**PART L30**

**TREE HOLLOW RELOCATION**

**CONTENTS**

1. General

2. Fauna Habitat

3. Inspecting for Tree Hollows

4. Habitat Creation

5. Tree Hollow Harvesting and Relocation

6. Equipment for Installation of Hollows

7. Removal of Material from Site

8. Maintenance

Table 1 Hollow Requirements for Particular Species

**1. GENERAL**

This Part specifies the requirements for tree hollow inspection and relocation.

**2. FAUNA HABITAT**

Natural tree hollows are valuable and often essential for many wildlife species. They provide refuge from weather and predators, and safe sites for breeding. The destruction of living or dead hollow-bearing trees displaces or kills wildlife dependent on those hollows.

Removal or pruning of trees, particularly in rural or remote areas, may result in removal of tree hollows. Where hollows are encountered during tree removal or pruning projects, the Contractor shall not disturb native fauna occupying them. In the event of the discovery of occupied hollows, the Principal shall be notified immediately, and the Contractor shall make every effort to leave the hollow and its occupant undisturbed. The Contractor will be directed as to the course of action to be taken.

**3. INSPECTING FOR TREE HOLLOWS**

**3.1 Tree Hollow Inspection Requirements and Responsibilities**

Refer to **Contract Specific Requirements** for tree hollow inspection requirements and responsibilities.

1. Inspection by the Contractor

Prior to undertaking vegetation clearance or pruning within the construction site, the Contractor shall undertake a fauna inspection.

Signs suggesting hollows are occupied by fauna include freshly rubbed bark around a well-scuffed tree hollow entrance or staining or apparent greasiness. In dead trees, there will be some obvious entrance wear or polish. Should signs of fauna occupancy be discovered, the Contractor shall advise the Principal and a joint inspection may be required.

1. Inspection by Others

In certain situations, the fauna inspection may be carried out by an independent zoologist or person with tertiary qualifications in natural resource management or similar.

**3.2 Identification of Hollows**

Trees containing occupied or unoccupied tree hollows or nests shall be clearly identified by means of an aluminum tag nailed to the trunk. All tags shall be numbered with the vegetation survey tree number and hollow number and recorded on the "Existing Tree Hollow Location Schedule" in the **Contract Specific Requirements**, noting all pertinent details.

**4. HABITAT CREATION**

Tree hollow entrance (or aperture size), location, and orientation largely determine which species are able to make use of a hollow. Specific rare species may be targeted a by relocating tree hollows of a particular aperture size.

Aperture sizes are generally classed as Large (150 to 200 mm), Medium (50 to 150 mm), and Small (50 mm or less). Refer Table 1 "Hollow Requirements for Particular Species" at the end of this Part. The Contractor will be advised if any targeted habitat creation applies.

**5. TREE HOLLOW HARVESTING AND RELOCATION**

**5.1 Hollow Type**

Refer to **Contract Specific Requirements** for tree hollow types.

(a) End of a Natural Tree Hollow

The opening at the end of a natural tree hollow shall be used as the aperture. The length of the hollow shall be a minimum of 400 mm and a maximum of 1 000 mm long (unless the targeted species is the Yellow-tailed Black Cockatoo which requires a hollow length of 2 400 mm).

The cut end of the hollow shall be capped using a galvanised, perforated end plate, and fixed with 8 g x 30 mm galvanised self-drilling screws at 150 mm centres. Nesting material 200 mm deep, such as leaf litter that would naturally fall into hollows, shall be placed inside the hollow.

(b) Section of a Natural Tree Hollow

A section of hollow branch that has both ends cut may have one or both ends capped. Where both ends are capped, an aperture is to be drilled or a slit formed at the top of the limb, depending on which species is targeted.

The length of the hollow shall be a minimum of 400 mm and a maximum of 1 000 mm long (unless the targeted species is the Yellow-tailed Black Cockatoo which requires a hollow length of 2 400 mm).

The top cut ends of the hollow shall be capped using a galvanised end plate and fixed with 8 g x 30 mm galvanised self-drilling tech screws at 150 mm centres. The bottom cut end shall be capped using a galvanised, perforated end plate, and fixed with 8 g x 30 mm galvanised self-drilling screws at 150 mm centres. Nesting material 200 mm deep, such as leaf litter that would naturally fall into hollows, shall to be placed inside the hollow.

(c) Natural Hollows

A natural tree hollow shall need no modification prior to relocation, i.e. the saw cut shall be made after the extent of the hollow. The length of the hollow shall be a minimum of 400 mm and a maximum of 1 000 mm long (unless the targeted species is the Yellow-tailed Black Cockatoo which requires a hollow length of 2 400 mm).

(d) Entire Trees with Hollows

Where entire trees are identified for relocation, the tree shall be retained or stockpiled until a suitable site has been selected. The tree shall be handled with care so as not to diminish its habitat value.

(e) Manufactured Hollows and Nesting Boxes

Manufactured hollows and nesting boxes shall be appropriate for the species encountered.

**5.2 Hollow Relocation Sites**

Refer to **Contract Specific Requirements** for tree hollow relocation sites.

(a) Arboreal

The Contractor shall select suitable host trees for the relocation of hollows. The host trees shall be mature, in good health, and will be part of a vegetated area conducive to habitat development. The host trees shall have sufficient height and branch structure to enable positioning hollows in positions that conform to the hollow requirements as shown in Table 1. No more than two hollows shall be placed in one tree.

In certain situations, the Principal may require arboreal relocation sites to be selected by a zoologist or person with tertiary qualifications in natural resource management, as specified in the **Contract Specific Requirements**.

(b) Terrestrial

Where directed, the Contractor shall place designated hollows on the ground in areas that are targeted for terrestrial fauna habitat creation. In certain situations, the relocation sites to be selected by an independent zoologist or person with tertiary qualifications in natural resource management.

**5.3 Hollow Orientation**

Hollows shall be mounted vertically or as close as possible to their original orientation. Hollows shall be mounted a minimum of 5 m from ground level or at a similar height and angle to where it was in the original tree. The aperture shall be faced away from prevailing weather to reduce entry of rain.

**5.4 Hollow Attachment**

Refer to **Contract Specific Requirements** for tree hollow attachment types.

(a) Chain Attachment

The hollow shall be attached to the host tree at bifurcations of a suitable height as per Table 1. The hollow shall be attached by means of two 6.3 mm galvanized chains bolted to the either side of the log with 7.6 x 90 mm galvanized coach bolts and washers. The chains shall be wrapped around the host tree above the bifurcation and joined using a galvanized "D" shackle.

(b) Rod Attachment

The hollow shall be attached to the host tree at a suitable height as per Table 1. The hollow shall be attached by means of two 10 mm stainless steel (316 grade) threaded rods, nuts and washers inserted through holes drilled through the host tree limb. The hollow shall be spaced off the limb by 100 mm by means of lock nuts.

(c) Hollow Attachment by Other Methods

In certain situations, the hollow may be installed by other methods, as specified in the **Contract Specific Requirements**.

**6. EQUIPMENT FOR INSTALLATION OF HOLLOWS**

**6.1** **Tree Hollow Sections**

Refer to **Contract Specific Requirements** for tree hollow installation requirements.

(a) Use of Climbers

Tree hollows shall be fixed by climbing the tree. The Contractor shall ensure that all climbers and supervising staff meet approved accreditation standards and that all climbing equipment complies with relevant standards, is fit for purpose and is in good working order.

(b) Elevated Platform

This method is to be used where machinery access is available, with one or two operators in a basket traveling up into the crown to install hollows. The Contractor shall ensure all operating staff has received approved training and qualifications in the use of this equipment.

(c) Equipment Recommended by Contractor

The Contractor shall examine the site conditions and recommend preferred methods of hollow installation for the project.

**6.2 Whole Trees**

Refer to **Contract Specific Requirements** for whole tree requirements.

(a) Use of Crane and Back-hoe with Auger

Whole trees to be sawn off at ground level and relocated into excavated holes and backfilled. The Contractor shall ensure all operating staff has received approved training in the use of this machinery.

(b) Equipment Recommended by Contractor

The Contractor shall examine the site conditions and recommend preferred methods of hollow installation for the project.

**7. REMOVAL OF MATERIAL FROM SITE**

Any timber, branches, leaves, stumps and debris resulting from tree hollow relocation activities, which has not been specified for disposal, shall be removed from the site and disposed of by the Contractor. No other material of any other kind shall be removed from the site, unless specified in the **Contract Specific Requirements**.

**8. MAINTENANCE**

The location of installed hollows shall be recorded using approved GPS equipment. The hollows shall be maintained for a period of 12 months from the Date of Practical Completion. The Contractor shall submit a program of maintenance based on site inspections at two monthly intervals.

At each site inspection the Contractor shall check each installed hollow for safety, including re-fastening, re-orientation, tightening of fixings, and re-fixing of end caps if necessary. All activities shall be logged and a copy of the logbook shall be provided upon request.

Where installed hollows are occupied, the Contractor shall make every effort to avoid disturbing the fauna. A record shall be kept of hollows that are, or have been, occupied by fauna in the **Contract Specific Requirements**.

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**TABLE 1**

**HOLLOW REQUIREMENTS FOR PARTICULAR SPECIES**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Species** | **Interior Diameter** | **Depth/Length** | **Entrance Diameter** | **Vertical/ Horizontal** | **Height off Ground** | **Breeding Season** | **Reference** |
| **LARGE HOLLOWS – 150 to 200 mm** | | | | | | | |
| Black Cockatoo, Red-Tailed | 300 mm | 870–1000 mm | 160 x 200 mm | V | > 7 m | Varied | Grant (1997) |
| Black Cockatoo, Glossy | 300 mm | 870–1000 mm | 160 x 200 mm | V | > 7 m | Mar–Aug | Pedler (1996) |
| Black Cockatoo, Yellow-tailed | 300–400 mm | 600–2400 mm |  |  |  |  |  |
| Boobook , Southern | - | - | 150 mm | H | - | Sept-Nov | Trainor (1995) |
| Cockatoo, Sulphur –crested | 300 mm | 1000 mm | 150 mm | V | > 7 m | Aug-Jan | Trainor (1995) |
| Corella, Little | 300 mm | 1000 mm | 150 mm | V | > 7 m | Jun-Oct | Trainor (1995) |
| Corella, Long-billed | 300 mm | 1000 mm | 150 mm | V | > 7 m | Aug-Dec | Trainor (1995) |
| Kookaburra, Laughing | 150–300 mm | > 400 mm | 80–120 mm | H | 5–10 m | Sept-Jan | Elliott (1994) |
| Owl, Barn | 400 mm | 750 mm | 150 mm (open) | H | 5 m | Autumn-Spring | Adams (1980) & Trainor (1995) |
| Shrike – thrush, Grey | 150 x 300 mm | 150–300 mm | 90–150 mm (open) | H | > 2-5 m | Jul–Feb | BFNC (n.d.) & Elliott (1994) |
| Swallow, Welcome | 130 mm | - | Open | H | 3 m | Aug-Dec | Adams (1980) |
| **MEDIUM HOLLOWS – 50 to 150 mm** | | | | | | | |
| Brushtail Possum | 210–320 mm | 400 mm | 100-150 mm | V | 4–8 m | Autumn | RSPCA (n.d.) & MZES (n.d.) |
| Duck, Australian Wood | 200 mm | 500 mm | 120 mm | V | > 1.5–2 m | Sept–Nov | Trainor (1995) |
| Duck, Pacific Black | 450 x 300 mm | - | 120 mm | - | > 1.5–2 m | Jul-Oct | Elliott (1994) |
| Galah | 200 mm | 650 mm | 120 mm | V | 6 m | Aug–Nov | Adams (1980) |
| Glider, Squirrel | - | - | 60 mm | - | - | May-Dec | Trainor (1995) |
| Kestrel, Nankeen | 400 mm | 750 mm | 100 mm | V | 5 m | Aug-Nov | Adams (1980) |
| Kingfisher, Sacred | 130 mm | 600–900 mm | 75 mm | H | 5–10 m | Sep-Mar | Adams (1980) |
| Lorikeet, Rainbow | 130 mm | 800 mm | 80–100 mm | V-H 45° angle | > 5 m | Aug-Jan | Grant (1997) |
| Lorikeet spp. | 120 mm | 600 mm | 60 mm | H | 5 m | Aug-Jan | Adams (1980) |
| Owlet-nightjar, Australian | 150 mm | 300 mm | 50–80 mm | V | > 5 m | Sep-Dec | Adams (1980) & Elliot (1994) |
| Parrot, Red-rumped | 100–150 mm | 400–600 mm | 70–120 mm | V/H | 5 m | Aug-Jan | Adams (1980) & Elliot (1994) |
| Ringtail-Possum sp. | 250 mm | 350–400 mm | 60–90 mm | V | 4-8 m | Apr-Nov | Trainor (1995) & MZES (n.d.) |
| Rosella spp. | 120–180 mm | > 400 mm | 70–120 mm | V/H | 5 m | Aug-Jan | Elliot (1994) & MZES (n.d) |
| Rosella, Crimson | 150–200 mm | 350–800 mm | 75–100 mm | V/H | 5–6 m | Sep-Jan | Adams (1980) |
| Rosella, Eastern | 135–240 mm | 350–800 mm | 60–100 mm | V/H | 5–6 m | Aug-Jan | Adams (1980) |
| Teal, Chesnut | 200–450 mm | 450–750 mm | 80–120 mm | V | 1.5 m | Sep-Dec | Adams (1980) & Elliot (1994) |
| Teal, Grey | 400–450 mm | 450–750 mm | 80–120 mm | V | 1.5 m | All year | Adams (1980) & Elliot (1994) |
| Treecreeper spp. | 90–150 mm | 100–400 mm | 50–80 mm | V | - | - | Elliot (1994) |
| Treecreeper, White-throated | 75–100 mm | 300–400 mm | 50 – 70 mm | V | 5 m | Aug-Jan | Adams (1980) |

**TABLE 1 cont'd**

**HOLLOW REQUIREMENTS FOR PARTICULAR SPECIES**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SMALL HOLLOWS – 50 mm or less** | | | | | | | |
| Antechinus, Yellow footed | - | - | 20–25 mm | - | - | Jun-Oct | Trainor (1995) |
| Bat spp. | 70–100 mm x 150–240 mm | 200–250 mm | 15-20 mm slit | V | 2-4 m | - | BFNC (n.d.) |
| Bat, Chocolate Wattled | - | - | 10 mm slit | V/H | 2-4 m | Nov-Dec | Trainor (1995) & Grant (1997) |
| Bat, Gould’s Wattled | - | - | 10 mm slit | V/H | 2-4 m | May | Trainor (1995) & Grant (1997) |
| Bat, Lesser Long-eared | - | - | 10 mm slit | V/H | 2-4 m | Sept-Dec | Trainor (1995) & Grant (1997) |
| Glider, Feather-tailed | 150 mm | 150 x 450 mm | 20–30 mm | H | > 2 m | Aug-Feb | Trainor (1995) & Grant (1997) |
| Glider, Sugar | 200–250 mm | 200-300 x 500 mm | 25–50 mm | V | 4-8 m | Jun-Dec | MZES (n.d.) & Grant (1997) |
| Lorikeet, Little | - | - | 25–30 mm | V/H | 4-10 m | Aug-Jan | Trainor (1995) |
| Lorikeet, Musk | - | - | 25–30 mm | V/H | 4-10 m | Aug-Jan | Trainor (1995) |
| Lorikeet, Purple-crowned | - | - | 25–30 mm | V/H | 4-10 m | Aug-Dec | Trainor (1995) |
| Pardolate spp. | 120 mm | 400–500 mm | 30–45 mm | H | 5 m | Jun-Jan | Adams (1980) |
| Pardolate, Striated | 90–200 mm | 200 mm | 25–35 mm | H | 6 m | Jun-Jan | BFNC (n.d.) |
| Phascogale, Brush-tailed | 180 mm | 180-500 mm | 25-40 mm | H | > 4 m | Jun-Sep | Trainor (1995) & Grant (1997) |

Source: Adapted from ‘Supplement to Birds Australia Information Sheet 5: Nestboxes for Natives (July 2001)’ and from the SA Native Vegetation Council fact sheet