HABITAT MANAGEMENT GUIDE

Managing dead and decaying wood habitats

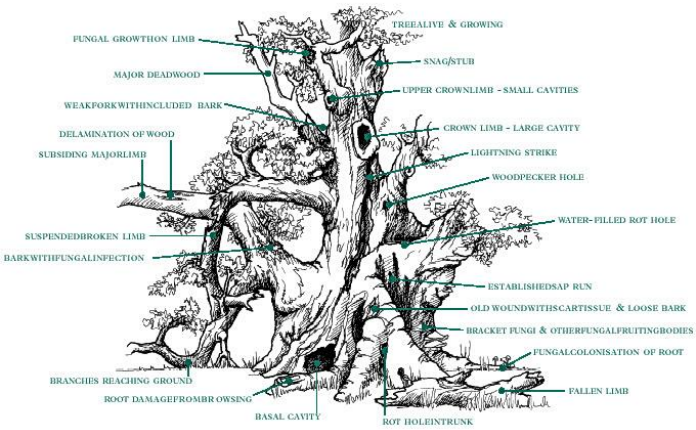
Why is dead and decaying wood important?

Dead and decaying wood comes in many varieties and is created by natural processes associated with living trees – it is part of the cycle of healthy tree growth. The more dead and decaying wood a tree contains, the greater its value to wildlife. Though trees can start producing wounds and small sections of decaying wood from a young age, the variety and importance of decaying wood tends to become greater as a tree ages. Old trees (often termed 'veteran' trees) tend to have more decay features as a natural consequence of the aging process. These trees produce a very wide range of distinct 'microhabitats' (Figure 1) that are scarce in younger trees and of important nature conservation value.

Dead and decaying wood habitats support a great diversity of specialist species with very specific habitat requirements – known as 'saproxylic' organisms. An estimated 13% of all species of plants and animals known in the UK are directly dependent on dead and decaying wood habitats, while many more are dependent upon the saproxylic organisms themselves.

The current management of our countryside rarely allows such habitat features to persist. Historic and continued loss of veteran trees and decaying wood features has contributed to the widespread decline in saproxylic organisms and other associated species.

An 'ideal' veteran tree for wildlife.



Significant opportunities exist to better manage woodlands, parkland and wood pasture for veteran trees and saproxylic organisms. The aim of the following management advice is to provide simple actions and guidance to land owners and land managers to ensure the persistence of old trees, their microhabitat features, and their saproxylic communities.

Important features of living trees include:

- dead attached limbs (e.g. stag-horned trees);
- cavities (of all sizes);
- rot holes (wet or dry);
- sap runs;
- hollow trunks/stumps;
- aging, flaking or loose bark;
- fungi (e.g. bracket fungi);
- decaying underground roots; and
- woodpecker holes.

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How can you manage your site for dead and decaying wood specialists?

Given the importance of dead and decaying wood for some of our most threatened saproxylic species, and their often poor dispersal abilities, the most important factors to consider when managing these habitats is habitat continuity and connectivity.

a) Avoid over-zealous tidying

Dead and decaying wood is often removed, 'tidied' or treated as a result of misguided management on the grounds of public safety, 'tidiness', tree hygiene or for firewood. Such practises threaten the survival of saproxylic species. Avoid removing, treating or 'tidying' any dead or decaying wood feature (e.g. rot holes, sap runs, natural fractures, loose bark and cavities) as these are valuable specialist habitats. Retaining dead and decaying wood of all ages, both standing and fallen, will ensure continuity of habitat for saproxylic species.

Where dead wood occurs naturally, it should be left in situ where it is found (including within freshwater habitats) wherever possible. Seek to retain attached, dead and decaying limbs/branches/twigs of all sizes; if their removal is necessary for public safety, then pruning is preferable to removal. Fallen trees, limbs and vegetation should be left to decay where they lie and not removed. If fallen dead wood conflicts with other land use (e.g. restricts access or presents a health and safety risk), it should be moved only as far as is absolutely necessary and kept as intact as possible to retain integrity of any habitats within.

Placing fallen dead wood in a variety of conditions, ranging from very humid and shaded to partially shaded or fully exposed to sunshine, will provide a greater variety of habitats. Avoid stacking fallen dead wood against tree trunks as this can disrupt lichens on the bark.

Standing dead wood tends to be more valuable for saproxylic species than fallen timber, as it rots from the inside rather than from the outside, creating quite different conditions and microhabitats. Standing dead trees (often called monoliths) should never be removed – if it presents a health and safety hazard, it may be possible to secure it safely in a standing position. Consider all alternative options before felling such trees.

Standing deadwood 'monolith'

Tree stumps should be retained and not ground up as some saproxylic species (e.g. Stag beetle) require buried dead wood and decaying underground roots.

b) Ensure a supply of both young and mature trees of varied species

Historic timber demand has removed the majority of old 'unproductive' trees, whilst on-going misguided management has eroded their value. Afforestation projects aiming to replace 'lost' trees often involve planting trees of the same age and species, and these may not be supplemented with new planting rounds in the future. This has sometimes resulted in a uniform age and species structure that lacks the progressive input of new dead wood material or veteran trees found in a more natural woodland environment.

Long-term plans are required to ensure that as older trees die, there will be an adequate number of trees reaching maturity to replace them, ensuring continuity. Identify any gaps in age structure and take actions to allow natural regeneration (e.g. by reducing grazing pressures) or else plant young trees in places where they will be allowed to persist for centuries.

When planting new trees, use species native to the area and keep the same mix of species as historically found on your site. It is important to note, however, that some non-native species (e.g. cedars, European oaks, Horse and Sweet chestnuts) can support the same valuable microhabitats as native, veteran trees. As such, these should not be removed where they are not causing problems.

Pollarding younger trees can help to close up the generation gap, encouraging the creation of dead wood habitats within the living tree.

c) Limit soil compaction and erosion

Soil compaction and erosion, for example from trampling by people, machinery or livestock, causes serious harm to tree roots by squeezing the air-spaces out of the soil. This can cause trees to become unstable, increasing the likelihood that they will be removed for public safety reasons. Soil surrounding trees (especially old trees) should be protected from compaction and erosion.

Limit the frequency and length of time stock graze or congregate near old trees. Locate supplementary feed away from old trees and provide alternative sources of shade.

Footpath diversions can also be used on sites with high recreational pressure to divert people away from the roots of old trees.

d) Avoid applying fertilisers or pesticides near the roots and trunks of old trees

Trees do not exist in isolation and the environment around them can be crucial to their welfare. The application of fertilisers, pesticides, soil conditioners (e.g. lime) and other chemicals within the vicinity of trees can disrupt mycorrhizal fungi and change soil structure, making trees more susceptible to stress and shortening their natural lifespan. Such chemicals can also be absorbed directly into dead wood, killing associated saproxylic species.

e) Avoid ploughing and slurry spreading within the vicinity of old trees

Most of the tree's roots are typically within the top 600mm of the soil, making them vulnerable to damage.

Poor management surrounding veteran tree

Cultivation, especially ploughing and ditching, damages roots and the important mycorrhizal fungi linked to them; as such, it should be avoided. Create a root protection zone around each old tree 15 times the diameter of the tree trunk or 5 metres beyond the canopy, whichever is the greater, to avoid undue damage to root systems.

Slurry can disrupt mycorrhizal fungi and contain a plethora of harmful chemical residues (e.g. from veterinary medicines) that can kill dung-dwelling invertebrates such as dung beetles. Lichens on the bark of trees can also be smothered or harmed if sprayed by manure. A physical protection around a tree will provide a barrier to activities such as ploughing or slurry spreading.

f) Improve habitat connectivity

Connectivity is important – saproxylic species (especially invertebrates) are often poor at moving to new habitats. Fragmentation of dead and decaying wood habitat within the landscape makes it difficult for less mobile species to colonise. Map the spatial distribution of old trees at a site/landscape level to identify gaps in connectivity. Seek to reduce site fragmentation by promoting future veterans on land in between existing sites. This can be achieved either by tree planting or encouraging natural regeneration (e.g. by relaxing grazing pressure), or a combination of both. Trees should be planted where they will be allowed to persist for hundreds of years.

g) Provide pollen and nectar

Many of the insects associated with dead and decaying wood microhabitats only use them in their larval form. As adults, many require pollen and nectar. It is important that pollen and nectar sources (e.g. native thorny shrubs, plants with umbellifer flowers) are provided in close proximity to old trees and decaying wood.

Retain patches of woodland and scrub, especially where this provides blossom and additional dead wood. Plant small blocks of flowering trees on sites that lack spring blossom, managing them rotationally over several years. Fencing-off or reducing livestock access to certain areas (e.g. hedge bottoms) can also encourage flower-rich conditions.

Managing hedges, on a minimum three year rotation, will create a range of species and heights across the landscape. Relaxing cutting will permit more profuse blossom and fruiting.

h) Be wary of changes in ground-water levels

Over-abstraction, drainage, neighbouring development, roads and prolonged drought can all cause water stress and tree death.

i) Encourage open grown trees

Open grown trees or isolated trees in hedgerows support different saproxylic species from those growing in closed canopy woodland, so it is necessary to ensure that there is a continuum of trees standing in the open.

This may require selective thinning of some younger trees in areas where denser woodland is developing. Natural vegetation succession results in a closing of the canopy, giving more shaded conditions, which could adversely affect many species.

Too much vegetation will compete with the tree for light and nutrients, shade out important lichen communities or affect insects which need sunlit tree trunks. Restrict vegetation that shades tree canopies and trunks but avoid any large-scale simultaneous woodland felling that suddenly

Hawthorn blossom provides important pollen and nectar source

exposes semi-shaded, old trees to full sunshine and wind - this can kill them. If cutting back scrub or herbage to prevent over-shading and maintain varied vegetation structure, do this rotationally over several years. Some vegetation around trees (e.g. bracken) can create a high fire risk and a single incident may kill many trees. It is worth noting that encouraging natural regeneration in some areas of woodland is beneficial to bats.

j) Encourage the growth of a variety of fungi

The presence of fungal growth such as bracket fungi should not be seen as a reason to remove or prune a tree, as only a minority of fungi are a primary source of tree death. Fungi not only provide an essential breeding medium for many invertebrate species of flies and beetles, but they also contribute to the decay of dead heartwood in older trees. This reduces a tree's bulk whilst leaving the living sapwood intact, which can actually make the tree better able to withstand high winds. Soft, red rotten heartwood is the sole habitat of some of our rarest and most threatened saproxylic invertebrates. Felling or removing trees with heart-rot could result in the extinction of these specialist species.

k) Consider creating new deadwood niches

A major problem at many sites is that there is a gap in the age structure of trees. Continuity of habitat is essential if the saproxylic fauna is to survive, as many are poor colonisers and cannot travel far to find suitable habitats. While tree planting may provide a long-term solution to the risk of losing an existing old tree resource, or

plugging a gap in the age structure, it will take many decades to a century or more for such trees to reach a point where they provide suitable wood mould habitat.

In the interim, there is a risk that existing old trees will be lost prior to the younger generation reaching the stage at which they will replace them. In such scenarios, one of the following options could be considered to plug any immediate short-medium term gaps in the existing resource. Note that these methods are still at the trial stage and should therefore only be seen as a stop-gap measure and not a long-term solution.

Short term measures: Where there are large age gaps in the availability of replacement hollow trees consider deploying "beetle boxes" as interim habitat. These boxes are designed to mimic the ecological needs of wood mould specialists in a targeted way using artificial substrates. "Beetle boxes" should ideally be situated within close-proximity (<50m) of existing hollow trees to increase chances of colonisation.

Medium-long term measures: Where there is an age gap in trees, 'veteranisation' might be considered where it is sustainable and essential. Veteranisation is the deliberate creation of features normally associated with older trees. Younger trees with existing low potential may be artificially damaged to accelerate the start of the decay process. There are various veteranisation techniques available including horse kicks, ring barking selected limbs (where they do not pose a health and safety risk), artificial woodpecker holes and rip tears of limbs in the lower canopy.

Before undertaking such works, it is best to map the distribution of existing old trees to help identify gaps in the network of available habitat and highlight potential places to create new habitat for the future. Veteranisation needs careful selection of trees by experienced arborists and should never be carried out on ancient or veteran trees.

Traditional woodland practices such as pollarding are a form of veteranisation and can be used on sites where artificially damaging trees would be less aesthetically pleasing.

Aerial hollow created through veteranisation

Pollarding can increase the life expectancy of a tree, improve stability, and create decay wood habitats. These trees are also more likely to become veterans. Creating new pollards from young trees is one way of providing more niches for saproxylic species at sites where continuity of habitat is likely to be a problem. Unfortunately, this traditional management technique is now rarely practiced in the UK, and the skills are being lost. Cessation of pollarding can result in trees becoming top-heavy and in danger of collapsing.

l) Maintain open areas and encourage habitat mosaics

Low-level grazing or rotational cutting of grassland and heathland will ensure that habitat is maintained in a reasonably open state, generate a diversity of heather structures / grassland sward heights, and maintain habitat mosaics. Open areas are essential, providing sunny sheltered places for flowering herbs and shrubs which produce the nectar and pollen required by adult saproxylic insects whose larvae develop in dead wood. As many invertebrates require two or more habitats to complete their lifecycle, management should aim for a mosaic of habitats in close proximity. These habitat components could include: bare ground, grasslands, heathland, wetlands, scrub, woodland, hedgerows and isolated trees.

m) Manage grazing carefully

Grazing can help to maintain a diversity of species in the sward and keeps down rank vegetation and invasive scrub. Grazing needs to be carefully managed as it is important to retain a range of

flowering herbs and shrubs and tussocky grasses. Where possible, allow plants to flower by relaxing grazing or not cutting between April and September. Excessive grazing will remove the understorey layer which is important for a number of species.

Avoid or limit the use of veterinary medicines such as avermectins wherever possible as dung excreted by livestock treated with these medicines is spiked with harmful residues that can kill dung-dwelling invertebrates such as dung beetles. Make sure that animals treated with veterinary medicines are kept away from trees until the medicines have been excreted.

n) Retain wet areas

Maintain wetland features and their marginal habitats (such as swamp) and ensure good water quality. Marginal wetland vegetation provides cover for bats feeding over open water, while the flowers of aquatic plants provide valuable sources of pollen and nectar for invertebrates. Avoid excessive trampling of water margins by stock. Sites which already include boggy areas or streams with fallen semi-submerged timber should be managed to ensure that a continuity of timber enters the system.

o) Clearly mark and protect any trees that contain confirmed bat roosts

Bats are particularly prone to disturbance and care is needed when thinking of site management as not to cause disturbance to bats or destroy any known roosts. Clearly mark and protect any trees that contain confirmed bat roosts and avoid work around confirmed roost sites to limit disturbance. Retain dead standing wood and limbs as they will provide suitable roost opportunities for the future.

p) Maintain existing old trees

Protecting and managing old trees (especially hollow trees) to prolong their lifespan is the highest priority action you can take for saproxylic species. Existing old trees should be identified and allowed to age and die naturally. Tree Protection Orders can be a useful tool for protecting these trees.

Veteran oak in wood pasture

In some instances, management intervention may be required to prolong their life. Management options may include direct tree surgery to reduce risks of collapse such as crown reduction or retrenchment pruning. Note that direct work on an old tree should only be undertaken as a last resort where there is a genuine risk of harm to the tree if it were otherwise left alone (e.g. lapsed pollard in danger of collapse).

Management work may also include indirect management on neighbouring trees that are competing with the canopy of the target tree. This may include the removal of whole trees (halo thinning) or parts of a tree (high-canopy competition) within 5-10m of the circumference of the target tree canopy. Such work should be phased over time to limit sudden shocks from increased light exposure and wind load which may kill or damage the target tree.

Ensure that the ecological importance of individual old trees is taken into account when making decisions around tree safety management. For example, consider removing or re-routing visitor infrastructure that falls within the root protection area of old trees. The root protection area of old trees is defined as a radius 15 times the diameter at breast height (DBH).

The Back from the Brink Ancients of the Future project is led by Buglife in partnership with Plantlife and the Bat Conservation Trust.

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