



Environment Protection Authority

# Coastal IFOA Guidance: Guidance for the identification of hollow- bearing trees

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This document provides guidance to support the application of the definition of a hollow-bearing tree.

# Purpose

Protocol 39 of the Coastal Integrated Forestry Operations Approval (Coastal IFOA) sets out the definition of **hollow-bearing tree** and includes a note which states that guidance will support the application of the definition.

This guidance document is intended to assist decision-making for those conducting and regulating **forestry operations** under the Coastal IFOA by providing a clear approach for identification of **hollow-bearing trees** for retention in a manner consistent with the Coastal IFOA and its protocols, including but not limited to:

- the definition of **hollow-bearing tree** in Coastal IFOA Protocol 39: Definitions,
- condition 64 of the Coastal IFOA, and
- the outcome statement for Division 3 of Chapter 4 of the *Coastal IFOA – Conditions*, ‘Retained trees’, that “important trees are retained and protected for shelter and food resources for native species, and to support their persistence”.

Note that this guidance does not affect the legal requirements of the Coastal IFOA and its protocols. This guidance is not a substitute for the Coastal IFOA conditions and protocols and does not modify their terms or effect.

Terms used in this guidance document have the same meaning as defined in Coastal IFOA Protocol 39: Definitions. Defined terms are indicated by **bold italics**.

## Hollow-bearing tree definition and interpretation

The first column of Table 1 lists an element of the definition of a **hollow-bearing tree**; the second lists signs that may help you decide if a tree fits that element of the definition.

**Table 1** *Hollow-bearing tree definition and interpretation*

| <b>Hollow-bearing tree definition</b>   | <b>Interpretation</b>  |
|---|--|
| A tree that is alive and has:   | The tree must be living, as evident for example by green foliage.<br>Where a tree has more than one stem (at any height), all stems are considered a part of the same tree.  |
| 1. visible hollows, holes or cavities that have likely formed because of decay, injury or other damage as the tree has aged; or | A tree that is alive meets the <b>hollow-bearing tree</b> definition if it has one or more visible hollows. These can include holes, fissures, cracks or other cavities in its base, trunk or branches.<br>Hollows need only be large enough to accommodate small vertebrate animals such as microbats – this effectively includes any hollow large enough to be visible. While hollows may form at sites of insect attack, they do not include the small holes of insects such as borers or termites.<br>A tree that is alive and has a visible hollow meets the <b>hollow-bearing tree</b> definition irrespective of its apparent growth stage.<br>Further guidance on identifying trees with visible hollows is provided in Section 3 below. |

2. clearly inferred hollows as it is an older growth stage tree (in particular in a senescent tree) with one or more obvious deformities such as a burl, large protuberance or broken limb.

Hollow development is a characteristic of older trees. Hollows become increasingly prevalent as trees age through the mature to the senescent (late and over mature) growth stages (see Table 2 below).

Hollow development is usually associated with a site of damage or injury that presents as a deformity such as a burl, large protuberance or broken limb. These features may be readily identified without a hollow itself being visible.

Hollows can be clearly inferred if a tree is of a growth stage where hollows occur and has at least one obvious feature indicating hollow development.

Hollows cannot be clearly inferred if a tree is not of a growth stage at which hollows normally develop, or lacks obvious features to indicate the presence of hollows.

Section 4 gives further guidance on identifying trees in which it is possible to clearly infer hollows.

## Trees with visible hollows

It can be very quick and simple to identify visible hollows. But more thorough observation is needed to conclude there are **no** visible hollows. To see whether a tree has visible hollows, you may have to look at the base, trunk and branches, from many different angles.

Figure 1 Trees with visible hollows as indicated



# Clearly inferred hollows: older growth stage trees with obvious deformities

If older growth stage trees display obvious features such as a burls, large protuberances or broken limbs, this can suggest that hollows are present and the ***hollow-bearing tree*** definition is met. To determine whether hollows can be clearly inferred relies on a thorough inspection of the tree and an understanding of concepts of tree growth stages and hollow development. This is explained further below.

Figure 2 Trees of an older growth stage with burls, large protuberances or broken limbs as indicated



Figure 3 Trees of an older growth stage with broken limbs as indicated






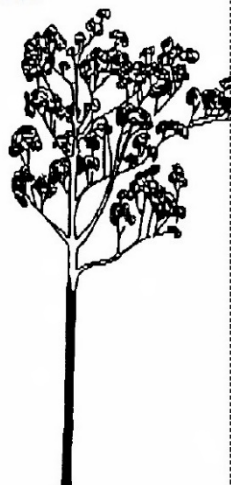


## Growth stages

As trees grow and age, they transition through a series of recognised growth stages that are shown in Figure 4. Table 2 provides details of various characteristics attributed to each growth stage and their relationship to hollow development.

Trees do not usually develop hollows until they are at an older growth stage. This typically begins when a tree is in the mature growth stage, although many mature trees do not have obvious features that can clearly infer the presence of hollows.

Hollows become increasingly numerous and diverse in size as a tree moves into the 'late mature' and then 'over mature' growth stages: they are particularly associated with these 'senescent' growth stages. The number and diversity of hollows eventually declines as a tree loses limbs and ultimately dies. Even at this point, the tree may continue to provide valuable hollows as a **dead standing tree**.

Figure 4 Illustration of growth stages

|  | Regrowth  |  | Mature   |  | Senescent  |  |
|--|---|--|--|--|--|--|
|  |  |                    |  |                                       |  |  |
| <b>Characteristics</b>                               | Pointed Crowns<br>Low height  | Rounded crown<br>limbs dead or dying<br>but not fallen<br><br>Reasonable height compared to regrowth | Crown opening up<br>Crown limbs still<br>healthy                                   | Good proportion of<br>crown limbs dead or<br>dying but not fallen<br><br>Crown shape may be distorted due to<br>exposure | Stagheaded<br>Crown view no<br>longer rounded  |  |
| Modified Jacobs<br>classification<br>(Woodgate 1994) | <b>Regrowth</b>   | <b>Early Mature</b>  | <b>Mature</b>  | <b>Late Mature</b>   | <b>Over Mature</b>   |  |

Source: Woodgate, P.W., Peel, W.D., Ritman, K.T., Coram, I.E., Brady, A., Rule, A.J. and Banks, J.C.G., 1994. *A Study of the Old-Growth Forests of East Gippsland*, Department of Conservation and Natural Resources, Victoria, Australia



**Table 2** Characteristics of growth stages and relationship to hollow development.

| Broad stage                       | Regrowth                   |                            | Mature              |                             | Senescent              |                           |
|-----------------------------------|----------------------------|----------------------------|---------------------|-----------------------------|------------------------|---------------------------|
|                                   | Field growth stage         | Sapling                    | Pole                | Early mature                | Mature                 | Late mature               |
| <b>Branch hollows</b>             | none                       | none                       | none                | few                         | common small to medium | abundant, small to large  |
| <b>Main axis</b>                  | dominant                   | prominent                  | not prominent       | lost                        | lost                   | lost                      |
| <b>Crown outline</b>              | very pointed               | pointed                    | rounded             | flattened                   | irregular              | very irregular            |
| <b>Height</b>                     | rapid increase             | rapid increase             | slow increase       | no increase                 | slight decrease        | distinct decrease         |
| <b>Total leaf area</b>            | very small                 | small to medium            | medium to large     | large                       | medium to large        | small to medium           |
| <b>Leaf area change</b>           | rapid increase             | rapid increase             | slow increase       | no increase                 | slight decrease        | rapid decrease            |
| <b>First order branches</b>       | very small, extending      | small to medium, extending | large, extending    | large, stable               | large, broken          | mostly fallen             |
| <b>Primary branch crown units</b> | not evident                | whole crown                | most of crown       | branch extremities          | few                    | none                      |
| <b>Epicormic crown units</b>      | none                       | none                       | few at branch bases | base and middle of branches | most of crown          | whole crown               |
| <b>Dead branch frequency</b>      | very common in lower crown | common in lower crown      | few through crown   | few through crown           | common through crown   | very common through crown |
| <b>Dead branch size</b>           | very small                 | small                      | small               | small to medium             | small to large         | small to large            |
| <b>Tree vigour</b>                | very vigorous              | very vigorous              | very vigorous       | vigorous                    | not vigorous           | moribund                  |

Adapted from Woodgate, P.W., Peel, W.D., Ritman, K.T., Coram, I.E., Brady, A., Rule, A.J. and Banks, J.C.G., 1994. *A Study of the Old-Growth Forests of East Gippsland*, Department of Conservation and Natural Resources, Victoria, Australia, and JOGFP (1996). *Joint old-growth forests project: summary report. A report for the Resource and Conservation Assessment Council*, Sydney. NSW NPWS and State Forests NSW.

## Obvious deformities

Obvious signs that hollows are present include:

- broken branches big enough to contain hollows suitable for small animals
- advanced decay or weathering
- cracks or fissures that occur in the trunk or branches.

Some wounds do not heal well and form hollows that are often indicated by burls or protuberances. Parts of branches or trunk that have obvious areas of deadwood can also be expected to be associated with hollow development.

Hollows develop more quickly where wounds are open to the weather, allowing water to collect and causing rotting, such as where an upper branch or tree head has broken off.

Animals that use hollows often exploit existing wounds such as broken branches, burls or insect damage to form hollows. Sometimes there are signs of chewing or gnawing at those sites.

Lower primary branches that are lost during the 'pole' or 'early mature' stages are often shed flush with or close to the trunk, and the wound is occluded (grows over) without forming a hollow. Small terminal branches that are dead and broken are not a sign that hollows are present.

## Prioritising hollow-bearing trees for retention in the selective harvesting zone

Trees may be of poor form or suffer poor health and damage but clearly fall within the ***hollow-bearing tree*** definition if they have visible hollows or deformities which can clearly infer that hollows are present. However, where sufficient numbers of healthier hollow-bearing trees are available to meet the required rates in the ***selective harvesting zone***, those stronger, healthier trees should be prioritised for retention over trees that are in poor health, have compromised longevity, are suppressed or otherwise have poor form and limited potential to provide a rich hollow resource into the future.