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Chapter 7
Worked Trees and Ecological Indicators in Wooded Landscapes

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Summary

A consequence of the long-standing traditional uses of trees in the woods and the long-term continuity and connectivity of uses through many centuries enables us to 'read' the landscape (Rotherham, 2011, 2013). The relationship between the natural conditions, and the history of uses of the woodland have led to numbers of species such as ground floor plants being useful as so-called 'indicators' and antiquity and continuity of a wooded landscape on the site (Hermy et al., 1999; Goldberg and Kirby, 2002/3; Crawford, 2006, 2009; Castle et al., 2008; Rose, 1999; Peterken, 1974, 2000).

Combining such indicators with an analysis and understanding of 'worked' trees can provide a very useful insight into woodland history, use and management. There are two main types of 'modified' trees through extraction of 'wood' and of 'timber', together with numerous other variants on the themes. These two forms of modified tree are pollards and coppices, and they can be related to basic types of woodland management or use (Jones, 2009; Rackham, 1986).

This chapter provides an introduction and overview to the approaches and the issues raised.

Coppices and wood pastures

In Britain, there are two broadly distinct 'ancient woodland' landscapes. Firstly, there are coppice woods, often managed since medieval times as simple coppice, or more frequently 'coppice-with-standards' (Rotherham, 2012, 2013). These have few obviously large trees, but strikingly rich and sometimes diverse ground floras (Photograph 1). Secondly, there are parklands, which may have historic links back medieval parks. These areas generally have poorer ground floras due to grazing livestock, and are characterised by massive and ancient trees, chiefly 'pollards'. In terms of wildlife conservation, it has been assumed that coppice woods were excellent habitat for woodland birds and flowers and parks for rare lichens and fungi growing on the trees, and insects or other invertebrates that depended on veteran tree dead wood habitat (Rotherham, 2007ab). Medieval parks were part of a suite of landscape types that mix trees and grazing or browsing mammals. These included wood-pasture, wooded commons, forests as relicts of a great wooded savanna across much of north-western Europe (Vera, 2000; Rotherham, 2013). Parks are 'pasture-woodland', related to forests, heaths, moors, and some commons, with grazing animals and variable tree cover. Aside from the obvious external enclosure, they were essentially unenclosed grazing lands. In the two centuries following the Norman Conquest, numbers of parks in England increased dramatically to perhaps three thousand or more, with possibly fifty in Wales, and eighty in Scotland. From the early 13th century, a royal licence was technically necessary to create a park in areas of royal forest; though in both England and Scotland baronial parks were created without licence. Where documents survive, they provide invaluable reference materials for a now vanished age, giving insight into landscape and ecology. The average English medieval park was around 100 acres though size varied considerably (Rotherham, 2007a, 2007b).

Parks are different from medieval coppice woods, which sit alongside them and sometimes, even within them; these enclosed landscapes are unique resources for conservation. They provide insights into ecological history and research has transformed understanding of the importance of parks for rare invertebrates. Until relatively recently, perhaps the 1990s, medieval parks were 'Cinderellas' of nature conservation not considered to be 'ancient woodland'. Parks have trees (usually but not always), and large (and sometimes smaller) grazing mammals, and to survive trees need protection. Some parkland trees are ornamental and others are managed 'working' trees, with differences in species and structures.

Parks share features with other unenclosed grazed landscapes with trees and woods: chases, forests, moors, heaths, commons and some fens. These wooded and

'treed' landscapes occurred almost everywhere and so too might their shadowy footprint today. Many parks 'took in' parts of earlier landscapes when they were enclosed from 'waste' or 'forest', and management may have allowed parts of this ancient ecology to survive. In other cases, parks include ecology and features from specific periods of active management (with specific ends and outcomes), from subsequent times of abandonment, or changed use. Each phase preserves, modifies, or removes earlier ecology; these working landscapes evolving over a thousand years or more (Rotherham, 2007ab).

The extensive medieval landscapes, which included parks, provided hunting, foodstuffs, and both wood and timber for building and fuel. Alongside their deer, medieval parks contained wild boar, hares, rabbits, game birds, fish in fishponds, and grazing for cattle and sheep. For some, such as Bradgate Park in Leicestershire, pannage (feeding pigs on acorns) from the oaks provided revenue in rents. Medieval parks generally had large areas of heath or grassland (called 'launds', the origin of modern-day 'lawns', or plains) dotted with trees, along with woods (called holts or coppices, and if for holly (*Ilex aquifolium*) hollins). The launds provided food for animals in summer, and the hollins, provided it through the winter. Parks may have held and maintained deer (fallow (*Dama dama*), and red deer (*Cervus elaphus*)) for the table and the hunt. In the latter case, this sometimes involved release beyond the park pale and into the chase beyond. Some parks extended over many miles with Woodstock in Oxfordshire having a perimeter of seven miles with hunting on a grand scale. Others were much smaller; some little more than deer paddocks.

Solitary trees in launds were 'pollarded' (high coppice) or 'shredded' (branches removed from the tall, main stem). The only new tree growth outside the woods was in protective thickets of hawthorn (*Crataegus monogyna*), holly, and bramble (*Rubus fruticosus* agg.). Special woods called holly hags or hollins had holly cut on rotation as winter deer-fodder. A boundary fence, called the park pale surrounded the park. This was cleft oak fencing, banking with cleft oak fencing, or a wall. The bank normally had an internal ditch and park pales had deer leaps to entice wild deer into the park. Buildings in these multi-functional parks included manor houses (from Tudor times), keepers' lodges, and banqueting houses. Turf and stone were extracted and mineral coal too. Arable crops such as cereals might be grown within the park pale. Deer were a priority but shared the landscape with other domestic stock such as cattle, horses, and even goats. Wharncliffe Chase near Sheffield even had North American Buffalo in the early 20th century. Many parks had warrens in or near and relict 'pillow mounds' now evidence these. Other parks had productive fishponds surviving today as ornamental features or abandoned.

Large oaks were grown for timber; in some cases trunks and boughs carefully nurtured to form particular shapes and sizes for specific functions in houses, halls, churches, barns and ships. Careful planning and management over many decades are key aspects of park historical ecology.

Photograph 1: An obvious ancient oak tree.

Most of the very old trees, often oak (*Quercus robur*), are specimens that have been actively managed for at least several centuries and then abandoned. The trees range from relative youngsters of 400 years, to veterans of 800 to 1,200 years; one of the most precious resources of former medieval parks. Large trees provided shelter for cattle and deer in winter and shade in summer. They produced herbage to feed the livestock, most deer and cattle preferring to browse on leaves and shoots than to graze grass. The trees were cut high, several metres above ground, keeping re-growth out of the reach of the grazing animals, until the parker cut it for fodder. This pollarding is effectively high coppice and means that leaf fodder or fuel wood and small wood, can be combined with grazing animals. Hollins and haggs ensured herbage throughout the winter. For several months of the year, longer during colder periods such as the so-called 'Little Ice Age' of the 1400s to 1800s, grass does not grow in Britain and livestock depended on stored hay and cut branches of evergreen holly. Pollarding extended the lifespan of trees and ensured supply and continuity of dead wood, a highly important wildlife habitat.

The coppice tradition

From the Middle Ages until the second part of the 19th century, ancient woods throughout much of Britain and Western Europe, were managed as coppices, either as simple coppice or as coppice-with-standards (Rotherham and Jones, 2000; Rotherham and Egan, 2005). In coppice woods the trees were periodically, (generally every 10-30 years, but as often as once a year), cut down to the ground to what is called a 'stool'. Then from the stool grew multiple stems, called coppice or underwood. The poles of wood were said to 'spring' from the stool, and hence the names of many coppice woods in England include the word 'spring'. Indeed, in many areas local people think a 'spring-wood' name is to do with the seasons or water; it is not, and it provides sure evidence of antiquity. In a

coppice-with-standards, some trees were not coppiced but allowed to grow on to become mature single-stemmed trees and these were the standards. The standards were of various ages. The coppice provided 'wood' and the standard trees provided 'timber'. The timber trees, mainly oak, were mostly for building projects but their by-products of bark and 'lop and top', were of economic value too (Jones, 2009).

Coppice was long-used not only for making hurdles and for house building, but also for tools, and for ancient trackways such as those crossing prehistoric fenlands. One of the oldest, best-recorded and most important uses of coppice poles was for charcoal making. However, a vast number of other crafts and industries also depended on it. Coppice wood was also essential for domestic purposes as it provided firewood used for heating and cooking. Before the introduction of sweet chestnut coppice, ash, hornbeam and alder poles were used extensively in the hop industry in the south-east of England and in Herefordshire. These formed the frameworks up which the hop-bines could be trained.

Coppice woods were valuable and particularly, in the first few years after they were coppiced, were vulnerable to grazing damage. For this reason, they were surrounded by stock-proof barriers such as fences, banks with external ditches, stone walls, hedges, or a combination of these. Where these woodland boundary features survive, they are important archaeological remains that tell you much about your wood, its extent, and its management. The woods had also to be protected against human thieves and trespassers particularly in autumn, when berries and fruits were ripe, and in winter, when firewood supplies were low.

There were also special woods in some regions called 'hollings', 'hollins' or 'holly hags' where the holly was cut on rotation to feed the deer and other livestock in winter. These might be in a park (specifically to feed deer in winter) or in the wider wooded landscape. Today, former holly hags are often full of tall holly trees and spreading, coppiced holly clones (Jones, 2009).

One formerly widespread woodland type was the wooded common. These sites were unfenced areas where commoners had rights to graze animals and to take other products such as fuel and building materials. These commoners held land in the open fields, or were tenants of the manorial lord, the local monastic landowner, or the Crown estate. They had certain rights on the common land in the manor, and their rights were strictly regulated and administered; this was not a free-for-all. Commoners usually had the rights of cutting underwood, harvesting the wood from pollards, and taking dead wood, but not the right of felling the timber trees. These common rights were called estovers or botes (e.g. hedgebote wood for making fences, housebote for housebuilding, and cartbote for making farm vehicles).

The more common forms include a raised coppice called a 'stub' which is often found as a significant ancient boundary feature, perhaps at a woodland edge on an old parish boundary. Some coppices, especially from ancient

Photograph 2: Ancient hazel coppice, Derbyshire.

Photograph 3: Ancient small-leaved lime, Whitwell Wood.

hazels (Photograph 2), may mix different ages and sizes of re-growth on one stool (the base of the cut tree), whereas the most frequently found examples are with all the poles (the re-grown shoots), of the same age. In upland sites especially, and particularly growing in boulder clutter of rocky scree slopes, there are multi-stemmed 'medusoid' trees which probably result from a form of coppice use. Some trees like alder and lime also form coppice stools naturally by stem growth and fall with age, followed by re-growth, or because of grazing damage. Your worked or retired trees can provide remarkable insight into management of your wood from maybe a few decades ago, to centuries past. Some coppice lime trees are around 3,000 years old (Pigott, 1993) (Photograph 3).

Worked and working trees

Clues to past woodland uses are the rich resources of once managed, 'worked', or 'working' trees or what I describe as 'retired veterans' (Rotherham, 2012, 2013). This heritage is unique to ancient wooded or treed landscapes. Once vital to local and even national interests the trees were coppiced, pollarded, shredded, stubbed, or grown

Figure 7.1 The wood-wain by Myles Birket Foster)

as maidens for timber. They also produced leaf fodder, bark, coppice wood for fuel and construction, acorns, nuts, and mast. Today, long-abandoned, these trees are iconic features rich in biodiversity; their shapes and forms provide unique archives through which we read the past. Woods and other wooded landscapes were at the very heart of pre-industrial society, providing fuel, food and building materials (Figure 7.1). They were essential for transport (such as shipbuilding and the first railway lines), and for making charcoal for heating, cooking, and especially for metal smelting and working. Very often, these lands were contested spaces with landowner and peasant or commoner at loggerheads over rights and usage. Similarly, local landowners, the major aristocracy, the church, and the Crown were in conflict over issues such as hunting rights and timbers uses. In some cases, national security was at stake, as for example when timber merchants required big trees for shipbuilding but ironmasters demanded charcoal for making armour, weapons and canon. Trees even produced pyroligneous acid (also known as wood vinegar; a dark liquid produced through carbonization, which occurs if wood is heated and the air supply is restricted such as during charcoal production), wood tar, and a plethora of volatile organic compounds for burning, for waterproofing, and as oils and paraffins. In a pre-petrochemical society, these were vital substances. Today, we depend almost entirely on mineral oil and coal to produce these materials.

Individual 'worked' trees, if 'ancient', bear the marks of centuries of human exploitation. This might be giant old pollards with massive heavy boughs, or great coppice stools with crowns of re-grown sprouts. When we examine these magnificent examples of living heritage, they have a story to tell of an interaction between them and local people over hundreds of years. The 19th-century clergyman and diarist, the Revd Francis Kilvert gives some idea of how special these trees are when he described the ancient oaks of Moccas Park, Herefordshire:

'…….grey, gnarled, low-browed, knock-kneed, bowed, bent, huge, strange, long-armed, deformed, hunchbacked, misshapen, oakmen with both feet in the grave yet tiring down and seeing out generation after generation.'

To understand the once-worked trees you need to appreciate a time when woodland and trees were at the centre of local and even national economies. To build you required big 'timbers' of the correct size, shape and dimensions, plus smaller 'wood' for in-filling and more modest construction work. The different tree species were selected for their properties: durability, hardness, water or rot resistance, flexibility, strength and more. Great trees might be forced to grow in particular ways and shapes over a period of a hundred or two hundred years, in order to provide the necessary materials for ships or buildings. Wood was at the heart of society in a way that it is not now, and probably will never be again.

The consequence of all these uses is a remarkable heritage of these trees, some tall and straight, others bent and bowed, or misshapen tangles of re-growth. These tell the story of woods and woodmen of times past. Huge pollards of wooded common, forest, or park are instantly recognisable and include many of our most iconic trees. Indeed, these wonderfully decrepit old giants are so obvious that you might imagine that in Britain at least, we know where they all are. Well we do not and certainly, twenty years ago we did not, until the advent of the Ancient Tree Forum and their Big Tree Hunt (Rotherham, 2013). This has been one of the most popular community-based surveys of our environment ever undertaken and has revolutionised our knowledge and understanding of ancient trees. You can be sure too, that the work of countless ordinary individuals across the country has helped to save the lives of many old trees that would otherwise have been 'lost'. The wonderful thing about this is that there is still much more to do, and anyone can take part by visiting the Ancient Tree Forum web site for guidance on how to survey and record his or her local area. Our team in Sheffield recently discovered a woodland of 1,000 to 2,000 previously unrecognised ancient veteran worked trees. All this is in woodland close to several major cities and in the heart of the Peak National Park; imagine what remains to be found elsewhere (Handley and Rotherham, 2013).

Old veterans still found and recorded, in hidden valleys, secret streamsides, and ancient hedgerows. Even more exciting is the recent recognition of massive old coppice trees, some many centuries in age. Alongside veteran smaller trees such as hawthorn, rowan, birch, holly, and hazel, these provide a rich resource for researchers. Many are much older than you might think, and as 'worked'

trees now retired, they provide real insight into the lives and the landscapes of your local countryside (Handley and Rotherham, 2013).

Woodland archaeology and ecology: archaeology 'in' the woods and archaeology 'of' the woods

As we play detective in the woods, we are looking for clues to their pasts. The traces left by the woodland crafts and the workers and families include where they lived, the worked trees, the pits, platform, processing areas and trackways. These are the archaeology of the woods, and along with internal and external wood banks, ditches, walls and other evidence relate closely to the history of the wood and its existence over time (Rotherham and Ardron, 2006; Rotherham, 2007c). Other people living and working in woods, such as quarrymen and miners, also left evidence. This is the archaeology in the woods but not of the woods. In many sites, this is a huge part of the modern-day landscape and tells unique stories of human interaction with environmental resources. The story runs from prehistoric times, to the medieval and early industrial, right up to the present day. Throughout history, all the people using the woods, and living in and around them, left their mark (Figure 7.2). The changes in land-use in the wood can be identified in the various internal and external boundary features; so a mediaeval deer park may have large external banks and even walls, plus an internal ditch to keep the deer in. There might be earthworks within the wood that are the remains of deer management features. Converted from a park to a coppice wood the site may have internal banks and ditches to mark out the different coppice compartments, and a ditch outside the boundary bank in order to keep out grazing animals. In some regions such as North Derbyshire or South Yorkshire, traditional medieval coppices were replaced by intensive industrial coppice for iron and steel industries again leaving distinctive evidence. For many sites in Britain, the 19th and 20th centuries saw abandoned traditions and replacement by exotic 'high forest' of non-native tree species like European larch, Norway spruce, and Scots pine (not native outside the Highlands). Sycamore and beech were widely used. Many woods were converted to conifer or sycamore plantations. Others in urban areas became amenity woods, often with clinically tidy management and emphasis on access provision often at the expense of conservation.

Wooded environments provide ideal conditions for special plants and animals, often only found in woods and wooded landscapes. Excitingly, some of these are good 'indicators' of ancient woodlands and we can use them to help find, identify, and verify our ancient wood (Photograph 4-8). Reading the landscape mixes archaeological humps and bumps with identification of woodland plants and animals (Spencer, 1990; Rotherham et al., 2008; Rotherham and Wright, 2008, 2011).

Figure 7.2

Old Oaks on Wickham, Common Kent after painting by S. Johnson. Raphael Tuck & Sons, Oilette, 1920s to 1930s, unused final.

Photograph 4: *Allium* sp. (Wild garlic) - an indicator of damp ancient woods.

Photograph 5: *Hyacinthoides* sp. (Bluebell).

Looking for the indicators

Helpfully for the beginner, many of the woodland wildflowers are familiar, easy to identify, and usefully, along with trees can be read like a book, as long as you know the language.

Within this book, the marks on the pages are the archaeological features, the worked trees, and the plants and animals. These indicators, along with soils, can be a rich source of information on history and former management and both presence and unexpected absence of key species can provide clues to the past (Rose, 1999; Rackham, 1986; Rotherham, 2011, Wright et al., 2012).

Ancient woods have antiquity and continuity of woodland cover providing refuge for a great variety of plants and animals over the centuries. Whilst this is the case within the wood, there will have been major changes in the surrounding landscapes. Consequently, ancient woods are often very rich in wildlife, and have undisturbed soil profiles and natural water features. Ancient woodland can also provide a living record of past woodland management practices and the organisation of the landscape. This is through the presence of features

Photograph 6: *Oxalis acetosella* (Wood sorrel) - an indicator of ancient woods and relicts and often in upland areas.

such as wood-banks, old pollards and coppice stools, remnant charcoal pits, ore furnaces and kilns (Rotherham and Jones, 2000).

How ancient woodland botanical indicator species are used

When trying to identify ancient woodland sites it is useful to sum the number of ancient woodland indicators to enhance the level of confidence. It is also possible to weight the species according to their reliability as indicators. There is a general increase in confidence with an increase in the number of ancient woodland indicators (Rose, 1999; Rotherham, 2011). However, a number of authors have found that this approach potentially gives a false impression of antiquity or at least a lack of disturbance. This is for various reasons such as:

- **The size of the woodland:** A small ancient wood may contain for example fifteen ancient woodland indicator species, and a larger but younger recent wood might contain the same number. Site history and complexity are therefore important. In particular, larger woods may have 'acquire' fragments of older woodland but these are now incorporated into a generally younger wooded site. It is worthwhile looking in detail at the particular species and their reliability as indicators alongside the total number found. The context of the wood, spatial, geographical, historical and ecological, will also influence expectations. Therefore, in base-rich soil the expected numbers will be much higher than a species-poor acidic site though they may be equally ancient.
- **Internal environmental variations (habitat diversity):** Ancient woodlands without significant internal habitat variation may contain the same number of ancient woodland indicator species as younger woodland with greater internal variation. However,

Photograph 7: *Anemone nemorosa* (Wood anemone) - an excellent indicator of an old woodland.

Photograph 8: *Lamium galeobdolon* (Yellow archangel).

in the latter case the key indicator species of ancient woodland continuity will be absent.

- **Biogeographical variations in species status:** The potential range of species in woodland can vary across the country due to a mix of environmental and historical factors. Because of this, relatively fewer species are needed to assign 'ancient' status to a wood on the eastern side of Britain than the west. This is due to the western Atlantic influences that are conducive to many of the species concerned. (Glaves et al., 2009abc).

A typical, regional, botanical indicator list for ancient woodlands in England is given in Table 7.1 as an example.

Intelligent Interrogation

Part of the approach that we are adopting and developing is based around the idea of 'Intelligent Interrogation' of the lists. There is a danger that the use of indicators becomes too formulaic and users expect a definitive numerical answer to indicator occurrence and worth. Indeed, it may be useful for an overall assessment of woodland status generate some form of numeric index or gradation. However, the evidence must be considered on a wide front and the lists of botanical indicators require scrutiny and assessment at many levels (Rotherham, 2001; Wright et al., 2012). They need to be assessed in terms of site history, of map-based evidence of land-use, of archaeological evidence of human activity and plant cover, of other documentation or historical sources, and in terms of the core ecology of the plants themselves. There is much to take in, including soils and other sediments and the evidence they hold; of working and worked trees and the stories they tell; and the variation and patterns of landscape history through time and space. The system that is emerging will help draw together key evidence and it will then aid the interpretation and presentation of that evidence to the benefit of woods and woodland and tree practitioners (Table 7.2).

The grid is a first attempt to bring together all the varied sources of evidence and information on a wooded or forested landscape so that they can be interrogated in a simple and integrated way. The application of the weighting scores is an optional approach that places emphasis on the degree to which evidence is robust for this to have been a wooded landscape for a very long period i.e. five or more centuries. The approach we have adopted involved the collection and collation of objectively gathered data, but then its interpretation and interrogation of this information subjectively. This is what I describe as 'Intelligent Interrogation' (Rotherham, 2011). This system builds on the approaches described previously in the Woodland Heritage Manual (Rotherham et al., 2008), and it is unique so far in linking indicator species, woodland heritage features, and historically worked trees. The research considers ideas and evidence such as from Kirby (1988) and Goldberg and Kirby (2002/03), and develops them in the context of environmental indicators as described by Ellenberg (e.g. Hill et al., 1999) and by Grime and colleagues (Grime et al., 2007).

An Example of Ancient Woodland Botanical Indicator Species for the English Peak District Gritstone Area — Table 7.1

*Acer campestre**	*Gagea lutea*	*Pyrola minor*
Adoxa moschatellina	*Galium odoratum*	*Ranunculus auricomus*
Agropyron caninum	*Geranium sanguineum*	*Rhamnus catharticus*
Allium ursinum	*Geum rivale*	*Rosa arvensis*
Anemone nemorosa	*Helleborus viridis*	*Rubus caesius*
*Aquilegia vulgaris**	*Hordelymus europaeus*	*Rubus saxatilis*
Brachypodium sylvaticum	*Hyacinthoides non-scripta*	*Sanicula europaea*
Bromus ramosus	*Hypericum pulchrum*	*Scirpus sylvaticus*
Campanula latifolia	*Ilex aquifolium*	*Solidago virgaurea*
Campanula trachelium	*Lamiastrum galeobdolon*	*Sorbus torminalis*
Cardamine amara	*Lathraea squamaria*	*Stachys officinalis*
Cardamine impatiens	*Lathyrus montanus*	*Stellaria holostea*
Carex laevigata	*Lithospermum officinale*	*Stellaria neglecta*
Carex pallescens	*Lonicera periclymenum*	*Stellaria nemorum*
Carex digitata	*Luzula pilosa*	*Tamus communis*
Carex remota	*Luzula sylvatica*	*Taxus baccata* (where native)
Carex strigosa	*Lysimachia nemorum*	*Thelypteris oreopteris*
Carex sylvatica	*Melica uniflora*	*Tilia cordata* or *platyphyllos*
Chrysosplenium alternifolium	*Mercurialis perennis*	*Trollius europaeus*
Chrysosplenium oppositifolium	*Milium effusum*	*Ulmus glabra*
Circaea x intermedia	*Myosotis sylvatica*	*Veronica montana*
Cirsium heterophyllum	*Narcissus pseudonarcissus**	*Viburnum opulus**
Conopodium majus	*Orchis mascula*	*Vicia sepium*
*Convallaria majalis**	*Oxalis acetosella*	*Vicia sylvatica*
Corydalis claviculata	*Paris quadrifolia*	*Viola palustris*
Daphne laureola	*Phyllitis scolopendrium**	*Viola reichenbachiana*
Daphne mezereum	*Polygonatum multiflorum*	nw *Calamagrostis epigejos*
Dipsacus pilosus	*Polygonatum odoratum*	o *Carex pendula*
Dryopteris carthusiana	*Polypodium vulgare (s. lato)*	o *Carpinus betulus*
Dryopteris pseudomas	*Polystichum aculeatum*	o *Malus sylvestris*
Epipactis helleborine	*Polystichum setiferum*	o *Poa nemoralis*
Equisetum sylvaticum	*Potentilla sterilis*	nw *Platanthera chlorantha*
Equisetum telmateia	*Primula vulgaris**	x *Moehringia trinerva*
Festuca altissima	*Prunus padus*	nw *Sedum telephium*
Frangula alnus	*Prunus avium*	nw *Serragula tinctoria*

N.B. *Rhododendron ponticum, Prunus laurocerasus, Castanea sativa, Fagus sylvatica, Mahonia aquifolium, Hedera* sp., *Ilex* sp., *Pinus sylvestris, Larix decidua* are often indicative of Victorian high forest plantings;
x. Appears in plantations
nw. Not typically woodland
o Not native of often introduced
* Only include these species if they occur well within the wood and do not appear to have been planted.

This list is based on one developed for the Peak National Park firstly by Penny Anderson, and then by subsequent peak park Ecologists. It has been applied in the South Pennines / South Yorkshire / North Derbyshire region by Ian Rotherham and colleagues and modified accordingly (Glaves et al., 2009a, 2009b, 2009c). The list can be used in a wider range of situations but subject to the provisos as given. To be applied with caution and in the context of the attached notes on regional and other variations.

Evidence-based Ancient Woodland Status Grid (from Rotherham, 2011) — Table 7.2

	Woodland	Old woodland	Ancient Woodland	Influence	Interpretation
	At least pre-1800 AD origin		Pre-1600 AD origin		
Evidence type	**Indication**	**Affirmation**	**Confirmation and continuity**		
Ecological	Indicator species Old trees Landscape context	Above threshold number of indicators Key species presence Community structure Worked trees Other	Key indicator species perhaps including rarities Saproxylic insect indicators Veteran worked trees: • stubbs • coppice • pollards Other ancient trees including veteran natural coppices	Association with woodland conditions Association with woodland continuity Association with absence of non-woodland use	1. + Perhaps evidence of continuity 2. Perhaps evidence of severance Weighted for biogeographical trends especially Atlantic influence Weighted for soil type and especially base status
	ECO Score 1	**ECO Score 2**	**ECO Score 3-5**		
Pedological	Absence of non-woodland soils	Woodland soils such as leached brown earths, podzols, acid brown earths etc	Woodland soil depth Sediment profiles and evidence of site continuity of woodland cover e.g. pollen C-dating of charcoal or of sediments	Association with woodland conditions Association with woodland continuity Association with absence of non-woodland use	1. + Perhaps evidence of continuity 2. - Perhaps evidence of severance
	PED Score 1	**PED Score 2**	**PED Score 3-5**		
Archaeological	Boundary features Old trackways Pits and platforms	Wood bank or other significant boundaries Woodland-related trackways Charcoal, whitecoal and other industries Old worked trees	Palimpsest of features indicating pre-1600 AD origins: • Ancient wood bank • Ancient park bank • Other ancient significant boundaries • Ancient woodland-related trackways • Dateable charcoal, whitecoal and other industries • Veteran worked trees	Evidence of woodland conditions Evidence of woodland continuity Lack of evidence of non-woodland use	1. + Perhaps evidence of continuity 2.. - Perhaps evidence of severance
	ARC Score 1	**ARC Score 2**	**ARC Score 3-5**		
Historical	Maps Place names Lane names Field names Location	First Edition Ordnance Survey presence Early estate maps Archival evidence of woodland use	Estate records pre-1600 AD Court rolls, evidence of disputes over woodland use or produce, bills of sales for woodland produce or rights, ownership and management documentation	Evidence of woodland conditions Evidence of woodland continuity Lack of evidence of non-woodland use	1.+ Perhaps evidence of continuity 2. - Perhaps evidence of severance
	HIST Score 1	**HIST Score 2**	**HIST Score 3-5**		
Other	**?**	**?**	**?**	Evidence of woodland conditions Evidence of woodland continuity Lack of evidence of non-woodland use	Woodland types: 1. Coppice 2. Park / Pasture Wood 3. Wooded Common 4. Linear remnant 5. Fragment
TOTAL EVIDENCE–BASED SCORE:	4 or less very weak	4-8 pre-1800 AD	9+ strong case pre-1600 AD		Described by woodland type or types and weighted by evidence-type

Conservation and conclusions

Many 'wooded' or ancient 'treed' landscapes exist today but largely over-looked or misidentified. The ghosts, shadows, or footprints of anciently wooded areas still survive, sometimes intact, and others barely clinging by their fingernails. Yet each has a unique story to tell in its own quiet history. Commons, heaths, fens, roadside verges, hedgerows, urban parks, and even gardens, all may have evidence of our woodland past. For the landscape detective this is a truly exciting prospect. However, often associated with 'cultural severance' many of these sites are in a sharp decline (Rotherham, 2008). An additional problem is that with severance follows intensification or abandonment, both potentially serious issues.

A real worry for our ancient woods and their unique heritage is that they can be lost ever so easily. Indeed, the current vogue in Britain of 'biofuel' extraction from wooded landscapes is on the one-hand laudable and a continuation of timeless traditions. On the other hand, such industrial and mechanised extraction should not be allowed in 'ancient woods'; to do so is tantamount to heresy. Generally when this type of use occurs there has been no meaningful survey of the woodland landscape and certainly not of veteran worked trees. One man, a large timber extraction machine and a few chainsaws can remove trees ranging in age from a few hundred years, to a thousand years or more in just a few hours. The track vehicles used, so-called low-impact machines, erase an ancient landscape and it banks, ditches, pits and platforms in just a few hours. I liken this to taking a felt-pen to scribble over the oil paint of the Mona Lisa; you still have a picture but it is not what it was. Currently, aside from a few dedicated local and regional groups across Britain, very few of our woodlands have been surveyed for their heritage interest; there is much to do (Rotherham et al., 2008). A final issue and again a growing problem for woodland conservation is that of recreational 'parkification'; in other words the conversion of a site to one primarily managed for leisure and urban-dwellers' recreation and not conservation. In Britain especially, there is much grant aid support for activities and use, but often not for effective survey, assessment and conservation management (Rotherham, 2012, 2013).

In terms of conservation significance, the ancient woods of Britain are hugely important for nature conservation and heritage reasons (Rackham, 1986, 2006). However, perhaps the special importance of an ancient wood is the feeling of walking in the footsteps of the ghosts of people that lived and worked our woods over thousands of years. These 'ghosts' have left their mark on the wooded landscape, on the soils, and even on the vegetation itself. As stewards of the environment, we have a responsibility to protect ancient, semi-natural woodlands for future generations. That some shadows of wooded landscapes remain today but beyond the 'wood', is a new concept and raises issues which are both exciting and challenging (Handley and Rotherham, 2013; Rotherham, 2012, 2013). The hunt for shadows and ghosts is now on, and this raises possibilities of a woodland lineage from lost, medieval coppices or even from earlier wood pastures and wooded commons. The recognition and identification of these remarkable survivals has come directly from the processes and ideas discussed above.

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