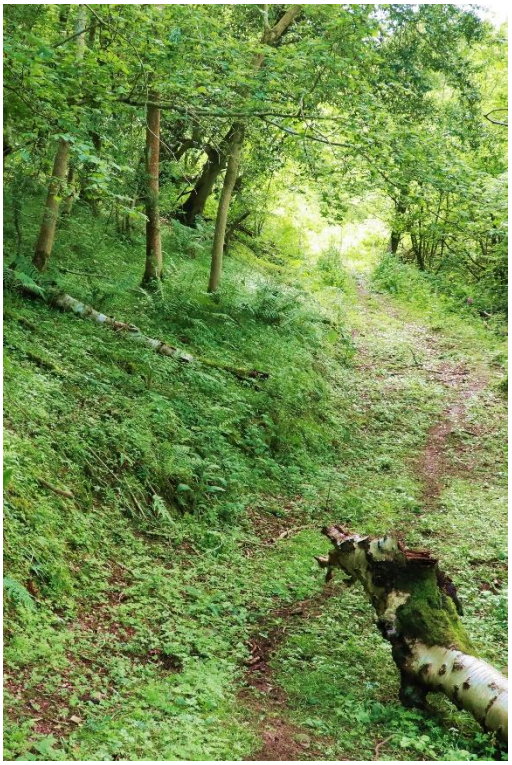
Managing Woodland for Biodiversity

Woodland forms a vital part of our ecosystem. Thousands of years ago it would have covered a great deal of Britain; now, old native woodland accounts for only around 4% of our land cover. This article discusses why we need to manage woodland to ensure the best biodiversity and offers guidance on a range of practical and worthwhile interventions to do so.

Introduction

We are desperately short of woodland in Britain. Over the Mesolithic and Neolithic periods, spanning seven thousand years, the tree species will have changed, and the density will have waxed and waned, but it always formed a fundamental part of the ecology. Man has been cutting back and removing the trees since farming started in the Neolithic and early Bronze Age. Britain now has only around 13% woodland and forest cover (Forest Research, 2023) and 70% of that is plantation, with nearly half of that alien conifer. We have the lowest woodland cover in Europe, with other countries boasting between 25% and 70%. Of the native woodland we have, only 7% is considered to be in good condition (Woodland Trust 2022).



A meandering woodland path with young trees, fern and herb understorey, and fallen deadwood

Old native woodland supports a wider range of species than any other habitat in Britain. However, no habitats are best in total isolation; they offer most diversity when they blend and merge from one to another with few hard boundaries between them. The interfaces between habitats, the ecotones, are often the most biodiverse areas. Managing woodland in sympathy with its surrounding environment is likely to be best. Of course, there is not 'one type of woodland' and there is no 'single management strategy' that can be applied to all woodland, especially if the primary aim is to manage the habitat for maximum biodiversity. A management strategy must be chosen that satisfies the interests of the ecology of the wood and the purposes of managing it; without doubt this will be a compromise.

When I started out over thirty years ago, most advice from experts was based on managing woodland for commercial benefit; with a few notable exceptions such as Peterken, there was very little consideration given to management for biodiversity as a priority. I was only ever interested in woodland for wildlife, so I had to forge my own ideas and create my own management plan based on a limited amount of available advice. To be clear, I am not saying that woodland should not be managed for commercial value; I am just proposing that, where possible, some woodland should be managed with emphasis on biodiversity as the priority; with nature first rather than human need.

This article is based on my own studies, training, learning, trials, and experience gained managing our own woodland, and aims to offer some basic guidance in defining the required objectives of owning or managing woodland, assessing the woodland structure, and in planning the ongoing management with emphasis on maximising biodiversity. However, it should be stated that we are still learning a lot about woodland environments, especially the vital symbiotic interactions between organisms. There is changing emphasis in woodland management strategy advice but there is still considerable debate and entrenched views.

Links to a range of reference material are placed at the end of the article.

Why we need to manage woodland

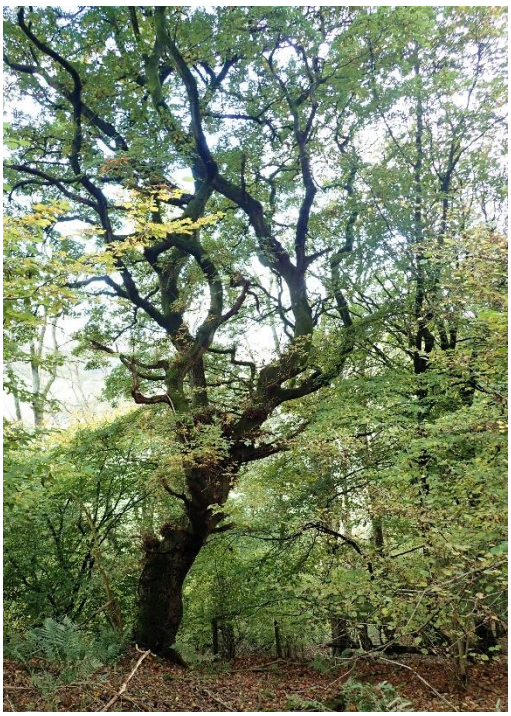
It is perfectly reasonable to ask why we need to manage woodland at all if its purpose is to provide a wildlife haven. Surely, if we leave woodland to grow wild it will be at its most natural? There may be circumstances where this is the case, such as the temperate oak rain forest in North West Wales, which is best left to its own devices. However, most woodland requires management to maximise biodiversity as natural processes like windthrow, storms, and browsing herbivores historically shaped them. Structural diversity is key to biodiversity and unmanaged woodland often lacks variation in age, canopy density, and ground cover.

What is 'Natural' in Britain?

The wildlife we observe today is predominantly the same as would have been seen in late Mesolithic Britain (twelve to six thousand years ago). Species like bear, lynx, wolf, have disappeared, while others like rabbit and the grey squirrel have been introduced. We have lost species along the way, but the species that still exist have not changed. When we talk about farmland birds, we actually mean birds that no longer have their natural habitat and have adapted to living in a farmed landscape. Our wildlife has evolved over hundreds of thousands or even millions of years. The majority of it moved back into Britain twelve to eight thousand years ago after the last ice age and before the Dogger Bank flooded and Britain became an island. In contrast, we have only farmed intensively in Britain for a little over four thousand years; no time at all in evolutionary terms. Consequently, a 'natural' landscape for nearly all our wildlife, is a pre-farmed one. To reproduce that, we would have to create a Mesolithic landscape over most of Britain – but we can't; the land is needed for agriculture, habitation, and leisure.

There is considerable debate regarding the extent of woodland cover over this period with some proposing that large herbivores maintained an open wood-pasture environment rather than dense forest. However, it is more likely that woodland ranged from scrubby wetland, through wood-pasture, to dense canopy cover and everything in between.

In Mesolithic times the structural range within the woodland would have been created by wind throw, storms, and fire, and would have been maintained by browsing herds. Gaps, both small and large, would have been created in the canopy cover that allowed ground flora and scrub to develop and browsing animals would have maintained that for a while. Eventually, thorny scrub then young trees would have grown and filled the gaps again. Depending on the level of browsing, this could happen in just a few years or over centuries. At that time much of the land would have been covered with quite dense woodland which would have had scrub and grassland meadows on its borders and reed and carr wetlands in the valleys and lowlands. Measured in our timescales the ecosystem would have looked static but, over a longer period, it would have been constantly changing.



An oak showing veteran characteristics of dead limbs, holes and fissures.

Limitation on Habitat Generation

Such environments are not easy to recreate; smaller habitat areas cannot support the roaming herds of browsers with no barriers to movement, and we do not have large predators to control their numbers. There are large scale projects being carried out, such as the Alladale Wilderness Reserve in North Scotland and, on a slightly smaller scale, the Knepp Estate in West Sussex, but the size of these enterprises is way beyond the resources of most of us. Left to its own devices, without management, most land will simply revert to scrubby woodland and, later, climax vegetation which, for most of Britain, will be dense woodland of one type or another.

After the last ice age, the seral stages of secondary succession (succession of plant material) resulted in the development of rank rough grassland, then scrub, early pioneer woodland species, mature woodland, and finally the development of old-growth forest. So, if we want to provide the maximum biodiversity, emulating a pre-farming landscape, with the relatively small amount of land available, and in a timeframe measured in years not centuries and millennia, we have to manage it and control change to maintain each of these stages as well as the aspect, elevation, and wet variations.

There is considerable environmental, cultural, and political pressure to increase the woodland cover in Britain. However, this is not as easy as just planting trees on waste land or even on farmland; it takes hundreds of years for the woodland ecosystem to fully develop, and 'new' woods will take a long time to become fully established, especially at the all-important fungal mycelium and mycorrhizal network level. We must manage the small amount of woodland we have to protect it and enhance its value as a priority. Then, the best strategy for increasing woodland cover is to expand existing sites and identify old sites and replant them (or allow natural regeneration). The Woodlands Trust 'Ancient Woodland Restoration' initiative and the identification of 'Plantations on Ancient Woodland Sites' (PAWS) describe the value of this process. That is not to say we should not plant new woodland; it is just that the best results are likely to be achieved by enhancing and expanding what is there now.

Woodland Value

Woodland has immense value in commercial, social and environmental terms. The detail of how woodland should be managed will depend on the priorities of those three uses. Some woodland will be dedicated to a single use, others will need to be managed to satisfy all three in different proportions. Compromises have to be made where woodland is required to be used for varying purposes, but it is usually possible to balance the management of woodland to satisfy all three. Obviously, the larger the wood, the easier it is to adopt different management strategies in different areas.

Commercial Value

Commercial use will vary from main-stream timber production to small-scale coppice craft material extraction. It could include wood produced purely for fuel, or straight-grained tall hardwood trees for building or traditional carpentry. Management strategies for the various commercial uses will vary and some are more suited to supporting conservation than others. An even-aged plantation of well-spaced tall trees with little undergrowth may well be best for timber production but provides very little biodiversity. An example of compromise is offered by the Continuous Cover Forestry Group which promotes a method of silviculture that aims to manage woodland for timber extraction as well as conservation; a link to the group is provided in the references but the basic concept of 'Shelterwood' is discussed later.

Social and Amenity Value

Social and amenity use will cover everything from just allowing public access for strolling through the woodland, to formal courses and training in a wide variety of subjects, and even recreational use such as cycling or paintballing! It may also include the relatively newly recognised applications of forest schools, wellbeing, and mindfulness practice. It is important to realise that frequent use by people will compromise the value of the woodland to biodiversity; how much will depend on the management processes.

Environmental Value

Woodland managed for environmental value may well have to include compromises as well. The best woodland structure for carbon sequestration may not be the best for the widest range of invertebrate species support for example. As mentioned earlier, woodland is of most value to biodiversity when it sits in, and is connected to, a mosaic of supportive habitats. For example, woodland edge bordered with scrub and meadow provides a good feeding environment for many woodland-nesting bird species. Removing an area of trees to create grassland and scrub will usually provide wider biodiversity at the expense of canopy cover.

Taking Stock

Before a single tree is planted for a new wood, or a chainsaw is powered up in an existing wood, there should be a period of assessment and consideration. This should be carried out over at least a full year to take account of seasonal change but, ideally, should take longer. Although an initial assessment can be made fairly quickly, to allow 'light interventions' to take place, the full process should be continuous. Unless there is vital work required, such as safety work, delaying carrying out any changes is more likely to be beneficial than not.

Assessing the Woodland Setting

The assessment starts with a good plan of the site and a clear definition of its aspect, boundaries, and the neighbouring habitats. It should also look at the history of the site and how it has been managed in the past. Many woodlands have evidence of past use including old coppice stools, walling and derelict buildings, and charcoal burning sites. Even a bare field should be evaluated in terms of its history. When was there woodland on the site in the past? What has the field been used for recently? Are there any important grassland species, such as waxcap fungi?

The boundary conditions are important too. Can species move between the wood and its neighbouring habitats? There may be a need for refencing to protect the wood; planning will need to account for both the cost and time involved. Access into and through the wood needs assessing and any additional facilities for ease of access, security, and quality of tracks and paths should be determined.

The Woodland setting is an important part of the assessment – here there is a lot of close-grazed pasture but good 'woody' corridors

The assessment of position and history should be followed up by an analysis of the base structure. That starts with the geology, the drainage, and the soil. Different woodland types are best suited to different environments and trying to create or expand a specific woodland type in an unsuitable environment is likely to fail. A simple example is Common Alder (*Alnus glutinosa*) that likes to 'have its feet wet'; planting it on well-drained dry soil will be far less likely to succeed. It is also useful to measure the soil acidity from a variety of locations on the site. Many plant species, including trees, prefer specific ranges of acidity. Whitebeam (*Sorbus aria*) for example, prefers calcareous soils and grows best on chalk downland. It is useful, but not vital, to determine the accepted classification of a piece of woodland; the most used one is the National Vegetation Classification, however, see the UKHab classifications in the references.

For new planting, careful consideration must be given to the suitability of the site. A bare field site that has not been wooded for a long time may not be ideally suitable for woodland planting. Depending on how much agricultural 'improvement' has been applied, such as herbicides, fertilisers, and vigorous plant species sown, the soil may contain chemical levels unsuitable for tree growth. On such sites, growing cover crops that help to balance the soil condition for a few years may be a good initial strategy. Additionally, the land may be of important value to conservation as it is or may be improved for biodiversity with alternative management. For example, unimproved grassland and meadow is a valuable habitat in itself and should not be converted to woodland without careful consideration.

The type and use of the neighbouring land is an important part of the assessment. Decisions on boundary fencing, security, and edge structure will be different for a woodland in a natural or wild landscape to one that is bordered by main roads, housing, or industrial sites. Even woodland with countryside on all borders is best managed differently depending on the exact land use. For example, if a woodland site has

grazed pasture on one border and dense woodland on another, the best managed structure could possibly be scrub next to the pasture and thinner, open, woodland leading to the dense mature woodland. However, it is vital to remember that neighbours and their land usage can change.

Biodiversity Surveys

A biodiversity survey, at whatever depth, is a vital part of any woodland management project. What is already there? If adopting a management plan will be detrimental to existing species, careful consideration of the effects must be given before any change is started. In addition, without a survey of what is there to start with, it is impossible to measure the value over time of any management plan put in place. Wildlife surveys should include plants as a bare minimum but, ideally, will include invertebrates, birds, terrestrial and arboreal mammals, bats, reptiles, and fungus. Surveys should be carried out throughout the year to ensure season-specific species are accounted for.

There are a number of plant species that are classified as Ancient Woodland Indicators, and they can be used to help identify if a piece of woodland is ancient. However, the indicators are regional; an indicator species in Essex may not apply in Shropshire. The more indicator species identified, the more likely the site is or was ancient woodland; a single indicator, or very few, means little.

Monitoring insect species can be a useful indication of rich biodiversity. The subject matter is vast: there are nearly 25,000 insect species in Britain; there are over 4,000 species of beetle; there are 300 moth species that thrive in old oak woodland alone. However, identifying the more obvious species, such as butterflies, bumble bees, and moths is achievable and valuable. The comprehensive surveying of insects and other invertebrates is really a subject for specialists and even they tend to concentrate on a specific family or even genus.

A Comma on Blackberry scrub. Scrub is a very valuable wildlife resource.

Woodland is a complex and rich habitat for birds. It supports more British breeding species than any other habitat; obviously, those species vary with location. Birds are relatively easy to monitor and record; a quiet walk or sitting patiently will result in a good number of species. When surveying it is important to be aware of the impact and legislation concerning disturbing nesting birds.

Mammals can be very elusive and difficult to monitor. Camera traps, small live-catch mammal traps such as the Longworth Trap, mammal footprint tunnels, and spoor identification (footprints and droppings), are all useful tools. Again, it is important to be aware of legislation. The Dormouse is a European protected species and must not be disturbed or handled by anyone without a licence. Notable species, on the UK BAP list (Biodiversity Action Plan), are Hedgehog, Red Squirrel, Dormouse, Harvest Mouse, Polecat, Pine Marten, Wildcat, Brown Hare, Otter, Water Vole, and all bat species. These are species that are highlighted for conservation action and are used to guide decision makers such as local councils.

Bats are difficult to observe and identify. Using sonar bat detectors gives positive identification for some, and reasonable degrees of confidence of others, but their use is very often not conclusive, and results should be verified. All seventeen species of breeding bat in Britain use woodland for foraging and six of those are considered woodland specialists. Only licenced bat workers are allowed to visit or monitor roosts. There are bat enthusiast groups in most areas of the UK, and they will usually be pleased to survey a new area.

There are only thirteen species of terrestrial amphibians and reptiles in Britain, and all are protected to some degree. Even if there are no permanent water features amphibians are likely to be present in most woodland. We have found toads several feet up a tree! Species such as the Great Crested Newt require a licence to survey them if their presence is suspected. Lizards and snakes can be hard to spot and observe; sitting still near a sunny spot that interfaces scrub cover and warm basking positions will often be the best strategy as ground vibration will alert them. Artificial refuges, such as corrugated sheet, will often attract reptiles looking for warmth.

Other wildlife that can be monitored include fungi, mosses, lichens and liverworts. These are all complex subjects with a large number of species. Professional help will often be needed for thorough monitoring but the identification of a more obvious range of each is within practical amateur capability.

A Hare in woodland edge rough grass. Many mammals use woodland as a refuge

There is a great deal of support available to carry out such surveys; a lot of it is free. As well as attending courses covering fungi, woodland plants, ferns, invertebrates, and others, we have benefited from help from our local Wildlife Trust and our local Field Society. The Field Society has been running for seventy-five years and includes experts on a number of topics as well as county recorders. They give their time free and are always keen to find new sites to assess. Similar support will be available in most areas.

The ongoing survey of the biodiversity of a site is a life-long activity that forms part of the pleasure of being a custodian of such a resource. However, a warning: it is easy to get frustrated with the difficulty in identifying invertebrate, plant, and fungal species, so it is important to accept that not even experts can always do so. We need to be satisfied with identifying the main species and maybe strive to learn a few new ones each year.

Finally, if possible, a similar study should be conducted on neighbouring land. It doesn't have to carried out to the same level of detail, but a reasonable overview will enable an understanding of the regional ecology and may help direct management decisions.

In summary, any survey should ideally include:

- Aspect
- The geological foundation and land drainage
- Neighbouring land usage and ecology
- Condition and type of boundaries
- Existence of historic usage
- Tree and shrub species, size, age, condition, and distribution
- Soil analysis at various positions on the site
- Ground level analysis of leaf litter, detritus, and deadwood
- Understorey layer species and density
- Identification of veteran trees and 'notable' trees (see later)
- Existence and quality of edge structure, glades, and rides or paths
- Existence and condition of any water features
- Plant species, especially indicator species
- Animal and fungus species

Woodland Structure

A woodland's structure is first defined in three dimensions. From the plan view we are interested in the position of the wood in the surrounding environment, the distribution and density of canopy cover, and the woodland edges and any open areas. From the side elevation we look at the various levels of vegetation growth on a typical cross-section of the woodland. Then, on top of this, but influenced by it, there are variations in temperature, light and moisture; a very complex matrix of habitats within the boundary of the woodland ecosystem.

A great deal of woodland in Britain is in small, isolated, patches. This is obviously not ideal for biodiversity or long-term sustainability of the ecosystem. Whereas 'woodland edge' is a rich habitat for a wide range of wildlife, dense, damp and shaded woodland supports completely different species that are no less important including woodlice, millipedes, springtails, beetles, gastropods, and spiders. If a small, isolated, woodland is managed so that there is woodland edge on all borders it would be very difficult to create the dense, dark, damp areas. This all comes back to the original assessment; if there is already a thriving 'damp woodland' ecosystem it would be wrong to open it up, let in the light, and lose what is there. We have a bad habit in Britain of only championing the 'pretty' species, the ones the public like to see; conservation is about protecting everything including the small creepy-crawlies under the damp log. On the other hand, small areas of habitat are less sustainable than larger areas. Creating lots of small habitats may result in not succeeding with any of them. Ideally, we can take advantage of the neighbouring land use as described before – if there is scrub, we don't need to recreate it, if there is dense woodland on one or more border, we can concentrate on a more open structure.

At the same time, it is necessary to be realistic based on the resources available. Grassland or pasture has to be grazed or cut each year. If there is limited time and manpower, maintaining a large area may not be feasible. Scrub has to be managed to prevent it turning into woodland. Self-seeded trees will need to be cut before they grow too large but add a nice dimension to the scrub whilst they grow. Coppiced woodland edge, which emulates the conditions of woodland succession into the scrub, will need to be cut on a periodic cycle of five or seven years or even longer depending on the height and structure required. If left too long, the coppice becomes part of the denser woodland. Self-seeded sapling in the coppice will need thinning occasionally but, within the woodland edge and the wood itself, some should be left to encourage a wider mixture of tree ages. It is important to note however, that many trees will not grow well under the existing canopy and, in a natural environment, regeneration relies on openings in the canopy caused by mature trees falling.

When deciding on a management strategy it is useful to look at the traditionally accepted silviculture methods used in forestry and comparing the structural outcome with the features we expect a 'natural' woodland would offer. The options range from clear felling on typical rotations of over fifty years, that provides very little biodiversity, to 'doing nothing' which, as we've discussed, will not lead to the ideal diversity of structure in a small area or in a short time. Other methods provide varying quality and abundance of habitat diversification. The basic options are variations on:

- Plantation and clear felling
- Wood pasture
- Coppicing
- Shelterwood

It is worth noting that, if managed primarily for commercial value, none of these systems support old, veteran, ancient or even damaged trees.

Natural Structure

Before considering the quality of the structural diversity in commercially managed woods, it is worth looking a little closer at what might be expected from natural woodland. As described earlier, in a late Mesolithic landscape, the wider structure would probably range from wetlands with reeds, Willow and Alder (a typical Carr ecosystem), leading to drier hummocky grassland grazing, then scrub and encroaching young trees, sparse early woodland, and finally dense woodland with mature and ancient

trees and occasional storm created glades. The type of woodland, the plant and tree species, will depend on the location of the wood. There will be many variations on this theme depending on the geology, topography, aspect, elevation, and local climate. This is not a static or stable landscape, but one that will change over time based on changes in climate and weather as well as the distribution and density of herbivores. The changes may take place over just a few years, or they may happen over thousands of years. Without near constant and substantial herbivore involvement, the climax habitat would be woodland.

From studies in other parts of the world, observations of remnants of ancient woodland, and studies of preserved timber, it is believed that a large natural woodland (with emphasis on large) would include old trees; many older than three hundred years and some much older. The average age of trees would also be between a hundred and two hundred years old. There would be a high number of tree species in any locality, but the exact mix would vary depending on topography and location. There would be gaps in the canopy caused by individual trees falling, sometimes taking others with them, and groups of trees being blown down by storms. Larger areas may be cleared by fires, but these are considered to be a rare event in pre-historic Britain. There would be very little totally permanently open spaces, but different spaces will open at different times. Structural diversity would be at a maximum. The woodland floor would have been covered with deep leaf litter and fallen deadwood. The canopy would have included decaying and hung-up branches.

A 'natural' type woodland structure is shown diagrammatically below.

A rich woodland showing structural diversity at the woodland edge, alongside rides and clearings and under the canopy, with a wide range of tree ages and growth.

Commercial – Clear Felled Structure

Not surprisingly, a commercial clear felling policy cannot approach a natural level of biodiversity even on a relatively long harvesting cycle. The 'crop' is typically even-aged and there will be no true 'old' trees. The number of species will be very limited with only occasional 'weed' adding to the diversity. There are few if any gaps until the felling starts when there is a shock change to the environment. The understorey is typically bare due to the low light levels and the woodland floor is often kept 'tidy' to facilitate management.

Wood Pasture Structure

Wood pasture is a traditional management method where dispersed large trees sit in pasture fields grazed by cattle, horses, or sheep. In the past, when grazing levels were lower and intervention was minimal, this system provided limited but good habitat diversity. Although trees were typically even-aged, they were quite often old and contained deadwood as well as holes and niches for wildlife. Some fallen deadwood was usually left. In most cases now, modern farming practices mean that the land is often 'improved', by turning it over, fertilising, and sowing ryegrass, and over-grazed. The soil compaction by

the animals and farm machinery and the change in soil chemical structure are detrimental to tree health. There remain some wood pastures, typically in parkland, where new trees are planted and protected from browsing, and grazing levels are kept low, but the structural diversity is very limited.

Coppice Wood Structure

Coppicing, the practice of cutting hardwood trees close to the ground to encourage new growth of sticks, poles, and larger timber, has been carried out in Britain since the Neolithic and, possibly, longer than that. Man will have observed the regrowth of many tree species, following cutting, beaver felling, and wind damage, and will have copied the practice to produce varying sized poles with a large number of uses. Initially it would have been on a small scale with just the woodland edge near habitation cut. Later, as farming developed in the Neolithic, populations increased, and demand for material increased, the areas of coppice grew. In a modern commercial coppice, a large area is typically cut at the same time and results in a relative monoculture of even-aged growth. The level of light reaching the floor encourages a diversity of plant growth which, in turn supports insects and birds. However, the overall structural diversity is very limited. There are no old trees, few shaded damp patches, very little deadwood and decaying material, and very few tree and shrub species. In many commercial coppices any scrub layer is cut back to facilitate access to the crop at harvest time.

Shelterwood Structure

Shelterwood is the management strategy championed by the Continuous Cover Forestry Group. It is a less intensive timber production process that fells selective trees or groups of trees from within a woodland that creates space for natural regeneration. Instead of clear felling an even-aged forest over a short period, the crop is taken slowly out of the wood over a long period of time leaving canopy cover and shelter. In theory, a similar amount of timber can be extracted but over a longer timescale. Although it does not support the growth of old trees (old, damaged, and decaying trees have limited commercial value) and the number of tree species may be controlled (some tree species have limited commercial value) it does provide reasonable diversity in the wood. Open spaces are created, deadwood can be left on the woodland floor, and the trees will be of different ages. The quality of the open space, woodland, and ride edges, as well as the quality of the understorey, will depend on how intensively and sensitively the woodland is managed. From a commercial perspective, access to individual trees in a dense woodland is more expensive than clear felling and large extraction machinery is not conducive to conservation management because of the damage caused.

Practical Management and Improvement Strategies

Unless the wood is being managed for major timber production it is unlikely that commercial management at a smaller scale will require a lot of compromising to develop biodiversity. By selecting areas to be left that are less valuable and productive, and rotating coppice and thinning areas over reasonably long periods, as promoted by the Continuous Cover method, productive habitats will be generated. When carrying out any major structural changes to woodland it is important to remember that legislation controls how much felling can be carried out. Only very limited felling can be done without a felling licence.

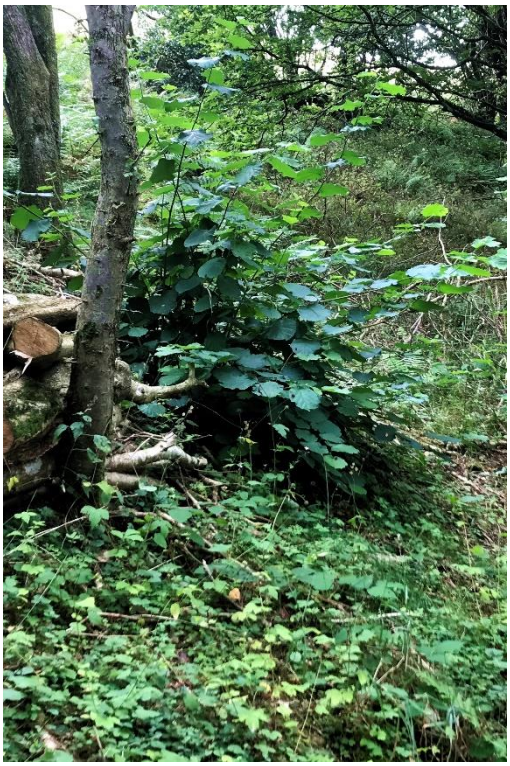
Managing a Plantation Site

If the area to be improved is an even-aged conifer plantation, conversion is going to take time, especially if there is no intention to fell and replant. If the area is classified as PAWS (Plantation on Ancient Woodland Site) the process can take generations, but early results will be rewarding. In these plantations the first step is to identify any areas that still contain remnants of native species. These will often be on the banks of streams or ride and clearing edges. The aim is to open the canopy around these remnants to let light in and encourage the growth but leave enough of the plantation to protect the area from wind. If the area is opened too quickly there could be significant windblow damage.

If the plantation is native hardwood the process is slightly different.

- Selective felling of the main crop trees around isolated groups of other species will quickly create some diversity.
- Opening up the leeward border trees will quickly generate scrub and understorey.
- Selective cropping, as defined in the shelterwood system, will create openings and glades.
- Ringbarking a few trees will kill them and create standing deadwood habitats.
- Any brash and cut wood not treated as crop should be left on the woodland floor.
- Any non-native and invasive species growth will require control.

A word of warning! If a plantation has been developed under a grant scheme, or there are still management payments being made on it, there are likely to be restrictions on the level and type of intervention that will be allowed.



'First season' coppice growth of hazel. Coppicing allows light in and creates a shrub layer

Managing a Coppice

A coppiced wood has potential to be improved quickly especially if it has been there a long time. Some of the issues are easily mitigated. A fairly standard coppicing regime for larger coppice woods is to cut adjacent coupes at different times to provide continuous habitats and varying ages and heights of the trees. The diversity is further enhanced by managing 'coppice with standards', where mature trees are allowed to grow on within the coppice stands. Other improvements result from allowing some areas, typically the less easy to reach and process, to revert to more natural woodland and scrub, and by diversifying the coppiced species. Clearly, diversity of structure will take time if the process starts with an even aged coppice.

Although coppice is often championed as a good woodland habitat, on its own it only provides a limited number of desirable structures.

Managing a Shelterwood

Commercially managed shelterwood provides potential for relatively easy enhancement for biodiversity. It is unlikely to have any old or truly veteran trees so one important change would be to identify, and perhaps mark, any trees that are suitable to grow on and should not be cut. These will likely include the oldest trees identified, notable trees that are already showing character, and decaying trees. The rides, glades, and woodland edges should be assessed to determine the level of diversity and improved if necessary.

Managing Old or Ancient Woodland

Old woodland or even ancient semi natural woodland, managed or unmanaged, would seem like the ideal starting point for habitat improvement. However, it can be the most daunting. Any old woodland will have developed a wide range of niche habitats that are easily disturbed and potentially lost by well-meaning improvement work. The very fact that the woodland is old means that there is no rush; the best initial plan is almost certainly to study the wood over time. However, most woodland can be improved with gentle, selective, and sensitive intervention.

Most old woods have very severe boundaries where often over-grazed pasture or cultivated fields are fenced from immediate high canopy trees. The ideal woodland edge, of rank grass, followed by scrub, and a shrub layer is rarely present even in wood that has been subject to some management. Creating it along the whole boundary is probably not practical. It would involve felling a large number of trees, creates the

potential for windblow damage, and could destroy important habitats. Creating scalloped edges, or one or two open glades, especially on the leeward side of the wood and the southern boundary, will create new habitat without those problems. Old hazel, and other hardwoods, will coppice creating a shrub layer, and bramble and bracken will quickly develop to form scrub; all of which will benefit the general biodiversity.

Similar intervention may be required within the wood along paths and rides which are often overgrown and shaded. Coppicing the edges and creating scalloped clearings will be beneficial without large-scale felling and disturbance. Selective felling may be necessary to create internal clearings, but old woodland often has wind-blown trees and slight enlargement of the gap created by felling the odd adjacent tree will produce a better environment.

Spotted Flycatchers hunt on the woodland edge

Heavy browsing, by deer or domestic stock, will restrict the development of woodland structural diversity, but once excluded, the desired understory will develop. Holly does not need light, but many other species will only really establish themselves where openings are created. Realistically though, it takes a good few years for any meaningful shrub layer to develop so careful consideration should be applied before removing any. All the other guidelines of leaving standing deadwood, hanging branches, and ground debris obviously apply subject to safety considerations. Ivy and other climbers are also important refuges and food sources for birds and insects and should only be cut if the trees are being grown as a 'crop' and even then, only if necessary. The amount of intervention applied will, to some extent, depend on the size of the wood. A good proportion of it should be left untouched if possible.

Managing Woodland for Amenity Use

Woodland used for amenity will require some compromises. Dead, decaying trees and hanging branches are vital environments to a very wide range of wildlife and, ideally, should be left. Large dead trunks and branches on the woodland floor look unsightly (to some) but, together with the leaf litter and smaller debris, are vital to a healthy ecosystem. However, if the wood is to be enjoyed or used at all, it must have safe corridors and areas where people can spend time and walk safely, so some removal of debris and dangerous material will be necessary.

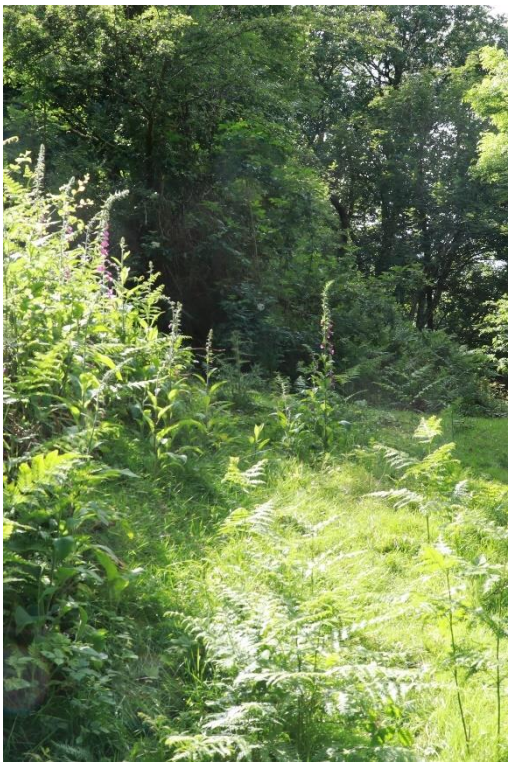
If the woodland is frequently visited by people, it is unlikely that it will be possible to maintain it to have the best biodiversity throughout. It doesn't take many people using the same area for the ground to quickly become compressed and bare. However, by restricting access to paths and routes, or dissuading access to some areas, a balance can be achieved. If people visit the wood and camp or even have open fires, rather than a constant battle to prevent it, perhaps a permanent camp area with a definite fire pit would be a better solution. It should be recognised that restricting access to specific routes and areas will result in erosion that will require a maintenance plan.

In the end though, if the planned use of the wood is detrimental to its historic or potential value as an ecosystem, perhaps an alternative wood should be found. As an extreme example, why start a paintballing business in an Ancient Semi-natural Woodland when a less ecologically valuable conifer plantation would do just as well?

Woodland Edge, Rides and Open Spaces

It has been stressed that the interfaces between diverse structures are rich habitats. In woodland these typically occur at the woodland edge, at the edges of glades, at the edges of rides and paths, and on stream or river banks. Wherever possible, rides should not be straight to prevent the generation of wind corridors and should offer a variety of aspects. The edges should be managed to include scallops and bays. The recommended width of rides is 1.5 time the height of the adjacent trees which could be 30m or more; this may be impractical or too intrusive for small woodlands, but the ride should be wide enough to allow a sunny aspect for at least part of the day. 'Bridges' between the sides of rides should be included, for animals such as dormice, by allowing some shrubs and trees to touch overhead. Glades can be created where there are junctions, such as where two paths meet.

The structure of all open areas should consist of short turf, leading to taller herbs and grasses, then scrub or shrub layer before reaching the trees. To prevent succession, and these areas reverting to woodland, they will need managing. Before committing to large areas of glade and edge, thought should be given to the time and cost of maintaining them.



Woodland glades and rides provide a varied structure of rough grass, herbs and shrubs

As always, consideration should be given to any potential negative result of creating paths, rides and glades on existing habitats. For example, cutting a new track or path using a mechanical digger, especially on a sloping wood, will damage roots and sever the mycelium link between two parts of the wood, effectively cutting it in two, which may take considerable time to recover.

Woodland boundaries should include some scrub where possible; it is not popular because it looks unkempt, but it is very beneficial to a wide range of wildlife and vital to some. It provides nesting for blackcaps, long tailed tits, and a variety of warblers. It is ideal cover for mammals, such as hedgehogs, and reptiles, and can provide a mass of flower for pollenating insects. Left to its own devices, there is little control of the type of scrubland that will develop. It could be Bracken, Bramble, Gorse, Blackthorn – or a mixture of all of those. Whatever develops, it will be a valuable habitat and wildlife resource. Admittedly, if it becomes too intrusive, it will need managing.

Although Bracken is considered an invasive species by some, it hosts over 40 species of invertebrates, including rare butterflies such as the High Brown Fritillary, and provides cover for reptiles, mammals and birds. Bramble is equally vilified but is a food plant for well over 50 species of moth and is an important nectar source for a vast range of pollinators as well as an important larder for mice, birds, and invertebrates when fruiting in Autumn. Dry rocky areas or large logs in or on the edge of scrub and open spaces will encourage lizards and snakes to bask.

From my own experience, and contrary to many texts, saplings of Rowan, Birch, Oak, Sycamore, and Ash will grow well through scrub cover such as bramble. It provides good protection from deer and other browsing herbivores and would have been a natural environment for tree germination and early growth as woodland encroached onto surrounding habitats. Remember, 'the thorn is the mother of the oak'. However, a number of ecologists still disagree with this and will urge you to weed and protect the base of saplings.

Grazing

At some point most woodland managers will consider the pitfalls and potential benefits of grazing. On the plus side, it can help with control of herbaceous density; on the other, at higher levels, it can lead to total loss of a wide range of valuable plant material.

Small woods cannot support much grazing at all. Deer browsing will prevent natural regeneration and affect biodiversity. Before any other grazing regime is considered the deer population, and the effect on the woodland, must be surveyed. Deer management is a huge topic for discussion and there is a great deal of advice from forestry and woodland associations. Deer can cause extensive damage to woodland especially new young saplings and coppice growth. Exclusion by fencing works but is very expensive. Temporary fencing around areas of new growth is effective but not always practical. Creating dead-hedging using coppice brash and other waste will be a deterrent but unlikely to control access for larger species. Control of numbers by culling only works where neighbouring landowners are prepared to do the same.

Unplanned browsing by domesticated animals, particularly sheep, can be more damaging to new growth than deer but are easier to fence out. However, lambs, followed by the ewes, will easily get through anything but well-maintained fencing and will make use of badger routes under the fences unless a lower run of taut barbed wire is added. It is worth remembering, it is the stockowner's responsibility to keep their stock off other people's land even if the fence line is not their responsibility. From experience, and contrary to some received wisdom, sheep will eat anything fresh before grass, especially new coppice growth.

Any planned browsing must be at a low level. Stocking levels will depend on the wood but are typically only one cow or pony per hectare, or 4 to 5 sheep, to as low as 1 cow to 10 or more hectares. In any case, browsing should be seasonal and typically late summer and autumn. In spring there will be too much damage to the flora of the wood as well as disturbance of ground nesting birds; in winter there is a good chance of damage to the soil if it is wet.

Planting - Provenance and Genetic Diversity

Depending on the age and state of a woodland, it is sometimes necessary to plant flowering plants, shrubs and trees. There is some discussion in forestry circles about how we plan replanting considering the changing climate. We need to be realistic. Average temperature alone will not affect our plant species a great deal. There is currently a five-degree centigrade difference in average July temperatures between Plymouth and John O' Groats yet most plant species, including most of our native trees, are capable, subject to other ecological conditions, of surviving (if not thriving) in both places. What is more likely to influence tree species survival are wetter winters leading to flooding and drier summers leading to drought. There have been periods in our pre-history, since the last ice age, when temperatures were higher, summers were drier, and winters were wetter than are currently forecast, so it is probably doubtful that Britain would experience wide-scale species loss because of climate change alone and it is not necessary, or advisable, to start introducing foreign species that may carry new pests and disease and potentially turn out to be invasive. When planting though, it is worth considering how the land will change over the next fifty years and choose native species best suited to survive.

Another ongoing debate is about genetic diversity versus local provenance of seed stock. It is generally agreed that evolution in general, but species health and 'robustness' in particular, are improved with genetic diversity. However, it is also accepted that trees adapt to their local environment over generations and that local provenance provides the best suited stock for woodland generation and expansion in a particular location. I take the view that woodland has evolved with locally developed seed, albeit the fertilisation may be from wind or insect borne pollen from some distance away. Based on that alone, I would try to source from as local a supply as possible. On top of that, I am a strong believer in the value of self-seeded natural regeneration where it satisfies the distribution and timescale requirements. Be very careful about your source of seed and saplings; a local supplier may not mean local provenance!

Invasive Species and Pests

It has been common practice for a long time to try to eradicate alien invasive species such as Cherry Laurel, Rhododendron, Japanese Knotweed, and Indian Balsam. However, again, the value of the species to the habitat should be considered before action is taken. If Laurel and Rhododendron are the predominant undergrowth in a wood they will suppress other indigenous species and will need to be reduced. However, this is hard work and will need continued effort almost certainly involving the use of herbicides. In small quantities, they can provide worthwhile winter cover and relatively light work will control their propagation – though, again, this will be an ongoing task. It is notoriously difficult, if not impossible, to eradicate Japanese Knotweed or Indian Balsam. It is perhaps easier to accept it is here to stay and acknowledge that they both provide a great deal of support for pollinating insect species.

Squirrels can cause severe young tree damage often leading to total loss of the tree

One of the most damaging pests for woodland is the Grey Squirrel. Very few woods, other than in Northern Scotland and on our islands, are without them, and their numbers in Britain are estimated to be over 2.5 million. All attempts to eradicate them, which started in the 1930's, have failed. Numbers are still rising and damage to young trees and saplings is very costly. The only measures available, since poisoning by warfarin was quite rightly stopped in 2015, are shooting and trapping. Neither method is very successful and necessitate continued efforts to be of any use at all. Unless neighbouring land is also managed for squirrel control, any value in culling is soon lost as populations move in on the vacated area. There is a glimmer of hope based on research into suitable safe contraception delivery, but that is some way off, will not be cheap, and will still rely on wide-scale application. Current trials suggest that a combination of culling and contraception will yield worthwhile reductions. There is also evidence that where Pine Martens are increasing, Grey Squirrel numbers are going down (University of Aberdeen, 2022). There is a positive to Grey Squirrel occupation of conservation woodland, albeit a slight one. We have very little mature and ancient woodland, much of it is relatively young and even-aged. Squirrel damage causes irregular growth, and limb and bark damage, that leads to fungal decay and rot, thereby 'aging' the woodland faster than naturally. This helps create habitats for invertebrates and nest sites for bats and birds that would not normally be common in younger woods.

However, most of these problems pale into insignificance compared to the potential loss of trees due to disease and parasitic insects. Ash Dieback (Chalara, caused by the fungus *Hymenoscyphus fraxineus*) is of particular concern at present and forecast to kill over 80% of British ash trees. It has been identified in most areas of the country and there has already been a large number of trees lost. Younger trees succumb more quickly, or at least show signs of the disease more quickly. We must plan for succession and decide what species are to be used to replace Ash. Unfortunately, because of its bark PH levels, Ash is unique in supporting some species of lichen and there are no alternatives that will fill that gap. In addition, Ash is very late to leaf and one of the first trees to shed its leaves. Consequently, many woodland floor species have evolved to take advantage of the light in spring and autumn. There is some hope: a number of trees have now been identified that have significant resistance to the disease (Forest Research UK, 2023) and, as well as implying that not all trees will succumb, it is hoped that a resistant strain can be developed for the future. Again, there is a slight positive, if dead trees that are not in a dangerous position are left standing, they provide a decaying structure that supports a lot of wildlife.

Resilience

How devastating all these problems and issues might be will depend on how resilient the wood is. For example, as we've discussed, a wood will be more resilient to drought if the right species are planted in the right area. However, resilience goes beyond that. A wood has to survive pests, disease, climate change, storms, fire … how well it does that, and if anything survives at all, depends on its resilience under these kinds of influences.

Woodland resilience is improved by structural and species diversity. The wider the age range of trees, and the greater the number of species present, the more likely a wood will survive. So, as an example, the wood I manage is mainly oak and ash, but the ash is only around 30% so, even if it all succumbs to ash dieback, there will still be a mature wood to grow on; the other 14 species of native trees will quickly (in tree terms) fill the gaps generated. Climate change will mean some struggle, but others will thrive. Consequently, forestry advice at present is to plan for woodland resilience based on expected change over the next 30 years. Whereas that does not discount bringing new species in, it is not currently seen as a necessary step. Assisted migration is being discussed, where we consider planting tree species based on the conditions expected in the future.

Some Final Thoughts on Management Interventions

Woodland management is a long-term commitment for generations into the future. By basing our management decisions on current best practice, scientific evidence, and the conditions specific to the site, we can maintain and improve a woodlands structural and ecological diversity for the benefit of species richness.

- Stop, assess, and measure before intervening.
- A healthy and resilient wood includes: standing, hanging, and fallen deadwood; open spaces; old and veteran trees; a wide range of tree species; a wide range of tree ages; scrub and shrub understory and edges.
- Veteran trees, trees with hollows, decaying branches, holes and fissures, should be identified. It is better to protect them and fence them off from the public, or divert a path around them, than take them down; they are one of the most valuable woodland habitats. They support bird nesting and feeding, bat roosts, a wide range of invertebrates, bryophytes, and fungi. Ground compaction from animals, people, and machinery, should be kept to a minimum.
- Deadwood is a vital component to healthy woodland. A 'tidy wood' is rarely a healthy one. Fallen trees and branches should be left in situ or, if causing an obstruction or a safety risk, moved somewhere close. Decaying branches, snagged branches, and hung-up trees should be left unless posing a real risk.
- Ivy should be left in place. It rarely inhibits tree growth and has high wildlife value as food for birds and insect, nesting for bats, flycatchers and others.
- In established old woodland, bird nest boxes are rarely needed. There is a danger they can upset the balance of species. Very often they encourage common species, such as Blue Tit and Great Tit, that compete for food sources with species such as Garden Warbler and Willow Warbler. In woodland with poor diversity, or to target specific species such as Pied Flycatcher, they may be appropriate.
- Ponds, and other water features, add a very valuable habitat to woods. In some cases, old ponds should be left untouched as they may contain irreplaceable conditions. It is often better to add a new pond rather than restoring an old one. A new pond should not be created in a marsh or damp area which is in itself a valuable habitat.

- Plant introductions are appropriate in isolated secondary woodland and new woodland. However, the aim should not be to make new woods look like ancient woods; they are environmentally different habitats. Generic 'wild flower' seed mixes should not be used; selective local species should be sown. There should be no introductions to ancient woodland or sites next to ancient woodland.
- Shrub layers and understory are vital components of healthy woodland and should only be removed selectively to create diversity. Where they are not present, they should be encouraged as described previously but brash piles can be used to simulate the environment.
- Try to avoid a lot of man-made structure that spoils the aesthetic of natural woodland. Things like brash piles should be out of sight if possible. Piles of stacked logs and cut wood offer great wildlife cover but too many makes a wood look industrial and messy and the process of decay is accelerated if they are scattered on the ground. On top of that, if there are children or even adults coming into the wood, log piles present a serious danger.

Water features add a very rich habitat to a woodland environment with unique wet woodland species

The Management Plan

Whatever the circumstances, it is best if a formal management plan is produced in writing. It can be communicated, discussed, reviewed and adjusted over time. The format of the plan will depend on why it is needed. If it is to satisfy a grant application for planting, or to work in a leased woodland, it will probably have to be to a specific format; if it is for personal use there is far more freedom. However, before it is written, and definitely before commitment to a woodland, the following should be considered:

- What is the woodland required for?
- Are there any restrictions on what can or is allowed to be done?
- What is the current structure and ecosystem of the wood? – once an initial biodiversity survey has been carried out, are the purposes in balance with the woodland's ecosystem?
- Would the plans for the wood increase or decrease the biodiversity or would it change emphasis of the range of wildlife? i.e. would the plans increase some species at the expense of others and is that good or bad?
- Has the woodland been managed for any purpose in the past? Has this been beneficial or detrimental to the wood biodiversity? Would continuing with such management be best initially?
- What are the borders to the woodland and how are they going to change over time? How will those borders influence the wood over time? (borders and boundaries, and the flows through them, are part of an ecosystem analysis).
- Have all the true costs been considered such as fencing, pathway maintenance, insurance?
- If there is public access will such access be in harmony with the plans or a constant battle?
- Can the woodland support the requirements without losing value to the ecosystem?
- Finally, given all the considerations above, is this the right piece of woodland for the intended applications?

The Starting Point

The management plan should start with a definition of 'now' which will consist of documenting the current status of the woodland; its historic use; its position, boundaries, and neighbouring habitats; and the base landscape and aspect as described earlier. This part should summarise the present level of any biodiversity study and refer to the full documented records. If the plan is being put together before the biodiversity survey is started it should define the timescales for the survey and any restriction on starting work until initial results are obtained.

Objectives

The plan should clearly state the objectives such as conservation, craft material extraction, timber production, education, or recreation - as examples. If it includes more than one of these, or others, it should clearly define the priorities so that if one objective appears to be detrimental to others it can be monitored and adjusted, and any effects controlled. The methods of observing change and the metrics to be used for defining the results of management intervention should be defined.

Introductions and Planting Policy

A species introduction policy must be decided. Careful consideration must be given to whether a 'no introductions' policy will be applied, where nature is left to take its course, or species will be brought in that may not be 'natural' in the area; once species introductions have started it can be hard to go back. I would always favour a 'no introductions' strategy and, as discussed earlier, would encourage getting any seed, plants and saplings that are to be planted with local provenance whenever possible. It is generally considered bad practice to introduce any new species to ancient woodland.

Task Plan

The plan should define what work will be done and over what period to achieve the objectives. This will include considerations of thinning, coppicing the edges or larger areas, leaving standing dead wood and hanging branches where safe or removing them, leaving ivy growth or removing it, and so on. It will also be necessary to list the infrastructure tasks that are needed to meet the objectives such as protection from browsing, perimeter fencing and access, ride and path creation, and any other facilities necessary.

Impact Assessment

Whatever intervention is decided, it should be assumed there will be a negative impact. A form of risk analysis can be used to assess the worth of the intervention and plan mitigation for the potential undesirable results.

Safety

For liability reasons a safety assessment should be carried out and mitigating actions defined. How often the safety assessment will be reviewed and updated should also be documented. I know that health and safety risk assessments are not popular, but it doesn't need to take long and will demonstrate that the subject has been given due consideration. Immediate risks such as leaning trees or hanging deadwood over paths, even if there is no public access, should be given priority. The plan should consider any insurance needs. At the very least it should be covered by public liability insurance; believe it or not there is a legal duty of care to trespassers! If any work is carried out by others, as volunteers or as paid help, employer liability insurance is a legal requirement. Any contractors should carry their own insurance.

Biosecurity

Any needs for biosecurity and intended action for pests and diseases should be documented. There is plenty of good advice on these subjects, so it is not necessary to start from scratch.

This may all sound a bit onerous, but it only needs a few words or a paragraph on each subject to make a good start; it can have more detail added as time goes on. Indeed, it should be seen as a 'living' document that gets adjusted as more is learnt about the wood. It can also be quite an enjoyable part of the whole custodianship responsibility.

Our Own Woods

In conclusion, I thought it would be useful to describe a little about how we have applied the strategies discussed earlier in our own woodland. We manage the woods primarily for conservation and biodiversity. We extract small amounts of timber for craft work and firewood, mainly from thinning and windblow. Neighbours and friends walk through the wood, although there is no public right of way, and we occasionally have small groups of people camp over in a dedicated camp area.

The majority of the land I manage is classified as Ancient Semi-natural Woodland, meaning there has been woodland here since at least the seventeenth century and probably a lot longer. I confess that some of my early actions, over thirty years ago, were carried out in unnecessary haste, and I would do some things slightly differently now, but it was worthwhile experience and resulted in some positive outcomes.

Around five acres of the land we have owned since 1994. Another fifteen acres, just a few hundred metres away over a grazed field, we have owned since 2017. The smaller area is showing considerable change, and we are at the early stages of applying gentle improvement intervention to the larger one.

The 'Small' Wood

The small wood is mainly Sessile Oak and Ash with a little Sycamore. There was very little understorey and structural diversity. Most of the trees are a little over one hundred years old and some are showing veteran signs of age and structure. The wood is on a South-facing slope. One edge is bordered by a single-track unclassified road, the other three by grazed fields, two of them our own small fields. It has a single ride roughly dividing it in two.

We were remiss initially in not carrying out any thorough level of biodiversity survey. We recorded obvious plant species, and a good number of bird species, but nothing else. The first thing we did was exclude the sheep from both the wood and the small fields. The land, and probably the wood, had been grazed for hundreds of years. In both small fields we planted Silver Birch, Ash, and a little Horse Chestnut to accelerate a young woodland edge and scrub border to the mature wood. The Horse Chestnut, I now know, was a mistake; it is neither native nor particularly common locally. However, the grey squirrels ruined them, so they have not become intrusive.

The Speckled Wood butterfly enjoys sunny woodland edge and glades

Rough grass, Bramble and Gorse scrub quickly developed and self-seeded Oak, Birch, Rowan, Hazel, and Wild Cherry have grown amongst it. A few windblown trees have created gaps in the wood, and I have coppiced Hazel at different times to improve the shrub understorey layer. Quite extensive areas of Holly understorey have developed providing good wildlife cover throughout the year. The ride has now become a little overgrown and is due to be cut back and further coppicing is needed. Some management of the scrub is ongoing.

The woodland and adjoining scrub have developed into rich wildlife habitats. We have nesting Pied and Spotted Flycatchers, Redstarts, Blackcaps, Warblers, Thrushes – to name but a few. A wide range of butterflies are frequently seen over the scrub and in the sunny openings in the wood. We have identified over 150 species of moth, over 100 species of flowering plants and ferns, and thirteen species of native tree not including the Sycamore.

The 'Big' Wood

The larger wood is on the north-facing side of the same hill. In some places it slopes at 45°. It has good rides zigzagging through it making access feasible if not easy. When we took it on in 2017 it had not been managed at all for over a hundred years and, possibly, a lot longer than that. It has been grazed by sheep for as long as anyone can remember. An area nearest the farm it belonged to shows signs of cutting for firewood and the rest appears to have been felled in the late 19th century. Most mature trees are between 100 and 150 years old with only a few that may be older.

Because of the grazing, there was little shrub understorey and a limited amount of herb ground cover. Despite that, the wood is carpeted in bluebells every May; it appears sheep do not eat bluebells. There is, however, extensive deadwood on the floor, plenty of standing and hanging deadwood, and a lot of trees showing 'character', including splits, holes, ivy growth and decay. It also has a reasonable level of structural diversity with younger trees on some of the edges and in natural clearings. It contains a few Bracken, Bramble and Blackthorn scrub areas that provide more diversity. It is a very healthy high canopy environment. Our task is to improve that without damaging anything that is already there.

Deadwood supports a range of species. Here a miniature garden of wood sorrel

The wood has a reasonable variety of neighbouring habitats: on two sides it is grazed hillside pasture; on one side grazed woodland; and on the other, grazing leading to wetland pasture in the valley floor. However, the interface between the grazed habitats and the wood is too stark at present.

The first thing we had to do was clear the rides from fallen trees and overgrowth to enable access and make a few areas safe. We then replaced the one fence that is our responsibility to endeavour to put pressure on the stock owners to keep the sheep out. We also started our biodiversity survey; we now know that the latter is a lifetime's effort. Having identified that the woodland edges were too severe we planned to coppice some of the trees along at least one fence line to create a scrub and shrub interface. Unfortunately, because we had not managed to keep the sheep out, that coppice growth was completely ruined; each year we tried, the same thing happened so the coppicing was put on hold. Finally, after some robust arm twisting, we managed to exclude the sheep in 2021. Thankfully, the coppice stools have recovered and there is good new growth. On top of that, the spring flowers in 2022 were exceptional. In addition to the carpets of Bluebells, we had swards of Red Campion, Greater Stitchwort, Wood Anemone, Wood Sorrel as well as many others.

The ongoing task list in the plan includes opening out the edges of the rides where feasible, continuing with coppicing the borders, lightly managing the scrub and rough grass, maintaining the safety of the rides, paths and camp area, and maintaining the fences to keep the sheep out.

The wood is mainly Sessile Oak and Ash and, clearly, there will be change over the next twenty years or so as we lose a lot of the Ash. However, as discussed, we have fifteen species of native trees established in the wood and, with careful management of self-seeded growth over the next few years it is unlikely we will have to make drastic planting plans.

We have a similar list of nesting bird species in and around the big wood as in the small one. We also have Tawny Owl, Buzzard, and Raven, and a Goshawk has been seen on more than one occasion. On top of that we have recorded over 100 species of flowering plants including 24 Ancient Woodland Indicator Species (AWIS). There are at least 60 species of lichens, mosses and liverworts, and over 30 species of fungi; we

are confident there are many more to identify. We regularly see Badger, Fox, Hare, Wood Mouse, and Bank Vole, and we get common lizard basking on the woodland edge.

We will never 'finish' but feel we've made good and valuable progress to ensure these woods have the necessary structural diversity to support as wide a biodiversity as possible into the future.

The objective of this article is to provide food for thought, and some guidance for people who are thinking of taking responsibility, or already have responsibility, for a wood and that do not have a great deal of formal training in the subject. I hope the discussion on strategies, planning, and management has not put anyone off. If I was to reinforce just a few main recommendations they would be: stop, think, and assess what is there already; assess any negative impact of intervention and try to mitigate against it; take pleasure in the planning process; and, above all, pause occasionally to simply enjoy the environment!

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References and Resources:

There are many useful resources freely available or, in some cases, to buy; the following is a selection. Searching under such topics as 'woodland management', 'woodland biodiversity', and 'woodland wildlife' will yield many more. The newer publications will, obviously, take better account of current research and thinking; opinion and advice is constantly changing.

How to benefit species and habitats biodiversity in your woodland - GOV.UK (www.gov.uk)
Wildlife Woodlands – Woodlands for Sale: Managing for Conservation (wildlife-woodlands.co.uk)
Woodlands | A practical conservation handbook from TCV (conservationhandbooks.com)
www.smallwoods.org.uk
www.treecouncil.org.uk
NHBS - Wildlife, Ecology & Conservation
National Vegetation Classification - field guide to woodland (jncc.gov.uk)
Continuous Cover Forestry Group (ccfg.org.uk)
Woodland Wildlife Toolkit (sylva.org.uk)
wood-wise-woodland-conservation-grazing.pdf (woodlandtrust.org.uk)
Ancient and veteran trees. An assessment guide. (woodlandtrust.org.uk)
The Pond Book - Freshwater Habitats TrustFreshwater Habitats Trust
Tree_Felling_-_Getting_Permission_-_web_version.pdf (publishing.service.gov.uk)
UKHAB Documentation – ukhab
Adapting forest and woodland management to the changing climate (forestresearch.gov.uk)
GPG Forest Resilience 2 - Tree Species Diversity (cyfoethnaturiol.cymru)

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