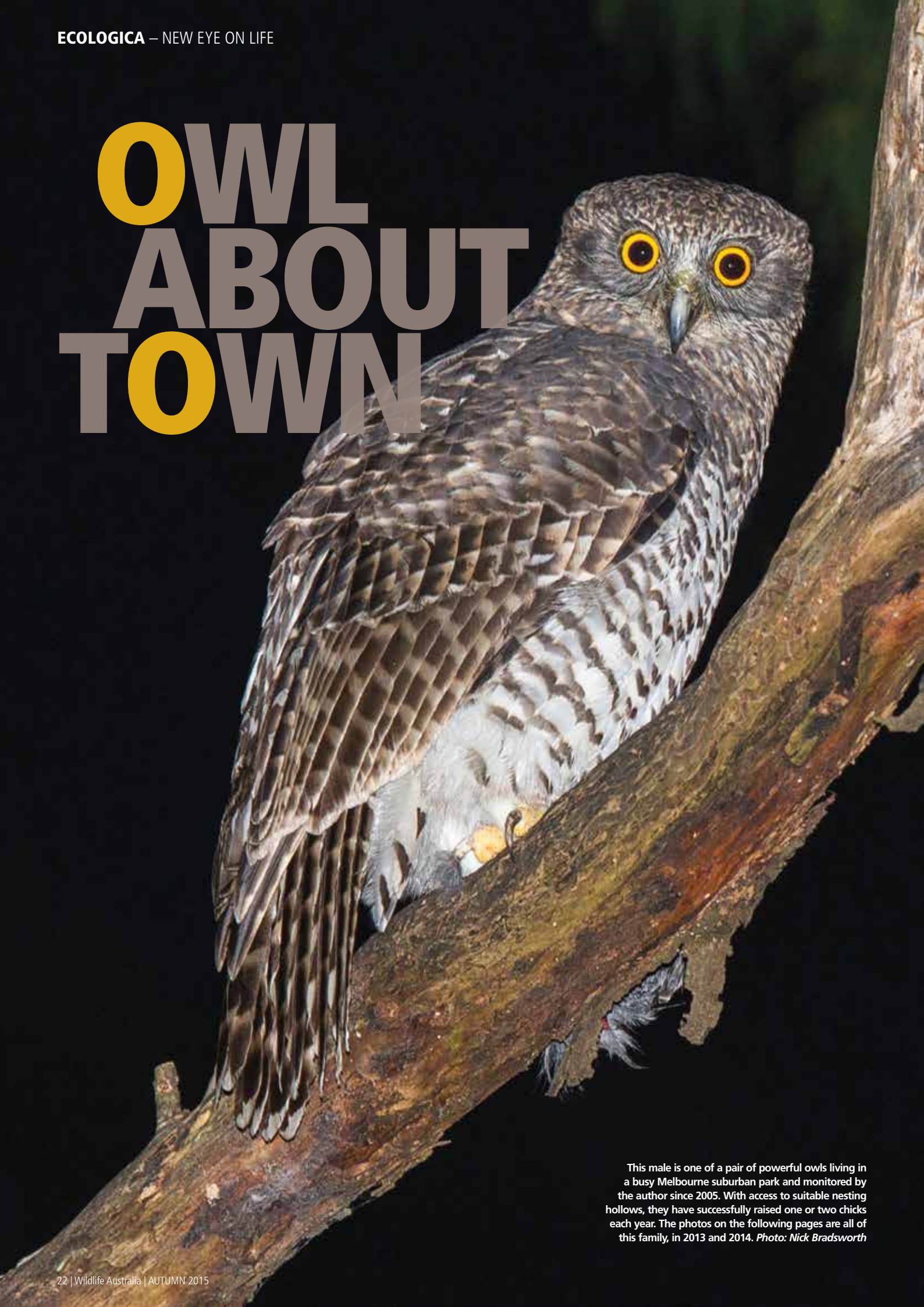
OWL ABOUT TOWN



This male is one of a pair of powerful owls living in a busy Melbourne suburban park and monitored by the author since 2005. With access to suitable nesting hollows, they have successfully raised one or two chicks each year. The photos on the following pages are all of this family, in 2013 and 2014. *Photo: Nick Bradsworth*

Powerful owls start courting in March or April and the female lays two eggs in May or June in a deep hollow. While incubating the eggs she leaves only briefly each evening to feed and bathe. After the chicks hatch, she stays in the nest another month or so to brood and feed them, before returning to roost nearby with her mate. The hollow shown far right, with a pre-fledging chick at the entrance, was lost after the 2013 breeding season when the crown snapped off. At right, the female is shown emerging from the hollow used in 2014. *Photos: Nick Bradsworth*

Spatial ecologist **Bronwyn Isaac** considers whether powerful owls are making good lifestyle choices by moving to the suburbs.

In 2005 a pair of powerful owls were found residing in Blackburn, a leafy suburb just 17 kilometres from Melbourne's central business district. A band on the female's leg indicated she had been born in Lysterfield, a bushy region on the outskirts of Melbourne. The owls (monitored by researcher Ed McNabb and locals) seemed to be faring well in suburbia, with lush trees of all shapes and sizes for roosting, and lots of common brushtail and ringtail possums for eating.

In autumn, they began courting. They exchanged soft 'whoo-whoo's at dusk and snuggled together in their roost, then progressed to heartfelt bleating, mutual preening and the male presenting food gifts to prove his prowess for supporting offspring. She was obviously receptive to his charms, and breeding commenced in earnest.

However, it was all in vain. The female could be seen searching all the local eucalypts, and she even tried to enlarge a hollow in a swamp gum, but nowhere could she find a hole big enough to lay her eggs and rear chicks. Powerful owls need a hollow at least one metre deep and with an entrance at least 30 centimetres across, the sort that takes 300 to 400 years to develop.

Some urban parklands provide powerful owls with all their nesting as well as food needs. But the Blackburn pair seem to have been enticed by abundant prey and roost trees into choosing a territory that stymied their chances of reproducing. In other words, they were probably caught in an 'ecological trap'.

The Blackburn pair may not be an isolated example. The range of powerful owls – from Cathu (near Eungella) in Queensland to the Victorian border with South Australia, mostly east of the Great Dividing Range – overlaps with Australia's densest human populations, and these owls are increasingly being sighted in the suburbs of our largest cities. Is this trend good for the future of powerful owls?

Cities as sources, sinks and traps

World-wide, more than half the human population lives in cities and towns. In Australia that proportion is almost 90 percent. Until a few decades ago, urban environments were thought to be universally bad for nature. We now know that some wildlife survive and even thrive among us. For opportunistic species such as common brushtail and ringtail possums, cities function as 'sources', providing all they need to live and reproduce. These possums, as well as some birds and lizards, have higher densities and more stable populations in suburbia than in more natural habitats.

However, the mere presence of wildlife in cities does not indicate that urban living is good for them. Some animals inhabit cities only when no better habitat is available. Urban habitats become 'sinks' if they require regular immigration from elsewhere for these populations to remain viable and will only be used when better habitat is already taken.

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In some cases, animals do not realise that urban areas are deficient and choose them even when better habitats are available. For them, cities become 'ecological traps'. Whether consciously or not, animals select habitats based on cues (such as prey abundance or vegetation structure) which in their evolutionary past have correlated with high quality habitat. But in highly modified areas these cues can become unreliable, and lure animals into sites that lack critical resources or have high risks. A trap differs from a sink because animals are being fooled into believing that it is good habitat.

Although ecological traps may be fairly common in rapidly changing environments, they are notoriously difficult to prove, for animals cannot tell us how they decide where to settle, and comparing how animals fare across different habitats requires a lot of data. Several possible cases of ecological traps have been documented. In Tucson, Arizona, an abundance of doves and tall nesting trees (mostly introduced eucalypts) have brought large numbers of Coopers hawks to the city, where they are in higher densities and bear larger ▸

While the female is incubating eggs or brooding chicks, she leaves the nest only briefly each night, usually first joining her mate for some affectionate bleating and preening. Here, she preens him. *Photo: Nick Bradsworth*

Powerful owls are Australia's largest owls, standing up to 65 cm high, weighing up to 1.7 kg, and with a wingspan up to 1.4 m. They are thought to live as long as 30 years. *Photo: Nick Bradsworth*

clutches than their non-urban kin. But a parasitic disease caught from the doves, which are their major prey in urban but not rural areas, kills 40 percent of the nestlings. Another likely trap is the preference of Cape vultures in some parts of southern Africa for high voltage electricity towers instead of trees as foraging perches. Hundreds of young vultures are electrocuted each year.

Urban areas are likely to be a major source of ecological traps, particularly for raptors, because they can offer large, stable populations of prey and plenty of roosting or nesting sites (often artificial), but are also full of hazards. Roads and residential developments may mean more prey but also a greater chance of collisions with vehicles; power poles provide great nesting and foraging sites but electrical wires can be deadly; and abundant prey species that are considered pests may lead to second-hand poisoning.

The consequences of ecological traps could be serious for species at low population densities, like many raptors, because with limited competition for space they have more opportunity to act on maladaptive habitat choices, and are more susceptible to declines. Conserving quality habitats may not work to stop decline when they choose to live in poor quality habitats.

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Until around 20 years ago it was thought that powerful owls could live only in intact forests. But they have become an increasing presence in suburban Melbourne, Sydney and Brisbane. Is this a positive example of wildlife adapting to us or a cause for concern? What will be their fate as cities grow ever bigger in eastern Australia? In 2006 I embarked on a project to find out whether urban areas can create ecological traps for powerful owls.

Studying a difficult species

Australia's largest owl, the powerful owl has a wingspan of up to 1.4 metres. Its formidable feet have long toes adorned with razor-sharp talons for capturing and incapacitating prey, and the short beak is robust for tearing flesh. If size alone is not enough to convince you of their appeal, they also have luminous golden eyes and bright yellow feet.

As an apex predator they were always sparse, but they have become much rarer due to clearing of forests and woodlands, and are listed in Victoria and New South Wales as vulnerable. Victoria is thought to have as few as 500 pairs.

Within their territory, which they defend year round, powerful owls have numerous day and night roosting sites to suit different weather conditions. This is a nocturnal roost shared by the male and female. Powerful owls are thought to be monogamous but will replace a mate who dies. *Photo: Nick Bradsworth*

When there are chicks to raise, the male does most of the hunting and passes the prey – here, a ringtail possum – to the female to feed herself and the chicks. These chicks fledged a week apart but only one survived. Powerful owls ambush their prey in trees. They eat mainly possums and gliders – up to 250 a year for a breeding pair – but also birds, flying-foxes and insects. *Photos: Nick Bradsworth*

Understanding whether they are capable of both surviving and reproducing in urban environments is important not only because they are regionally threatened, and cities and towns are expanding, but because they are ecologically influential. Their hunting helps maintain 'trophic balance' by keeping populations of plant-eating possums in check. A breeding pair can eat some 250 possums and gliders a year.

As rare, nocturnal, shy and highly mobile animals with large territories (typically about 1000 hectares) – who don't like responding to call playback – powerful owls are difficult to study. The only feasible way to obtain the information I needed was to model potentially suitable habitat based on representative sites in my 370,000 hectare study area in south-eastern Victoria. Although modelling is cost-efficient and useful, it has pitfalls because it is based on a simplistic representation of complex environments and cannot include all the facets of the real world that might influence distribution (such as competition, predation, prey abundance and breeding resources). Models often over-predict available habitat.

Ideally, to develop a model I would have contrasted sites where powerful owls were present and absent. But determining their absence is too difficult. They fly silently and often utter no sound. One researcher suggested that a site has to be surveyed 18 times to be 90 percent confident of their absence. So, I had to base my models only on sites where they were present.

From 2006 to 2010, I visited more than 250 parks and reserves across a gradient of urban to forest habitats, using call playback at night. I found 50 owls and supplemented this with reliable sightings by others since 1997. To compare the resources available for powerful owls in urban, urban-fringe and forest areas, I surveyed 54 sites for their prey (gliders and possums) and hollows (large ones potentially suitable for them to nest in and smaller ones suitable for possums and gliders), and then modelled the associations between the presence of powerful owls, their prey, large hollows and habitat characteristics such as vegetation density and distance to water. By identifying where powerful owls, their prey and hollows occur I was able to produce maps showing where these owls can theoretically live and breed based on the presence of these resources.

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The pros and cons of city living

The habitat models showed a high potential for cities to become ecological traps for large owls. In my study area, most urban, urban-fringe and forest areas were likely to have possum and glider prey as well as roosts to sustain the owls on a daily basis, but urban areas had very few large hollows. Little more than 10 percent of the urban area may support breeding compared to about half the urban-fringe area and more than 90 percent of the forest.

In forests powerful owls have much more varied diets but cities offer higher prey densities due to the large populations of ringtail and brushtail possums. That this narrow diet can sustain them over long periods is suggested by regular sightings since 1964 of a powerful owl in the Melbourne Royal Botanical Gardens (although undoubtedly not the same bird).

All this prey in cities could help powerful owls if urban areas function mainly as refuges or short term habitat until sites with hollows become available. But it is maladaptive if it leads to long-term occupation without breeding. In Melbourne, only a few parks, such as Wilson's Reserve in Ivanhoe and other areas along the Yarra River, provide suitable hollows. Most urban bushland areas were logged during European settlement, and large trees or limbs are often removed today because they are hazardous to people.

A more practical option is to offer nest boxes. For their second breeding season, researchers provided the Blackburn pair with three boxes, two in native gums and another in an exotic pine tree. While the owls showed interest in the boxes almost straight away they did not successfully breed in one (in the pine tree) until 2007. So, nest boxes may be the answer, provided there are no hazards, such as electrocution, collisions, poisoning or disease, to undermine their urban future. ■

READINGS: Isaac B, Cooke R, Ierodiaconou D, White J. 2014. Does urbanization have the potential to create an ecological trap for powerful owls? *Biological Conservation* 176: 1–11 ■ McNabb E, Greenwood, J. 2011. A powerful owl disperses into town and uses an artificial nest-box. *Australian Field Ornithology* 28: 65–75.

DR BRONWYN ISAAC completed her undergraduate studies and PhD at Deakin University. Her PhD research focused on how powerful owls are responding to urbanisation. Although she originally wanted to work with small mammals, once she saw her first powerful owl she was hooked.