



Wildlife Notes



DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT **No. 3 January 1997**
Information Notes for the Land for Wildlife Scheme in Western Australia

Nest boxes for Wildlife

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Location: South-west WA

Author: Penny Hussey, CALM, Como.

Tree hollows are essential to provide shelter and breeding sites for many native animals. Where old, hollow trees no longer exist, artificial nesting boxes may induce hollow-using mammals and birds to return to an area. Since many of these are insect-eating, this encourages the return of natural pest control to revegetation areas.

Hollows for nesting and shelter

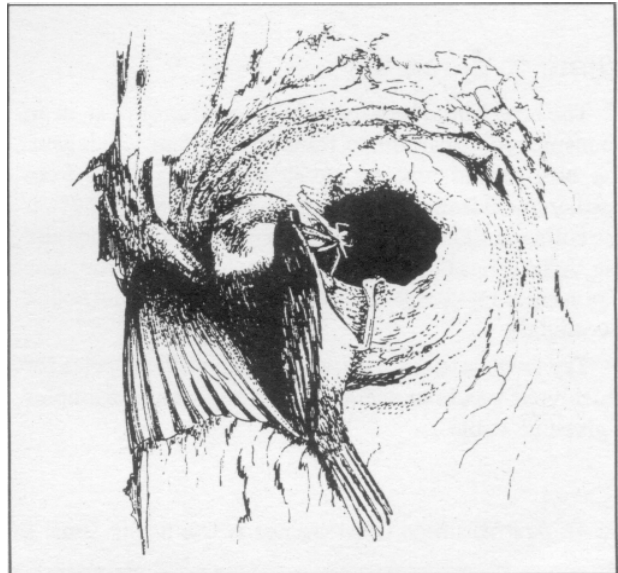
Young trees do not have hollows, but, as the tree ages and matures, hollows may develop. They are formed when the interior of a branch or trunk decomposes while the outer layers remain healthy. Often a natural event, such as a fire or a storm, breaks off a branch, allowing fungi or termites to reach the heartwood. Further fires can enlarge the hollows and some hollow-dwelling animals - especially parrots - may also do so.

The rate of hollow formation depends on the species of tree, its location and its history, but in general, more than 100 years are needed for hollows to develop. Salmon Gum, for example, first bears useable hollows at about 120 years old. Large hollows, suitable for nesting by Red-tailed Black Cockatoos, longer to form.

Many different species of fauna use tree hollows which provide shelter from weather and predators, as well as safe sites for breeding (see Table 1). Once hollow bearing trees are removed from an area, animals that are dependant upon them will no longer be able to live there.

Different types of hollows

Animals select hollows according to their own individual needs. Factors such as the size and shape of the entrance hole and the interior cavity, as well as the degree of insulation, affect how and when a hollow is used. Therefore, a range of hollow sizes and shapes is necessary to support a variety of wildlife.



A sacred kingfisher returning to its nest, a hollow in a flooded gum.

Hollows in fallen timber are also very important for animals such as echidnas, numbats, chuditch and many reptiles. In streams, hollow logs may be important to aquatic animals for shelter and egg attachment.

The role of nest boxes

If natural hollows are not available, artificial ones can be created. These are usually called "nest boxes". They may be in suitable bushland or located near a house or other convenient site, to encourage the animals to a place where a careful observer can enjoy watching their behaviour. (*Note: natural hollows are always best, protect hollow trees wherever possible.*)

Animals will not forage too far from safety, therefore nest boxes need to be placed adjacent to food sources. If suitable food is not within reach of the nest boxes, their

value to fauna becomes limited, therefore they should only be placed in revegetation areas if bushland is adjacent or if habitat requirements have been incorporated as part of the revegetation strategy.

If a box is being used, animals should leave some signs - for example, scratches on the wood, changes in the bedding material, or faeces. Once a nest box is occupied by a native species, try to resist the temptation to look inside, as this might lead to desertion of the box. Regular observation from outside will indicate what is going on. You might like to keep a record of these observations.

Constructing a nest box

See details on attached sheets. A generalised box design is given, with specific details for phascogales, possums, pardalotes, black cockatoos and bats.

Where to place the nest box

The box should be firmly fixed to a tree or post, in an inconspicuous position to minimise human vandalism. The box should also be given some protection from weather, including cold, rain and the direct heat of the sun. The entrance should face away from prevailing winds and rain. After it has been in place for a while, check for signs of rain entering - or excessive heat in summer - and adjust accordingly.

Try to imitate the natural nest site of the species for which your box is intended. A list of possible examples is given in Table 1.

Problems which may occur

Pest species such as feral honey bees and black rats may occupy the boxes, and feral cats may prey on fauna using them. Natural nest predators such as goannas, butcher birds or owls may also prey on fauna using the boxes, but natural predation is part of building up an ecosystem and so should not be of great concern.

Regular (weekly) inspection of the nest box may be necessary to prevent its use by pest species. Control black rats using rat traps. If feral honey bees take up residence, suspend a pest strip (such as "Shelltox") on a wire inside the box. Do this operation at night when the cold will keep the bees quiet. The pest strip will kill the bees and they will have to be removed. Alternatively, a local apiarist may help with their removal.

For further information

Contact: Regional Ecologist at nearest CALM office or Senior Zoologist, Wildlife Branch, CALM, phone (08) 9334 0455.

Acknowledgements

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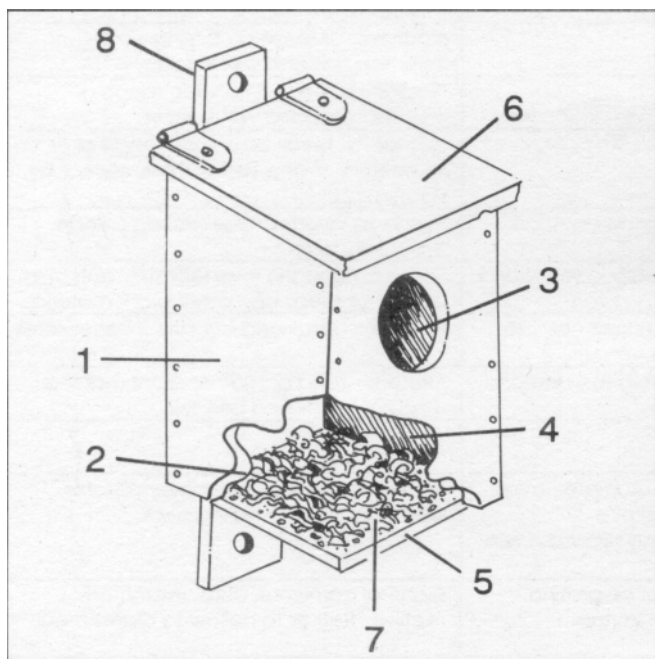
Table 1: Animals that use hollows in the South-west of WA

name	hollow location	notes
MAMMALS		
Echidna <i>Tachyglossus aculeatus</i>	large hollow at base of trunk, or in hollow lops or rock plies.	specialist feeder on ants and termites
Chuditch <i>Dasyurus geoffroyi</i>	medium hole at ground level. Also creates burrows under lops or stumps.	carnivore, eats anything it can catch, from insects through to bandicoots and parrots
Mardo <i>Antechinus flavipes</i>	small hollows low down, may use higher boxes.	mostly eats insects but is very fond of house mice.
Red-tailed phascogale <i>Phascogale calura</i>	small entrance, 1.5 - 5 m from the ground.	found where wandoo and rock oak grow together. Rare and Endangered
Brush-tailed phascogale <i>Phascogale tapoatafa</i>	small entrance, 1.5 - 5 m from the ground.	feeds mainly on invertebrates, mostly arboreal
Fat-tailed dunnart <i>Smithopsis crassicaudata</i>	low hollows, eg in mallee roots, commonly uses rock plies in paddocks.	not in wetter South-west
Numbat <i>Myrmecobius fasciatus</i>	mainly hollow logs but known to shelter in hollows up to 4 m from the ground.	specialist termite feeder
Pygmy-possum <i>Cercartetus concinnus</i>	small hollows, often in the skirts of Balgas,	needs dense shrub layer, eats insects
Ringtail possum <i>Pseudocheirus occidentalis</i>	medium sized hollows 3 - 6 m off the ground in marri or Jarrah, Sometimes builds dreys if no hollows available.	survives best in dense, lush vegetation associated with drainage lines. Eats leaves, flowers and fruits,
Honey possum <i>Tarsipes rostratus</i>	small hollows, often in the skirts of Balgas.	specialist nectar feeder, will not survive without something in flower every day of the year
Brush-tail possum <i>Trichosurus vulpecula</i>	medium-sized hollows 3 - 6 m off the ground.	eats mostly leaves, but also flowers and fruits when available

BIRDS	smaller birds can use larger entrance holes, but not the other way around	
Red-tailed black cockatoo <i>Calyptorhynchus magnificus</i>	entrance hole size 25 cm, in drier areas it prefers broken-off, straight dead trees	The Inland populations feed mainly on Doublegee seed. The forest race feeds on eucalypt seed, especially marri.
Carnaby's cockatoo <i>Calyptorhynchus funereus latirostris</i>	entrance hole size 25 cm	Eats seed of eucalypts, banksia family and some weeds. Rips open trees to get at the larvae of wood-boring Insects.
Baudin's cockatoo <i>Calyptorhynchus boudinii</i>	entrance hole size 25 cm	Eats seed, especially of marri and from the banksia family. Rips open trees to get at the larvae of wood-boring Insects.
Galah <i>Cacatua roseicapilla</i>	entrance hole size 16 cm	Eats seed, fruit, grain, grubs and caterpillars. Aggressive bird, will drive other species out. Chews bark off the trunk of trees, which may girdle and kill them
Major mitchell <i>Cacatua leadbeateri</i>	entrance hole size 20 cm	Requires to eat fruit of native plants, but can also eat grain and weed seed.
Little corella <i>Cacatua sanguinea</i>	entrance hole size 19 cm	Feeds on grain, weed seed and Insect larvae.
Long-billed corella <i>Cacatua tenuirostris</i>	entrance hole size 19 cm	Feeds on grain, weed seeds, tubers of plants such as Guildford grass and Insect larvae.
Twenty-eight parrot <i>Barnardius zonarius</i>	entrance hole size 14 cm	Eats seed, fruit, wood-boring grubs, lerps, caterpillars and spittlebug larvae. May be displacing other hollow nesters.
Regent parrot (Smoker) <i>Ponytails anthoepus</i>	entrance hole size 16 cm	Eats grain, other grass seed and fruits, Galahs may be displacing it from nesting hollows.
Red-capped parrot <i>Purpureicephalus spurius</i>	entrance hole size 8.5 cm	Eats seed and fruits from bushland and orchards, also eats blossoms, bugs and lerps.
Western rosella <i>Platycercus icterotis</i>	entrance hole size 6.5 cm	Eats seed and fruit.
Mulga parrot <i>Psephotus varius</i>	entrance hole size 6.5 cm	Eats seed, grain, fruit and grubs.
Elegant parrot <i>Neophema elegans</i>	entrance hole size 5 cm	Eats seed, especially grasses, and fruit.
Purple-crowned lorikeet <i>Glossopsitta porphyrocephala</i>	entrance hole size 5 cm	Feeds on eucalypt pollen and nectar, moves into areas where there is abundant flowering. Also eats fruit and Insects such as thrips.
Tree martin <i>Cecropis migricans</i>	entrance hole 2.5 - 5 cm	Eats bugs, water boatmen, beetles, flies wasps and ants.
Sacred kingfisher <i>Halcyon sancta</i>	entrance hole 6 - 7 cm, often in hollow branch overhanging water. Can also breed in a burrow, usually in a creek bank	Eats both aquatic (eg crayfish or tadpoles) and terrestrial Invertebrates, reptiles and small mammals,
Rufous treecreeper <i>Climacteris rufa</i>	entrance hole 4.5 - 5 cm, mostly in dead, broken trunks and branches, sometimes quite close to the ground.	Feeds on invertebrates.
Owlet nightjar <i>Aepotheles cristatus</i>	entrance hole 4.5-5 cm	It is nocturnal and feeds on a wide range of Invertebrates.
Boobook owl <i>Ninox novaeseelandiae</i>	entrance hole size 10cm	Nocturnal, it feeds on a range of Invertebrates and vertebrates.
Barking owl <i>Ninox connivens</i>	entrance hole size 10cm	Nocturnal, feeds on a wide range of Invertebrates and vertebrates.
Barn owl <i>Tyto alba</i>	entrance hole size 10cm	Nocturnal, feeds on a wide range of Invertebrates and vertebrates, especially house mice.
Striated pardalote <i>Pardalotus striatus</i>	very small holes, 3 cm - hollows in stone walls possible	Feeds on Invertebrates among foliage, especially lerps.
Mountain duck <i>Tadorna tadornoides</i>	entrance hole 10 cm. Usually in woodland adjacent to water.	Feeds on aquatic Invertebrates, ants, flies, as well as seeds and other plant material.
Black duck <i>Anas superciliosa</i>	entrance hole 10 cm. May also nest on the ground.	Feeds on seeds and aquatic Invertebrates.
Wood duck <i>Chenonetta jubata</i>	entrance hole 10 cm. Usually in woodland adjacent to water.	Feeds on seed and other plant material, molluscs, bugs and beetles.
REPTILES		
Black goanna <i>Varanus tristis</i>	entrance hole 3 - 5 cm in diameter, at any height above ground, shelter - thermoregulates by moving up and down inside a hollow tree.	General carnivore, eats Invertebrates, small mammals, nestling birds.
Carpet python <i>Morellia spilota</i>	holes from 1 - 10 m above the ground. Hibernates over winter within these hollows.	General carnivore, birds, mammals, reptiles. Retires to hollow to digest meal.

Standard nest box

- 1 Material: roughsawn, untreated pine, -20 mm thickness to ensure insulation. Use galvanised screws to join all parts. Do not use treated timber, toxic paints, chipboard, smelly glues, or leave any projecting nails or screws.
 - 2 Interior dimensions: depending on fauna it is intended to attract, see list below. Box must be weatherproof and dark inside.
 - 3 Entrance hole: diameter CRITICAL for the animal the box is intended to house, see list below. Placing the hole near the top will ensure that the inside of the box is dark.
 - 4 Inside walls: must have toe holds so that the young can climb out. Use rough-sawn timber or notch with a circular saw before assembly.
 - 5 Floor: should be recessed inside walls, loose knots glued in place with non-toxic glue and any gaps that do occur sealed with a quality mastic. Three small (< 10 mm) drainage holes should be drilled in the floor towards the front. Avoid creating an updraft.
- Lid: for weather protection the lid should slope from the back and overhang on the front and sides by at least 25 mm. Hinge the lid at the back to permit inspection and cleaning out after use.
- 7 Nesting material: use weathered woodchips, shredded jarrah bark or paperbark, to cover floor or deeper, see list below.
 - 8 Tree attachment: fix a mounting strip (jarrah board) to blocks attached to the back of the box to make attachment to the tree trunk easier. Pre-drill holes in the strip to prevent splitting and use 100mm galvanised roofing nails. The box must be stable. A slight forward lean will assist drainage and exit by young.



Nest box for *Phascogale*

Specific information - standard nest boxes

small mammals (brush-tailed phascogales, red-tailed phascogales, mardos and pygmy possums)

Internal cavity size 20 x 20 x 20 or 30 x 30 x 30 cm
Hole location side of box, under lid overhang and on the tree side of box rather than the front

Hole size 3.5 - 3.7 cm diameter circle (if smaller phascogales can not enter, if larger other species could)

lid hinged for inspection. Overhangs all sides to prevent rain entry

nesting material prefill 2/3 with finely shredded jarrah bark or paperbark - encourages early use

height 3 - 5 m off ground (higher the better - except for mardos, for which place at knee height)

distribution if several boxes available, 100-200 apart

larger arboreal mammals (brush-tailed possum and ring-tailed possum)

as above except:

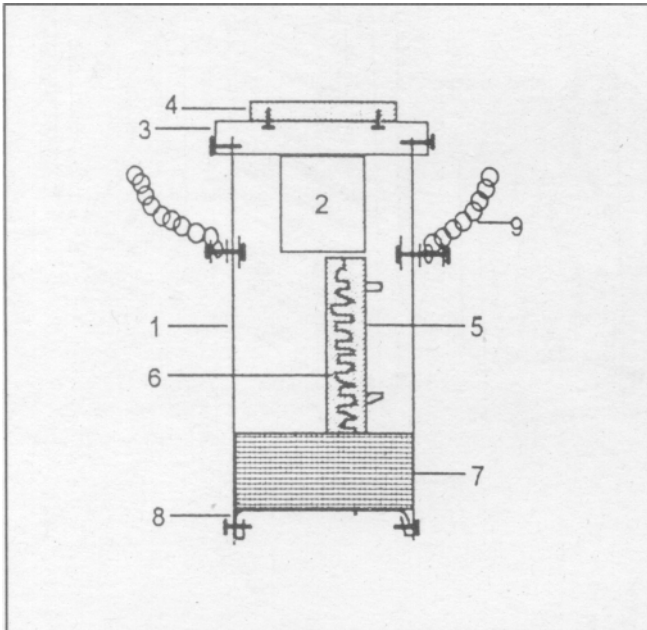
internal cavity size 45 x 35 x 25 cm

hole size 10 cm diameter

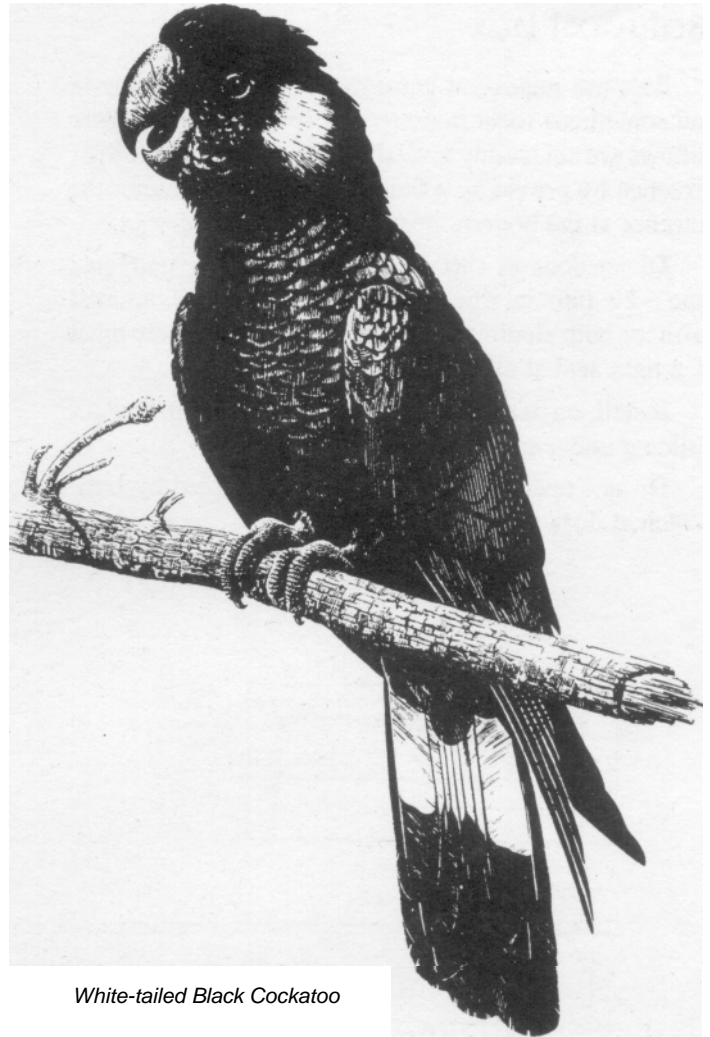
nesting material 1/4 broken up dry leaves and bracken fern

Nest boxes for Black Cockatoos

Information from Lynn Pedler, P0 Box 41, Parndana, SA 5220 Details taken from "Eclectus" No 1 - used with permission.



- 1 Tube: PVC stormwater pipe 3 00 mm internal diameter in 1 m lengths. The outside is scorched with a blowtorch to give timber appearance.
- 2 Entrance: 16 cm wide by 20 cm deep. This and the pipe sections can be cut with a hand-held circular power saw.
- 3 Weatherproof cap: spun galvanised steel with- 5 cm flange to fit outside of PVC section, pre-drilled and fixed using 3 tech screws. Caps should be fitted before heating PVC.
- 4 Sacrificial chewing/perching/climbing blocks: hardwood, -30 x 15 x 5 cm fixed with 2 tech screws.
Pre-drill and attach before fitting lid.
- 5 Hardwood internal ladder: -50 x 10 x 5 cm, fixed below entrance with tie wire.
- 6 Wire internal ladder: 3.2 mm fencing wire or similar. Ends passed through holes drilled in PVC and bent over or fixed to the wood ladder with fence staples.
- 7 Lining: weathered woodchips -20 cm deep.
- 8 Floor: heavy duty galvanised woven wire mesh shaped to fit internally with rough edges folded and curled inwards. Fixed with four 3.8 x 0.6 cm galvanised gutter bolts.
- 9 Tree attachment: galvanised 6.3 mm chains (about 12 links) bolted to PVC with internal mudguard washers and fixed to tree with 7.6 x 0.9 cm galvanised coach bolts and washers in a vertical or near vertical position, facing away from prevailing weather, at similar heights to natural



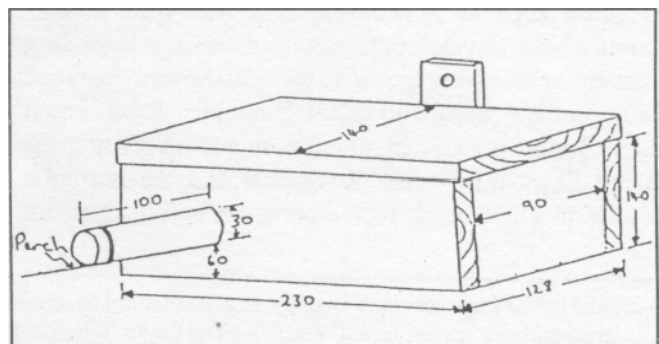
White-tailed Black Cockatoo

ests. Boxes are not heavy and can be lifted and held in position with a rope by a ground assistant while holes are drilled to attach chains to tree trunk/limb.

Note: Maintenance will be necessary on sacrificial wooden blocks and hardwood internal ladder.

Nest Box for Pardalotes

Dimensions as shown (mm). Internal diameter of entrance pipe must be 3 cm. (Class 12 water pipe has internal diameter = 3 cm, outside diameter = 3.2 cm.)



Bat roost box

Bats are important consumers of nocturnal insects and sometimes roost in extremely small places. Where hollows are not readily available, you can encourage their presence by providing a bat roost box. Bats prefer the entrance at the bottom, hence the alternative design.

Dimensions as shown. Use rough-sawn, untreated pine -20 mm in thickness, and roughen all internal surfaces with shallow, horizontal saw cuts. There must be a tight seal at all joints to avoid draughts.

Install on tree, clear of branches, or on wall of building under eaves.

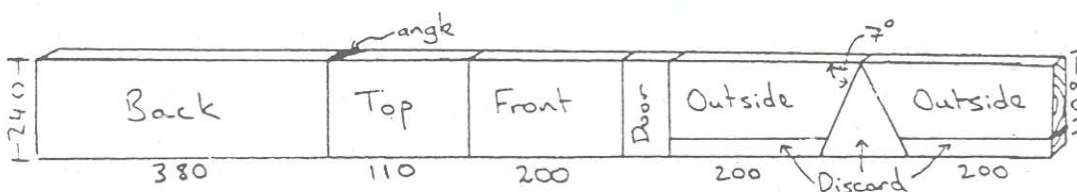
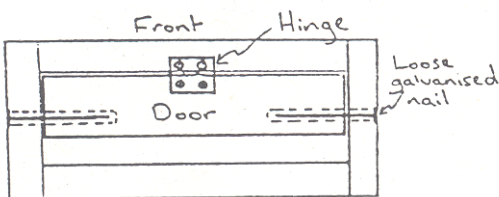
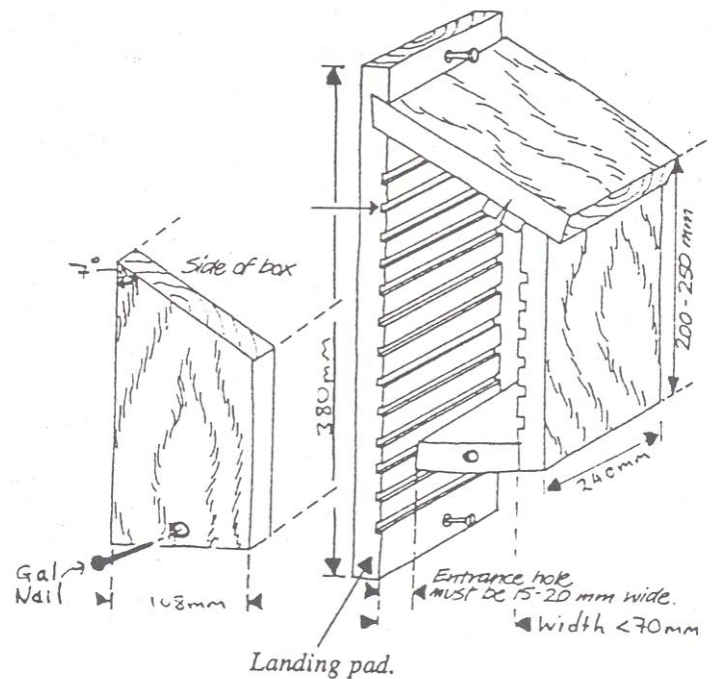
Do not open the box when it is occupied by bats. Watch at dusk for their exit.

There are about nine species of bats in the south-west of Western Australia. They are all insectivorous and they all use trees for shelter. However different species find shelter in different places within trees. The design of nest boxes for bats must take this into account. There are two basic types; those that use hollows at the ends of branches or in trunks and those that use crevices. The latter includes species that live under strips of bark shedding from dead trees and, often, under paperbark.

The bats that use holes may adopt nest boxes designed for birds such as a standard nest box with smaller entrance hole, but the boxes can be made more appealing if canvas or hessian is tacked to the walls because bats use claws on their thumbs to climb "hand over hand" into a secure corner where they about-turn and hang using the curved claws of their feet. Remember, too, the bats must be able to climb back to the entrance before they can

launch into the night air. Many of these bats fly in relatively open spaces in woodlands, along roads or over the tree tops. The boxes should be placed fairly high up and where flight access is uninterrupted; may be on the trunk of a tall tree, but avoid exposure to hot sun.

The box shown here is suitable for most bats that live in crevices or under bark but it is important to provide inner surfaces that the bats can climb and several sheets of hessian hung like curtains will imitate the insulated, secure crevices under bark or in a split tree trunk. Many of the species that will use it fly in or near dense undergrowth so the boxes should be placed near thickets. They need not be much more than a couple of metres off the ground so long as access is easy for a flying bat. Again avoid exposure to hot summer sun although the low winter sun can be advantageous.



A single bat box can be cut from a length of timber as shown above.

