THE BAT ROOST BOX KIT

A JOINT PROJECT BY THE

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GUIDELINES FOR BAT ROOST BOXES

BAT ROOST BOXES

The Bat Roost Box Kit is an initiative of the Latrobe Valley Field Naturalists Club Inc. (LVFNC), West Gippsland Catchment Management Authority and Latrobe City. The objective of the kit is to promote the conservation of hollow-roosting bats by providing artificial roosts.

Most bats eat insects and are important for controlling insect populations and assisting to maintain the ecological health of the environment. The majority of bats roost in tree hollows and the substantial clearing of native vegetation since European settlement has resulted in the loss of trees with hollows that provide habitat for many species of birds and mammals. The provision of bat roost boxes will in part compensate for the loss of roosting sites for bats.

The target species of this program are hollow-roosting bats which are found in Gippsland. Many of these species have a wide distribution in Australia and so the design and the guidelines for bat roost boxes can be adopted elsewhere and modified for other hollow-roosting bats.

The bat roost box design is a single compartment box. The guidelines offer advice in relation to bat roost box construction, siting, attachment, maintenance and monitoring. The design, the Placement Sheet and the Monitoring Sheet are partly based on the bat roost box experiences of The Friends of the Organ Pipes National Park in Victoria.

The West Gippsland Catchment Management Authority is making the guidelines and design freely available to interested organizations and individuals to enable people to build their own bat roosting boxes based on the recommended design. Alternatively conservation and non-profit organizations are welcome to adopt the design and sell the bat roost boxes to the public. There is room for experimentation and modification of the design as there is still much to be learnt. We would appreciate records being kept of any modified or alternative bat roost box designs.

A permit, issued by the Department of Sustainability and Environment (or equivalent authority in other States) is required to handle live bats. Poor handling technique may result in bat bites, consequently bat roosting box monitoring for most people will involve looking, but not touching. It will not always be possible to identify the species. Identification of bats to species level often requires specialist knowledge.

We request those who implement the bat roost box guidelines and design to also monitor the boxes. Monitoring needs to be done with the minimum disturbance to any roosting bats.

The success of the boxes will depend on a range of factors, one of which is the availability of existing roost sites (in either tree hollows or buildings). Bats may not occupy the boxes immediately and it may take two or three years before bats start roosting. Bats regularly move between a number of different roost sites and they will not always be present when the boxes are monitored. To determine if bats have used empty boxes, look for their scats at the bottom of the box.

BAT ROOST BOXES (Continued)

Bats need a large number of roost sites in the one area. Depending on the availability of existing hollows, the installation of 10 to15 boxes in the one locality is likely to increase the chances of success.

The implementation of the bat roost box guidelines and design is of interest to bat biologists. By sharing bat roost box experiences with others, we can all learn more about the requirements for bats.

The Latrobe Valley Field Naturalists Club Inc., the West Gippsland Catchment Management Authority and the Latrobe City hope bats will roost in the boxes provided and people will obtain satisfaction knowing that they have made a positive contribution towards bat conservation in Australia.

Photo by Steve Kurec

BAT BIOLOGY

Of the 23 species of bats found in Victoria, 16 species are found in Gippsland. The 16 species include two cave-dwelling species and one species of flying-fox. The remaining 13 species of bats naturally roost in tree hollows and under loose bark. Southern Myotis roosts in both caves and tree hollows. Tree hollow-roosting bats sometimes roost in both old and modern buildings.

Bats are classified into families. The tree hollow-roosting bats found in Gippsland belong to three families. There are ten species of 'evening bats' including the Wattled Bats, Forest Bats, Long-eared Bats, Eastern Broad-nosed Bat, Eastern False Pipistrelle and Southern Myotis. The Eastern Free-tail bat and the White-striped Freetail Bat are members of the free-tail family of bats. The Yellow-bellied Sheathtail bat belongs to the sheathtail bat family. Many of the bat species found in Gippsland are widely distributed in Australia.

The hollow-roosting bats of Gippsland are all insectivorous and most eat a range of flying insects. However, Southern Myotis eats fish as well as aquatic insects. Bats are most active in the warmer months when insects are plentiful. During the cooler months, the insectivorous bats in Gippsland enter periods of torpor (a form of hibernation). While in this state bats conserve energy by lowering their body temperature, heart-beat and rate of breathing. **Bats in torpor should not be disturbed, as their response is usually to raise their body temperature, which uses valuable fat reserves.**

Insectivorous bats use echolocation to navigate and to find prey. High frequency sound waves are emitted through their mouths and their ears detect the echoes that are reflected off obstacles and potential prey. The calls have frequencies that are species specific and normally well outside the human hearing range.

Bats roost during the day and are active at night. Their peak activity is shortly after dusk and again prior to dawn. When at rest, insectivorous bats fold their wings against their body.

Young bats are born in November or December each year. Bats commonly have a three month gestation period and are born blind and furless. Bats at birth weigh up to 30% of their mother's body weight. In most species, females usually have one young each year although some eg. Gould's Wattled Bats produce twins. After 4 to 6 weeks of maternal dependence the young bats are able to fly and catch their own food. Some species have separate maternity colonies and males and females may occupy separate roosting sites while the young develop. Most bats reproduce in their first year while others reproduce in their second year of life. Some bats may live up to 20 years.

The provision of artificial roosting sites will increase the number of potential sites for bats to roost and breed. Bats are faithful to the one roost area and regularly move between a number of roosts in the area. Colony sizes can vary from a single individual to 30 or more bats. Sometimes individuals from different species will roost together.

Biologists learn more about the life of bats by bat banding, bat trapping, using electronic bat detectors and radio telemetry. The monitoring of the bat roost boxes will assist in both bat conservation and research.

ROOSTS FOR VICTORIAN BATS

Flying-foxes

• Grey-headed Flying-fox	*Pteropus poliocephalus*	Hanging from branches
• Little Red Flying-fox	*Pteropus scapulatus*	Hanging from branches

Horseshoe bats

• Eastern Horseshoe Bat	*Rhinolophus megaphyllus*	Cave dwelling

		Recommended base entrance

Sheathtail bats

• Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	25–35 mm

Free-tail Bats

• Eastern Freetail Bat	*Mormopterus* sp.	12-15mm
• Inland Freetail Bat	*Mormopterus* sp.	12-15mm
• Southern Freetail Bat	*Mormopterus* sp.	12-15mm
• White-striped Freetail Bat	*Tadarida australis*	15-25mm

Evening bats

• Gould's Wattled Bat	*Chalinolobus gouldii*	12-15mm
• Chocolate Wattled Bat	*Chalinolobus morio*	12-15mm
• Eastern False Pipestrelle	*Falsistrellus tasmaniensis*	16-20mm
• Common Bent-wing Bat	*Miniopterus schreibersii*	Cave dwelling
• Southern Myotis	*Myotis macropus*	16-20mm & Cave dwelling
• Lesser Long-eared Bat	*Nyctophilus geoffroyi*	12-15mm
• Gould's Long-eared Bat	*Nyctophilus gouldi*	12-15mm
• Greater Long-eared Bat	*Nyctophilus timoriensis*	16-20mm
• Inland Broad-nosed Bat	*Scotorepens balstoni*	16-20mm
• Little Broad-nosed Bat	*Scotorepens greyii*	12-15mm
• Eastern Broad-nosed Bat	*Scotorepens orion*	16-20mm
• Inland Forest Bat	*Vespadelus baverstocki*	12-15mm
• Large Forest Bat	*Vespadelus darlingtoni*	12-15mm
• Southern Forest Bat	*Vespadelus regulus*	12-15mm
• Little Forest Bat	*Vespadelus vulturnus*	12-15mm

TARGET SPECIES IN GIPPSLAND

HOLLOW-ROOSTING BATS

Target species for 12 to 15mm base entrance

Chocolate Wattled Bat *Chalinolobus morio*
Eastern Freetail Bat *Mormopterus* sp.
Gould's Long-eared Bat *Nyctophilus gouldi*
Lesser Long-eared Bat *Nyctophilus geoffroyi*
Large Forest Bat *Vespadelus darlingtoni*
Southern Forest Bat *Vespadelus regulus*
Little Forest Bat *Vespadelus vulturnus*

Target species for 15 to 20mm base entrance

Gould's Wattled Bat *Chalinolobus gouldii*
Eastern False Pipistrelle *Falsistrellus tasmaniensis*
Southern Myotis *Myotis macropus*
Eastern Broad-nosed Bat *Scotorepens orion*

Target species for 15 to 25mm base entrance
White-striped Freetail Bat *Tadarida australis*

Target species for 25 to 35mm base entrance
Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*

The White-striped Free-tail Bat and the Yellow-bellied Sheathtail Bat are high-flying bats and probably roost higher than other hollow-roosting bats.

Smaller bat species are unlikely to roost in bat roost boxes with a base entrance targeted towards the larger species. Bats usually select roosts with entrances only marginally bigger than the thickness of their skull and chest. This protects bats from predation and from competition from larger mammals and birds. As most bats found in Gippsland are very small (4 to 20 grams), entrances for bat roost boxes also need to be small.

It is strongly recommended that when installing bat roost boxes the emphasis is placed upon constructing bat roost boxes with a base entrance ranging from 12 to 20mm.

CONSTRUCTION GUIDELINES

These Construction Guidelines should be read in conjunction with the two models of a bat roost box design included in this kit.

- Required 7 pieces of wood preferably rough sawn hardwood. *(Do not use treated pine, particle board or Craftwood').*

- 2mm deep, 5mm apart parallel horizontal grooves on landing pad and internal back and front of box.

- 20mm thick internal block screwed under the inspection lid of **all** boxes. The internal block assists to make the inside of the box free of draught and light. The block also minimizes wrapping of the lid and provides additional weight for a close fitting lid.

- Brass screws and construction glue eg.*'Liquid Nails'*, '*Maxbond'* to affix the components of the bat roost box. Apply construction glue to where the two sides adjoin the back, front and base of the box. (Avoid PVA glue as it is not suitable for wood joints subject to weathering).

- Use an outdoor wood filler to fill-in the saw cut gaps and any cracks or holes in the bat roost box. (Avoid silicone as acidic chemicals in the silicone may be harmful to fauna. If it is intended to paint the box, silicone can not be painted).

- Ensure that the timber selected for the inspection lid is free of cracks and knots.

- By being exposed to the weather, the inspection lid may warp. If this occurs, either replace the lid or secure a latch to firmly close the lid.

- If planed timber is used to construct the boxes, once the box has been assembled, roughen the outside of the box with a knife, glass cutter or saw. The roughen timber will allow the bats to grip and climb on and around the box.

- Exterior of the bat roost box may be painted with two coats of camouflage green or camouflage brown with a non-lead based paint eg. 'Wattyl Solargard', 'Dulux Weathershield' gloss acrylic, 'Duralex Sunmaster' gloss acrylic. *(Do not paint landing pad).* No undercoat or primer is required. If kiln dried timber is used, definitely apply two coats of paint.

- Paint or affix large bold white numbering on exterior of base of bat roost box to facilitate box maintenance and monitoring. Consider using an alpha-numeric numbering system where a letter of the alphabet is designated for each kind of animal artificial roost or nest boxes. For example, *B* means bat roost box, *A* means bird nest box, *P* means possum nest box.

BUILDING YOUR OWN BAT ROOST BOXES GUIDELINES

MATERIALS REQUIRED

- Preferably rough sawn timber
- Brass screws
- Construction glue eg. '*Liquid Nails*', '*Maxbond*'
- Stainless steel, galvanized or brass hinge(s) or stainless steel piano hinge
- Outdoor wood filler
- Two galvanized coach screws for each box
- Two 25mm min. rubber chair tips or two 60mm cushion door stops
- White paint or white bold plastic numbers for the bat roost box number
- Optional – Camouflage green or camouflage brown paint
- Optional – Stainless steel or brass latch
- Optional – Rubber strip of bike tube under the hinge before screwing the hinge to the box and lid. This is to prevent water from running down inside of the box. Alternatively and to protect the hinge from weathering, secure the rubber strip over the secured hinge

CHOOSE THE DIMENSIONS

These are the recommended minimum and maximum dimensions shown on the Bat Roost Box Measurement Guidelines for Model 1 and Model 2. The design for the two models is enclosed as a bound and as a loose copy in a plastic folder in this kit. **When constructing a quantity of boxes, build boxes of various dimensions within the recommended minimum and maximum dimensions. This gives bats a choice of boxes. Commence by choosing the internal height, width, depth and the size of the entrance. The external dimensions of the box will then be determined by the thickness of the wood being used.**

MAXIMUM DIMENSIONS – MODEL 1 Drawing LCC 851

In a temperate climate, this model is more likely to be used by hollow-roosting bats in the cooler months.

Timber thickness – 45mm (except for the 20mm internal block)

Back Height 851mm, Width 250mm

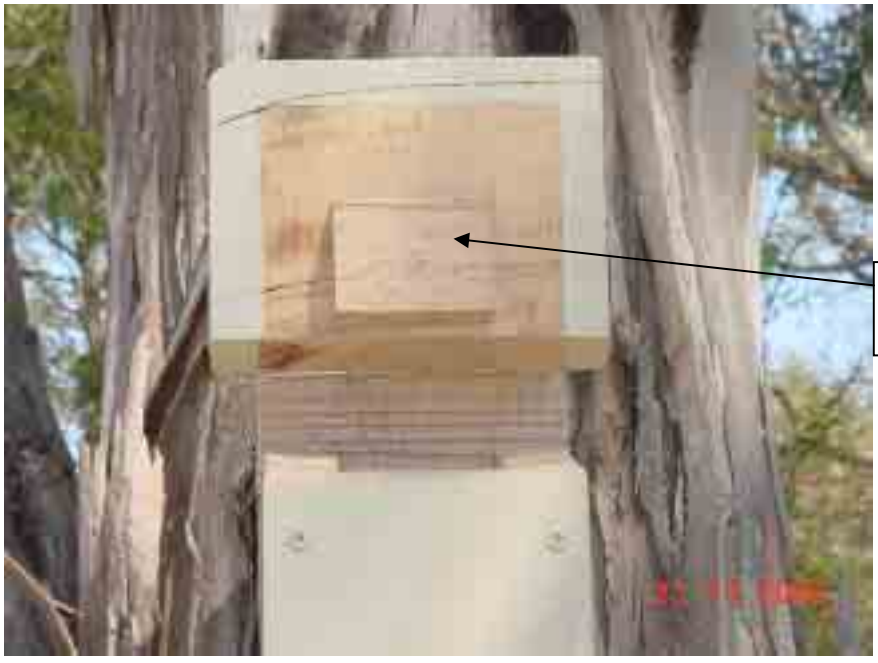
Sides x two Height 541mm, Width 100mm

Front Height 505mm (20^0 bevelled edge), Width 250mm

Base Depth 160mm, Width 80mm (Provides for 20mm entrance)

Inspection lid Depth 205mm (20^0 bevelled edge), Width 300mm
This dimension allows a 25mm over-hang of the lid on each side and at the front of the box.

Internal block 20mm thick. Measure internal block dimensions to suit after assembly of box. Weathering may cause the box to contract. Consequently, ensure that the internal block when screwed to the inspection lid allows the lid to close freely.



Inspection lid fully opened
Photo by Steve Kurec

ASSEMBLY OF BAT ROOST BOX - MODEL 1 Drawing LCC 851

(Maximum dimensions)

Construct six components from 45mm timber and internal block of 20mm, preferably rough sawn hardwood

(a) **Back** 851mm x 250mm
- Cut parallel saw cuts on the internal back including the landing pad
- Drill holes for top and bottom galvanized coach screw

(b) **Sides x 2** 541mm x 100mm
- Cut 20^{D} angle on the top of both sides for the inspection lid
- Screw and glue the two sides into position

(c) **Front** 505mm x 250mm
- Cut parallel saw cuts on the inside
- Plane 20^{D} bevel at the top for the inspection lid
- Screw and glue front in position

(d) **Base** 160mm x 80mm
- Screw and glue in position ensuring that a 20mm entrance is provided next to the saw cut landing pad

(e) **Inspection lid** 205mm x 300mm
- Plane 20^{D} bevel at the top before screwing the hinge(s) in position
- Saw a drip-line on the underneath sides and front of the lid. 2mm deep cut, 10mm from edges
- Screw hinge(s) to the lid and back. Unless using a stainless steel piano hinge, use more than one hinge to ensure that as far as practical, the width of the lid is hinged to the back.

(f) **Internal block** on inside of inspection lid
- Measure the block dimensions to fit after assembling the box. Allow for contraction of the box as a result of weathering. Screw the block to the lid ensuring that the lid closes freely. Do not apply construction glue to the internal block as it may subsequently be necessary to remove the block for repairs.

(g) **Finally**
- Apply outdoor wood filler to saw cut gaps and to any cracks and holes
- Paint or affix bold white numbers on box base
- Optional – Rubber strip of bike tube under the hinge before screwing the hinge to the box and lid or alternatively, affix the rubber strip over the secured hinge
- Optional – Round external edges on the box and inspection lid with a plane or rasp
- Optional – Roughen the outside of the box
- Optional – Paint exterior camouflage green or camouflage brown
- Optional – Screw stainless steel or brass latch to lid.

MAXIMUM DIMENSIONS – MODEL 2 Drawing LCC 852

In a temperate climate, this model is more likely to be used by hollow-roosting bats in the warmer months.

Timber thickness – 20mm for the 7 components

Back Height 556mm, Width 130mm

Sides x two Height 286mm, Width 80mm

Front Height 250mm (20^0 bevelled edge), Width 130mm

Base Depth 68mm, Width 90mm (Provides for 12mm entrance)

Inspection lid Depth 145mm (20^0 bevelled edge), Width 180mm
This dimension allows a 25mm over-hang of the lid on each side and at the front of the box.

Internal block Measure internal block dimensions to suit after assembly of box. Weathering may cause the box to contract. Consequently, ensure that the internal block when screwed to the inspection lid allows the lid to close freely.

Bat roost box number
Photo by: Steve Kurec

ASSEMBLY OF BAT ROOST BOX - MODEL 2 Drawing LCC 852

Minimum dimensions

Construct components from 20mm timber, preferably rough sawn hardwood

(a) Back 556mm x 130mm

- Cut parallel saw cuts on the internal back including the landing pad
- Drill holes for top and bottom galvanized coach screw

(b) Sides x 2 286mm x 80mm

- Cut 20^{D} angle on the top of both sides for the inspection lid
- Screw and glue the two sides into position

(c) Front 250m x 130mm

- Cut parallel saw cuts on the inside
- Plane 20^{D} bevel at the top for the inspection lid
- Screw and glue front in position

(d) Base 68mm x 90mm

- Screw and glue in position ensuring that a 12mm entrance is provided next to the saw cut landing pad

(e) Inspection lid 145mm x 180mm

- Plane 20^{D} bevel at the top before screwing the hinge(s) in position
- Saw a drip-line on the underneath sides and front of the lid.
  2mm deep cut, 10mm from edges
- Screw hinge(s) to the lid and back. Unless using a stainless steel piano hinge, use more than one hinge to ensure that as far as practical, the width of the lid is hinged to the back.

(f) Internal block on inside of inspection lid

- Measure the block dimensions to fit after assembling the box. Allow for contraction of the box as a result of weathering. Screw the block to the lid ensuring that the lid closes freely. Do not apply construction glue to the internal block as it may subsequently be necessary to remove the block for repairs.

(g) Finally

- Apply outdoor wood filler to saw cut gaps and to any cracks and holes
- Paint or affix bold white numbers on box base
- Optional – Rubber strip of bike tube under the hinge before screwing the hinge to the box and lid or alternatively, affix the rubber strip over the secured hinge
- Optional – Round external edges on the box and inspection lid with a plane or rasp
- Optional – Roughen the outside of the box
- Optional – Paint exterior camouflage green or camouflage brown
- Optional – Screw stainless steel or brass latch to lid.

SITING GUIDELINES

- Preferably within 400 metres of a body of water
- Base entrance may face any orientation but if practical, install the majority of the boxes facing east and west. Avoid entrance facing the prevailing wind.
- Sunny positions on growing, mature or dead trees. Other alternatives are buildings, structures or poles
- Free from over-hanging branches, especially close to or below the bat roost box. There should be no over-hanging branches within 3 metres in a horizontal distance from the box base entrance
- Height, from 4 metres to within reach of an extension ladder
- Stable footing at the base of the point of attachment to support a person on a ladder
- Any number of bat roost boxes can be installed in the one locality. In localities having a low natural availability of roost sites, installing from 10 to 15 boxes would increase the probability of bats roosting in boxes
- One to three bat boxes on each tree or place of support. More boxes could be placed on large trees
- Where more than one bat roost box on the same tree, install all boxes at the same height facing different directions. This minimizes the manoeuvring of a ladder when monitoring the boxes.
- Recommended bat roost box distance apart, if practical 10 to 40 metres
- **Recommended ratio of bat roost boxes with varying base entrance dimensions 12 to 15mm to > 15mm to 20mm, 3:1**
- **Recommended ratio of bat roost boxes with thickness from 20mm to 45mm, 1:2.** The two thicknesses of timber aims to provide bat roosts throughout the year. In a temperate climate, the thinner timber roost boxes are likely to used by bats in the warmer months and the thicker timber roost boxes during the cooler months. The different thicknesses of timber provide bats with a choice of roosts.
- If after five years since the installation of bat roost boxes there has been no sighting of bats or bats' scats, consideration should be given to relocating the boxes to another site.

ATTACHMENT GUIDELINES

- Secure ladder before attempting to attach the bat roost box. Two ladders with one person on each ladder may be necessary to attach the boxes, especially those made from 45mm thick hardwood
- The back of bat roost box is extended at top and at bottom to enable the box to be attached.
- Use galvanized coach screws to secure the boxes. A pilot hole will be necessary.
- Attach to tree, pole, structure or building so that 60mm of the galvanized coach screw penetrates the tree (or other solid mounting). Remove back as necessary at the point of attachment.
- Place 25mm minimum rubber chair tip or 60 mm cushion door stop between tree and back of bat roost box.
- **Countersink base screw head** so that it is flush with the surface of the back (of the bat roost box). This is necessary to prevent damaging the bats' wing membranes.
- Complete Bat Roost Box Placement Sheet.

Photo by Steve Kurec

MONITORING GUIDELINES

- Monitoring and maintenance of bat roost boxes can be conducted on the same occasion. Monitoring aims to record the usage of the boxes by bats and other fauna. This is done without handling the bats.

- Monitor the bat roost boxes so that the inspection is completed well before dusk. If the monitoring is not completed before dusk, bats will fly from their roosts soon after dusk.

- Place the extension ladder into position as quietly as possible. Rest the top of the ladder above and to the side of the bat roost box to facilitate inspection. Secure ladder before inspecting the box. It is advisable for a person to hold the ladder while another person climbs to inspect the box.

- Thoroughly block the base entrance with a rag or cloth before opening the inspection lid to ensure there are no gaps for the bats to escape.

- Gently open the lid. Roosting bats will tend to congregate at the top of the box.

- If no bats are present, look for bat scats (which look like mouse scats) at the bottom of the box. Providing there are no bats, use a torch to check for bat scats at the base of the boxes.

- Providing there are no bats in the box, wipe out any leaves, bat scats, spiders' webs, beetles, millipedes and other nuisance invertebrates with a long-handled paint brush. By cleaning the inside of the box, it is apparent that anything found inside the box was deposited since the boxes were last monitored.

- Eradicate pest invertebrates. If insects prove to be a problem, place marine grease on the rubber chair tips (between the tree and the back of the box). This will restrict the movement of pest invertebrates into the box. If ants are a problem, lightly sprinkle talc powder inside the box. Ant and wasp nests, particularly if the nest is restricting the base entrance can be removed by using a scraper or a knife.

- **As a last resort,** use a chemical spray or dust to eradicate bees or wasps. After the pest insects have been killed, remove the bat roost box and thoroughly rinse with boiling water before re-installing the box.

- If bats are present, close the lid with caution, making sure the bats and in particular, their legs are clear of the inspection lid opening when the lid is closed. If bats have extended their limbs around the edge of the lid, blowing on their feet is likely to cause the bats to withdraw their limbs sufficiently for the lid to be closed safely. Failing the success of this action, it may be necessary to touch the extended limbs of the bat, to get the bat to withdraw its extended limbs from the edge of the lid.

- Quarterly monitoring inspections

- Record all findings on Bat Roost Box Monitoring Sheet.

MAINTENANCE GUIDELINES

- Maintenance of bat roost boxes can be conducted when the boxes are monitored. Maintenance aims to keep the boxes in a physical condition that will encourage the bats to roost.

- If maintenance of the boxes is being performed on a different occasion than monitoring, position the ladder, block the base entrance with a cloth, open and close the inspection lid as per the Monitoring Guidelines.

- If bats are roosting in a box which is in need of repairs, unless the repairs are urgent, leave the repairs to another occasion when the bats are roosting elsewhere.

- Check condition of bat roost box and rubber chair tip. If the chair tips appear to be squashed then unwind the coach screw a turn or two. The failure to take this action on growing trees may result in the tree damaging the box and causing it to fall to the ground.

- Check the security of the inspection lid hinge. Rain may settle around the lid screws causing the timber surrounding the hinge screws to rot. If the lid can not be adequately secured by tightening loose screws, the lid may need to be replaced.

- If gaps appear in the joints of the box or in the inspection lid, use an outdoor wood filler to fill the gaps.

- Boxes may split especially along the grain. Use construction glue eg. '*Liquid nails*', '*Maxbond'* to repair the box or replace that component. If a crack appears in the inspection lid, the lid will need to be either repaired or replaced.

- If the internal block under the lid causes the lid to jam, unscrew, re-size and re-fit the block. Bats require draught free roosts.

- Boxes may need removal for repairs.

- Cut back any tree growth that has grown around the base entrance area since the boxes were erected.

- Quarterly maintenance inspections.

BAT ROOST BOX PLACEMENT SHEET GUIDELINES

The Bat Roost Box Placement Sheet is an integral feature of the Bat Roost Box Kit.

The sheet is designed to record the physical dimensions and siting details of the boxes. The physical dimensions of the box should be measured with a metric ruler before attaching the boxes to the trees. The sheet needs to be completed after the boxes have been placed in position. An 8 metre (or longer) tape measure is necessary to measure the height of the box above the ground. A compass is recommended to record the base entrance orientation. Use an electronic calculator to calculate the internal volume of the box.

Prepare a Bat Roost Box Site Map showing the location of the erected boxes. It is recommended the map be prepared the same day as the bat roost boxes are installed. The map will be of assistance when subsequently monitoring and maintaining the boxes, particularly if other people inspect the boxes.

The number on each box is best applied by painting or affixing the numbers in bold white on the base of each box. Consider using an alpha-numeric numbering system if boxes for birds and possums are erected in the same locality as bat roost boxes. This system makes it easier to locate the various boxes when monitoring and maintaining nest and roost boxes.

Chocolate Wattled Bat
Photo by: Lindy Lumsden

BAT ROOST BOX PLACEMENT SHEET

LOCALITY ……SITE ……..…LAT……..…… LONG…….. ALT……..……

Or AMG Coordinates Map No: ……..……LONG……..……..…EASTING……..…….……..…NORTHING…….……

BOX	INTERNAL		DIMENSIONS		WOOD Thickness mm	BASE Entrance mm	BOX ON same tree	HEIGHT Above ground m	ENTRANCE orientation	TREE SPECIES	COMMENT
	Hmm	Wmm	Dmm	Vol.M^3							

BAT ROOST BOX PLACEMENT SHEET EXAMPLES

LOCALITY ***Traralgon*** **SITE** ***Railway Conservation Reserve*** **LAT.** ***$38^0 12'$*** **LONG.** ***$146^0 32'$*** **ALT.** ***100m***

Or AMG Coordinates: MAP 8221 EASTING 5770478 NORTHING 55458805

Examples of six entries together with explanations are shown for the Bat Roost Box Placement Sheet.

BOX	INTERNAL		DIMENSIONS		WOOD THICKNESS mm	BASE ENTRANCE mm	BOX ON SAME TREE	HEIGHT ABOVE GROUND m	ENTRANCE ORIENTATION	TREE SPECIES	COMMENT
	Hmm	Wmm	Dmm	Vol.M^3							
B1	*195*	*95*	*100*	*0.0013*	*45mm*	*15mm*		*4.0m*	*North*	*Dead tree*	*Repaired. 19/2/00*
B2	*280*	*155*	*100*	*0.0043*	*20*	*25*		*4.2*	*Northeast*	*Forest Red Gum*	*Resited 19/2/00 Box sloping forward 10°*
B3	*260*	*155*	*101*	*0.0041*	*30*	*15*	*B5*	*5.5*	*Southeast*	*Manna Gum*	*Installed 26/2/00*
B4	*350*	*160*	*95*	*0.0053*	*45*	*12*	*B6*	*6.0*	*South*	*Narrow-leaf Peppermint*	*Installed 26/2/00 Box sloping back 10°*
B5	*300*	*140*	*80*	*0.0034*	*30*	*15*	*B3*	*5.5*	*Southwest*	*Manna Gum*	*Installed 26/2/00*
B6	*400*	*90*	*90*	*0.0032*	*45*	*18*	*B4*	*6.0*	*North*	*Narrow-leaf Peppermint*	*Installed 26/2/00*

Explanations:-

B means Bat Roost Box. Progressively use each number as boxes are constructed and installed.

Hmm, Wmm and **Dmm** are internal height, width and depth measurements in millimetres. The internal height of the bat roost box is measured from the lowest internal height, that is at the front of the box. **Vol.M^3** is the internal volume in cubic metres. This is determine by multiplying the height by width by depth.

Wood thickness is the thickness in millimetres of the timber used in the construction of the box. If the components are made from different thicknesses of timber, state the most commonly used thickness.

Base entrance is the size in millimetres of the entrance opening.

Box on same tree is the alpha-numeric number of any other bat roost box installed on the same tree, pole or structure.

Height above ground is measured in metres (to the nearest tenth of a metre) from the base of the box to the ground.

Entrance orientation is the entrance orientation of the box when installed

Tree species is the identification of the living tree where the box has been installed. Alternatively state the type of structure eg dead tree, pole, building

Comment is the date of installation, re-siting, forward or backward sloping installed box, repairs etc

BAT ROOST BOX MONITORING SHEET GUIDELINES

The Bat Roosting Box Monitoring Sheet is an integral feature of the bat roost box kit.

The Bat Roost Box Monitoring Sheet is designed to record on what was found inside each bat roost box each time the boxes are inspected. Record the result even if the box is found to be empty. Check for bat scats at the bottom of the box. Record the presence of live and dead invertebrates and the presence or evidence of any other fauna. Record the number of roosting bats, estimating the size of the colony if they can not be counted without handling. If confident, identify the bat species.

From information recorded on Bat Roost Box Placement Sheets and Bat Roost Box Monitoring Sheets, improvements may be made to the bat roost box physical guidelines and the siting guidelines.

Little Forest Bat

Photo: Lindy Lumsden

BAT ROOST BOX MONITORING SHEET

LOCALITY…… SITE …… LAT. ……LONG. ……..… ALT. ……

Or AMG coordinates… MAP…….EASTING…….NORTHING……..

Dates of Inspection								
Box								

BAT ROOST BOX MONITORING SHEET EXAMPLES

LOCALITY ***Traralgon*** **SITE** ***Railway Conservation Reserve*** **LAT.** ***$38^0$12'*** **LONG.** ***$146^0$32'*** **ALT.** ***100m***

Or AMG coordinates Map 8221 Easting 5770478 Northing 55458805

Examples of six entries together with explanations are shown for the Bat Roost Box Monitoring Sheet.

Box	***27/5/00***	***26/8/00***	***25/11/00***	***27/2/01***	***1/6/01***	***Date 6***	***Date 7***	***Date 8***
B1	*Empty*	*Empty*	*Empty*	*Empty*	*Emply*			
B2	*Ants*	*Fresh bat scats*	*Old bat scats D cricket*	*2 GW Bats*	*4 GW Bats*			
B3	*Empty*	*Leaves*	*2 S Gliders*	*4 Bats*	*6 ch Bats*			
B4	*Empty*	*Spider web*	*2 GW bats*	*Empty*	*G/hopper*			
B5	*Fresh bat scats*	*2 Bats*	*6 Bats inc. young*	*Old bat scats*	*Fresh Bat Scats*			
B6	*Millipede*	*Empty*	*> 10 bats inc. young*	*> 15 bats*	*>12 Bats*			

Explanations:-
B1 means Bat Roost Box 1 and so on
Date refers to the date of monitoring
Findings record what was found in the box. Record *Empty* if nothing was found. If desirable use abbreviations, for example *D cricket* means Dead cricket*, G/hopper* means Grasshopper*, GW Bats* means Gould Wattled Bats, *ChW Bats* means Chocolate Wattled Bats and *S Gliders* means Sugar Gliders. State condition of bat scats. Fresh (black, moist), old (brown, dry) and very old (grey, powdery, disintegrating). The condition of the bat scats indicates how recently bats have been using the bat roost box. Bat scats look like mouse scats

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Morris J *Australian Bats* Greater Glider Productions Maleny Qld 1992

BAT CONTACTS

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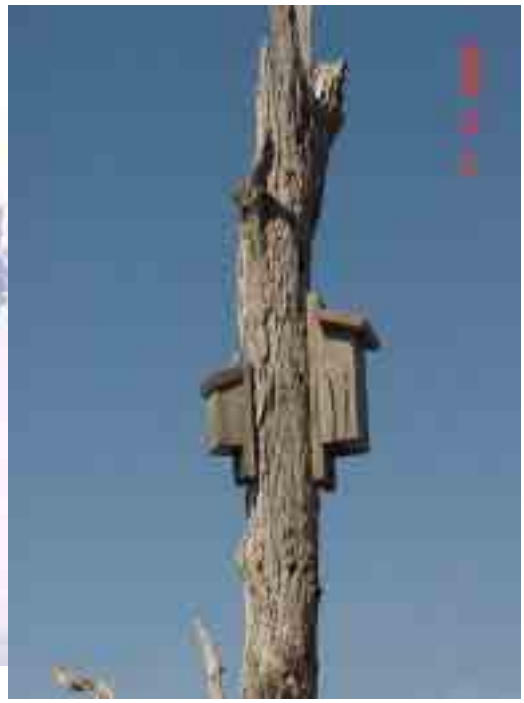
BAT WEBSITES

Australasian Bat Society http://life.csu.edu.au/batcall/abs.home.htm

Bat Conservation International http://www.batcon.org/

Landing pad with counter sunk coach screw head

Photo by:Steve Kurec



Bat roost boxes
Photos by Steve Kurec

Gould's Wattled Bats *Photo by Terry Reardon*