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A Powerful Owl Disperses into Town and Uses an Artificial Nest-box

ED McNABB[1] and JIM GREENWOOD[2]

[1]Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, P.O. Box 137, Heidelberg, Victoria 3084 (Email: Ed.McNabb@dse.vic.gov.au)
[2]34 Beatty Avenue, Bittern, Victoria 3918

Summary

A female Powerful Owl *Ninox strenua* was banded as a nestling at Lysterfield, Victoria, in 2001. She was found in 2007, 19 km south-west of her natal site, in the Melbourne suburb of Blackburn, nesting in an artificial hollow, where subsequently one young was successfully raised. The nest-box was provided by a local community group after becoming aware that the Owls were attempting to breed at a site where suitable hollows are scarce. Nest-box design is presented, and issues relating to the use of nest-boxes are outlined.

Introduction

The Powerful Owl *Ninox strenua* is listed as *least concern* in Australia (Garnett & Crowley 2000) and *vulnerable* in Victoria (DSE 2007). In Victoria, Powerful Owls occupy large forested home-ranges ~300 ha to >4000 ha (Kavanagh 1997; Soderquist & Gibbons 2007), where old hollow trees provide nest-sites (Higgins 1999). Webster, Humphries & Lowe (1999) stated that 'the Powerful Owl generally favours dense gullies for roosting and breeding sites. It prefers older forests where large tree hollows provide nesting sites and arboreal prey items are plentiful'. Suitable nesting hollows for Powerful Owls occur in large old, often senescent trees (Higgins 1999), and loss of such hollow-bearing trees has been identified as a *potentially threatening process* (DSE 2009). Although artificial nest-hollows (nest-boxes) have been tested for a large range of hollow-dependent fauna, including some Australian owl species, e.g. Southern Boobooks *N. novaeseelandiae* (Olsen 1996) and Masked Owls *Tyto novaehollandiae* (Thomson 2006), only one report (McNabb & Keating 2008) has been published to date on use of nest-boxes by Powerful Owls.

This paper provides further information regarding a breeding event by a pair of Powerful Owls in an area where suitable roosts and prey were available but suitable nesting hollows were lacking. It also provides detailed information regarding the construction and installation of the nest-box, and discusses issues regarding the use of such boxes. This paper also reports the dispersal of a female Powerful Owl from her natal site into suburban Melbourne, where she successfully raised one chick in the nest-box.

Background

Over recent decades, Powerful Owl sightings in urban environments have become increasingly common (e.g. Pavey 1995; Webster, Cooke *et al.* 1999; Cooke 2000; McAllan & Larkins 2005; Menkhorst *et al.* 2005; McNabb *et al.* 2007), where leafy suburban parks and private gardens provide habitat for favoured prey items such as Common Ringtail Possums *Pseudocheirus peregrinus*, Common Brushtail

Possums *Trichosurus vulpecula* and Sugar Gliders *Petaurus breviceps*. Various other prey are taken opportunistically, e.g. birds, rats and, occasionally, flying-foxes *Pteropus* spp. (e.g. Pavey 1995) and Cats *Felis catus* (EM pers. obs). With this abundant prey base and suitable day-roosts, often in exotic trees, these Owls may survive for many years. However, suitable nest-hollows have become severely depleted in suburban areas, because they tend to occur in old or senescent trees that are assessed to be dangerous to humans, motor vehicles and buildings, and are therefore removed.

Since 1982, a long-term project to band pre-fledged Powerful Owls at the nest has been conducted by EM. The aim of this banding study was to investigate the dispersal and survival of young Powerful Owls. During this period 64 juveniles were banded. Such banding studies have revealed little information regarding dispersal and survival of young. Only one report has been published to date, of a banded young which dispersed into a neighbouring gully (McNabb *et al.* 2007), although recent genetic work by Hogan & Cooke (2010) reported two young Owls found dead ~15 and 18 km, respectively, from their natal sites.

Observations

In 2005, Melbourne Water Corporation conducted extensive creekside habitat restoration along a creek in suburban Blackburn, Victoria (37°49′S, 145°09′E), ~17 km east of the Melbourne Central Business District. This work involved the removal of many weed trees, and creek-bank stabilisation and revegetation. The Department of Sustainability and Environment was contracted to investigate the status of the Powerful Owl in the area and, if confirmed in the area, to provide advice regarding mitigation of possible negative impacts on the Owls. EM conducted this investigation and, subsequently, a pair of Owls was confirmed to be active in the area. Follow-up monitoring was conducted to identify any suitable nest-sites. This work confirmed that no suitable hollow trees were available for nesting (McNabb 2006).

Blackburn is a well-developed, leafy green suburb containing many mature exotic and native trees. Private gardens are generally well vegetated with a range of both native and exotic plants. This habitat supports many Common Brushtail Possums, Common Ringtail Possums and a diversity of diurnal birds. In winter, another occasional prey species in Melbourne, the Grey-headed Flying-fox *Pteropus poliocephalus* (Menkhorst *et al.* 2005), forages and roosts in the area, and ~20 individuals were camped nearby during this project. Powerful Owls are occasionally observed roosting in the nearby Blackburn Lake Sanctuary, a popular bird-watching area.

During the 2005 breeding season (autumn), local residents frequently heard the Powerful Owls calling to each other, and observed them roosting together and mating. One of the Owls was observed attempting to enlarge and enter a tree-hollow in a Swamp Gum *Eucalyptus ovata* ~50 m from a regular roost-site. The local street community, led by JG, took action to provide artificial hollows in the area. Three nest-boxes were constructed by JG in consultation with EM. These were installed on 16 January 2006 in trees close to the Owls' roost-sites and where their attempts at breeding had been observed. There were only three mature trees tall enough to support the boxes. Two were indigenous species, a Swamp Gum and a Yellow Box *E. melliodora*. The other was an exotic species, a Monterey Pine *Pinus radiata*. Nest-box 1 was ~15 m above ground level (agl) in the Yellow Box, Box 2 was ~20 m agl in the Pine tree and Box 3 was 7 m agl in the Swamp Gum (Plate 18)

Adult female Powerful Owl emerging from Nest-box 2 at Blackburn, Vic., 14 August 2007
Plate 18 Photo: Ed McNabb

(see McNabb & Keating 2008). These trees were 40–50 m apart and all within 50 m of the site where mating had been observed.

The Owls showed some interest in the boxes during the 2006 nesting season and, on one occasion, the male was seen to enter and scratch around in Box 1, but there was no breeding. On 14 August 2007, the Owls were discovered to be nesting in Box 2 (in the Pine tree; Plate 18). Observations over subsequent weeks revealed the presence of two nestlings heard trilling (i.e. begging) within the box, and when the adult female was entering the box we became aware that she was wearing a metal leg-band. During the 2-week period before fledging, the male was seen delivering a Grey-headed Flying-fox once, a Common Brushtail Possum on two occasions, and an Australian Magpie *Cracticus tibicen* once. On another occasion, the female was observed unsuccessfully attacking a Common Ringtail Possum, which fell to the ground and escaped after being struck. One healthy Owl chick fledged on 25 September (see McNabb & Keating 2008), but the other was never sighted. The fledgling was observed regularly in the area over the next month, often accompanied by an adult.

The female, previously banded on 20 September 2001, was found dead near the creek in a backyard, ~100 m from the nest-site on 11 November 2007. She was severely decomposed and a post-mortem examination conducted by veterinary staff at Healesville Sanctuary failed to determine the cause of death. The band (no. 131-74838) was identified as an Australian Bird and Bat Banding Scheme band which had been fitted by EM when the Owl was a nestling at Lysterfield Lake Park (37°56′S, 145°18′E), 19 km to the south-east of Blackburn. She had, therefore, dispersed 19.2 km to the south-west and was 6 years old.

All three nest-boxes were inspected on 23 February 2008 to investigate their contents, and to assess the plywood, screws and all components for any sign of decay or compromise. Material was collected from within the Owls' nest-box (Box 2) for analysis. The boxes and attachments were found to be in perfect condition. Preliminary examination of the material from Box 2 revealed a fragment of a juvenile Powerful Owl's foot amongst a range of prey remains. Box 1 was occupied by a pair of Common Ringtail Possums, and Box 3 was occupied by a pair of Common Brushtail Possums.

An adult Powerful Owl has been observed in the area occasionally since the nest-box was used by Owls in 2007, but there has been no indication of a replacement female or further nesting.

Nest-box construction and deployment

The dimensions of the nest-boxes were based on measurements taken at eight natural nests between 1998 and 2001 (EM unpubl. data). The average floor dimensions of these cavities were 623 × 409 mm (range 800 × 530 mm–380 × 203 mm).

Artificial nest-boxes with floor dimensions of 550 × 550 mm were constructed from 12-mm exterior plywood, with blocks of framing pine placed internally at the corners and midway along the sides, with galvanised screws attaching the sheets of plywood to the blocks. Each back wall was 800 mm high, and the front wall was 700 mm high to provide runoff. The oversized sloping lid was connected with a piano hinge. A 200-mm-wide hole was cut in the top of the front, and two perches were fitted. Hoop iron was used to brace the boxes and prevent sag (as shown in Plate 19). The removable bases were gently convex to allow for drainage. This was achieved with 30-mm-diameter hardwood dowel spanning the base, and a wooden wedge jammed between the base and the dowel to secure the base and create a slight doming (Plate 20). Inner surfaces were all left unpainted, with the exception of the floor, which was oiled with decking oil to prevent bacterial and fungal decay. A ladder of plastic lattice was installed inside below the entrance-hole, and this in combination with the framing pine and added blocks of wood allowed easy egress (Plate 21). Even with these aids, however, several noisy attempts were required for both adult and juvenile Owls to reach the entrance-hole.

A fully developed attachment system comprised heavy-duty trace springs (see Plates 19 and 22) bolted to the top and the middle of one side. Tie-downs consisting of nylon-webbing straps with ratchet tighteners were attached to the springs. To protect the trees and prevent UV damage to the nylon strapping, off-cuts of fire hose were placed over the webbing and the ratchet mechanism; this would also prevent damage to the nylon webbing that might be caused by birds or animals. Extra layers of plywood were applied to reinforce around the entrance-hole, attachment points and base supports. Two lengths of framing pine were attached vertically at the back to act as standoffs to hold the nest-box off the tree-trunk. The outside was painted with SolarGuard® paint in a gum-leaf green colour. A layer of coarse wood shavings was placed inside each box to a depth of 10 cm. Bark was applied to the front of the boxes to give the effect of a natural finish (Plate 18). The finished boxes weighed between 22.5 kg and 24.9 kg, and outside testing over 2 months proved them to be totally rainproof.

Demonstration of nest-box mounting. Note that in this photograph the top chain is not weight-bearing. The lid is screwed down after the box is in position. The smooth inside surface of the lid is designed to deter Honey Bees from attaching to it.

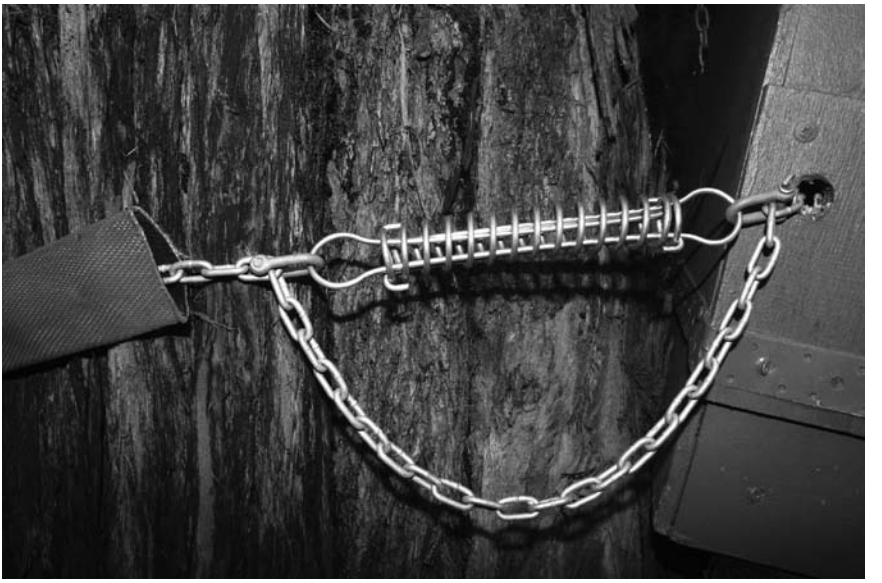
Plate 19 Photo: Ed McNabb

A wooden wedge is used to secure the base and create a domed floor to facilitate drainage

Plate 20 Photo: Ed McNabb

Internal view of nest-box showing wooden blocks and plastic mesh to assist with egress. Note 10-cm depth of wood shavings on floor.

Plate 21 Photo: Ed McNabb



Close-up view of trace spring fitted to one side of nest-box. Loop of chain provides long-term security in case of spring failure.

Plate 22 Photo: Ed McNabb

Inside view of rear wall of nest-box showing 'endless' chains

Plate 23 Photo: Ed McNabb

Discussion

Provenance of the adult female

This event was the second banding recovery for a Powerful Owl that was banded as a nestling and successfully dispersed from its natal territory. It was also the longest in terms of dispersal distance and survival age for the species (ABBBS data). It is also the first documented account of Powerful Owls breeding in an artificial hollow. Of special interest was the fact that this female was one of two offspring raised by a 1-year-old female, reported previously as the only banding recovery of a successfully dispersed Powerful Owl (see McNabb *et al.* 2007).

Fate of the sibling

The partial remains of a juvenile's foot among the material collected from the nest-box floor suggests that, although we have no direct evidence of infanticide (see Webster, Cooke *et al.* 1999) or cannibalism (Schodde & Mason 1980), both possibilities should be considered. This owlet may have died of natural causes, e.g. air-sac mite infestation (Fleay 1968), and, if so, would have been consumed by the adults and/or its sibling. Webster, Cooke *et al.* (1999) reported nestling feathers and remains in regurgitated pellets beneath roosts, to confirm cannibalism by the adults. We found no such evidence other than the remains of the foot inside the nest-box. Detailed analysis of the material from the box floor has revealed no further information.

Nest-boxes

We have received many enquiries about installing these nest-boxes, from people with a range of motives. For example, a nest-box may be seen to offer a strategy for controlling 'troublesome' or 'over-abundant' possums. This is in the belief that Powerful Owls will take up residence and therefore 'control' the possums. Other enquiries focussed on a more emotive idea that 'it would be nice to have Powerful Owls living here', and that a nest-box would attract them. Although well-meaning, these motives are inappropriate. It is important that before these boxes are deployed, the welfare of the owls is the primary goal, and there is a low probability that the owls (and other fauna) will be negatively affected.

We do not believe that boxes will attract owls to an area. In fact, owls are not likely to become resident unless the prey base is adequate. If owls are present and there is a lack of suitable large hollows then boxes may be beneficial. Competition from other hollow-nesting birds (e.g. Sulphur-crested Cockatoo *Cacatua galerita*, Laughing Kookaburra *Dacelo novaeguineae*) presents a low risk because Powerful Owls usually fledge by around the time (spring) when hollow-nesting diurnal birds are seeking hollows. For example, Kookaburras moved into a hollow 1 day after a Powerful Owl fledged at Olinda, Victoria (EM pers. obs.). Common Brushtail Possums do compete for hollows, and have been reported eating eggs and evicting nestlings of the smaller Southern Boobook, despite vigorous defence by the parent Boobooks (Olsen & Trost 2009). However, the larger, stronger Powerful Owl is better equipped to defend its nest, and Brushtail Possums may be less adventurous in the presence of one of their major predators, although such conflict may still be likely.

Several enquirers were interested only in the dimensions of the boxes. It is our belief that dimension alone does not make a suitable box. Natural hollows

provide plenty of internal structure to allow easy egress, whereas large boxes lacking climbing aids may cause entrapment and demise of the inhabitants. A box without a suitable internal amenity is unlikely to be chosen by the owls. It must be noted that even with blocks of wood and plastic lattice below the entrance-hole, the adults and juvenile required several noisy attempts before they appeared at the entrance to perch or exit.

Another somewhat stronger motive would be to replace one or more large tree-hollows that have been lost during wild or prescribed fires or extreme weather. We recommend that this strategy should be considered in a case where a known nesting site is lost or destroyed.

We believe that we had valid reasons in the case described here to undertake installation of the three boxes. Our reasoning was that:

- we may be able to assist a threatened species to reproduce in the wild,
- a mated pair of Owls was resident in the immediate area,
- the Owls were seen attempting to enter an unsuitable hollow to nest,
- a formal research project (McNabb 2006) had established that there were no suitable hollows in the broader landscape,
- the site was on private property and therefore public interference was unlikely, and
- suitable prey was abundant in the area and there was a reasonable expectation that breeding would be successful.

Risks

There are inherent issues and risks associated with installing large nest-boxes for owls, e.g. (a) public and personal risk, (b) long-term management, (c) risk to the owls, and (d) feral occupants. These are outlined below.

(a) People passing beneath a box may be injured if the box falls. This risk increases over time as the box and attachments are degraded by weather. Boxes left *in situ* and forgotten become increasingly dangerous. The boxes must be installed by qualified arborists and attached securely with long-lasting, weather-resistant fittings.

(b) Boxes should be inspected closely at least biennially, to ensure the integrity of attachments and metal parts. At time of inspection, detritus should be removed to reduce rotting of the plywood. Inspection of boxes should be conducted in summer when the Owls tend to roost elsewhere in their territory (Higgins 1999).

(c) Introduction of nest-boxes can be seen as habitat manipulation. The impact of their installation in an area where suitable natural hollows are available is unknown. In our opinion, these boxes should not be installed unless a detailed habitat assessment has shown that suitable hollows are not available and that suitable roosts and prey are. To avoid disturbance to the Owls, boxes should be installed only during the non-breeding season, i.e. summer, when the Owls usually roost elsewhere. The boxes must allow easy egress or they could cause entrapment and demise of any occupants.

(d) There is a risk of the boxes being taken over by unwanted species, e.g. Common Myna *Sturnus tristis*, Common Starling *S. vulgaris*, Honey Bee *Apis mellifera*. Some native fauna are also considered to be pests in some situations, e.g. Sulphur-crested Cockatoo and Common Brushtail and Ringtail Possums.

Further development of nest-boxes

More recent nest-boxes are equipped with galvanised chains replacing the webbing, and with a third chain attached at the top rear corners. This third chain is fed across a sturdy branch or fork above the box to take most of the weight of the box. This weight-bearing chain is rated to 170 kg safe working load (SWL). The other two lighter chains (SWL 54 kg) are attached to the box on one side by a heavy-duty trace spring (Plates 19 and 22). The chains go right through the box (Plate 23) and form a loose loop at the trace spring (Plate 22). The loose loop provides extra security in the case of a spring failure. When the chain is positioned and tightened around the tree, it is then attached to the other side of the box with a D shackle. The chains have only one join. Chains are more durable than webbing and are still encased by fire hose to protect the trees. To reduce materials and weight, the boxes have been downsized to 500 × 500 mm floor measurement, with the height still remaining at 800 mm at the back and 700 mm at the front. The ceiling is fitted with a layer of smooth polycarbonate or Laminex® to discourage Honey Bees, which have a tendency to attach to the ceiling of nest-boxes (EM pers. obs.).

Bark mulch has been glued to the outer painted surfaces to achieve a more natural look. Hardwood has been attached around the entrance hole as well as the edge of the oversized top. Thinner (8 mm) exterior plywood has produced a lighter box, and the base is still 12-mm exterior plywood. Safely and efficiently installing a nest-box of this size requires two professional tree-climbers, and at least one of them must be a qualified arborist. Experienced ground crew is also an advantage.

Conclusions

Provision of nest-boxes for Powerful Owls (and other species of hollow-nesting owls) may facilitate breeding in areas where suitable natural hollows are lacking. If the habitat is suitable in regard to food availability, vegetation and water, then Powerful Owls may occupy the area. However, a lack of large hollows will prevent breeding, and such a situation would be ideal for installation of nest-boxes. Large nest-boxes require serious consideration of the responsibilities and possible risks associated with installation high in suitable trees, as well as commitment to long-term maintenance. Nest-boxes should only be deployed at locations where the Owls are unlikely to be disturbed by humans; nest-boxes must be inspected biennially for integrity of fixings (i.e. safety), inspected inside and cleaned if needed, and checked for any problems with the exterior. After the inspection any repairs or replacements can be completed or organised. To prevent the possibility of entrapment, the boxes must provide easy egress for owls and owlets. To safely install and inspect these large nest-boxes, we firmly advise the use of professional tree-climbers.

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