 1993; Debus & Rose 1994). However, there are also several reports of the Masked Owl inhabiting tall, wet forests where the nearest cleared or disturbed land was at least several kilometres away (Hyem 1979; Roberts 1983). The distance to the nearest dry open-forest (i.e. structural ecotone) was not stated in these two studies. A regional survey in the forests of north-eastern New South Wales found the Masked Owl to be strongly associated with dry open-forests having a sparse understorey (Kavanagh et al. 1995). The diet of the Masked Owl is reported to comprise mainly small terrestrial mammals that may include substantial numbers of introduced species (Schodde & Mason 1980; Hollands 1991; Mooney 1993; Peake et al. 1993; Debus & Rose 1994).

In south-eastern New South Wales, nine years (1975–83) of general forest fauna surveys failed to locate Masked Owls (Recher et al. 1980; Smith 1984). In the same region, this species was recorded at eight of 228 locations in 1988–89 during surveys for the Powerful Owl *Ninox strenua* and the Sooty Owl *T. tenebricosa* (Kavanagh & Peake 1993a).

Surveys specifically designed to include the Masked Owl, which incorporated a call-playback component, began during 1990 and by the end of 1994 the species had been detected at 44 locations south of Bermagui and east of Bombala in south-eastern New South Wales (Binns & Kavanagh 1990; Kavanagh & Bamkin 1995; RPK unpubl. data).

One breeding record for the Masked Owl near Eden in south-eastern New South Wales was reported briefly by Debus (1990). This record concerned a fledgling flushed from a tree hollow during daylight at Yambulla State Forest in November 1987. A second record of Masked Owls breeding was made in 1990 at Nullica State Forest near Eden (Binns & Kavanagh 1990). This paper provides details of the breeding habitat used by the owls at both locations. Other aspects of Masked Owl ecology are described for the Nullica birds including their diet between 1990 and 1992 and details of their nesting behaviour between 1990 and 1994.

Study area and methods

In November 1987, a Masked Owl fledgling with wisps of down remaining was flushed from a hollow tree during a diurnal bird survey in Yambulla State Forest, approximately 40 km south-west of Eden.

In May 1990, a pair of Masked Owls and their nest tree were located approximately 20 km north-west of Eden during a survey of nocturnal fauna in Nullica State Forest (Binns & Kavanagh 1990). At least 31 visits were made to the nest tree between 1990 and 1994 (see Table 1) to record owl presence and behaviour. Although the breeding season for Masked Owls is variable (see references cited above), nest hollows may be used as roost sites by *Tyto* owls during the non-breeding season (J. Young pers. comm.; RPK pers. obs.). Accordingly, visits were made to assess the quantity of fresh whitewash (faeces) below regular landing perches 20-30 m from the nest tree and below the nest tree to provide an indication of use, or interest in, the nest hollow throughout the year. The nest hollow was watched for periods at dusk and later in the night to observe birds entering or leaving or any other activity that would confirm roosting or breeding behaviour. A sensitive omni-directional microphone and tape recorder pre-set with a timer (see Kavanagh & Peake 1993b for a full description) was also used to record the presence of the owls. Goshawk traps (eight trap nights) and suspended mist nets (two trap-nights) were set (see Table 1) in an effort to catch and radio-tag the adults so that their movements and home range size could be determined. Playback of pre-recorded vocalisations of the Masked Owl was done during most sampling periods to detect the presence of the owls but generally followed failure to establish the presence of the owls using other procedures. Playback was occasionally done at locations up to 2 km away when the owls could not be found.

The nest hollow was inspected by an experienced tree climber during each of three consecutive years. Observations were made of any eggs or owlets present, and a sample of any regurgitated pellets (indigestible fur and bones of the prey) was collected to determine the diet of the owls. The minimum numbers of each prey species in the samples were determined by hair cross-section (Brunner & Coman 1974) and by comparisons with an extensive reference collection of bones (held by Ms B. Triggs).

The characteristics of the two nest trees and the environment surrounding each at the Nullica and Yambulla sites are described.

Results

Breeding habitat

At Yambulla State Forest, the presumed nest tree was a large Mountain Grey Gum *Eucalyptus cypellocarpa* approximately 100 cm in diameter (at breast height) and 30 m tall. The entrance to the large nest hollow was 18 m above the ground and provided access into the trunk of the tree. The tree was located at the head of a small, dry gully. The open-forest canopy was dominated by *E. consideniana*, *E. globoidea*, *E. agglomerata*, *E. cypellocarpa* and *E. radiata* (State Forests of New South Wales Forest Type 123, Anon 1989) and had a sparse xeromorphic understorey layer interspersed with a ground cover of leaf litter and logs. The forest in the immediate vicinity (< 50 m) was logged the following year, together with several other areas nearby, as part of an experimental logging and burning study. Daylight searches for the birds at this location in November 1988–90, 1992 and 1994 were unsuccessful, but no nocturnal searches were made. Before logging, there was no forest disturbance caused by logging or other clearings within several kilometres of the site.

The nest tree at Nullica State Forest was a large, old *E. cypellocarpa* located on a creek flat 50 m from the edge of the creek. The tree was 191 cm in diameter (at breast height) and approximately 45 m tall. The nest

hollow was vertical within the trunk of the tree, made possible because the original top of the tree had broken off some decades previously. The entrance to the nest hollow was 30 m above the ground and its interior dimensions were approximately 1.0 x 0.6 x 2.5 m deep. A small ledge protruded halfway across the hollow at about 0.5 m below the entrance. The nest chamber itself, located at the base of the hollow, was only about 0.5 m wide and lined with dry, rotting wood.

The tall-open riparian forest in which the nest tree was situated was dominated by *E. cypellocarpa*, *E. obliqua* and *E. fastigata* (State Forests of New South Wales Forest Type 155, Anon. 1989). Prominent understorey species included *Acacia longifolia*, *Cyathea australis*, *Blechnum cartilagineum*, *Culcita dubia*, *Pteridium esculentum* and *Tetrarrhena juncea*. Local topography away from the creek flat was quite steep. Adjacent ridge forest was dominated by *E. sieberi*, with *A. obtusifolia*, *T. juncea* and *P. esculentum* prominent in the understorey. The dry ridge forest was open with a sparse understorey structure, partly due to frequent wildfires. The nest tree was in a large (> 20 000 ha) area of continuous forest, approximately 90% of which was unlogged. Beyond an undisturbed buffer of about 200 m, the local environment of the nest tree was more disturbed than most other parts of the forest. Within one km of the nest tree, there was about 25 ha of 40-50 year old forest regrowth following earlier clearing for agriculture, another 7 ha patch of 5-10 year old regrowth, and about 45 ha of forest regrowth following heavy logging in 1987. The nearest cleared land was 1.7 km away.

Nesting chronology and associated behaviour

The Nullica nest tree was located on 22 May 1990, following two nights (13 and 15 May) of intense responses to playback from an adult male bird (judging by size and call) which retreated on both occasions to a large tree 30 m away. Inspection of the area revealed concentrations of whitewash below several nearby open branches and the presence of a large vertical tree hollow (described above) from which the first calls of the evening (at 1735 h) were heard. Observations continued until 2205 h during which time both adults were seen to enter and leave the hollow on at least three occasions. Once the male was seen returning with a prey item. Soft trilling and rasping calls were heard, suggesting young birds in the nest.

On 29 May 1990, the tree was climbed, causing both adult birds to fly out of the hollow and perch in the outer branches, and the hollow inspected. The observations of Hill (1955) suggested that for Masked Owls this should be a low risk procedure. Inside, two chicks were seen on the floor of the hollow which were estimated (by J. Young), on the basis of size and plumage development, to be about two to three weeks old. Eight pellets and one complete mammalian skull were collected from the ledge below the hollow entrance (see below).

On 13 August 1990, sounds were heard of owlets being fed inside the nest hollow. The adult female was also seen perched on a branch of the nest tree. Then on 28 October, two owlets that had apparently only recently fledged were found calling continuously and flying between the upper branches of the nest tree and other trees within 50 m. One adult, presumably the male, was seen nearby. Playback of owl vocalisations resulted in vigorous begging responses from the owlets but they did not approach.

My observations illustrate a variety of responses to playback displayed by the Masked Owl (Table 1). Observations of these birds and others elsewhere suggest that Masked Owls respond most intensely to playback near the nest tree. For example, no response to playback was obtained from a site 400 m away on 13 May, less than an hour before the owls were initially located. Often the birds called from the nest tree itself but on other occasions the owls did not respond although they were present. No calls were heard on 14 August and no response was obtained to playback although the owlets were still in the nest and the adults presumably in attendance. It was common for the owls to spend long periods of the night without calling. For example, on 15 May no calls were heard after 2030 h (one call heard when I arrived) until 2330 h when an immediate response to playback was obtained from the male. The best response to playback appeared to be early in the breeding season.

A further 11 visits were made to the nest tree in 1991 (February, April, May, June and October), six visits in 1992 (January, March, May, August and November), three visits in 1993 (April, July and October) and four visits in 1994 (April, June and November).

Although one adult was observed near the nest tree in February 1991 and fresh whitewash was observed in the usual places, by April no birds or fresh whitewash could be found and the birds did not respond to tape playback. A large amount of fragmented pellet material was collected from inside the nest hollow on 3 May 1991 but the absence of any fresh pellets confirmed that

Table 1 Summary of Masked Owl breeding chronology and associated behaviour in Nullica State Forest, Eden.

Year and month	No. visits (nights)	Behaviour observed
1990		
May	4	Nest hollow located containing 2 owlets estimated to be 2-3 weeks old. Strong response to playback of Masked Owl calls.
August	2	Adult seen; sounds of owlets being fed inside nest hollow. No response to playback.
October	1	Adult and two fledglings seen; owlets calling and flying between nest tree and other trees within 50 m. Owlets responsive to playback.
1991		
February	2	Adult seen. A goshawk trap set for two nights below nest tree; no captures. Nil response to playback first night; adult calling softly and continuously on second night but moved away (calling) when playback began.
April–May	6	Nest hollow inspected but not in recent use. Adults visited nest tree at least once. Two goshawk traps set at dusk on each of three nights; one Brown Goshawk captured. No response to playback on each of three nights.
June	2	Evidence of infrequent visitation (some whitewash). Suspended mist net set; no response to playback.
October	1	Evidence of infrequent visitation. Upstream, adult response to playback.
1992		
January	1	No evidence of visitation (no whitewash).
March	1	Very strong, continuous response to playback from 1.5 km upstream.
May	1	Nest hollow inspected but not in recent use. No response to playback.
August	1	No evidence of visitation.
November	2	Evidence of infrequent visitation. Adult responded to playback on first night, but not on second night when suspended mist net was set.
1993		
April	1	No evidence of visitation.
July	1	Evidence of infrequent visitation.
October	1	No response to playback.
1994		
April	1	Adult seen on a ridge 500 m from nest tree; attracted to playback but did not give a vocal response. No response to playback 2.0 km upstream.
June	1	Two calls heard at dusk 50 m from nest tree.
November	2	Adult seen to fly into nest hollow, followed by sounds of owlet being fed. Later in the month, one owlet seen and heard calling continuously in and near nest tree.

the owls were not regularly using the hollow. It was not until October that a few splotches of whitewash were observed, indicating infrequent use of the nest tree, possibly for roosting. In October, a Masked Owl responded to playback at a position more than 0.5 km upstream. It was concluded that the Masked Owls did not breed in the nest tree during 1991 and it was assumed that the upstream birds were the same pair using a different portion of their home range.

Similar observations were made at the nest tree during 1992 and 1993. Only occasional splotches of whitewash were observed around the nest tree, suggesting infrequent inspections of the hollow. Except on 29 October 1992, when one Masked Owl responded to playback, the birds were not heard or seen near the nest tree during 1992 and 1993. A third inspection of the nest hollow was made on 15 May 1992 but no fresh pellets were collected, only some old bones. Meanwhile, on 10 March 1992, a very intense response to playback consisting of more than 15 minutes of continuous 'chattering' calls was obtained from a position 1.5 km upstream of the nest tree. I concluded that the owls did not breed

in the nest tree during 1992 and 1993 and that they may have bred, at least during 1992, in an unknown nest tree about 1.5 km upstream.

On 18 April 1994, one Masked Owl was seen on top of a ridge 0.5 km from the nest tree. This bird was apparently attracted to the position but it did not respond vocally to call playback. Earlier on the same night, calls were broadcast from a position 2.0 km upstream near the suspected alternative breeding location but no response was obtained. On 23 June 1994, two 'screech' calls were heard at dusk only 50 m from the nest tree but it was too dark to see whether the bird had just left the nest tree. On 4 November 1994, one adult Masked Owl flew into the nest hollow followed by the sounds of rasping which suggested that young were being fed inside the hollow. On 19 November 1994, one young bird was seen and heard rasping incessantly from the nest tree (outside the hollow) and in adjacent trees. No adult birds were seen or heard on this occasion. Thus, it was concluded that the owls bred successfully in 1994 in the nest tree, the second time in five years.

Several unsuccessful attempts were made to catch the owls. On six occasions between February and June 1991 (Table 1), one or two large wire cage traps (Goshawk traps) using live rats as a lure were set on the ground below or within 150 m of the nest tree. Unfortunately, the nest tree was rarely used by the owls during 1991 but they were present at the time of trapping in February. One Brown Goshawk *Accipiter fasciatus* was captured in April 1991. A mist net suspended in the canopy of the forest, combined with playback to attract the owls, was also used twice at this location but without success.

Diet and prey availability

More than 124 prey items were identified among the regurgitated pellets collected from inside the Nullica State Forest nest on 29 May 1990, 3 May 1991 and 15 May 1992 (Table 2). The diet of the Masked Owls at Nullica was dominated by native ground-dwelling mammals. Very few arboreal mammals or birds were recorded, with invertebrate material appearing to be incidental. The most common prey species were the Bush Rat *Rattus fuscipes*, the Brown Antechinus *Antechinus stuartii* and the Dusky Antechinus *A. swainsonii* (Table 2). Other prey species were the Sugar Glider *Petaurus breviceps*, the Common Ringtail Possum *Pseudocheirus peregrinus* and unidentified passerine birds (probably Pied Currawongs *Strepera graculina*).

Nine intact (fresh) pellets were collected together with a large amount of disintegrated pellet material, particularly in 1991. The 1992 sample contained only old bones and may represent material uncollected in 1991. The data collected in 1990 represent the diet of the adults and nestlings (up to three weeks of age) during the early phase of the nesting period, whereas the 1991 and 1992 data probably represent the diet of the adults and the owlets for the remainder of the 1990 nesting period (Table 2). A notable change occurred in the size of prey taken between the 1990 and 1991–92 samples which may reflect a change in the prey fed to the growing owlets. The greatest differences were the proportions of the larger Bush Rat and Dusky Antechinus in the diet in relation to Brown Antechinus. Bush Rats (mean weight 125 g, Strahan 1983) and Dusky Antechinus (mean weight 53 g, Strahan 1983) increased from 30% of the diet (28.6% of biomass) when the owlets were very young (in the 1990 sample) to 66% (72.8% of biomass) for the remainder of the nesting period. Sugar Gliders (mean weight 128 g, Strahan 1983), although uncommon in the diet, were only recorded during the latter period. The proportions of the smaller Brown Antechinus (mean weight 28 g, Strahan 1983) in the diet reduced from 60% (18.0% of biomass) to 27.5% (8.7% of biomass) as the owlets grew larger. The preponderance of small (20-35 g) prey items in the diet in

Table 2 Diet of a breeding pair of Masked Owls and their young in Nullica State Forest, Eden. Data represent minimum numbers of prey species in each sample.

Prey species	Sampling date			Total
	29 May 1990	3 May 1991	15 May 1992	
Common Ringtail Possum *Pseudocheirus peregrinus*	1	1	0	2
Sugar Glider *Petaurus breviceps*	0	3	0	3
Bush Rat *Rattus fuscipes*	3	37	7	47
Brown Marsupial Mouse *Antechinus stuartii*	12	25	1	38
Dusky Marsupial Mouse *Antechinus swainsonii*	3	23	4	30
Unidentified bird (possibly *Strepera graculina*)	1	2	1	4
Unidentified invertebrates (possibly beetles)	trace	trace	trace	trace
Minimum number of items	20	91	13	124

1990 suggests that the owls were deliberately selecting small prey to feed to their very young chicks. An alternative explanation is that the male was providing most of the food during the early stages of nesting. In Tasmania, where the degree of sexual dimorphism is more pronounced in the subspecies *T. n. castanops*, the male has been found to take significantly smaller prey items than the larger female (Mooney 1993). The annual early spring mortality suffered by all males of the Brown Antechinus is well known (Strahan 1983) but this is unlikely to explain the reduced proportion of this species in the owls' diet because the owlets had fledged by October.

The Common Ringtail Possum (mean weight 900 g, Strahan 1993) in the 1990 sample was represented by a clean intact skull (i.e. not a fresh pellet sample) and thus may have formed a part of the diet of the adult birds before the eggs hatched. The Common Ringtail Possum in the 1991 sample was represented only by a femur and pelvic bones and thus may have been part of the same individual as the skull in 1990. Birds and invertebrates appeared to be relatively unimportant components of the diet.

The relative abundance of potential prey species in the study area was assessed only for arboreal mammals (Binns & Kavanagh 1990), which turned out to be only a minor component of the owls' diet. Three studies of the habitat preferences of small ground mammals have been completed in forested areas within 50 km of the present study (Recher et al. 1980; Braithwaite et al. 1984; Lunney et al. 1987). All found Bush Rats, Brown Antechinus and Dusky Antechinus to be much more abundant in tall-open (moist) forest, low-open forest and in other riparian vegetation where ground cover was very dense compared with dry open forest on ridges which generally has a sparse ground cover. Furthermore, all three studies showed that logging was not a major factor affecting the abundance of these small ground mammals. In most cases, all three species recovered to pre-logging levels, or greater, within 2-3 years of logging.

Masked Owls take arboreal mammals occasionally (Schodde & Mason 1980; Schulz 1987; Mooney 1993; Debus & Rose 1994) so it is useful to indicate the relative abundance of potential prey species for the Nullica owls. Sugar Gliders and Common Ringtail Possums were the two most frequently recorded and widely distributed arboreal mammal species in a 7500 ha study area surrounding the nest tree of the Nullica Masked Owls. These two species were recorded on 50% and 40% of all sites sampled (n = 40, Binns & Kavanagh 1990), yet they formed only a minor contribution to the diet of the owls at Nullica State Forest. Yellow-bellied Gliders *Petaurus australis*, although not as abundant due to their large home range (Goldingay & Kavanagh 1993), were widespread, being recorded on 45% of sites. Three other species of arboreal mammals were recorded infrequently in the study area. Greater Gliders *Petauroides volans*, Feathertail Gliders *Acrobates pygmaeus* and Common Brushtail Possums *Trichosurus vulpecula* were recorded on 5%, 12.5% and 7.5% of sites, respectively. A small number of European Rabbits *Oryctolagus cuniculus* was observed at night on tracks through the forest. The rabbit is a favourite prey item of Masked Owls elsewhere (Schodde & Mason 1980; Mooney 1993) but it was not recorded in the diet of the owls at Nullica State Forest

The home range of a pair of Powerful Owls and a pair of Sooty Owls overlapped that of the Masked Owls under study. The two larger owl species were seen or heard within 1 km of the nest tree on several occasions during the study. On 4 November 1994, when an owlet was present in the hollow, a Powerful Owl roosted by day less than 100 m from it but moved away at dusk. The paucity of Sugar Gliders and Common Ringtail Possums in the diet of the Masked Owls at Nullica, despite their availability, supports the notion that all three species of large forest owls may co-exist in the same environments due to partitioning of the prey resource.

Discussion

This paper describes the only two confirmed breeding localities of Masked Owls south of Bermagui in south-eastern New South Wales. There is also a possible record of Masked Owls breeding about 10 km east of Bega (Harriet Swift pers. comm.) and a confirmed record of breeding by Masked Owls outside the region in Kioloa State Forest near Batemans Bay (approximately 100 km north of Bermagui) where at least one young bird was fledged in 1992 (RPK unpubl. data).

Breeding chronology for the Nullica owls in 1990 involved egg laying in late March–early April (assuming an incubation period of 35-42 days, Fleay 1968; Hollands 1991), chicks hatched in early May and fledged sometime between mid-August and late October. The exact period spent in the nest by the 1990 owlets is uncertain but it must have been longer than the 10-12 week period given by Schodde & Mason (1980) and Hollands (1991) because this would have put

fledging at mid- to late July. Evidence of fresh whitewash under the nest tree in mid-February 1991 suggests that some or all of the birds continued to use the nest tree, at least occasionally, for up to six months after fledging. In 1994, fledging occurred in mid-November suggesting that laying occurred about early to mid-July (i.e. three months later than in 1990). The downy fledgling seen at Yambulla State Forest in early November 1987, in comparison with the 1990 and 1994 breeding records, indicates that eggs were laid sometime between April and July 1987. These observations fall within the range of laying dates noted by Olsen & Marples (1993).

It is unknown whether the owls at Nullica bred at a different location during 1991–93. The strong response to playback on 10 March 1992 from the owls 1.5 km upstream from the Nullica nest tree suggests that the birds may have been preparing to lay, or had laid, and that they probably did breed in 1992 at the upstream location. This is corroborated by the evidence of infrequent visitation by the owls to the 1990 nest tree during 1992. If so, this suggests that the owls may breed in alternate years. All previous workers have reported the erratic breeding success of this species (Hill 1955; Fleay 1968; Hyem 1979; Hollands 1991). The numbers of young fledged (two, one and one) is comparable with the numbers observed by Elliot (1935), Hill (1955) and Hyem (1979), but differs from the high reproductive potential observed for this species in captivity when an excess of food is deliberately supplied (Fleay 1968) and at some locations where food may be abundant (e.g. Hollands 1991).

Native small ground-dwelling and scansorial mammals (< 125 g) made up the bulk of the diet of the Masked Owls in Nullica State Forest. None of these prey species is regarded as being dependent on old growth forest for habitat (Recher et al. 1980; Braithwaite et al. 1984; Lunney et al. 1987). No introduced species were recorded. This contrasts markedly with reports of the present day diet of the Masked Owl in Tasmania and on mainland Australia where introduced species (mainly European Rabbits, Black Rats *Rattus rattus* and House Mice *Mus musculus*) may comprise more than three-quarters of the prey taken (Mooney 1993; Peake et al. 1993; Debus & Rose 1994). Some authors (Hyem 1979; Mooney 1993) have suggested that Masked Owls forage mainly in cleared areas compared to within forests (although they may choose nest trees in tall-open forest). The diet of the owls at Nullica indicates that this was not the case in the present study. The habitat of the Dusky Antechinus and the Bush Rat is closely associated with riparian forests, whereas the Brown Antechinus occurs in many habitats but wherever some native tree cover remains (Strahan 1983; RPK unpubl. data). Although some recently logged patches occurred within one kilometre of the nest tree, it is not known whether the owls hunted in these areas.

The apparent rarity of this species throughout its range (Garnett 1992), and in New South Wales in particular (Kavanagh & Peake 1993a; Debus & Rose 1994; Kavanagh & Bamkin 1995; Kavanagh et al. 1995), is not predicted on the basis of its ecological requirements. The Masked Owl exhibits a high degree of flexibility in its diet and habitat, both of which are independent of continuous areas of old-growth forest. The reproductive potential of this owl is high, given an abundant food supply, but this potential may be achieved only rarely in the wild. Some old, hollow trees are required for nesting and roosting but no other limiting factors are known for this species. The Masked Owl appears to be strongly associated with dry open-forest habitats having a sparse understorey that may be more conducive to successful hunting (Davey 1993; Kavanagh et al. 1995). Although there is little evidence from the present study that the owls hunted in such areas (two main prey species were strongly associated with riparian habitats), future work should attempt to quantify differences in prey availability for these owls.

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