

Practical Guidance

Ancient tree guide 6:

# The special wildlife of trees

December 2009



WOODLAND  
TRUST



# Ancient trees as an ecosystem

Ancient and veteran trees' – trees that are very old, or, if younger, already have the cavities and dead wood of ancient trees – support many species that need the very special conditions that such trees provide. Many of these specialist species are already rare and becoming rarer still as we lose old trees and deadwood from our landscapes. It is vital that we retain and care for our ancient and veteran trees, even when they are dead, to ensure the survival of the species that depend upon them.

It is also important that we understand the role that ancient trees play in the complex web of life. They provide a rich and diverse range of habitats, playing host to countless other species. However, the relationships often work both ways; many of these species are crucial to the health of the trees.

The majority of species that are specialists of ancient, veteran and dead trees fall into three distinct groups:

- **fungi**, some of which feed off the dead wood of the trees and others that form special relationships with the trees' roots;
- **invertebrates**, very many groups, but especially beetles and flies, which live in and on the decaying wood or fungal fruiting bodies, in the bark or amongst the lichens or mosses;
- **lichens**, growing on the outside of the trees or in cavities.



**Brown rot - decay which makes the wood brittle, from the digestion of cellulose by certain specialist fungi.**



Ted Green

**Bark beetle galleries under the bark of oak. Burrows of the young larvae radiate from the wider burrow of the mother beetle and widen as they do so.**



Ray Woods

**Lungwort lichens are important in their own right but maybe eaten or provide habitat for other wildlife**

These species have quite specific requirements and many appear to require trees that have grown in open park-like conditions and have full crowns with lower branches that reach down almost to the ground. High forest trees do not provide the same niches as they have small, high crowns and do not retain broad, spreading lower branches.

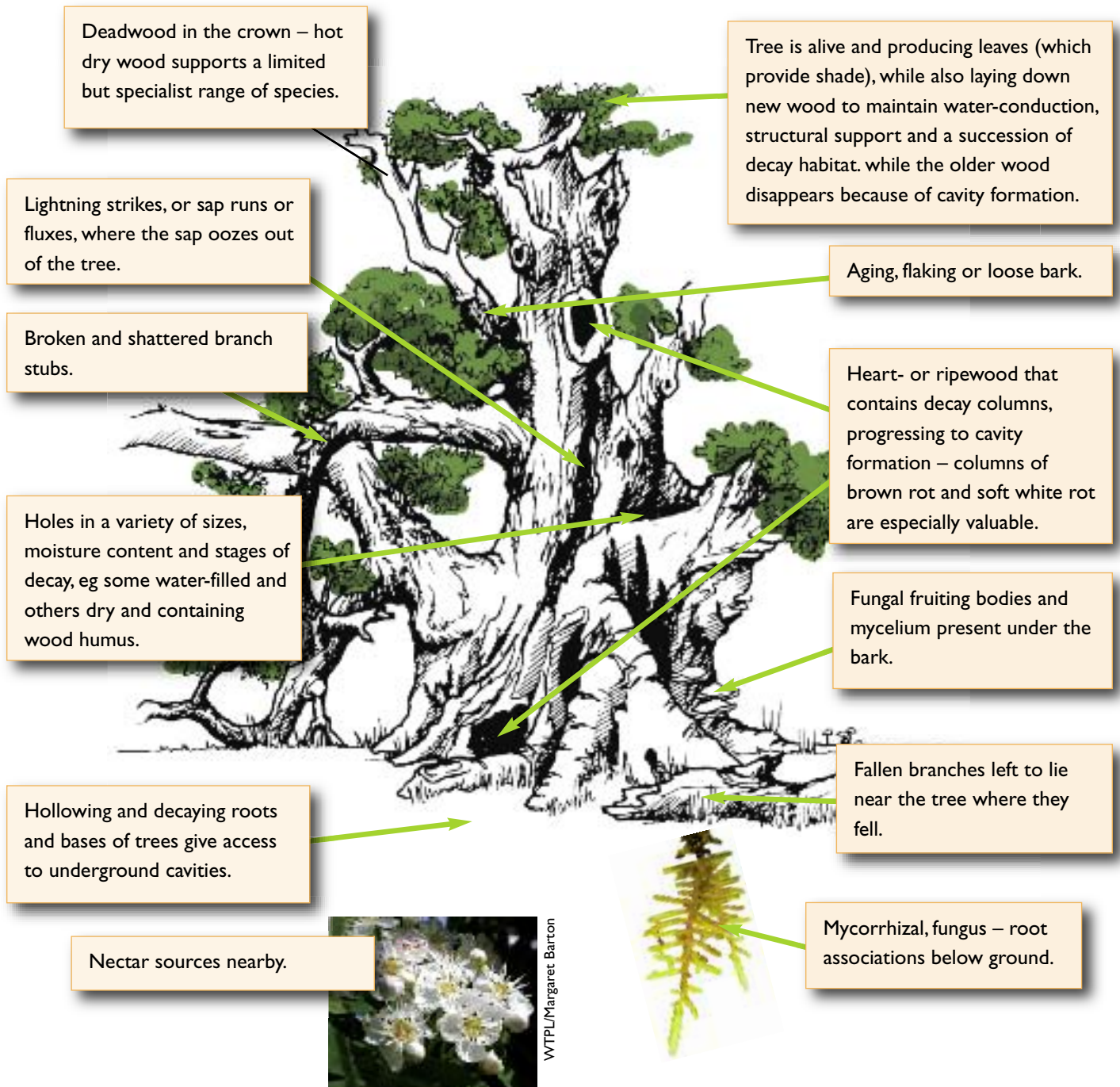
Many species are reliant on other species to create their specialised habitats. For example, certain beetles live in a type of decaying wood called brown rot which results from the activity of a very small number of particular species of fungi.

Ancient, veteran and dead trees also provide valuable habitat for other species, such as bats and birds which make use of the nooks and crannies in which to nest or roost. The importance of these trees for wildlife comes on top of their many other values – cultural, historical, aesthetic – all of which means that ancient, veteran and dead trees occupy a very special place in the landscape.

This guide is intended to inspire all those who own or look after ancient and veteran trees, and the valuable and often unseen wildlife they support. Each tree record on the Ancient Tree Hunt website ([www.AncientTreeHunt.org.uk](http://www.AncientTreeHunt.org.uk)) has information about the wildlife associated with it, where available.

We hope that species surveyors will find interest in the information about trees and that they will feel encouraged to submit any findings of ancient and veteran trees for inclusion in the database.

## A good ancient tree for wildlife:



Illustration; Veteran Trees: A guide to good management (Natural England)

**Fig.1** An ancient tree is a tenement block of wildlife - full of life, decay and rebirth.

*“Ancient trees are precious. There is little else on earth that plays host to such a rich community of life within a single, living organism.”*

David Attenborough

<sup>1</sup> Ancient Tree Guide No4: What are ancient, veteran and other trees of special interest?



Each species of wildlife requires different conditions to thrive in an aging tree, depending on its species, age and population. However, these habitats can be limited if habitats have not been conserved. Throughout this guide we will refer to these as 'ancient trees'.

## Getting old

As a tree ages, it develops certain characteristics which provide habitat for an increasing range of species of wildlife. Such habitats include areas of different types of decay and hollows in the trunk, branches and roots, loose bark, burrs, and water pools.

## A single tree

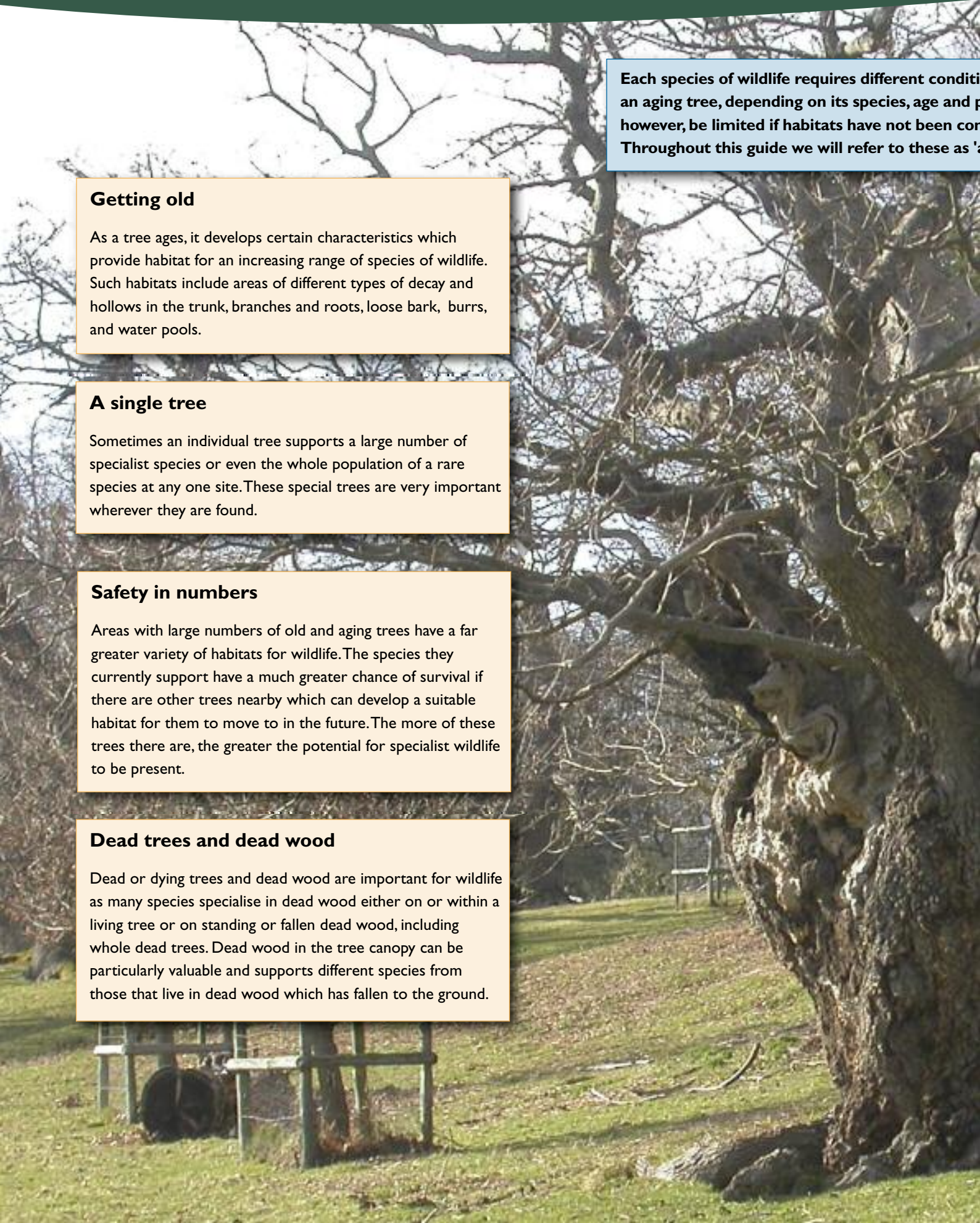
Sometimes an individual tree supports a large number of specialist species or even the whole population of a rare species at any one site. These special trees are very important wherever they are found.

## Safety in numbers

Areas with large numbers of old and aging trees have a far greater variety of habitats for wildlife. The species they currently support have a much greater chance of survival if there are other trees nearby which can develop a suitable habitat for them to move to in the future. The more of these trees there are, the greater the potential for specialist wildlife to be present.

## Dead trees and dead wood

Dead or dying trees and dead wood are important for wildlife as many species specialise in dead wood either on or within a living tree or on standing or fallen dead wood, including whole dead trees. Dead wood in the tree canopy can be particularly valuable and supports different species from those that live in dead wood which has fallen to the ground.





# What factors are important?

ons, many of which can occur simultaneously in physical characteristics. The range of species may, continuously present for centuries in the locality. 'ancient tree' species.

## **Veteran trees**

A veteran tree is one that has developed some of the features so often found in ancient trees such as cavities, dead wood, and flaking bark. They may, however, not be that old but have had a hard life and suffered damage from storms or man-made injuries. These veteran trees can support some of the same wildlife found on ancient trees.

## **Continuity – 'old-growth'**

There are some places where there have been ancient trees for many centuries – so there has been a continuity of old-growth characteristics a long way back into the past.

In these areas, some 'ancient' tree species of wildlife may also be found on younger trees but, importantly, are not found outside the old-growth area.

## **Landscape**

The special characteristics peculiar to old trees cannot last forever. Their dependent wildlife eventually needs to find new trees in just the right condition. Some of these species appear to be poor at dispersing and so it is important that there is enough habitat nearby to allow them to move successfully between trees. The greater the number of trees, the more secure rare species will be. Trees in the wider landscape may be particularly important as links between concentrations of ancient trees provide stepping stones, at least for the more mobile species.



# To the heart of the matter – fungi, the recyclers

WTPL/Richard Becker



Fungi are the unsung heroes of the natural world. Crucially they decompose plant matter so the constituent minerals and nutrients are released and supply trees and plants with essential nutrients, some of which living plants cannot obtain in any other way.



## Fungi as decomposers

Saprotrophic fungi break down and feed on dead plant and animal (and even other fungal) material. The breakdown products, which include trace elements, can be used by other species of fungi, bacteria, plants and animals.

Ted Green

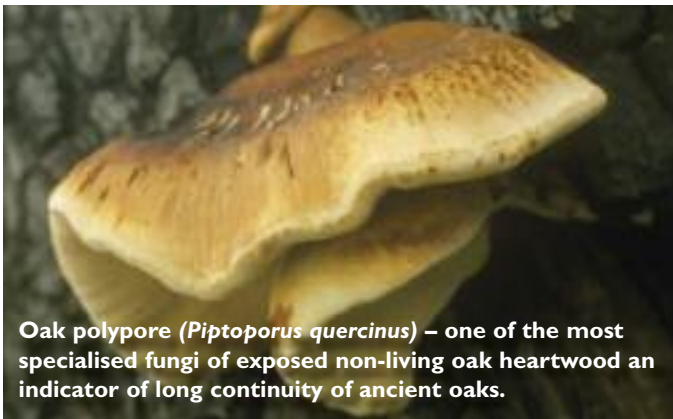


Fungi live on all parts of trees and other plants from the leaves to the roots. They are even present in the plant's tissues while it is still alive. A fungus consists mostly of a network of microscopic threads, the hyphae, which are collectively called a mycelium. Mycelia are sometimes visible under loose bark or fallen logs, but fungi are usually hidden inside the

wood, soil or other substrate except when they produce fruit bodies, for example mushrooms or brackets. Some fungi fruit rarely or even not at all, so it can be difficult to know how many different fungi live in a tree at any time. However, we believe the number to be high, as there are many habitat niches in a tree, each of which supports a different range of fungi. For example, the fungi growing in shaded twigs are different to those growing in twigs in sunshine, and will be different on the sunlit and shaded sides of a tree.

A key feature of most ancient trees is a hollowing of the trunk, caused by, specific heartwood decay fungi which primarily develop in the older, central wood of the tree. In most cases, such fungi do not decay the live sapwood of the trunk. By breaking down the older wood that the tree no longer needs, heartwood decay fungi release mineral nutrients which the tree can take up again – a sophisticated recycling system. Most of these fungi occur in a range of tree species but there are some that form partnerships only with specific kinds of tree; for example, the oak polypore is found only on ancient oak





**Oak polypore (*Piptoporus quercinus*)** – one of the most specialised fungi of exposed non-living oak heartwood an indicator of long continuity of ancient oaks.



***Ganoderma pfeifferi***, an indicator of old-growth beech, is on the European Red List but found more frequently in the UK than elsewhere

trees or occasionally on exposed heartwood of younger veteran trees in old-growth areas.

## Fungi as nutrient-gatherers

Very many flowering plants, including trees, form partnerships known as mycorrhizas with fungi, which grow round, or sometimes in their roots. The hyphae of these fungi extend far into the soil, absorbing inorganic nutrients, including trace elements, far more efficiently than would be possible via non-mycorrhizal roots. The plant makes use of these nutrients and in return, the fungi have access to sugars from the plant's photosynthesis. Both the tree and fungus are therefore able to grow much better in partnership than separately; indeed some species of plants and fungi cannot survive on their own.

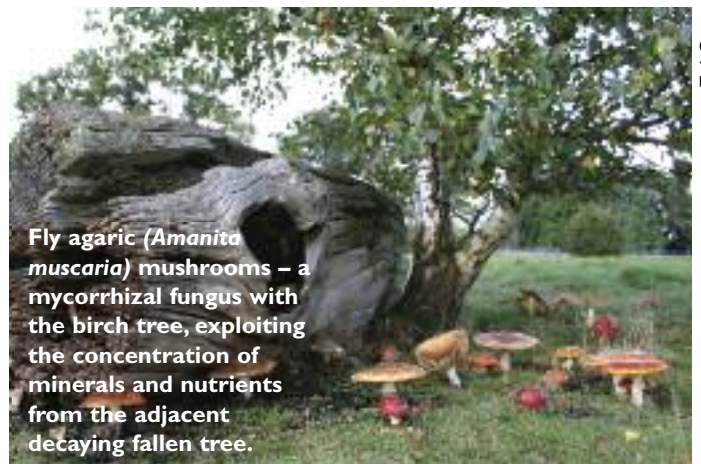
Some mycorrhizal fungi appear to have relationships only with mature or ancient trees and usually only in sites that are rich in veteran and ancient trees, such as the dramatically named Devil's Bolete (*Botetus satanus*) found with old beech.

### CASE STUDY

**Chicken of the woods (*Laetiporus sulphureus*), a fungus, hollowing an ancient tree creating relatively soft brown rot – a favourite of *Ampedus rufipennis* a click beetle, which is an indicator species of old-growth.**



***Ampedus rufipennis***



**Fly agaric (*Amanita muscaria*) mushrooms – a mycorrhizal fungus with the birch tree, exploiting the concentration of minerals and nutrients from the adjacent decaying fallen tree.**



**Zoned rosette (*Podoscypha multizonata*)** – usually seen among open grown oaks and an indicator of long continuity of open parkland landscapes.



# Depending on decay - insects and other invertebrates



Ancient, veteran and dead trees to support saproxylic<sup>2</sup> invertebrates, especially beetles and flies but also a wide range of other invertebrates including, moths, bugs, spiders, false scorpions, mites, millipedes, and snails. In Britain, there are at least 2,000 different invertebrates which rely in some way upon dead and decaying wood, each with different habitat requirements.

These dead wood habitats change over time as the wood decays and so the range of species of

invertebrates also changes with time. Certain species, including various longhorn or bark beetles, feed on wood or bark that has not been altered by fungi, but some of these invertebrates have symbiotic organisms in their guts that enable them to digest such food. When the wood is affected by fungal decay, it can support a much wider range of invertebrates. Some of these require wood that has only been slightly decayed but others, such as chafers, click beetles and most of the flies, live off the remains of the wood after it has crumbled into wood-mould. Like the fungi, many of the invertebrates that a tree supports may not be visible. They live within the decaying wood, maybe as larvae in tunnels or chambers, or as adult beetles living amongst the decomposed wood at the bottom of the hollow trunk. Many cannot digest the wood themselves and instead digest the fungi decomposing the wood or digest it using special micro-organisms in their gut. Others are predators or parasites of other dead wood invertebrates, with

Photos: Roger Key



**This fly larva (*Xylophagus ater*) uses its awl to injure longhorn beetle larvae that subsequently die and can be eaten.**



**Brown tree ants (*Lasius brunneus*) nest in the decaying brown rot in trees and forage out on the crown for the honeydew from aphids.**

<sup>2</sup> Saproxylic means relying on dead wood.

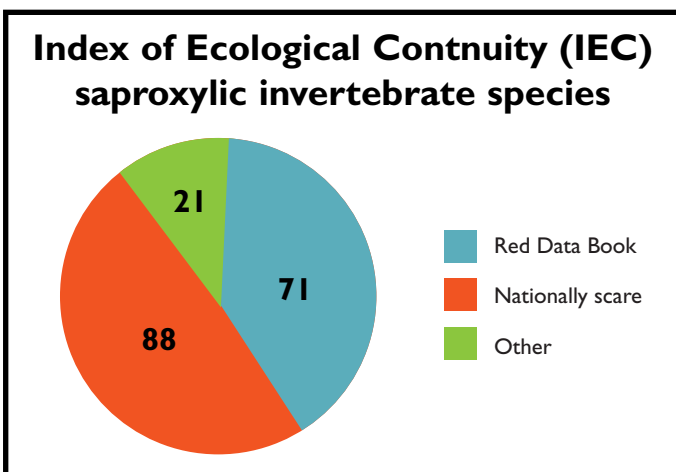


complex interdependencies between groups of species. Many (though not all) time their emergence as adults to coincide with the flowering of shrubs such as hawthorn, as they need the protein in pollen to produce the next generation of eggs and nectar to fuel their activity.

Many species appear unable to travel very far and their survival may be threatened if the ancient trees in which they live become isolated from others, highlighting the importance of retaining ancient trees and creating successive generations with the opportunity to age.

Some of the invertebrates that rely upon ancient, veteran and dead trees are so specific in their requirements and so dependent on centuries of continuity of such trees in the same locality, that they can be used as good indicators of habitat quality and continuity. The number of such species in a given locality can be used to calculate an Index of Ecological Continuity (IEC). When large numbers of these indicator species are found at a site, it is highly likely that the site has had generations of ancient and veteran trees stretching centuries into the past ie the trees represent old-growth.

Identifying and conserving these areas is important, not only for the sake of the rare beetles but usually for rare species in other groups such as lichens and fungi.



**A remarkable number of old-growth, decaying wood indicator species are very rare.**



Roger Key

**Hornets (*Vespa crabro*) are often seen emerging from their nests in hollow trees, where they often have other species associated with them.**



Roger Key

**Cobweb beetle (*Ctesias serra*) larvae live under flaking bark or in cavities and feed on the dead remains in spider webs. Their stiff bristles save them from spider fangs.**



Keith Alexander

**This slender slug (*Limax tenellus*) eats fungi and shelters in the humid interior of large, old, rotting, hollow trees**



# On the outside – the lichens

There are about 2,000 lichen species in the UK, of which some are widespread, while others, like certain fungi and invertebrates, are very particular in their requirements. A whole suite of lichens are now recognised as only ever being found in association with ancient and veteran trees. Most lichens are very sensitive to air pollution and so their distributions have been greatly affected by changes in the intensity and type of pollution over the past 200 years. The various species, are dependent on certain light and moisture regimes. Many of the lichens that are confined to ancient trees are now under threat of extinction, since there are so few places where the trees and the conditions are favourable.

Recent dramatic reductions in sulphur dioxide levels have helped some lichens to recolonise city centres. However, these are the more mobile species that can grow on the bark of younger trees that has grown after the air quality has improved.

Sadly, the bark of many ancient trees appears to have been permanently affected by acidic pollutants and there has been very little recovery of the specialised lichen flora on these trees.

Even where pollution has recently lessened, there are certain lichens which are unlikely to expand their current range as, like many invertebrates, they are very poor colonisers. To colonise new areas, lichens generally need to produce spores – their version of seeds – which are carried to new areas on the wind. Even if they land in the right spot they still need to marry up with the right alga for this dual organism to reconstitute itself. Many ancient tree lichens do not produce spores regularly, or if they are species that produce tiny vegetative propagules these are so small and slow growing, their young colonies are vulnerable to browsing by grazing, such as the larvae of certain moths.



Lichens can be killed and damaged by slurry, dung and artificial fertilizers so it is important to manage the area around ancient trees by low intensity farming



## CASE STUDY

Lobarion (*Lobaria pulmonaria*) – is severely affected by poor air quality. For example in Wales its long term future is poor as it is now only found in three or four sites where previously it was more widespread. It appears to need at least 14-15 suitable trees within 40m of each other and a mating strain nearby if it is to successfully propagate and sustain itself in a locality.



Ray Woods

Many of the rare and special lichens of ancient trees also require alkaline bark. The bark of a tree often becomes alkaline as the tree ages but the acidity or alkalinity varies between species. Acid rain leaches out some of the constituents of the bark of ancient trees, rendering it acidic and unsuitable for many of the lichens that could have lived on it otherwise.

In the face of these odds, it becomes imperative to protect these lichens where they currently occur and to try to ensure that there will be successive generations of suitable trees close by.

As with certain invertebrates, the specific requirements of certain lichens enable them to be used as indicators of habitat quality. The lichens of areas of 'old-growth' fall into two somewhat separate groups – those lichens of more densely wooded and shaded high forest – and lichens of trees in the open in wood pastures. Changes in management from wood pasture to high forest and vice versa will threaten the lichen flora since many of the species are not able to adapt to the changes in light levels. A loss of grazing livestock from wood pastures is especially damaging if, as a result, evergreen vegetation, especially ivy or holly, shades tree trunks.

Lichens are not just important in their own right but also support other species, such as moths and bark lice, which graze on or live amongst them, and a wide range of fungi that parasitise them.

Again, it is important to remember that, because of the rarity of the lichen habitat, the species which rely upon them may be rarer than the lichens themselves.



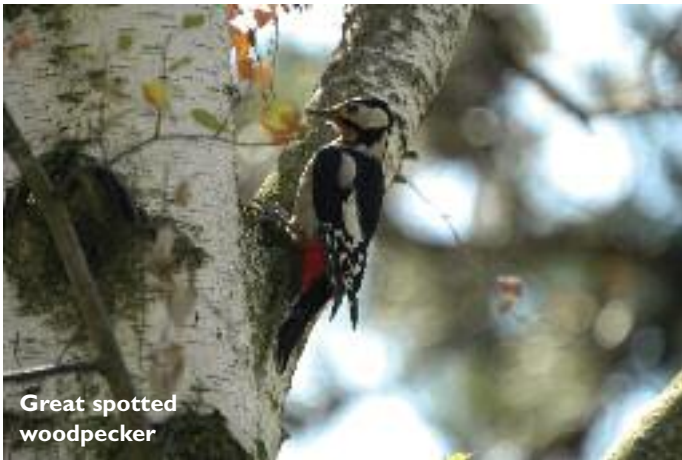
Ray Woods

Ideal conditions for old-growth lichens are where there are many veteran and ancient trees and they have adequate light and shelter from drying winds



# Nesting, roosting and hiding - birds, bats and other animals

WTPL/Pete Holmes



Great spotted woodpecker

Other species live on ancient and veteran trees, alive or dead, but are not specialists: i.e. such trees are habitat for these species but are not always necessary.

WTPL/Dennis Johnson



Redstart

A number of bird species utilise ancient, veteran and dead trees, by feeding on saproxylic and other invertebrates, or by nesting or roosting in the cavities and other hollows that tend to reach a large size in such trees. Redstarts, woodpeckers and barn owls nest in the cavities but have different feeding requirements. Redstarts forage for insects in the lower branches of trees, green woodpeckers like to feed on anthills in grassland, great and lesser spotted woodpeckers on saproxylic insects within wood, while barn owls hunt across open rough grassland.

Bats often depend on smaller crevices and sometimes patches of loose bark for their roosts. A variety of these niches are often provided by ancient and veteran trees, some of which provide the right conditions for a number of bat species. Barbastelle, one of our rarest and most threatened bats, favours ancient trees in wood pastures for the loose bark on old tree trunks.



Grass snake

WTPL/Libby Owen

An ancient, veteran or dead tree can also provide a convenient place for an entrance to a rabbit burrow, while also providing small gaps around its roots where hedgehogs can hibernate safely, or warm, moist hollows, where the eggs of grass snakes can be incubated. Of course, there are many other species that use ancient, veteran or dead trees as they would any tree.



Old-growth areas containing clusters of ancient and veteran trees can now be assessed by a standard protocol.



# Glimpses of the ‘wildwood’ through ancient trees

Although most landscapes in Europe have been considerably modified by humans, we can be sure that the pre-human landscape (often called the original ‘wildwood’), contained plenty of ancient and veteran trees. As the wild landscapes were tamed, old trees became increasingly confined to a few isolated areas. The evidence from sub-fossil invertebrate faunas in old trees such as bog oaks and pines shows that species now regarded as rare and restricted to small areas of old-growth were formerly widespread and, no doubt, quite common in earlier millennia.

In the UK, only the ancient and veteran trees and their associated species are pointers to this past wilderness. Our best remaining areas of old-growth are, mainly found in historic deer parks, remnants of mediaeval hunting forests and ancient wood-pasture, or on commons. Sometimes, however, species characteristic of old-growth may still be found associated with old pollards in managed cultural landscapes or with individual ancient trees in ancient hedgerows, wooded gorges, and traditional orchards. Characteristically, these trees are open-grown (individuals without their crowns touching) and found in grazed landscapes.

This dependence of open-grown ancient trees fits poorly with the conventional idea of ‘natural’ ancient woodland. We often think of ancient woodland as being ungrazed and having a closed canopy formed by trees grown very close together. Although ancient ‘semi-natural’ woods rarely contain ancient or veteran trees or their associated specialist species, and lost their ‘old-growth’ character many centuries ago as a result of intensive cutting by people, they are good places where trees could be managed to become ancient trees of the future.

Areas with ancient and veteran trees, have been reduced to a few tiny islands with groups of old trees or even individual trees within the landscape. These islands represent fragmented remnants of habitats that formerly existed, few, if any, connections between them. To maintain the structure and biodiversity of this old-growth into the future, each and every ancient and veteran tree and its decaying wood should be managed carefully wherever possible. Also, new generations of open-grown trees established around them – though far enough away so that their crowns at maturity will not compete with each other or with the existing trees.

In 2005, Natural England published a protocol which helps assess the value of clusters of trees primarily on the basis of their ancient and veteran tree populations (R628 A veteran tree site assessment protocol). This protocol has been accepted by the Joint Nature Conservation Committee as a way of assessing the quality of sites for designation.

<b>Primary veteran tree site assessment criteria</b>			
Field measure	High	Medium	Low
No. ancient trees	> 15	1-15	0
No. veteran trees	>100	10-100	1-10
No. dbh .1.5m	>15	5-15	< 5

This protocol may need modification depending on the site and wherever possible should be supplemented by records for fungi, invertebrates and lichens for which the sites are important.

All our landscapes once had many open grown trees in hedges, in fields, in wetlands and along rivers, on heaths and in grassland. It is a priority to retain existing trees and establish new trees to become the ancients of the future, and give future generations of people a chance to appreciate them and their dependent species.

# Managing for wildlife



## Look after them

Old trees should always be retained and managed to keep them alive for as long as possible, minimizing harm to the living tree.

## Don't forget the dead

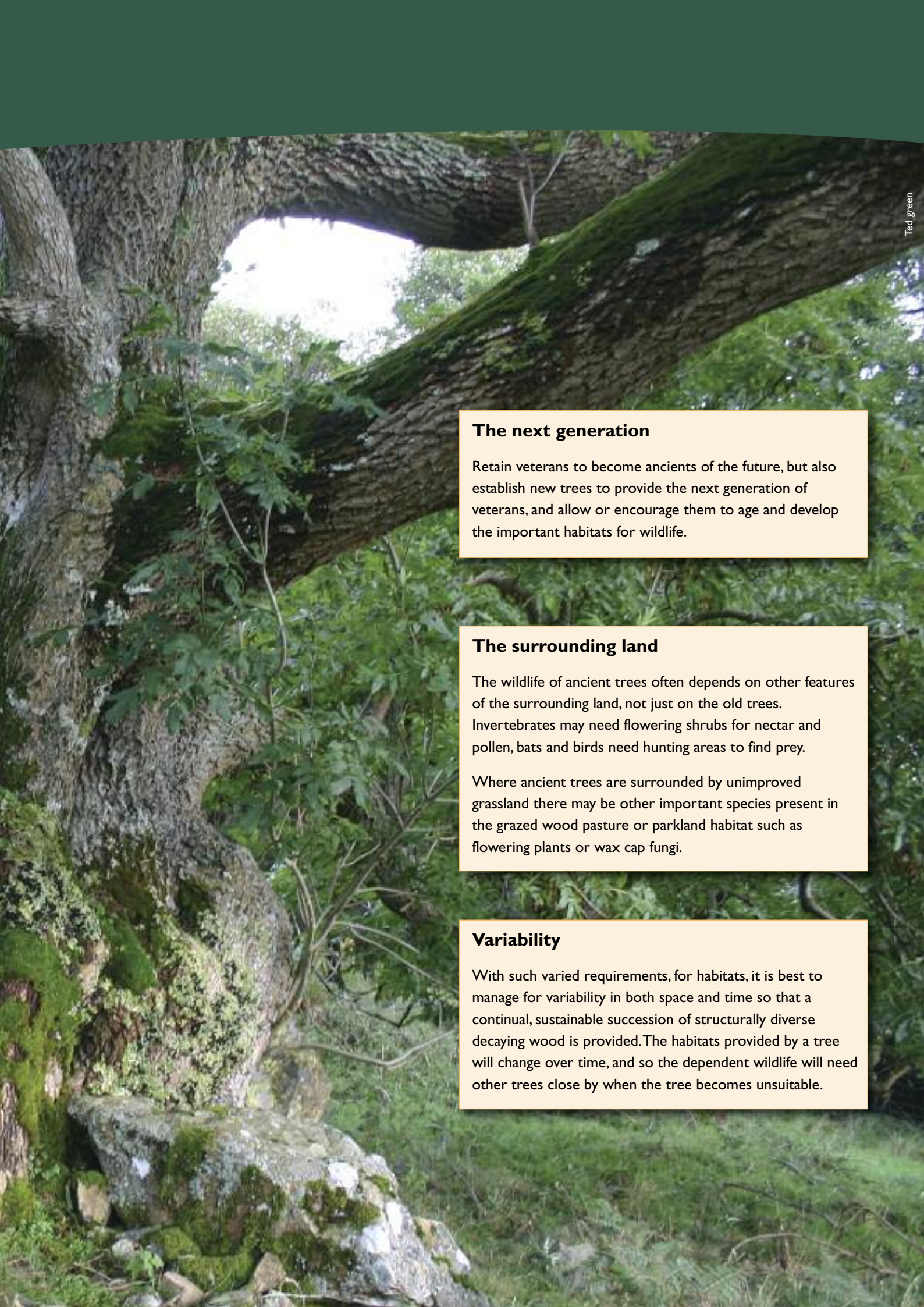
Although the processes of decay and aging are vital for biodiversity, they eventually lead to the death of any ancient tree. When this happens, the tree remains a valuable habitat for wildlife for many years or even decades thereafter and should always be retained (after being made safe if necessary).

## Trees need their wildlife

Remember that some of the wildlife dependent on a tree provides benefits to the tree; in particular, mycorrhizal fungi supply mineral nutrients and protect the tree from pathogens. Nutrients are released also by the breakdown of the older dead wood by decay fungi and invertebrates.

We are only just beginning to understand the relationships between ancient trees and other species. We do know that some of the associated species are sensitive to agricultural chemicals such as fertilisers, slurry, animal medicines and pesticides. Thus avoiding their use near trees will help to ensure the survival of both the old trees and the species associated with them.





### **The next generation**

Retain veterans to become ancients of the future, but also establish new trees to provide the next generation of veterans, and allow or encourage them to age and develop the important habitats for wildlife.

### **The surrounding land**

The wildlife of ancient trees often depends on other features of the surrounding land, not just on the old trees. Invertebrates may need flowering shrubs for nectar and pollen, bats and birds need hunting areas to find prey.

Where ancient trees are surrounded by unimproved grassland there may be other important species present in the grazed wood pasture or parkland habitat such as flowering plants or wax cap fungi.

### **Variability**

With such varied requirements, for habitats, it is best to manage for variability in both space and time so that a continual, sustainable succession of structurally diverse decaying wood is provided. The habitats provided by a tree will change over time, and so the dependent wildlife will need other trees close by when the tree becomes unsuitable.



# More information:

This leaflet is the sixth in a series about ancient trees:

No 1: *Trees and Farming*

No2: *Trees in Historic Parks and Landscape Gardens*

No3: *Trees and Development*

No4: *What are Ancient, Veteran and other Trees of Special Interest?*

No5: *Trees and Climate Change*

No6: *The Special Wildlife of Trees*

They are available from the Woodland Trust or can be downloaded (as a pdf file) in English and Welsh from [www.ancient-tree-forum.org.uk](http://www.ancient-tree-forum.org.uk).

Mae'r daf len hon ar gael yn Gymraeg fel pdf o wefan.

## Further reading:

*Veteran trees: A guide to good management* (2000) ed Read, H. Available as a pdf from Natural England [www.naturalengland.org.uk](http://www.naturalengland.org.uk)

*R600 – BAP fungi handbook*. Ainsworth, A.M. (2004) Available as a pdf from Natural England [www.naturalengland.org.uk](http://www.naturalengland.org.uk)

*Important Fungus Areas*. (2001) Evans, S., Marren, P. and Harper, M. Plantlife. Available as a pdf [www.plantlife.org.uk](http://www.plantlife.org.uk)

*R574 – Revision of the Index of Ecological Continuity as used for saproxylic beetles*. (2004) Alexander, K.N.A. Available as a pdf from Natural England [www.naturalengland.org.uk](http://www.naturalengland.org.uk)

*R467 The invertebrates of living and decaying timber in Britain and Ireland*. (2002) Alexander, K.N.A. Available as a pdf from Natural England [www.naturalengland.org.uk](http://www.naturalengland.org.uk)

*A Conservation Evaluation of British Lichens* (2002) Woods, R.G. and Coppins B. J. British Lichen Society

*Indices of Ecological Continuity for Woodland Epiphytic Lichen Habitats in the British Isles* (2002) by Coppins, A.M. and B.J. British Lichen Society.

*Old woodland lichens are worth saving*. (2009) Plantlife. Available as a pdf [www.plantlife.org.uk](http://www.plantlife.org.uk)



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Front cover photo: Ganoderma fungi on an ancient beech creating white rot inside the tree – a favourite of the larvae of *Ctenophora flaveolata* a wasp mimic.

Inset on front cover: Roger Key. Front cover photo: WTPL/Ted Green. Back cover photo: Jill Butler. Printed on recycled paper ♻️ 4250 12/09