

Identifying hollow-bearing and recruitment trees

Guidance note for Private Native Forestry in northern and southern NSW

This guidance note is to provide practical tips to assist landholders and contractors to identify hollow-bearing and recruitment trees which should be retained under the Private Native Forestry Code of Practice for northern and southern NSW (PNF Code) during forestry operations.

What are hollow-bearing and recruitment trees?

Hollow-bearing trees are dominant or co-dominant living trees where the trunk or tree branches have visible hollows, holes or cavities, or are likely to have these. Hollows are not always visible from the ground but may be apparent from the presence of rounded knotty growths, protuberances or broken limbs, or places where the head of the tree has broken off.

Hollows also include fire scars in the butt of trees, and fissures or cracks in the branches or the main trunk.

Hollows are common in myrtaceous trees, primarily eucalypts and corymbias. Hollows develop in the trunk and branches of these trees after the internal heartwood has been eaten away by fungi and invertebrates, particularly termites, and has decayed. Fire damage, wind breakage or lightning strikes can also expose heartwood to decay or create cavities.

Recruitment trees are large vigorous trees that are not yet hollow-bearing trees but are capable of developing hollows in the future.



Tree hollow. C. Bell.



Hollow-bearing tree. M. Pennay.

Identifying hollow-bearing and recruitment trees

Why tree hollows are important

In NSW, at least 46 mammals, 81 birds, 31 reptiles and 16 frogs depend on tree hollows for foraging, shelter, roosting and nesting (Gibbons and Lindenmayer 2002). Forty of these species are listed as threatened in Schedule 1 and Schedule 2 of the *Threatened Species Conservation Act 1995*, which means that they are at higher risk of extinction.

Species are called hollow-dependent when they require hollows as part of or all their habitat to survive. These species require tree hollows for different purposes.

Tree hollows may vary in size and shape, including the diameter of the hollow opening and the depth and volume of the holes. A diversity of hollows caters for the wide range of species that use them. Bats use them as roosting and maternity sites, many birds nest in them, and tree dwelling (arboreal) mammal species, such as possums and gliders, make their dens in hollows. The prey species of some owls live in hollows, and owls themselves use tree hollows for roosting during the day. Smaller hollows could harbour insects, and could be used as refuge for smaller birds, frogs and reptiles.

For hollow-dependent species, their ongoing survival depends on the availability of hollow-bearing trees with a range of hollow shapes and sizes across the landscape. Any decrease in the availability and diversity of tree hollows, such as when large old hollow-bearing trees die or are removed and are not replaced, can lead to a significant loss of species' diversity and abundance. In some cases, there may be local extinctions of these species.

As a result, the loss of hollow-bearing trees has been listed as a key threatening process (final determination 2007) by the NSW Scientific Committee – visit www.environment.nsw.gov.au/determinations/LossOfHollowTreesKtp.htm.

Why are large trees important?

Tree hollows vary in shape and size from species to species and depend on environmental conditions. However, models show that the presence, size and number of hollows increases with the size of the tree. The size can be assessed by measuring the diameter of the tree trunk (Fisher et al, unpublished). Tree diameter is a strong predictor of the tree being occupied by native animals.

Although large hollow-bearing trees are rare, native animal species strongly select them as nest and roost sites. As such, large old hollow-bearing trees are relatively more valuable to hollow-dependent species than smaller, younger hollow-bearing trees.



Owlet nightjars *Aegotheles cristatus* take refuge in a tree hollow. R. Eckermann.

Identifying hollow-bearing trees

Visible hollows or signs of hollows identify hollow-bearing trees

When selecting hollow-bearing trees, look for trees with one or more visible hollows, or trees with other features suggesting they have hollows. See 'What are hollow-bearing and recruitment trees?'

Diameter of the tree trunk

The larger a hollow-bearing tree is around the trunk the more likely it is to have hollows of different shapes and sizes, and large hollows.



Example of tree hollows. M. Pennay.

Why recruitment trees must be retained

As it is important to retain tree hollows for native animals over time, ways in which hollow availability will change in the landscape over time must also be considered. Hollow formation is slow, with small hollows taking at least 80 years to form (Koch et al 2008), while larger hollows suitable for large hollow-dependent species such as forest owls and greater gliders may take as long as 220 years to develop (Gibbons and Lindenmayer 2002).

Because tree hollows take such a long time to form, the retention of **recruitment trees** is important for the long-term replacement of existing hollow-bearing trees as the older trees eventually die of natural causes.

Identifying recruitment trees

Tree diameter is the best way of identifying suitable recruitment trees.

When selecting recruitment trees, choose trees from the largest diameter size class in the harvest area.

The larger a tree is around the trunk, the more likely it is that the tree will develop one or more hollows in the more immediate future, and will develop large hollows which take longer to form and are rare in the landscape.

Severely damaged or suppressed trees are unlikely to grow further so will not be suitable.

If both large hollow-bearing trees and large recruitment trees are protected during forestry operations and permanently through time, there will be suitable tree hollows now and in the future for native animals to use.

Retaining hollow-bearing trees and recruitment trees

The PNF Code for northern and southern NSW requires that you must retain 10 hollow bearing trees and 10 recruitment trees per 2 hectares. Where the total number of hollow-bearing trees is fewer than 10 per 2 hectares, additional recruitment trees must be retained to bring the total number of hollow-bearing trees and recruitment trees to 20 trees per 2 hectares.

A simple way to visualise this is in every 0.2 hectares you can retain at least one hollow-bearing tree and one recruitment tree. If there are no hollow-bearing trees in that 0.2 hectares, you can retain two recruitment trees.

You may retain more trees than the minimum required, if you wish.

A 0.2-hectare area can be measured by standing at a central point and measuring a plot radius of approximately 25 metres around you. This is approximately the range of view in a moderately dense forested area.

Helpful examples of how you can select hollow-bearing trees (H trees) and recruitment trees (R trees) in the forest are portrayed in Figures 1a, b and c.

Identifying hollow-bearing and recruitment trees

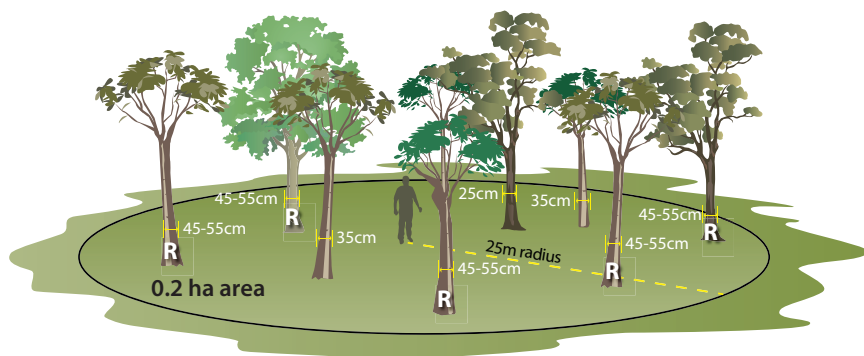


Figure 1a: Two large recruitment trees

In this scenario, there are no trees with hollows or signs of hollows in the 0.2-hectare plot. There are five trees of a similar diameter size that are the largest in the plot. Choose at least two of these five trees to be your recruitment trees.

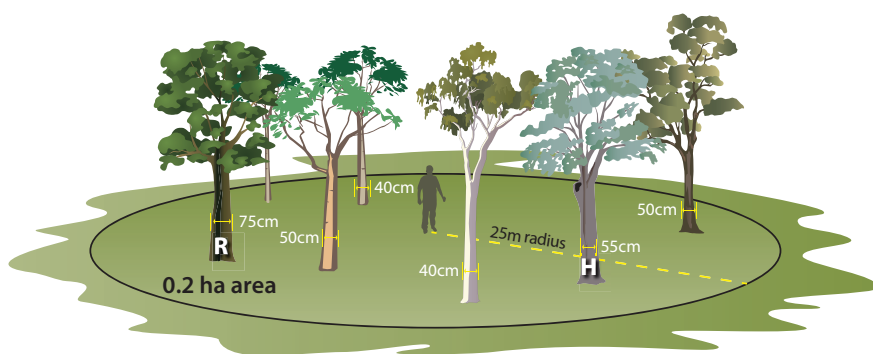


Figure 1b: One hollow-bearing tree and one recruitment tree

In this scenario, there are trees with visible hollows or signs of hollows in the 0.2-hectare plot. Choose at least the hollow-bearing tree with the largest diameter to retain in your plot. Of the trees in the plot that do not have hollows or signs of hollows, choose at least the tree with the largest diameter to retain as your recruitment tree. In this example, there is only one choice as the other trees are smaller.

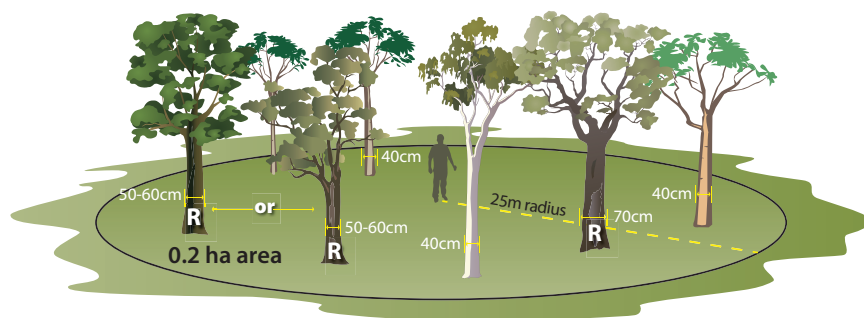


Figure 1c: Two largest recruitment trees

In this scenario, there are no trees with hollows or signs of hollows in the 0.2-hectare plot. There are trees of various sizes. One tree is obviously larger in diameter than the other trees, with a diameter of 70 cm. You should choose this tree as one of your recruitment trees. There are two trees that are both about 55 cm in diameter and are larger than the remaining trees in the plot. Choose at least one of these trees as your second recruitment tree.

Further reading

Fisher M, Cotsell N, Scotts D, Cameron M (unpublished), 'High value arboreal habitat in the Coffs Harbour local government area', NSW Office of Environment and Heritage and Coffs Harbour City Council, Coffs Harbour, New South Wales, Australia.

Gibbons P and Lindenmayer D. 2002. *Tree Hollows and Wildlife Conservation in Australia*. CSIRO Publishing, Victoria, Australia.

Koch A, Munks S, Driscoll D and Kirkpatrick J 2008. 'Does hollow occurrence vary with forest type? A case study in the wet and dry *Eucalyptus Obliqua* forest', *Forest Ecology and Management* 255, pp. 3938–3951.

NSW National Parks and Wildlife Service 1999, *Voluntary conservation on private and public land Note 5: natural tree hollows*. NSW National Parks and Wildlife Service, Sydney.

NSW Scientific Committee Determination – Loss of hollow-bearing trees as a key threatening process, visit www.environment.nsw.gov.au/determinations/lossofhollowtreesktp.htm.

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