

Wood pasture ecology and its value as a wildlife habitat

One of the most valuable features of wood pasture and parkland habitat are the of species that live off deadwood that is supports. Whether directly or indirectly dependent on deadwood. These are known as saproxylic species.



Bringing the wild back to life

Veteran tree biodiversity

Veteran trees provide nutrition, shelter and anchorage to a whole ecosystem of species and the richness of species a tree supports generally increases with age. Deadwood is an ephemeral habitat, it will decompose over time creating rot holes in the branches and hollow trunks that are used as nesting sites by many species of birds bats. Veteran trees support a huge quantity and diversity of invertebrates that can also act as food for nesting animals.

Veteran trees in wood pasture are also particularly valuable for epiphytes such as lichens, mosses and liverworts. These groups are particularly rich on old open grown trees because these trees provide nice light surfaces to colonise, but also because these groups have a slow colonization and succession rate so it can take decades to develop the rich communities.

These trees are important for fungi that decompose dead wood, fungi that form symbiotic relationships with the tree roots and those that live in the leaves or the bark or even between the living cells of the tree. Fungi feed much of the rest of the species in this ecosystem either directly, with species eating their fruiting bodies or mycelium, and indirectly through softening up the dead wood which enables it to be digested by others.

Each feature on the list of veteran tree features adds to the diversity of microhabitats that the tree provides, so also the variety of wildlife it accommodates.

The role of fungi as pioneers

The living tissue in a tree trunk or branch is found just under the bark, and from here the tree grows outwards over the years. This leaves a legacy of dead woody tissue on the interior of the tree. Broken or cut branches, tears and other damage to the tree can let in fungi colonies that will start to decompose this dead heartwood.

Most of the specialised beetles for which this habitat is so important actually eat wood that is actually decaying rather than just dead. As such the initial decay caused by fungi in the deadwood of a tree is always the first step to creating this habitat. In this way fungi are the pioneer species that convert, or 'soften' this initial deadwood into the rich habitat for which it is noted. They create the space and the substrate that enables the richness of other saproxylic communities of species to flourish.

Fungi have developed this role over 290 million years, since they evolved the capability to digest lignin. This process of fungi assisted tree hollowing is natural and, contrary to older ideas, not a threat to the tree. It is a natural part of the ageing process and in some instances can help extend the life of an ancient tree.

Saproxylic insects

Saproxylic insects are one of the most threatened community of invertebrates across Europe. For part of their lifecycle they live in the decomposing heartwood of old trees and tend to be highly specialised, particularly associated with the late stages of wood decay that you find in veteran trees. Saproxylic species are not only specialised to what is now quite a rare habitat, but are also only able to disperse over small distances. This makes fragmentation a real threat. These beetles now mainly reside in the isolated refuges that have been able to provide a continuous and plentiful source of dead wood.

Wood pasture specific ecology

'10,000 oaks of 100 years old are not a substitute for one 500 year old oak'

Oliver Rackham, conservation author and historian

The deadwood habitat available in wood pasture and parkland is particularly valuable for a number of reasons.

Open grown trees

When grown in open situations like pastureland, trees adopt a characteristic shape. Unlike the light deprived trees of woodland that grow tall and thin with relatively little side branching, open grown trees tend to make the most of the space and light available to them by growing large side limbs. This creates the broad shaped old trees with large limbs branching from low down on the trunk. This tree form allows for large levels of deadwood to be retained within the tree, and provides a huge number of different niches.

Tolerance of crown retrenchment

As trees get into their late stages of their life, their crowns retrench, which reduces the crown size, leaving stag-horn deadwood as a reminder of where the canopy used to extend. In a woodland scenario, this retrenchment would mean that the ancient tree would lose access to sunlight as it becomes outcompeted by the taller trees around them. The unfortunate consequence is that this process speeds up their aging and eventual demise. Veteran and ancient trees in wood pasture however, do not have as much competition for light, so can tolerate the natural reduction in crown size, so continue the slow ageing process for a lot longer. This means that open grown trees are able to continue their aging process over a longer period of time, providing further important continuity for the communities living in the deadwood habitat.

Sunlight penetration

Unlike in woods with high canopy cover, the open habit of wood pasture and parkland allows sunlight to penetrate to the trunks and the soils surrounding the trees. Sunlight penetration to the trunk is important to a number of beetles, some particularly favour the deadwood in trees that is warmed by the sun, making this feature important for the tree dwelling fauna as well as the flora.

Soils and wood warmed by sunshine can encourage the fruiting of fungi associated tree roots (mycorrhizal fungi), and those associated with the deadwood (saproxylic fungi). These fruiting bodies are important for the dispersal of these fungi as they produce the spores, and they also produce valuable micro-habitats for other invertebrates, including some rare and threatened species.

Unimproved grassland

The pasture found in wood pasture and parkland is normally undisturbed, having escaped ploughing and agricultural improvement. Fertilizers contribute to the loss of both plant and fungal diversity in grasslands. Woodland and meadow wildflowers are often adapted to nutrient poor soil in some cases this means the addition of fertilizer is directly toxic to them.

The lack of ploughing means the soil structure is left largely intact, so the complex ecosystem of the subterranean world undisturbed. The result is reduced soil erosion and less damage to fungal hyphae networks. Whilst some plants thrive in disturbed soil there are others that prefer this undisturbed soil structure.

The value of the pasture

Species do not exist in isolation and some of those living in a veteran tree will require separate habitats for different stages of their life. It is the decaying deadwood that the larvae of saproxylic insects require, but the adults often depend on other features of the wood pasture habitat. Meadow flowers and scrub species in the pasture act as a nectar and pollen source for some of these in their adult form, others predate the insects that flowers or dung in the sward attract. This means that a species rich and variable sward can fulfil the other life stages of these insects, enabling them to live their full life history in wood pasture.

Pollarded trees

Pollarding is a tree management practice whereby a tree is heavily pruned on a rotational basis, providing a constant source of vigorous leafy growth. Historically this has been a common practice in pasture woodlands to provide both leafy foliage as a diet supplement to grazing animals and also as a source of wood. The management practice dwarfs the growth of the tree, but actually helps the trees longevity, which allows many pollarded trees to survive as veteran and even ancient trees. Although these trees do not have the canopy deadwood of a normal open grown veteran tree, it provides fantastic deadwood in the bole of the tree and in all the nooks and crevices that the management style creates. The added longevity is also a welcome feature as it increases the continuity of this habitat, one of the limiting factors in other habitats.

Continuity

Ancient wood pasture and parkland sites have been providing this incredibly rich habitat, often for hundreds of years, offering exactly the continuity that these specialized, low dispersing species require.

If a site breaks this continuity for any reason and loses its saproxylic species, it is very difficult for it to be recolonized with the same diversity of fauna that it lost, as they tend not to be able to disperse very long distances.

In Britain, there are concentrated pockets of these communities living in historic parkland and open wood pasture where the continuity of their habitat has remained unbroken. In fact, the distribution of many of the red data book saproxylic species reflect the pattern in habitat with a continuity of ancient trees.