Australian Field Ornithology 2013, **30**, 113–125

Observations of Masked Owls *Tyto novaehollandiae* in East Gippsland, Victoria

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Summary. This study reports limited ecological information gathered from opportunistic observations and radio-tracking of Masked Owls *Tyto novaehollandiae novaehollandiae* from coastal forests in East Gippsland, Victoria. Eight mammal species (seven native, one introduced) were detected from 44 dietary items, of which six species and 86% of dietary composition were species that are predominantly terrestrial in habit. Twelve roosting/nesting sites were located; 11 were within eucalypt tree-hollows (of which 10 trees were either dead or partially dead, with significant structural damage), and one roost was within foliage. Observations of apparently aggressive behaviour between the Masked Owl and the Sooty Owl *T. tenebricosa*, following call-playback, are discussed.

Introduction

Masked Owls *Tyto novaehollandiae novaehollandiae* have been the subject of limited ecological study in mainland Australia, primarily owing to their low abundance, nocturnal habits and cryptic behaviour making ecological studies challenging (Debus 1993; Peake *et al.* 1993; Debus & Rose 1994; Kavanagh 1997; McNabb *et al.* 2003). Much information has been collected from disturbed or fragmented forested landscapes (e.g. Kavanagh & Murray 1996; McNabb *et al.* 2003), with few studies conducted within contiguous forested habitats where population densities appear greatest (e.g. Peake *et al.* 1993; Kavanagh 1996; Todd 2006). The Masked Owl is a top-order predator that typically occupies a large home-range, consumes predominantly terrestrial mammalian prey, and requires large hollows in trees for nesting and roosting (Kavanagh 1997, 2002; Higgins 1999; McNabb *et al.* 2003). Several threatening processes exist, including some land-management practices and exotic species (Debus & Rose 1994; Kavanagh & Stanton 2002; DEC 2006), so the limited ecological information that exists is likely to hamper the application of appropriate conservation measures.

The information gathered during this study was collected primarily via opportunistic observations of Masked Owls, and from limited radio-tracking of several individuals.

Study area

Information on Masked Owls reported in this study was collected throughout coastal forests

in East Gippsland, Victoria, south of the Princes Highway from Lake Tyers in the west to the Victoria–New South Wales border in the east. The majority of information, however, was collected from two main regions: Cape Conran Coastal Park and Lake Tyers State Park in East Gippsland. These sites are ~50 km apart, both are situated within 10 km of the ocean at less than 80 m elevation, with limited history of selective logging, and have been subjected to extensive control of Red Foxes *Vulpes vulpes* since 1999 (Murray *et al.* 2006; Dexter & Murray 2009). (It should be noted that most dietary remains collected in the present study at Lake Tyers were from outside the extensively baited area.) At Lake Tyers, the dominant Ecological Vegetation Classes (EVCs) included Lowland Forest (dominated by Southern Mahogany *Eucalyptus botryoides,* Silvertop Ash *E. sieberi* and White Stringybark *E. globoidea*) mainly on ridges, and Limestone Box Forest (dominated by Southern Mahogany*,* Blue Box *E. baueriana,* Coast Grey Box *E. bosistoana* and Mountain Grey Gum *E. cypellocarpa*) typically on the lower-mid slopes, with some gullies containing small pockets of Warm Temperate Rainforest (dominated by Lilly Pilly *Syzygium smithii* and Sweet Pittosporum *Pittosporum undulatum*) and Damp Forest (dominated by Mountain Grey Gum and Messmate *E. obliqua*) (Kemp *et al.* 1994). At Cape Conran, the dominant EVCs include Banksia Woodland (dominated by Yertchuk *E. consideniana,* Silvertop Ash and Saw Banksia *Banksia serrata*) at higher elevations, and Wet Heathland (dominated by Grass-tree *Xanthorrhoea resinosa*, Scented Paperbark *Melaleuca squarrosa* and Scrub Sheoak *Allocasuarina paludosa*) typically restricted to swales between coastal dunes. Riparian Forest (dominated by Mountain Grey Gum*,* Southern Mahogany and Kanooka *Tristaniopsis laurina*) occurs adjacent to the Yeerung River, which flows through the study area, and the tributaries of the Yeerung River contain Riparian Scrub (dominated by Scented Paperbark and Tall Saw-sedge *Gahnia clarkei*) (Bramwell *et al.* 1992).

Methods

Information on Masked Owls was collected primarily via two methods: opportunistic observations during substantial nocturnal fieldwork primarily relating to other large forest owl species (Sooty Owl *Tyto tenebricosa tenebricosa* and Powerful Owl *Ninox strenua*), and an attempt to radio-track several individual Masked Owls (radio-tracking failed to exceed ~3 days). All data were collected between January 2007 and September 2012, with information from radio-tracking and call-playback collected between 1 February 2007 and 29 January 2008.

The technique used to capture Masked Owls involved suspending a net (10 × 12 m) in the canopy of the forest and broadcasting pre-recorded Masked Owl calls through one of three megaphones positioned around the net. The playback calls were used to lure the bird towards a particular megaphone and for the net to intercept its flight-path (see Kavanagh 1997; Soderquist & Gibbons 2007; Bilney *et al.* 2011a). A 25-g backpack-style radio-transmitter (manufactured by Titley Electronics, Ballina, NSW) was attached to an Owl using a weak-link harness and crimps (brass tubing) (see Karl & Clout 1987).

A hand-held three-element Yagi aerial and Telonics (Tr-2) radio-receiver were used to obtain radio signals from radio-tagged owls. The location of radio-tagged owls was determined primarily by triangulation of signals, using compass bearings of the direction of strongest signals from three different locations (within 10 min.). Roosting sites were located by following the signal emitted from the transmitter to the individual roost-tree.

Once roost-trees were identified, measurements taken included: height of the roost-hollow above the ground, measured using a clinometer; tree species and diameter at breast height; type of hollow (based on its entrance, i.e. spout/branch, chimney/vertical or trunk); aspect of the roost-hollow (i.e. compass direction that entrance faced); and health of tree (dead or alive). Some trees could be climbed, and the internal dimensions of hollows

(including height, width, depth and floor dimensions) measured. Heights of roost-trees were not measured as most were missing a substantial proportion of the main trunk.

The contents of regurgitated pellets were analysed to identify prey items. Skeletal remains were identified to species, based on comparisons with a reference collection (from Museum Victoria). Determining the minimum number of individual prey items per pellet involved counting the most numerous left or right skeletal element present. Hair/fur from prey remains was identified under a microscope, based on descriptions by Brunner & Coman (1974).

Results

Short-term movements of Masked Owls

Radio-transmitters were attached to four Masked Owls (one female, three males; three other males were captured, but released without transmitter attachment because they weighed <500 g and transmitters exceeded 5% of the Owl's body weight). Each male removed its harness/transmitter within 1–3 days, and the transmitter on the female failed soon after attachment, resulting in only three nights of tracking. Although no useful information regarding home-range size was obtained, limited ecological data could be collected. Combining observations from all four radio-tracked Owls, there was a total of 21 nocturnal and 14 diurnal location fixes. All records were located within contiguous forest, and three of the four Owls traversed considerable distances in the limited time that they were radio-tracked (2715–5165 m between farthest location fixes). In addition, an uncaptured male Owl was observed at two different locations ~4 km apart on consecutive nights (it responded to call-playback and was photographed and could be identified from its distinctive plumage).

Body weight

The captured female weighed 650 g and was noticeably underweight (in poor condition). Six males averaged 499 g (± 34 g standard deviation, range 460–550 g).

Diet

Forty-four prey items of the Masked Owl were identified from 25 regurgitated pellets (attributed to Masked Owl based on activity at the site), two observations of Owls feeding and two samples of fur collected at apparent feeding sites (Table 1). Three pellets were collected from a roost-hollow, two were regurgitated from an Owl soon after it was taken to an animal-rehabilitation shelter (i.e. before it was fed in care), one from below a eucalypt roost-hollow, and 19 from a foliage roost-site (collected on 22 August 2012). One fur sample was collected beneath a suspected nest-tree, and the other at a presumed prey-kill or feeding site where the Owl's transmitter and harness had been removed. In the latter case, the harness was found on a log covered in and surrounded (within <20 cm) by a substantial amount of Greater Glider *Petauroides volans* fur in numerous clumps (suggesting that the Glider had been plucked and eaten by a raptor), beside five patches of apparent tytonid faeces. The evidence therefore strongly implicates the Masked Owl as having fed on the Greater Glider.

Table 1. Prey items of Masked Owls from coastal forests of East Gippsland, Victoria.

Species	*Lake Tyers*	*Cape Conran*	*Total (%)*
Agile Antechinus *Antechinus agilis*	12	3	15 (34.1)
Dusky Antechinus *Antechinus swainsonii*	1	2	3 (6.8)
Long-nosed Bandicoot *Perameles nasuta*		1	1 (2.3)
Sugar Glider *Petaurus breviceps*	5		5 (11.4)
Greater Glider *Petauroides volans*	1		1 (2.3)
Long-nosed Potoroo *Potorous tridactylus*		1	1 (2.3)
Bush Rat *Rattus fuscipes*	14	2	16 (36.4)
House Mouse *Mus musculus*	2		2 (4.5)
Total prey items	**35**	**9**	**44**

In total, eight mammal species were detected in the diet of the Masked Owl, with the Bush Rat *Rattus fuscipes*, Agile Antechinus *Antechinus agilis* and Sugar Glider *Petaurus breviceps* being the main dietary items. Terrestrial species (including the scansorial Agile Antechinus) dominated the diet, at 86% by number (Table 1).

Roosting and nesting

From all radio-tracked Masked Owls combined, eight individual roost-/nest-sites were located, all of which were within eucalypt hollows. From opportunistic observations on other Owls in the study area, two more eucalypt roost-sites were located, one by accidentally flushing an Owl from a eucalypt hollow, and the other (in an area frequented by two recently fledged juvenile Owls) where a single regurgitated pellet and whitewash (excreta) were located under a presumed roost-hollow. A suspected nest-tree was located after hearing repetitive begging calls from an apparently pre-breeding female. An Owl was located roosting ~3 m above ground within dense foliage of a Black Sheoak *Allocasuarina littoralis* <3 m from a bitumen road; nineteen recently regurgitated pellets were collected at this site, indicating frequent use of this roost.

Of the 11 roost-/nest-sites located in eucalypt hollows, the height of the hollow-entrance above ground averaged 14.1 m ± standard deviation 4.4 m, and the diameter of the tree at breast height averaged 110 ± 26 cm (Table 2). Chimney hollow types were used on seven occasions, and trunk hollows on four occasions. No roosts were recorded in spout/branch hollows. The health of roost-trees indicated that five were dead and a further five either had dead tops or had experienced severe damage so much of the tree crown was missing. Only one of the 11 trees had a live entire trunk. Roost-hollows were found within three eucalypt species (Yertchuk, Silvertop Ash and Mountain Grey Gum), but three dead trees could not be identified to species.

A suspected nest-tree was located on 29 July 2007, a radio-tracked adult male Masked Owl having roosted therein. A second Owl was also observed roosting

Table 2. Characteristics of eucalypt roost- and nest-trees used by Masked Owls in coastal forests in East Gippsland, Vic., at Cape Conran (CC), Lake Tyers (LT) and Howe Range (HR). * = suspected nest-tree. Tree—Species: E = *Eucalyptus* sp., M = Mountain Grey Gum, S = Silvertop Ash, Y = Yertchuk; DBH = diameter at breast height (cm); Status/health: BT = broken top, DS = dead stump, DT = dead top, L = live. Hollow—HH = height above ground (m); type: C = chimney, T = trunk; A = aspect (compass direction that hollow faces); dimensions (cm) of chamber: H = height, W = width, D = depth and F = dimensions of floor.

Location	*Tree*			*Hollow*						
	Species	*DBH*	*Status/ health*	*HH*	*Type*	*A*	*H*	*W*	*D*	*F*
CC	Y	102	L (BT)	15.3	C					
CC	Y		L (DT)	6.5	T	W				
CC	E	62	DS	7	C				350	
LT	S	122	L (DT)	18.4	T	SW				
LT	S	110	DS	14.5	C					
LT	M	108	DS	14	C					
LT	M	100	L (BT)	13	C					
LT	M*	91	L (BT)	19.2	C			16	205	40 × 50
LT	M	161	L	15	T	E	38	32	375	99 × ?
LT	E	110	D	12	T	W				
HR	E*	130	DS	~20	C					

within the same hollow, but its sex and age could not be determined. There was also a large scattering of Masked Owl whitewash around this tree, indicating long-term occupancy of the site. This second Owl was observed on three nights (over a period of several weeks) to roost within the tree, and it stayed within close proximity of the nest-hollow. The tree was climbed in May 2008, when there was no recent Masked Owl activity at the site.

On 4 April 2011, repetitive Masked Owl begging calls were heard coming from a hollow inside a large dead eucalypt. Upon closer inspection of the tree, an adult female emerged from a hollow and was joined by an adult male, and both reacted with aggression/agitation to the presence of the observer. Breeding at this site was unconfirmed, but behaviour suggested an early stage of breeding.

The only confirmed successful breeding event recorded (close to fledging) was of two (one male, one female) recently fledged juveniles that were suspected of fledging in October (see also Hollands 2008).

Observations of interactions between Masked and Sooty Owls

Responses to call-playback

While conducting call-playback for large forest owl species (while attempting to

capture owls or to determine their presence at a location), it was often noticed that Masked Owls (and, to a lesser extent, Sooty Owls) responded to broadcast calls (by calling immediately and/or approaching the megaphone) of the other *Tyto* species, and often before calls of their own species were broadcast. Although a quantified assessment of the frequency of responses was not conducted for all playback surveys, observations were made of interactions between Masked and Sooty Owls as they responded to call-playback around Cape Conran Coastal Park between 26 July 2007 and 29 January 2008. The surveys were conducted across 14 different locations within an area of ~4500 ha (5 × 9 km), where possibly five pairs of Masked Owls (five male Masked Owls were captured) and at least four pairs of Sooty Owls were known to inhabit the area. Call-playback was used on 26 occasions (20 for Sooty Owl, 24 for Masked Owl), with both *Tyto* species' calls broadcast on 18 occasions (only one species broadcast on eight occasions). When the calls of both species were broadcast, at least one owl species responded on 89% of occasions, and both species responded on 33% of occasions. Sooty Owls responded on 70% of occasions when Sooty Owl playback was broadcast, whereas Masked Owls responded on only 46% of occasions when Masked Owl playback was broadcast. Sooty Owls responded on 17% of occasions when Masked Owl playback was broadcast, and Masked Owls responded on 25% of occasions when Sooty Owl playback was broadcast.

On three occasions, Sooty Owl playback induced Masked Owls to approach and call before Masked Owl playback was used and before Sooty Owls responded. On two of these occasions, after broadcasting several calls of the Sooty Owl, Masked Owl calls were then broadcast in an attempt to catch the responding Masked Owl, resulting in a Sooty Owl responding to the Masked Owl playback. On both of these occasions, both species came within 50 m of the net, and male Masked Owls were captured.

On one occasion following Masked Owl call-playback, a male Masked Owl approached within 20 m of the net but showed little interest in approaching closer. After a short break of silence (several minutes), Sooty Owl calls were broadcast, and the Masked Owl was seen to be agitated and unsettled, flying around more frequently, and soon flew directly towards the Sooty Owl broadcast calls and into the net.

On one occasion a pair of Masked Owls, and a pair of Sooty Owls with their recently fledged juvenile, were within ~50–100 m of the net. Both species reacted strongly to calls of the other species (both broadcast calls and calls emitted by the owls themselves). However, the male Masked Owl was the only owl captured on that occasion (although previously both adult Sooty Owls had been captured at this site).

On two additional occasions, Sooty Owls responded to Masked Owl call-playback but no Masked Owls responded. Although Sooty Owls occasionally responded to Masked Owl calls, their responses never appeared to be as aggressive as when Masked Owls responded to Sooty Owl calls.

Additional observations of interactions

In April 2008, as preparations were being made to climb a Mountain Grey Gum and measure a roost-hollow known to be used by a Sooty Owl (observed to be used on eight occasions between 15 November 2006 and 9 January 2007), a Masked Owl flushed from the hollow.

For ~4 months (from 19 April 2007 to 28 August 2007), a radio-tagged female Sooty Owl had rarely been observed away from a nest-site. After dusk on 28 August 2007, a listening survey was conducted near the tree, to establish whether a nestling was present. Approximately 90 minutes after dusk, and when the female had flown several hundred metres from the nest, a descending whistle was given by RJB in an attempt to provoke a begging-call response from a nestling (if present). Almost immediately, a male Masked Owl landed ~5 m away from the observer (<30 m from the Sooty Owl nest). Shortly afterwards, a pair of Masked Owls was calling frequently 30–100 m from the Sooty Owl nest. About 6 weeks later, the female Sooty Owl was found dead (~200 m from the nest-tree; the cause of death was unknown, and the carcass had obviously been scavenged), breeding had failed and again, after dark, the pair of Masked Owls was present and vocal within 100 m of the Sooty Owl nest-tree. No further listening surveys were conducted at the site until ~14 months later, when a juvenile Masked Owl was heard calling in the area.

Discussion

The coastal forests of East Gippsland appear to support the highest population densities of Masked Owls in Victoria (Peake *et al.* 1993; McIntyre & Henry 2002; Shedvin *et al.* 2003). They support dense understorey vegetation and have a relatively high density and diversity of native terrestrial small mammals (Bramwell *et al.* 1992; Dexter & Murray 2009), which are the main food source of Masked Owls (Higgins 1999; Kavanagh 2002; McNabb *et al.* 2003; Kavanagh *et al.* 2008). It has been suggested that ecotones, forest edges and open habitats may be favoured by Masked Owls (Peake *et al.* 1993; Kavanagh & Murray 1996; McNabb *et al.* 2003; Shedvin *et al.* 2003; Hollands 2008), but this theory appears inconsistent with patterns observed in this study where all known pairs (~15 from Lake Tyers and Cape Conran combined), and all location detections from radio-tracking (21), were centred entirely within structurally dense forested habitats. These observations are consistent with those of Todd (2012), who found that in Tasmania there was a higher likelihood of detecting Owls in mature eucalypt forest (no clearing, limited previous logging activity) compared with forest edges. Instead, it appears likely that prey availability dictates habitat usage.

Although dense vegetation may be difficult for Masked Owls to hunt in, this is likely to be offset by the higher densities of native terrestrial prey species that typically occupy structurally complex habitats (e.g. Catling & Burt 1995). On the other hand, in structurally open habitats such as woodlands and fragmented forested landscapes (e.g. near farmland), densities of native terrestrial mammals are typically low, and exotic mammals are instead common (especially Rabbits *Oryctolagus cuniculus*, Black Rats *Rattus rattus* and House Mice *Mus musculus*),

Figure 1. Male Masked Owl, East Gippsland, Vic., March 2011. Photo: Rohan J. Bilney

Figure 2. Male Masked Owl, Cape Conran, Vic., 16 November 2007. Photo: Rohan J. Bilney

which is reflected in the diet of Owls from such environments (Kavanagh & Murray 1996; McNabb *et al.* 2003). However, on eight occasions during this study, Owls were opportunistically observed perched along roads, suggesting that these Owls readily take advantage of these unnatural open areas for foraging in otherwise dense forest.

The small sample of Masked Owl prey remains collected during this study is consistent with previous dietary studies, where a wide range of terrestrial mammal species dominates the Owl's diet (Higgins 1999; Kavanagh 2002; McNabb *et al.* 2003; Kavanagh *et al.* 2008). Of particular interest was the apparent consumption of a Greater Glider, a species that has never previously been detected in the Owl's diet, and which seems a rather unusual prey item (e.g. Higgins 1999; Kavanagh 2002). The Greater Glider is virtually exclusively arboreal in habit, and in August (when this apparent predation occurred) only adult or subadult Gliders exist in the population, and all of these would typically exceed 800 g in body weight (Tyndale-Biscoe & Smith 1969), dramatically exceeding the weight of the male Owl responsible (520 g). Although the evidence for consumption of the Greater Glider by the Masked Owl is circumstantial, an alternative explanation that a different raptor species consumed the Glider at the precise location where the Masked Owl harness was removed seems highly unlikely. It is possible that the Glider was sick or injured, possibly even on the ground and more susceptible to predation by the Owl.

Most of the Masked Owl roosting/nesting sites within hollows (10 of 11) were in dead or severely damaged (i.e. with a significant proportion of the tree dead) eucalypts. If this small sample is representative of typical roost-/nest-trees utilised by Masked Owls, this finding potentially presents a conservation and management concern. These trees are likely to suffer a high attrition rate, being highly susceptible to fire (wildfire and prescribed burns), storms (especially after substantial rainfall) and decay. Yet, it was also apparent that major trauma/damage had been sustained by virtually all roost-/nest-trees, by events such as storms, wildfire or disease, which had contributed to their death, partial death or major structural damage. The presence and height of burnt wood from previous wildfires was apparent on many of the roost-trees, indicating their exposure to intense fires in the past, and that fire can play an important role in the formation of potential roost-/nest-trees (e.g. Gibbons & Lindenmayer 2002). A management concern therefore exists regarding the frequency of fire in the landscape, as frequent fires may reduce the number of potential roost-trees available.

There are many reports of Masked Owls roosting in dense foliage of trees, including in East Gippsland (Debus 1993; Peake *et al.* 1993; Higgins 1999). However, we knew of only one Masked Owl foliage roost (reported to us on 22 August 2012), despite conducting hundreds of surveys specifically targeting dense vegetation and searching for roosting owls, throughout East Gippsland (mainly between the Mitchell and Snowy Rivers), between 2003 and 2008. In contrast, a total of >500 foliage roosting sites of Sooty and Powerful Owls combined was located during these surveys (see L'Hotellier 2008; Bilney *et al.* 2011b). We suggest, therefore, that hollows are the preferred roosting location for Masked Owls in this region, and that foliage roosting sites are rarely used.

Interactions between Masked and Sooty Owls have rarely been discussed in the literature (see Higgins 1999), and there appears to be no previous mention of apparently aggressive interactions. Hyem (1979, p. 23) mentioned a Masked Owl occupying a nest-tree previously used by a Sooty Owl, with both species nesting ~200 m apart, yet made no observations of interactions between the two species, suggesting that they co-exist 'quite amicably'. Although our observations were only of apparently aggressive vocalisations rather than displays of physical altercations, and mainly in response to call-playback, it appeared that aggression exists between these species. Cape Conran supports high population densities of both Masked and Sooty Owls, and it is likely that interspecific aggression helps these species co-exist (e.g. Orians & Willson 1964; Gerstell & Bednarz 1999). Typically, when similar species co-exist they utilise resources such as habitat or prey differently to minimise competitive interactions (Pianka 1973; Schoener 1974, 1982). However, there is likely to be substantial resource-use overlap between Masked and Sooty Owls, especially in relation to diet (Kavanagh 1997, 2002; L'Hotellier 2008). Although the sample size was small, the characteristics of roost-/nest-trees and hollows utilised by Masked Owls (usually dead or partially dead trees with vertical hollow-entrances) differed from that typically used by Sooty and Powerful Owls in the same area (usually live trees with trunk and spout hollow-entrances) (e.g. Bilney *et al.* 2011b).

We advise caution to inexperienced surveyors conducting call-playback surveys for large forest owls in south-eastern Australia, as a responding *Tyto* owl may not necessarily be the same species whose call is being broadcast. This can be further confused when some Sooty Owl calls (of adults and, especially, juveniles) could readily be confused with Masked Owl calls.

If the Masked Owl is to be appropriately conserved, there is a desperate need to improve our ecological understanding of this species, especially from contiguous forested ecosystems in south-eastern Australia and in relation to land-management practices (especially fire regimes, logging and long-term predator-control programs). Radio-tracking studies appear fundamental to this research, owing to the highly cryptic nature of the Masked Owl and its propensity for roosting in hollows. There is a need to understand its population size (and long-term fluctuations), home-range size and resource use, including macro- and micro-habitat usage, so land managers can make informed decisions when trying to conserve this species.

The current *Flora and Fauna Guarantee Act 1988* Action Statement for the conservation of the Masked Owl in Victoria recommends conserving sufficient habitat for 150–170 pairs across the state (only 50–70 outside East Gippsland) (Shedvin *et al.* 2003). This figure is potentially well below viable population levels, and much lower than aspirational (or target) conservation population levels for other more abundant large forest owl species (500 for the Powerful Owl and Sooty Owl: Webster *et al.* 1999; Silveira *et al.* 2003). Although this figure is possibly a reflection of the Masked Owl's current low population density, it is important to recognise that current population levels of this species are almost certainly artificially low, being constrained primarily by limited food availability (following widespread severe terrestrial mammal declines since European settlement),

rather than being limited by habitat availability (e.g. Peake *et al.* 1993; Bilney *et al.* 2010). This aspect is particularly relevant to structurally open habitats, such as woodlands and dry forest, that have suffered the greatest mammal declines in temperate Australia (Bilney *et al.* 2010), and Masked Owls are now rare in such habitats (Peake *et al.* 1993). Conservation management targets should instead cater for a potentially larger population, to anticipate population recovery, especially when an objective of the Action Statement is to 'increase population numbers in potentially suitable areas' and 'return the species to a secure conservation status in the wild' (Shedvin *et al.* 2003, p. 4). We therefore recommend that all confirmed resident pairs of Masked Owls throughout the state should be allocated a similar level of habitat protection (e.g. minimum of 500 ha Special Protection Zone in state forest) and should not be restricted by the arbitrary targets currently allocated. It should also be recognised, however, that habitat protection alone is unlikely to achieve these desired conservation outcomes.

With conservation of Masked Owls inextricably linked to that of small terrestrial mammals, controlling exotic predators is likely to be the most fundamentally important strategy for conservation of this species, because of the adverse impacts that exotic predators have on populations of small mammals (Dexter & Murray 2009). The implementation of long-term fox-baiting at Cape Conran and Lake Tyers has increased densities of some terrestrial mammals, including the Long-nosed Potoroo *Potorous tridactylus* and potentially the Long-nosed Bandicoot *Perameles nasuta* (Murray *et al.* 2006; Dexter & Murray 2009), both of which were recorded in the diet of Masked Owls, in a very small sample from the baited areas in this study.

Acknowledgements

We are grateful to Roger and Carolyn Bilney, Lavina L'Hotellier, Raylene Cooke, John White and Mike Irvine for their assistance throughout this study. Particular thanks go to Roger Bilney and students from Forestec TAFE for locating the foliage-roosting Masked Owl and allowing us to include the relevant ecological information in this paper. Many thanks go to David Hollands for field assistance and to Victor Hurley for climbing several roost-/nest-trees. Thanks go to Rod Kavanagh, Ed McNabb and Mick Todd for their valuable comments to improve this paper. Funding provided by the Holsworth Wildlife Research Endowment, Stuart Leslie Bird Research Fund and Parks Victoria Research Partnership Program was greatly appreciated. Research was undertaken using Department of Sustainability and Environment research permit numbers 10005288 and 10003726, with ethics approval A22/2006 from the Deakin University Animal Welfare Committee.

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Received 2 May 2012 ■