Managing Woodland for Invertebrates

An advisory note produced by the Mercian Woodland Biodiversity Project, a partnership between **Small Woods Association** and **Severn Trent Water**

SmallWoods

Contents

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Cover and case study 1: Brown hairstreak (*Thecla butulae*) by Matt Gibson / Shutterstock.com

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Introduction

The invertebrates represent the most diverse and abundant group of animals on the planet. The invertebrates include the **arthropods** which possess an external **exoskeleton** in the form of a more or less hardened shell, bilateral symmetry, segmented body, and jointed limbs[1]. In terms of numbers of species, the insects are the most diverse group of arthropods with over 24,000 species in the UK[2]. The insects include familiar six-legged species such as beetles, flies and butterflies. Familiar non-insect arthropods include the spiders, millipedes, centipedes, and woodlice. The invertebrates also include other important groups, such as snails and worms, that share some arthropod-like characteristics.

Woodlands are an important and diverse habitat for invertebrates, both in terms of the total number of species, but also in the extent of variation occurring between different types of woodland habitat. Recently cleared areas, woodland rides, glades and edges, and the deadwood found in mature stands each support a different range of species. Woodland soils also support an astonishing array and abundance of invertebrates and represent an important, but often overlooked, component of woodland **ecosystems**[3].

The importance of invertebrates

Woodland invertebrates have a range of critical roles within the ecosystem including breaking down dead plant material, soil formation, nutrient cycling, pollination of plants, and dispersal of plant seeds. They are also important as the basis of the food chain for larger more noticeable species such as birds and bats. In contrast, a relatively small number of species cause problems by damaging trees and spreading plant **pathogens**. Invertebrates have been referred to as the 'little things that run the world' because of their importance for the functioning of natural systems[4].

Challenges of managing for invertebrates

There is no habitat within woodland that is not host to a diversity of invertebrates. Managing woodlands for invertebrates, however, poses a number of challenges. The majority of invertebrates are small, not easily noticeable and, for the non-specialist,

hard to identify. The distribution and habitat requirements of many species are poorly known. Moreover, many species are dependent upon specific microhabitats or host-plants. To say that the habitat of an invertebrate species is for example, broadleaved **deciduous** woodland, will often obscure the fact that for many species the critical microhabitat is something quite specific such as the presence of rot holes in trees, deep wet leaf litter, sunny edges to rides, or a specific species of plant[5]. Indeed, for any single species, there will be a number of these features that must be present, and especially so for those which have distinct larval and adult stages to their life cycle[1].

This form of life cycle (termed **holometabolism**) is demonstrated by butterflies, but is also shared by other major groups of insects, including the beetles, flies, bees and wasps. Thus, for example, in woodlands the caterpillar of the pearl bordered fritillary butterfly (*Boloria euphrosyne*) feeds on dog violet (*Viola riviniana*), while the adults use nectar from bugle (*Ajuga reptans*) and a range of other species. The egg laying requirements of many species can also be quite precise with young dog violets growing on bare ground in sunny rides being favoured by the pearl bordered fritillary, while those in deep shade are unused[6].

Despite these challenges it is possible to make general recommendations to enhance the invertebrate value of woodlands. The following sections describe key woodland habitats for invertebrates, before outlining steps in the management cycle that will ensure that invertebrates are adequately considered.

Pearl-bordered fritillary (*Boloria euphrosyne*)
Monika Surzinn / Shutterstock.com

Case study

Brown Hair Streak at Grafton Woods

Grafton Woods is a 56ha Ancient Semi-Natural Woodland in Worcestershire. Until the 1950s management included rotational coppicing, but this was then abandoned and 6ha of the site was planted with conifers. Current management aims to replicate past conditions through resumption of coppicing, widening of rides and creation of glades. The conifers were also clearfelled and the area was allowed to regenerate naturally with no planting. After 10 years it became a mosaic of scrub and ground flora providing a haven for wildlife and particularly butterflies.

Coppicing and cutting of rides, glades and scrub is carried out on a rotational basis to ensure a diversity of age structures is maintained. The site is managed by Butterfly Conservation and so butterflies are a particular management objective.

A total of 12ha of coppice is cut on a 12 year cycle with 1 ha being cut each year. Main rides are about 35 meters wide between the tree lines. The centre of the ride is cut annually in July to allow visitor access. Ride shoulders and grassland glades are cut every year in late September and October when the flora has set seed.

The programme of habitat creation and rotational cutting has created habitat that supports a diversity of butterflies including Brown Hair Streak, White Admiral, Purple Hairstreak, Silver Washed Fritillary and Wood White. Of these, the Brown Hair Streak is particularly important, being the only population in the Midlands.

The caterpillars of the Brown Hair Streak feed on the leaves of young blackthorn shoots. Eggs are laid in late August to September and they remain on the shoots overwinter. The eggs hatch in May and the caterpillar feeds on leaves until July before pupating on the ground. Scrub management along woodland edges, rides, and in areas of natural regeneration, involves cutting in early August to create new growth. This timing avoids killing caterpillars and eggs and stimulates new growth for the next generation. Cutting is on a 4 year rotation, such that the woodland contains a mosaic of blackthorn scrub of different ages. Butterflies are able to move through rides and glades to find shoots suitable for egg laying each year.

The success of management at Grafton Wood is demonstrated by annual monitoring of butterflies along transects using standard methods established by the British Butterfly Monitoring Scheme[7].

Additional information

Worcestershire Wildlife Trust

worcswildlifetrust.co.uk/nature-reserves/grafton-wood

Butterfly Conservation

butterfly-conservation.org

Woodland Management for Butterflies

sway.office.com/gc1A6cEXQnWc6bGa

Source: John Tilt Butterfly Conservation

Important woodland habitats for invertebrates

Ancient woodland

Ancient woods cover only 2.5% of the UK's land and can be divided into Ancient Semi-Natural Woodlands (ASNW) and Plantations on Ancient Woodland Sites (PAWS)[8,9]. Ancient woodlands in England and Wales are defined as those which have persisted since at least 1600 based on evidence from maps which became reasonably accurate around that time. ASNW contain native stands of trees; even though their species composition and structure have often been influenced by a long history of management for timber, coppicing and charcoal making. PAWS have also been under long term forest cover, but are those woodlands which have been clear-felled and planted with non-native species and are often managed as single species plantations for timber production.

Ancient woodlands, particularly ASNW, typically support a higher diversity of invertebrate species than more recently planted woodlands. These invertebrate communities have built up over time and contain species which have existed at the site from a time when the woodland may have been larger and/or better connected to other woodlands in the surrounding area. Many specialist woodland invertebrate species are not mobile across a predominantly agricultural landscape so woodland age, connectivity, continuity of habitat availability and history play a significant role in the species found there.

A good example is the lemon slug, which is restricted to ancient sites because of its limited dispersal ability, intolerance of disturbance, and requirement for micro-habitats (such as accumulation of dead wood) that are missing from newly created woodlands.

Dead wood habitat and veteran trees

Approximately 7% of invertebrates in Britain, that is over 2000 species, depend on decaying wood, either in standing trees or that which has fallen to the ground, to complete their life cycles[10]. Even fine twigs are utilised, but the rarest species are those associated with the large timbers and trunks of mature trees. The most important of these can be very old indeed, and are known as veteran trees. Veteran trees develop when growing in the open – often in wood pasture – but they can be

found at woodland edges, in hedges, and within woods where they have been surrounded by more recent plantations or natural regeneration in the absence of grazing.

A key feature of importance for invertebrates, and another reason why ancient woodlands can be particularly diverse, is the presence of large volumes of standing deadwood in the crown and trunks of otherwise living trees. Oaks over 400 years old will typically contain hollows within their trunks supporting communities of heart-rot fungi and associated insects which change through time as the tree ages. These cavities are a rare habitat and, in turn, support a community of rare invertebrates. Continuity of the deadwood micro-habitats, over hundreds of years, across a range of trees of different ages within a woodland is associated with the richest assemblages of these rare **saproxylic** invertebrates[11].

Wet and waterlogged areas

Wet woodland is an important invertebrate habitat and wet areas within drier woodlands can support a range of specialised invertebrates, especially when there is an accumulation of dead wood[12]. For example, semi-submerged decaying timbers are important for the larval stage of species such as the endangered cranefly *Lipsothrix nigristigma* and the rare hoverfly *Chalcosyrphus eunotus*. Damp conditions support species of plant absent from drier areas of a woodland. In lighter areas, tussocks of damp-loving sedges, reeds and grasses are an important habitat for species such as the nationally scarce fly *Elachiptera austriaca*.

Lemon Slug (*Malacolimax tenellus*)
Alastair Hotchkiss / The Woodland Trust

Tingis reticulata
Gilles San Martin | CC BY-SA 2.0

Open areas

Woodland edges, rides and other clearings provide warm, sunny, sheltered locations and encourage a diversity of flowering plants that support a large number of pollinators, such as hoverflies, bees and butterflies[6]. Woodland edges grading from low vegetation, through tall grass and herb communities to scrub and finally to trees are likely to be particularly valuable. Curved and irregular edges provide sun-traps and shelter from wind. Open areas allow establishment of sun-loving plants, such as bugle (*Ajuga reptans*) which is host plant of the scarce bug *Tingis reticulata* and dog violet utilised by the pearl bordered fritillary butterfly, *Boloria euphrosyne*. Both species are associated with warm, sunny woodland edges. Coppiced compartments can also support a range of these sun-loving species, including the dingy skipper butterfly, *Erynnis tages*, whose principal host plant is bird's-foot-trefoil (*Lotus corniculatus*).

Woodland soils

Woodland soils are fragile and develop slowly compared to the soils of other habitats. Woodland soils typically have surface accumulations of decaying material and, compared to other soils, have a high organic content. Fungi are very important in the decay process and there may be hundreds of thousands of kilometres of fungal filaments (hyphae) in a single gram of leaf litter, alongside numerous beetles, worms, woodlice, millipedes and centipedes. Including the smaller invertebrates, such as nematode worms, mites and springtails, there can be over 140,000 per metre square[3]. A special group of fungi, the **mycorrhiza**, form intimate **symbiotic** relationships with the roots of over 80% of all terrestrial plant species. The mycorrhiza use the products of **photosynthesis** from trees and in return increase the uptake of water and minerals by the host plant. Recent research has proposed that the fungal network allows communication and sharing of nutrients between trees – the wood wide web – improving their resilience to drought, disease and pests[13]. The health of the soil community is important for the woodland as a whole and the undisturbed soils of ancient woodlands are a rare habitat in their own right.

The management cycle

Woodland management planning

For the purposes of management, woodlands are typically divided into stands, also known as compartments or coupes. These are areas which are structurally similar in tree species composition, age or both. Improving the biodiversity for woodland wildlife starts with a well-conceived woodland management plan which accounts for the existing features and gives overarching objectives for the woodland as a whole. These objectives are delivered by a clear scheme of management on a stand by stand basis. This management is then carried out through appropriate operations planning. Improving a woodland for invertebrate populations occurs at each of these three steps. For example, an objective for a woodland may be to increase butterfly numbers, this may be delivered through a planned system of **coppiced** stands which should be carried out in such a way to minimise ground disturbance and outside of times of year which may negatively impact butterfly populations.

Woodland management differs from other forms of land management as forests develop gradually. Stand rotations, the number of years between planting and clearfell harvesting or coppicing of trees, can be anywhere between 5 and 120 years depending on the species and the desired wood and timber products. This requires much longer term planning than the annual cycles seen in agriculture. In what is known as **continuous cover forestry**, individual or small groups of trees are harvested periodically so there are multiple rotations occurring within the stand simultaneously without ever **clearfelling**. In stands where deadwood accumulation is the principal objective, it may be appropriate to avoid any harvesting and have little to no management intervention. The forest management plan provides an opportunity to consider how these different forms of stand management can be put together to create a woodland with the abundance and range of habitats desired. A forest management plan can support your application for a **felling license** and will provide a cornerstone for **sustainable forest management**. Having a formal management plan is considered an essential prerequisite to achieving government grant funding for conservation

How to find out what is present in your woodland?

A first step is to determine if a woodland has any statutory or non-statutory designation. Ancient woodlands, Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) are mapped within the Multi-Agency Geographic Information for the Countryside (**MAGIC**). Links within this online database can be followed to identify the features for which designated sites were notified, including the presence of important invertebrate species. Further information may be found in publicly available Woodland Management Plans of sites in your local area. The Woodland Trust make all of their Woodland Management Plans publicly available, as do Forestry England (**Woodland Trust, Forestry England**).

Invertebrates with varying degrees of importance for conservation and legal protection are listed in Schedule 5 of the Wildlife and Countryside Act and Section 41 of the Natural Environment and Communities Act (NERC Act)(Section 42 in Wales) (**Wildlife & Countryside Act, NERC Act**). The latter is based on the UK Biodiversity Action Plan (BAP). The UK BAP is no longer active, but some local authorities still provide access to County-level Action Plans on their websites. The Buglife conservation organisation also lists scarce species of invertebrate associated with different types of woodland in a series of advisory notes available on their website, while Butterfly Conservation summarise the ecology and national distribution of butterfly species (**Buglife, Butterfly Conservation**).

More generally, distribution records of invertebrate and other species can be downloaded from the National Biodiversity Network website for which online registration is free (**NBN**). If a rare species has been recorded locally and its habitat requirements are suited to your woodland, it may be worth undertaking a survey to determine if the species is present on your site. Identification of many invertebrates is difficult, so seeking advice from your local Wildlife Trust or similar organisation is recommended. It is worth considering whether management of your site can accommodate the possibility that the species is present, yet remains undetected, or may colonise if the habitat is enhanced.

focussed management. It is also required for any woodlands which wish to have Forestry Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC) for their timber products. The Forestry Commission provide funding, extensive guidance and templates for the creation of forest management plans.

Understanding the distribution and habitat requirements of important invertebrates may significantly inform your management planning. Where you have identified such species, you may wish to focus your management on their requirements. Active management for a scarce species can often benefit a range of other species with similar requirements. However, it is not necessary to have an ancient woodland or individual species of conservation importance to have a woodland of significant invertebrate diversity and abundance. Woodland owners may wish to take a more holistic approach. Doing so requires the active provision of a range of woodland tree and ground flora species, woodland age structures and management prescriptions to create a mosaic of interlinked, dynamic habitats which provide a wide range of feeding and breeding grounds for invertebrates. Below, management of some key woodland habitats is discussed:

High Forest

High forest may refer to a range of mature woodland stands. These could be recently planted single species, single age, conifer plantation stands or they could be mixed species, mixed age, native ancient woodlands or anything between. Often in UK woodlands, we see two distinct categories of high forest woodland stands; those that are intensively managed for timber (usually non-

Hoverfly (*Chalcosyrphus eunotus*)
Nigel Jones

native conifers) on large scale clearfell rotations, and those which are entirely unmanaged as they are uneconomical (usually native **broadleaves**). The former tends to lack diversity in tree and plant species, as well as the large diameter trees and associated deadwood which is so important to many invertebrates. The latter may be richer in deadwood and diversity of tree species, but may lack the open space habitat which is also important to many invertebrate species.

Management of high forests should focus on the diversification of tree species and **age classes**. This can be undertaken within forest stands or between forest stands. Within-stand diversification is often associated with the use of continuous cover silvicultural systems such as the harvesting of groups of trees or individual trees and encouragement of a wider range of **naturally regenerated** or underplanted trees. Diversification between stands may involve small – medium scale clearfells, combined with planned objectives regarding choice of species in the next rotation.

Accommodating both old growth, long rotation woodland stands alongside young growth, shorter rotation stands, preferably with a diverse mix of tree species is the key to a biodiverse woodland. Consider leaving some pockets of non-intervention woodland. These can be in areas which are costly to harvest due to difficult terrain or alongside watercourses or on particularly sensitive soils. When planning harvesting and thinning operations, do not be overly tidy with fallen wood, leave a proportion of large timbers and standing deadwood intact and in situ where safe to do so. Retain and respect veteran trees, gently opening the canopy around them (known as **halo thinning**), preferably over

Dingy skipper (*Erynnis tages*)
Sandra Standbridge / Shutterstock.com

multiple 'little and often' interventions. Consider positive approaches to thinning, focussing on the retention and halo thinning around "veterans of the future", as well as areas of naturally regenerating trees, ground flora of interest and water features such as ponds. Operations should aim to minimise ground compaction though a combination of utilising careful operators, using the right equipment and understanding high risk areas of the site.

Young woodlands

Younger woodland stands can provide the warmth, sunlight and density of foliage which is required by some invertebrate groups such as moths and butterflies. These can be provided by small clearfells or coppice areas with a small area undertaken on a regular cycle to provide a long-term mosaic of different aged blocks. Potential future veterans and trees of unusual species, alongside any standing deadwood, can be retained. A proportion of the harvest, often the 'remainder' of timber which does not make up a full trailer load, can be left as a fallen deadwood resource along with stacks of 'brash' or 'lop and top' branches which are not valuable to market.

Open areas

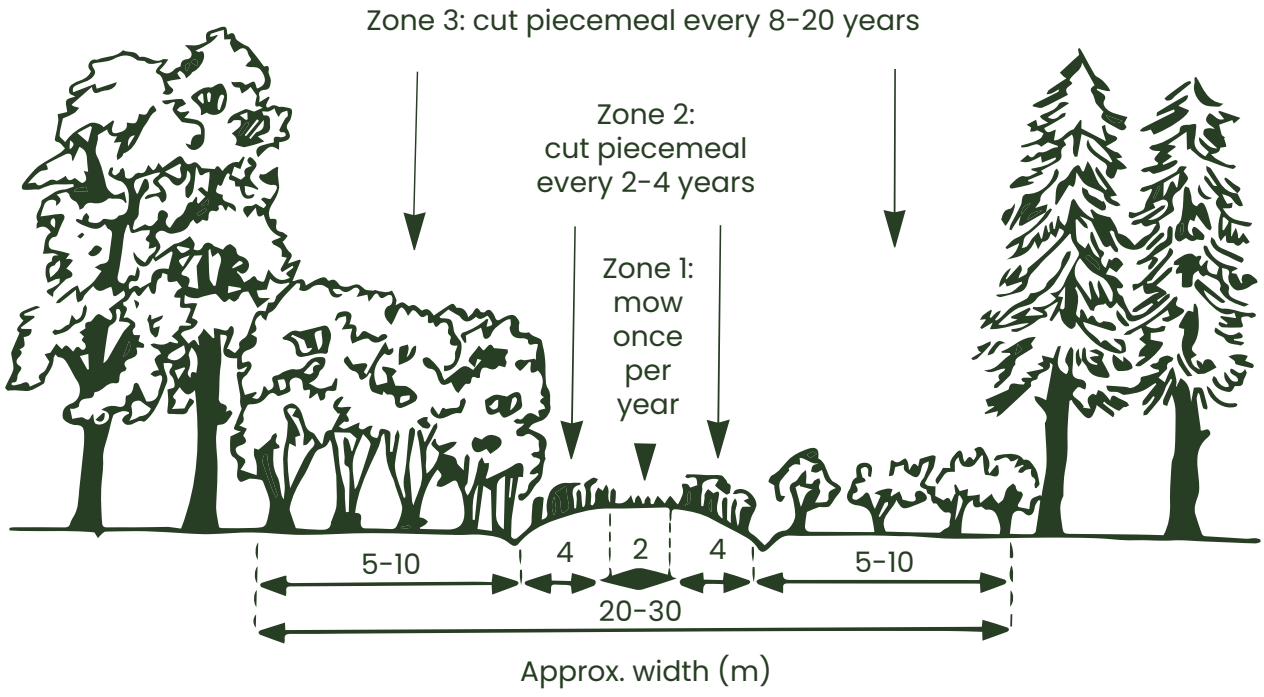
Open space within woodlands provides space for the critically important ground flora which is the basis of the food chain for many woodland invertebrates. They can be permanent or temporary and in blocks or in long linear rides though the forest. Permanent blocky open spaces can be provided through woodland glades, preferably south facing areas which are mown on a regular basis. Maintenance of these are a cost so scale can be limited, but even small glades can be effective when situated correctly and well managed. If possible, remove cuttings from the glade and deposit to a set area in the woods to avoid nutrient build up. The aim is to maximise floristic diversity and this generally occurs best where soil nutrient levels are low. Cutting should be undertaken as late in the season as possible (September – October), to give wildflowers the opportunity to seed and to give invertebrates the opportunity to breed through the summer. If possible, divide glades into sections and cut on alternative years to allow some areas to be undisturbed each year.

Rides are one of the most important features for invertebrates in a well-managed woodland. Not only are

they great habitats in themselves, but they also act as wildlife corridors, allowing species to travel through the woods, locating feeding and breeding habitats along the way as well as other populations with which to breed. Many invertebrate species are surprisingly poor at dispersing without the correct habitat to do so and need these corridors. Rides should be as wide as the surrounding trees are tall. They should preferably be zoned with a shorter cambered section in the middle, along which forestry vehicles can travel (known as Zone 1 and cut annually). This will be flanked on either side by Zone 2; a herbaceous layer cut every 2-3 years. These in turn will be flanked by Zone 3, a scrubby layer cut on a 3-10 year rotation which grades into the surrounding forest stands. (Please see figure 1). Rides can be aligned on a north to south axis, to maximise sunlight, and with sinuous edges to maximise area, sun-traps and shelter.

Temporary open space is typically in the form of newly cleared areas following timber harvesting. These are often on a much larger scale than glades and rides and so can be particularly valuable invertebrate habitats which then develop over time into the young woodlands described above. Having these harvested areas, newly created every year or every few years, connected by a ride network will allow invertebrates to find and make the most of these ephemeral hotspots of

Figure 1. 'Ideal' ride structure © Warren and Fuller



Case study

Chequered Skipper at Rockingham Forest

The Chequered Skipper, although always scarce, became extinct in England in 1976. The butterfly's demise was caused by a decline in coppicing and maintenance of woodland glades and rides, alongside an increase in dark conifer plantations. It has since been successfully reintroduced to Rockingham Forest, in Northamptonshire, using butterflies from Belgium starting with a release of adults in 2018. But it was first necessary to improve the availability of its key habitat – thereby removing conditions which led to its disappearance.

Habitat enhancement was achieved through a programme of widening rides and creation of open sunny glades which the butterflies prefer. The adult butterflies feed on nectar from the flowers of bugle and other plants in sunny spots. Eggs are laid in June and July on wood small-reed and false brome grasses. These grasses are fed upon by the caterpillar which forms a characteristic tube by stitching the edges of grass leaves together with silk. The caterpillar overwinters within its protective tube before emerging and pupating in the spring.

The centres of grassy rides are cut annually, but rotational mowing of ride edges is carried out on a 3 year cycle. Periodic mowing of clearings, or creation of new clearings nearby, is undertaken primarily when clearings start to scrub over. The butterfly is vulnerable to under management causing loss of open, grassy areas, but also over management. Too frequent cutting, and to a low height, can result in excessive mortality of the caterpillars. Rotational management is, therefore, a component of successful management. The successful reintroduction of the chequered skipper demonstrates the importance of understanding, and targeting, the key aspects of a species ecology.

The release of chequered skipper butterflies into Rockingham Forest in 2018 followed four years of careful planning between Butterfly Conservation, partners and authorities in the UK and in Belgium to agree techniques, secure permissions and ensure the right habitat management was in place to support the new population. In the following years, monitoring has provided evidence that a breeding population has established and is spreading along woodland rides. Studies of the butterfly in Scotland where it persists at a small number of sites demonstrate the importance of providing a network of sites connected by rides. If the butterfly dies out at one location, it can recolonise from surviving colonies nearby. Rockingham Forest now has over 7 km of flower-filled rides creating a network of habitats into which the Chequered Skipper can expand and thrive.

Additional information

Chequered Skippers – Taking Flight in Rockingham Forest, Northamptonshire

butterfly-conservation.org/butterflies/chequered-skipper

Source: Butterfly Conservation
Photo: Matt Gibson/ Shutterstock.com

sunlight and botanical diversity.

An important aspect of ancient woodlands is the continuity they provide in terms of the availability of the micro-habitats required by woodland specialists. This does not imply an unchanging habitat because the natural processes of the death of large trees will create gaps for regeneration, while traditional practices such as coppicing periodically open up the canopy and bring light to the forest floor. A woodland supporting a diversity of invertebrate species is likely to contain a mosaic of stands of different ages and management, such that species can disperse within the wood itself to locate the resources they require. Continuity of habitat within a wood is important for many species of invertebrate and especially those with limited dispersal ability.

Summary

Invertebrates are the most diverse group of species on Earth. Many are barely noticeable , but play critical roles in the functioning of natural systems, including woodlands.

The distributions of many species are poorly documented, but a first step in considering invertebrates in site management would be to identify any species of particular interest that are present within the vicinity. The presence of a species' habitat, even in the absence of records of the species itself, may be a factor to consider.

The continuity of micro-habitats within woodlands, such as sunny edges or dead wood, is important for the persistence of many species with specialist requirements and poor dispersal ability. Species are often associated with a particular host plant or micro-habitat. Management to support invertebrates should therefore aim to create a mosaic of habitats of varying botanical species-composition and age structure.
To retain a mosaic of habitats management of blocks of habitat on a rotational cycle, for example the mowing of sections of woodland rides or cutting coppice compartments, is recommended, rather than treating all areas in the same year.

Invertebrates associated with dead wood and veteran trees are particularly threatened in a national context and should be prioritised where these habitats exist.

The advisory notes on management of ground flora and veteran trees are recommended as additional reading because of the dependence of invertebrates on these aspects of woodland management.

Glossary

Introduction

Arthropods
Invertebrate animals with an external skeleton, a segmented body and paired jointed appendages (legs, antennae, mouthparts etc.).

Exoskeleton
An external skeleton that supports and protects an animal's body.

Ecosystem
A biological community of interacting organisms and their physical environment. The living and non-living components of an ecosystem are linked together through nutrient cycles and energy flows.

Pathogen
A bacterium, virus or other microorganism, that can cause disease.

Deciduous
A deciduous tree loses its leaves in autumn and grows new ones in the Spring.

Holometabolism
Holometabolism or complete metamorphosis, is a form of insect development which includes four stages: egg, larva, pupa and adult (or imago). The larval stage looks very different from the adult (e.g. butterfly caterpillar and adult).

Important woodland habitats for invertebrates

Saproxylic
Those invertebrates that are dependent on dead or dying wood. These invertebrates may not depend on the wood for their entire life cycle but at least some stage is dependent on wood.

Mycorrhiza
An intimate association between plant roots and a fungi in which the fungi uses the products of photosynthesis from the plant, while the fungi supplies the plant with water and nutrients from the soil. A form of symbiotic relationship.

Symbiotic
An interaction involving two different organisms living in close physical association and from which both benefit.

Photosynthesis
The process by which green plants use sunlight to synthesize nutrients from carbon dioxide and water. Photosynthesis in plants involves the green pigment chlorophyll and generates oxygen.

The management cycle

Coppice
An area of woodland in which the trees are periodically cut back to a stump level to stimulate growth and provide wood products.

Continuous cover forestry
An approach to forest management that seeks to create more diverse forests, by avoiding clear-felling, and building up uneven age stands through selecting and harvesting individual trees.

Clear-felling
Cut down and remove every tree from an area.

Felling licence
The Forestry Commission requires a tree felling licence in order to fell trees. It is an offence to fell a tree without a licence when one is required. Everyone involved in felling trees must ensure that a licence has been issued before any felling is carried out.

Sustainable forest management
Managing woodlands in a way that protects the woodland environment, biodiversity and productivity today, as well as for future generations.

Broadleaves
See Deciduous

Age classes
Age classes are used to describe the distribution of ages among trees in a forest. They can be measured in 10 year or 20 year age increments depending on the objective of stand management. Age class is used by foresters as an indication of timber and wood yield.

Natural regeneration
The process by which woodlands are restocked by seeds falling from mature trees within the stand and germinating in situ to produce the next generation of trees.

Halo thinning
A woodland operation to retain space and light around ancient trees – it is good for the tree and for the wildlife that lives in the many niches that these trees provide.

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Further reading

BUGLIFE **|** buglife.org.uk

BUTTERFLY CONSERVATION **|** butterfly-conservation.org

FORESTRY ENGLAND **|** forestryengland.uk

MAGIC (Multi-Agency Geographic Information for the Countryside) **|** magic.defra.gov.uk

NATIONAL BIODIVERSITY NETWORK **|** nbn.org.uk

NATURAL ENVIRONMENT & RURAL COMMUNITIES ACT 2006 **|** legislation.gov.uk/ukpga/2006/16

WILDLIFE & COUNTRYSIDE ACT 1981 **|** legislation.gov.uk/ukpga/1981/69

WOODLAND TRUST **|** woodlandtrust.org.uk

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Interested in involving your woodland in the Mercian Woodland Biodiversity Project?

If your woodland falls within the Severn Trent catchment and you would like to hear more about the project, please get in touch.

Contact the project co-ordinator

David Reeve
davidreeve@smallwoods.org.uk

SmallWoodsUK