A Report to the Woodland Trust

Field Surveys for Ancient Woodlands: Issues and Approaches

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1 Non-technical Summary

Field surveys of ancient woodlands and potential ancient woodlands can be undertaken for a variety of purposes, including: to help identify an Ancient Woodland, investigation into existing designated ancient woodlands, gathering information for site management and conservation decision making, assessing potential impacts of development, and making decisions on restoration etc.

There is a variety of features in a woodland which can indicate whether it is an ancient woodland and can inform on the history and current ecological/historical value of the site. Many surveys of potential ancient woodlands have tended to focus on ancient woodland indicator species (AWIs), particularly Ancient Woodland Vascular Plants (AWVPs). Surveys which just focus on such indicators miss a lot of historical, archaeological and species information which can help confirm woodland continuity (i.e. that it is an ancient woodland) and/or identify features of historical and conservation value.

There is a wide range of field survey techniques which can be used in ancient woodlands and a need to bring together the archaeological and ecological surveys in a single guide, hence this document.

There are three broad types of feature to look for in an ancient woodland:

- Ancient woodland vascular plant indicators;
- Tree shape and form; and
- Surface and buried archaeology.

This report sets out survey methods for these features and advises on what to look for.

Many important ecological and archaeological features can only be easily found at specific times of the year and surveying these features requires specific technical expertise and experience. Where surveys are undertaken outside the optimal period of time and/or are undertaken by individuals without the appropriate training and surveying expertise, the results should be treated with caution.

Ideally several types of surveys of a woodland should be undertaken at different times of year to maximise the evidence collected and the robustness of this evidence. Where this is not possible, limitations in the surveys need to be stated and recognised in any analysis.

In most cases field surveys should be combined with archive surveys (of site history, previous surveys etc.); this is particularly important when identifying ancient woodlands.

2 Introduction - Why Undertake Field Work in Potential and Actual Ancient Woodlands

There are several reasons for undertaking a field survey of a potential or actual ancient woodland site these include:

- Ancient woodland inventories,
- Confirmation of ancient woodland status,
- Woodland management, and restoration (especially for Plantations on Ancient Woodland Sites (PAWS), and
- In connection with a proposed development affecting the site (Ecological Impact Assessments) etc.

Field based surveys alone should not be used to confirm that a woodland is or is not ancient. Field surveys can provide valuable information about the history and current condition of a woodland but such surveys need to be linked to archive based research (See separate report on *Ancient Woodland Evidence* for further information on archive surveys).

The value of ancient woodland sites is well recognised, Peterken (1977, 1983) argued the case for treating ancient semi-natural woodlands as the most important category of woods for nature conservation and in the 1980s the Nature Conservancy Council, as it was then, undertook surveys to identify and list such woods on a county by county basis (see Kirby 1984 and Walker and Kirby 1987).

There are several types of field evidence which can indicate the antiquity of a woodland, or which may indicate that a site is a recent woodland. Such evidence can be divided into four broad types:

- Ground flora – including ancient woodland vascular plant indicators,
- Trees – including type of species, their shape and form,
- Archaeological features – point and linear features, and
- Other features/groups to look for – including fauna, woodland names, woodland location etc.

This report covers the first three of these types of evidence. Use of woodland names, woodland location etc. are covered in a separate report on Ancient Woodland Evidence. Surveys for ancient woodland fauna e.g. beetles, hoverflies, require specialist identification and survey skills and are not covered in this report.

3 Field Surveys

3.1 General issues, timing, equipment, expertise

The robustness of the results of a woodland survey is affected by a range of factors including:

- The time of year when a woodland is surveyed,
- The amount of time allocated for surveying,
- The coverage of the surveys (vascular plants, trees, archaeology, topography, soils),
- The total area of the woodland surveyed (and which parts of the woodland are surveyed),
- The amount of relevant woodland survey training and experience of the surveyor, and
- The survey methods used.

All of the above factors will affect the range and type of indicators of woodland continuity and ancientness which are recorded.

Ideally several types of surveys of a woodland should be undertaken at different times of year to maximise the evidence collected and the robustness of this evidence.

Surveying woodland for evidence of ancient woodland requires specific knowledge of both woodland ecology and archaeology. Different types of field evidence require different sets of expertise, often important evidence can be overlooked by inexperienced surveyors.

Failure to survey the whole woodland, including its perimeter and all habitats and geographical features often means that an incomplete picture of the woodland is obtained and important evidence can be overlooked.

Ancient woodland surveying requires specialist knowledge and training which is often not covered by formal archaeological and ecological training. **The training and expertise of surveyors should be considered when reviewing the findings of such surveys**. Specialist training can be invaluable.

When surveys are undertaken outside the optimal survey periods (see following sections for timing) key indicators are often not visible and **the results of such surveys must be treated as tentative and further surveys will be required.**

Potential sources of error need to be judged in survey methods and their results, for example:

- the competence of the surveyor and variations between surveyors;
- inconsistencies or differences in interpretation of survey instructions
- sources available;
- weather;
- season; and the
- nature of the terrain (Kirby 1988)

As indicated above field surveys should be linked to surveys of existing and archive data. Prior to undertaking field surveys it is recommended that as many as possible of the following sources be searched for information on the woodland survey area:

- *Ancient Woodland Inventory http://www.magic.gov.uk/ or for Northern Ireland, www.backonthemap.org.uk. For further information on the Ancient Woodland Inventory for England and Wales visit

  http://www.english-nature.org.uk/pubs/gis/tech_aw.htm

  For more information for Scotland, *The inventory of ancient and long-established woodland sites and the inventory of semi-natural woodlands (provisional)*, visit

  http://www.snh.org.uk/publications/on-line/advisorynotes/95/95.html

- For Northern Ireland visit; www.backonthemap.org.uk.
- *Local AWI lists – if available, regional AWI list if unavailable (See Rose Wild Flower Key for regional lists).
- Previous woodland surveys (from Natural England, Forestry Commission, Local Authority, Wildlife Trust etc.);
- *SSSI schedules or county wildlife site schedules (is the site is designated);
- Biological Records Centre for previous site records;
- *The 'Magic' website for ecological records near the site;
- County Floras;
- *Land owner & land users and related associations (eg. NFU, CLA, FWAG) for access agreement and site information;

- Local Plans and supporting documents – including plan map (for site planning designations);
- *Aerial photographs (English Heritage, Google Earth, Local Authorities);
- *Archaeological records for records near the site (English Heritage; County Archaeology Service);
- Local Studies Libraries and County Archives – for existing historical information;
- Local History Groups – for existing historical information;
- *Old Ordnance survey maps – for changing site boundaries and land uses;
- Historical maps – tithe maps etc.

These are the priority pre-site survey sources to check are indicated with a *.

When undertaking a woodland survey please remember that;

- Ecological complexity, combined with limited resources, often leads to sites under examination being difficult to fully assess or evaluate:
- Time, resources and indeed competence are often restricted and this can affect the results obtained and the robustness of the evidence and conclusion derived;
- The use of so called ‘ancient woodland indicator species’ can be useful when surveying an ancient woodland and can provide valuable information about the ancientness and nature conservation value of a woodland, ***but indicator species are not necessarily valuable in themselves, they just indicate that a site may be ancient they do not prove it is or is not ancient;***
- A good ancient woodland survey should seek to identify any features which indicate the current value of a site, its history, management issues, and positive and negative conservation/historical value. **A survey should not just look at ancient woodland vascular plant indicators.**

3.2 Ground flora surveys

3.2.1 General Issues

Many woodland ground flora surveys simply focus on ancient woodland vascular plant indicators (i.e. flowering plants and ferns). Whilst such species can provide valuable indicators of ancientness, a failure to consider the wider range of species severely limits the value of the results obtained. Surveys often focus on vascular plants because the surveyors do not have the expertise to identify mosses, lichens, algae etc. These other groups of plants often provide valuable information about woodland history and ecology and some of these species are of conservation concern. Where possible, they should be included in ground flora surveys.

Ideally a woodland ground flora survey should look for:

- Ancient woodland indicators - vascular plants and other species;
- Plant species of conservation value – any nationally rare or nationally scarce species, and locally rare species (see local floras for the latter);
- Species which may harm the ecology/conservation value of the site – including invasive non native species such as Japanese knotweed, Himalayan balsam, garden escapes etc.;
- Species which indicate something about the woodland history, for example dense cover of bluebells is often associated with soil stripping for charcoal production, planted non native species can indicate that the site was managed by the Victorians as a park;
- Species which may indicate woodland archaeology, for example moss covered areas are often associated with shallow soils over rocks (these may relate to building remains;
- Signs of animals present in the woodland, tracks of deer, small mammal runs etc. These species may be important considerations in woodland management or development.
- Whilst you are looking at the ground flora it is also useful at the same time to look for woodland archaeology, for example large dead tree stumps, surface remains, humps, bumps and lines which may indicate historic woodland management or gaps in woodland cover (e.g. ridge and furrow).

3.2.2 Ancient Woodland Indicators

A number of plant species have been listed as being associated with ancient woodlands and over 200 species appear on various ancient woodland vascular plant indicator lists. Such lists have now been produced for most UK areas (see Appendix 1 for a list of woodland indicator lists) but are extremely variable in their construction and reliability.

It is important to remember that an indicator species indicates a particular type of environment, in this case woodland continuity/ancientness. On their own they do not prove that a site is ancient. Ancient woodland indicators (AWIs) should be used in conjunction with documentary and map archive research to evaluate the ancientness of a woodland.

A list of ancient woodland indicator plant species from a site is useful, and the more indicator species found the better, but **the number and type of ancient woodland indicators found in a woodland can be affected by other factors than age/ancientness of woodland:**

- different types of woodland contain different numbers of indicator species, generally there are more species on sites with neutral and alkaline soils than with acidic conditions;
- size of woodland can affect number of indicator species; on the whole, larger woodland tend to contain more species.
- the variety of micro-habitats present in a woodland affects the number of indicators found – generally the greater the number of clearings, rides, wet areas etc. the more species found.
- geographical features present within the woodland affects number of species – e.g. scree slopes, hollows, dryer humps etc.
- the UK geographical location of the woodland affects the number and type of indicators; upland sites generally have fewer indicator species than lowland sites; different species are found in the dryer eastern counties than the wetter west.
- recent and historic management affects the number and type of species found, recent coppicing can increase number of clearing species, historic turf cutting for charcoal production changes the soil and species found.

It is important to remember that **the primary aim of compiling lists of ancient woodland indicators was to determine antiquity.** These indicators have now become synonymous with indicating or assigning conservation value to a woodland as a whole. Care should be taken when considering ancient woodland indicators, although they may indicate age of a woodland and they may be indicative of overall vascular plant diversity, the **indicator species are not necessarily of value in themselves, the value is in what they indicate i.e. age and diversity.**

It should also be noted that whilst some lists such as the recent ones from Scotland, Wales and Northern Ireland have been produced using a combination of robust fieldwork and/or expert review, not all lists have been through such a robust testing process.

Care should be taken when using some of the lists if the methods used to produce the list (i.e. their robustness) are unknown.

3.2.3 Possible Survey Methods

A range of methods can be used to survey for AWIs including: general walk over, transects or quadrats; equal effort across sites of different area, or proportional effort. There are arguments to make in favour of each of these different approaches depending on what you are trying to do. However, you need to be aware of the consequences when comparing surveys with different intensities and different observers. For example, almost any development site will be surveyed by objectors with a higher intensity per unit area than a typical phase two woodland survey in the past, so is likely to pick up more species, making the site look relatively better than perhaps it is. For a discussion of these factors see Kirby, et al.(1986).

General walk over surveys can be:

- An efficient way of detecting species;
- Likely to be related to overall site richness;
- Subjective in terms of abundance estimates, but still useful;
- Used to target small hot-spots of species (flushes, glades, etc);
- More likely to detect rare species;
- Useful in directing effort in part which may be related to wood-size and complexity;
- Standardised (using a fixed time/length in which to carry out the survey);
- Used to mark species occurrence on a map; and
- Used to relate species occurrence to other elements of the wood (structure, archaeology etc) qualitatively.

But walk-over surveys have a number of limitations in terms of what is recorded:

- May cover areas within the woodland which are of different historic origins;
- Combines areas of different vegetation types/richness;
- Tendency to avoid difficult areas (blocked by bramble patches, dense scrub etc.);
- Potential uncertainty as to area/proportion covered from survey results, so difficult to do reliable statistical comparisons; and
- The overall completeness may be variable.

A Quadrat survey is superficially a more objective way of collecting data. This type of survey allows for:

- comparisons on known areas;
- more intense recording, likely to pick up difficult species;
- spatially precise information to be generated so it is easier to link to other spatial data;

- flexibility to either use a fixed number of quadrats, or vary according to wood size;
- the potential for accurate change detection;
- individual plots which can be assigned to growth stage/ vegetation type/ origin; and
- a statistical analysis that is generally valid.

But for the purposes of comparing Ancient Woodland Indicators, they may not be that efficient or effective. The downside of a quadrat survey includes:

- Results will be affected by survey design:
  - Distribution of quadrats can be 'Representative', Random, Stratified random or Systematic,
  - Number of quadrats plotted, and
  - Size of quadrats.
- Very small percentage of the woodland is sampled for the time involved ;
- Number of species detected is not necessarily related to the total number on site;
- Far fewer species detected overall;
- Small hotspots likely to be missed;
- The standard error on numbers may be large, so statistical power low;
- Time spent walking between plots 'wasted'; and
- Frequency of species recorded is affected by the plot size of the quadrat.

When analysing the results of a survey the following points need to be taken into account:

- The general idea is that some animals and plants have their ***occurrence*** (**distribution and abundance**) restricted or facilitated by particular environmental factors or variables.

- Analysis of ***occurrence*** or ***absence*** may provide information about not only the individual species, but of a more general nature - about the communities of animals and plants - or about the environment.

- Ancient woodland indicators may now be restricted to small patches within a woodland, as some areas have been modified by both recent and historic management.

The results of such a woodland survey will tell you (amongst other things):

- which ancient woodland indicator species have been found;

- how many ancient woodland indicator species are found;

- where these species occur; and

- what habitats or features these indicators are associated with.

Remember that finding more indicator species is useful. Even if ancient woodland indicators are only found in a few small locations this does not necessarily mean that these are the only ancient woodland areas in the site. They may indicate that the whole woodland is ancient but that historic and current management have meant that indicators are not visible in other areas.

The results will also tell you about the current conservation value of the site including the location of:

- rare or valuable communities;
- important and diverse microhabitats;
- important archaeological features; and
- problem areas (e.g. with invasive or non-native species).

It is worth remembering that while a woodland may be valuable because it is ancient, it may also be valuable because it is diverse, contains rare species or habitats, contains valuable archaeology, is important to local people etc. **The value of a woodland, even an ancient woodland, is not just that it is ancient. The value of an ancient woodland is not necessarily in its indicators.**

3.2.6 When to survey

Surveys of woodland species can take place **between April and September.** Many woodland ground flora species have a limited period when they are obvious, and a number of species are more difficult to find from the end of June onwards.

It is recommended that a survey takes place early in the survey season, April and **May or possibly May to early June are optimal for many species** (optimal times for surveys of upland woodlands and more northerly woodlands being later than southern or lowland woodlands)**. Two surveys are best; an early season survey and a late season survey** to identify additional indicator species.

3.3 Tree Surveys

3.3.1 When to survey

Tree surveys can be undertaken all year round but many species are easier to identify when in leaf; surveys between **late April and early September** are optimal.

3.3.2 What to look for

Ancient woodlands typically contain a diverse range of tree forms. These are often the product of various types of human interference and management, but a proportion may have resulted from natural processes such as storm damage. The tree forms include well-known types like coppice-stools and pollards and large “veteran-trees”, but there is considerable variation and some integration of the types.

There are two broad types of tree to look for:

- Ancient or veteran trees.
- Trees modified by human management.

In addition you should look for:

- Tree stumps, particularly coppiced stumps.
- Dead wood, tree remains.

Ancient trees have three characteristics:

- trees in the ancient stage (i.e. latter stage) of their life.
- trees that are old relative to others of the same species.
- trees which are of interest biologically, aesthetically or culturally because of their age.

The term veteran tree is often used interchangeably. Such trees are of value because of one or more of their age, size, or condition.

Some veteran trees are easy to identify because of their size/girth, other veteran trees may not be particularly large (especially in upland areas or where trees have been managed/modified). But such veteran trees can be recognised because they show at least some of the following characteristics:

- Holes in the trunk,
- Hoes in the branches,

- Dead wood on the trunk and in the canopy,
- Aerial roots,
- Sap running down the trunk,
- Pooling of water in the upper trunk,
- Cracks and crevices in the bark,
- Loose bark,
- Epiphytic plants,
- Fungi, and
- Dead wood on the ground around the base of the tree.

If you find ancient trees this does not necessarily indicate that the woodland is ancient. Ancient trees may have established in open habitats which have since become wooded.

Ancient trees can be found in ancient woodland but they tend to be:

- Boundary trees, often associated with other boundary features, e.g. banks and ditches.
- Working / manages trees e.g. coppices, pollards etc.
- Have a modified canopy shape (trees which grow in open habitats tend to develop a domed canopy shape, so called maidens), in woodland the branches of a tree are brushing against other trees and a less broad canopy tends to develop.

Ancient and veteran trees are important features to look for in ancient woodland surveys, even if the surveyor cannot confirm the ancientness of a woodland. Such trees are of conservation value in themselves and are therefore worth recording.

Worked trees are trees which at some stage in their lives have been cut to produce timber, fodder, bark, firewood etc. As a result worked trees have distinctive shapes and forms which are often quite different from unmanaged trees (natural event such as fire, storm damage etc. can also modify the shape of a tree and care needs to be taken when identifying worked trees.

Trees have been used for many different purposes and as a result there are many shapes and forms which can be found. Working trees are often associated with ancient woodland sites, particularly if:

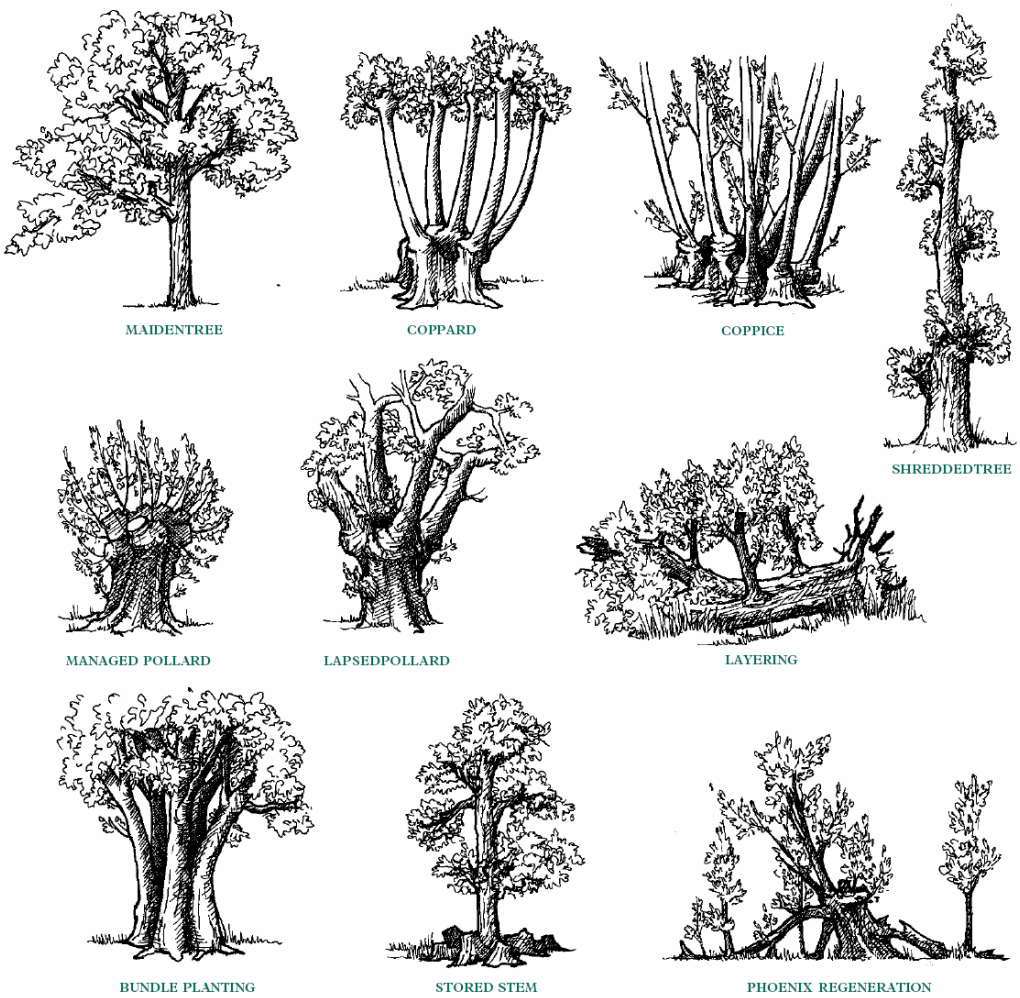
- A number of worked trees are found together, and

- When the worked trees are large sized.

Types of worked trees include:

- Pollards,
- Coppice,
- Stub,
- Multi-trunks,
- Medusoid (or irregularly shaped), and
- Layered trees – possible old hedges.

Example shapes of worked and unworked trees (from N Fay)



For further details on tree shapes see the Woodland Heritage Manual (Rotherham et al (2008) of the ancient tree hunt website (http://www.ancient-tree-hunt.org.uk/recording/).

If ancient woodlands have not been managed for many years then the stems can grow quite large and lapsed forms of coppice, pollard etc. can develop.

3.3.3 Methodologies – approaches and limitations

There are several ways to survey ancient, veteran and worked trees, these range from fairly simple methods (see Ancient Tree Hunt), to very detailed surveys (see Natural England approach, N Fay). Survey sheets for woodland surveys can be found in the Woodland Heritage Manual (Rotherham et al 2008).

It is advisable that all veteran, ancient and worked are recorded as part of a survey of an actual or potential ancient woodland. Together the trees may provide evidence of woodland continuity, history of woodland management of gaps in tree coverage.

Locate and map all veteran, ancient or working trees.

The characteristic of individual trees can be recorded on a survey form.

Further details on tree recording can be found at

the Ancient Tree Hunt	http://www.ancient-tree-hunt.org.uk/recording/
Natural England	http://www.naturalengland.org.uk/
Woodland Heritage Manual	www.ukeconet.co.uk

3.3.4 Analysis and Interpretation

As indicated above ancient and veteran trees may provide evidence of woodland continuity or gaps in cover.

Evidence for a history of woodland management and woodland continuity:

- Blocks of several managed trees, fairly closely associated.
- Veteran trees on woodland boundary features.
- Large veteran or lapsed coppice, pollards or coppice rings etc.

Evidence for gaps in woodland cover include:

- Maiden trees within woodland blocks (although this may indicate historic parkland and ancient wood pasture).
- Layered trees – these may indicate old hedgerows.
- Espalier trees or tree forms associated with orchards/gardens.

3.4 Survey of Woodland Archaeology Surface Features

3.4.1 Recommended Survey Approach

The same principles apply when surveying for surface archaeological features as for botanical surveys. The aim is to obtain as much information as possible in a structured way to enable evidence based decisions to be made on the ancientness of the woodland. As with botanical indicators, **a combined walk and virtual quadrat approach is recommended**. (See section 3.2 of this report for a discussion on overall survey methods). Based on an initial walk over survey, a route should be plotted through the woodland which covers all potential features of the site (where possible). This will need to include a survey of the woodland boundary and topographical features. A single walk over survey can be used which combines identifying potential ecological and archaeological features for further survey.

The starting point for the survey, **prior to any field visit**, should be to identify potential features, the following sources may help in this:

- Obtaining a current Ordnance Survey map (Landranger / Explorer series), which will give the likely boundary of the site, approximate locations of footpaths (although these could have changed, perhaps as a tree has fallen down), surrounding land uses and recorded archaeological features; Note: for survey purposes a 1:2500 map should be used.
- Comparing the modern with historical ordnance survey maps to identify boundary changes, new footpaths etc; and changes in surrounding land uses.
- Determining what previous surveys have been undertaken (consult with local wildlife groups, archaeologists etc.) and talk to individuals who may have knowledge about the site etc. – see list of sources (Section 3.1 p4).
- Consultation with the Historic Environments Record Centre to identify any records on the Sites and Monuments Record.

If there is no previous knowledge of the site it is recommended that **an initial site walk over** is made prior to a detailed survey. If the surveyor(s) are familiar with the woodland this stage may be omitted but the detailed survey will still need to be planned before visiting the site so that features are not missed. It is also recommended that the locations of the features are recorded using a GPS (powerful, easy to use and relatively low-cost

models are now available which can be used in woodlands). This will enable any features identified in the walk over to be relocated in the detailed survey.

The walk over survey should cover the whole site (as evenly as possible) noting down presence of any features such as:

- main routes through the site and their condition;
- clearings, glades, rides;
- water bodies ponds, streams, springs, fire ponds;
- wet areas - hollows, bogs, flush, fen etc.;
- draining slopes;
- rocky areas cliff, gorge, scree, areas with stones at the surface and near the surface (look for moss dominated areas);
- dead wood dominated areas;
- mounds and raised areas including banks;
- lower lying areas, hollows, dry ditches; and
- woodland edge boundaries.

The objective of an initial walk over survey is to identify areas for detailed survey and to design the survey route for the woodland**, to ensure that the woodland survey route is representative of the whole woodland.**

The survey route with estimated timings should then be planned to cover all the main features encountered in the walk over survey. This may look like a random route but if planned properly should reduce the overall time taken to survey the woodland but will allow more time for detailed survey at each of the potential archaeological features. At the identified feature points along the route stop and undertake a basic visual assessment of the feature, sketch the form of the feature, take a photograph and make simple dimension measurements.

The overall aim is to record basic details of the potential features and record the location of the survey points on a map (preferably using a GPS.).

3.4.2 Recording and analysis

Examples of survey forms are given in the appendix. These can be modified to take into account the characteristics of the specific woodland. All surveys should identify the name and grid reference location of the wood, the date and time of the survey and the name of the surveyor(s). Key variables which will need to be recorded generally across the site and at key points (virtual quadrats) are:

- Specific geographical location of the feature;
- Dimensions of the feature;
- Specific characteristics of the feature – eg. overall shape, presence of stones, other structures; and
- Any associated physical or ecological factors eg. tree growing in middle or at edge of feature, moss lined.

At the same time you may be able to observe and record the presence of potential botanical features which should also be marked on your map.

Woodland archaeological remains fall into the following broad categories and include:

- living and dead trees and their remnants;
- stones, structures and ruins;
- material scattered on site - such as flints, cast off tools and equipment, domestic materials from settlements, etc.;
- earthworks such as banks and ditches, and platforms and pits; and, the vegetation itself.
- soils, sediments, and buried deposits including seeds and other organic material preserved in waterlogged ground;

The final category in the list requires disruption of the surface and should not be attempted during the basic field surveys.

Analysis of these key variables will help in assessing the history, current conservation value and possible ancientness of a site by answering the following questions:

- What are the **F**eatures? – these may be ‘point’ features such as a charcoal hearth or ‘linear’ features such as a boundary bank .
- Where are they **L**ocated? – can produce a distribution map for the woodland.
- How **A**bundant are they? – estimate across the whole woodland and associated with specific micro-habitats.
- How are they **G**rouped? - analyse the distribution and look at the association between features and with micro-habitats

i.e. undertake a F.L.A.G (Features, Location, Abundance, Grouping) analysis. The analysis together with an assessment of the ecology of the site supported by historical information will help to answer the fundamental question as to whether the features are ‘archaeology’ or just part of the natural topography and ecology of the site. Section 3.4.2 below sets out the main types of features which may be found in a woodland.

3.4.1 When to survey

Unlike woodland ecology surveys, woodland archaeology surveys are **often best undertaken in the autumn or winter.** During the summer months ground flora can hide surface and buried archaeology. In autumn leaves tend to collect in hollows, highlighting the hollows and bumps associated with archaeology. In winter snow performs a similar function.

Early morning and late afternoon are often the best times to survey as low light highlights surface topography and archaeological features.

3.4.2 Types of Archaeological Features in Woodland

Because of the longevity of the environment and the absence of modern agricultural practice, in the UK, surface archaeology is generally better preserved in ancient woodlands than other landscapes. However, features are usually heavily masked by the trees, under-storey shrubs and ground flora and care needs to be taken when looking for these features.

In all woods, there are usually distinct associations between the physical archaeology and the vegetation, physical features including archaeological features can often be identified by their “botanical signatures”, i.e. species such as moss covering banks.

Archaeological remains can be separated into:

- archaeology of the woodland – linked to a history of woodland management
- archaeology in the woodland – but not linked to settlements.

Archaeology <u>of</u> the woodland is evidence of woodland continuity (coppiced trees, boundary banks etc.)

Archaeology <u>in</u> the woodland may be indicative of gaps in woodland cover (e.g. houses,

Archaeological remains you may find are related to:

- land ownership and management;
- woodland processes and products (pits, platforms, ponds, sawpits, storage and
- processing sites, access routes and trackways, settlements of woodland workers, etc);
- industrial extraction (stone, coal and other minerals) and industrial processes (smelting, tanning, etc);
- agricultural phases of land use (field systems, boundaries, buildings, soil downwash, plough-marked stones, etc);

- recreational activities now (such as war-gaming or dens) and in the past (such as deer;
- parks, or Victorian and earlier leisure landscapes;
- settlement sites (from prehistoric to modern); and
- military training (rifle butts and trenches).

3.4.3 What to look for – linear features:

Linear features may or may not be representative of ‘ancientness’ in woodland but their presence / absence together with ecological and historical information will help to build up a case for assessing a particular woodland as ancient. Some of the main types of linear features which surveyors should be aware of include:

- **Boundaries - Patterns** of boundaries can sometimes reveal the story of a place's development over thousands of years. Some boundaries are not continuous features on the ground, but are marked at intervals by boundary stones and distinctive immovable landmarks. Boundaries and other linear features may move around, within, or through a woodland. **Sinusoidal boundaries with significant ditches and banks can indicate an old woodland boundary.**

- **Hedges, walls, fences, banks** and **ditches** were generally designed to keep animals and/or people in/out of certain areas and so served to separate different land management regimes. Historically some woods were managed just like fields and were enclosed within boundaries that physically prevented grazing and browsing animals from entering at will. This is why most ancient woodlands have remnants of boundary features either around or even within them. **Walls and banks around a woodland may indicate a woodland of considerable age. Hedges within a woodland may indicate a more recent woodland.**

- **Trackways** can reflect the history of a piece of woodland. Many of the deeply eroded 'hollow ways' (trackways) were used heavily over many centuries and thus have eroded to form a sunken path. Trackways can also include rides, carriage drives and avenues, which almost always relate to more aristocratic traffic linked to the many minor houses and halls that dotted the landscape during the eighteenth and nineteenth centuries, and may also relate to farmsteads.

- **Drainage networks**, and other **artificial watercourses are often associated with** post-medieval industries.

3.4.4 What to look for - point features

There is a vast variety of point features present in woodlands and some of the more common ones are listed below. Any mounds, depressions, platforms, stone piles or significant trees (large girth, coppice or pollard) should be recorded as point features. Some point features may be natural, e.g. natural hollows, tree through hollows etc.

Point Features linked to archaeology include:

- **Charcoal hearths -** Charcoal hearths are probably the most typical archaeological feature of many woodlands in zones where manufacture took place. You should look out for them in any suitable area of potentially ancient woodland. The presence of ancient coppices within a wood will usually imply the presence of charcoal hearths.

  Today, most hearths survive usually as more-or-less circular platforms, ranging from about 4 metres to 15 metres in diameter. Where these platforms were located on slopes, they were partially cut into the hillside, sometimes with a wall retaining the terrace of spoil down slope. Where the ground surface is even, they present more subtly with a shallow dish and a raised perimeter. Changes in vegetation and the tell-tale evidence of charcoal dust and fragments provide clues. This may include the presence of distinctive mosses on the platform. It is worth noting that the season of year may make a big difference in the visibility of charcoal platforms on flat ground. Late winter is best.

  It is important to look at sites both in wooded and non-wooded landscapes. A charcoal platform outside a woodland may reveal a woodland clearance episode, or it may have been a process occurring beyond the woodland boundary. Check for other evidence such as estate records and maps, and indicator species.

- **Q-pits** were built for whitecoal production which is not fully understood today. Few Q-pits are well preserved, as the kilns were presumably dismantled after use and the stones lining the pits were mostly removed subsequently. The 'mouth', or stoke hole, can often be distinguished and sometimes it will be possible to detect the remains of the stone lining. Q pits vary considerably in size and detail of structure, some with a lot of stone and others with little. It is known that dressed stone structures were removed within living memory. Often the pits occur in groups, and the flue leading to the mouth of the pit varies considerably in length.

- **Saw pits** occurred both within the woods and larger ones at processing locations outside. Despite their widespread use in the past, the smaller sawpits within woods are rarely recognised. This is because many were constructed for a brief period of use and may have collapsed or were infilled soon after their abandonment, leaving only shallow depressions that are not very distinctive in appearance. Most pits are rectangular, 2 to 3 metres long by 1 metre wide. You are looking for a trench that is roughly coffin sized and shape, and 1 metre to 2 metres deep.

- **Potash kilns -** the surviving evidence is in the form of very large stone built structures for the burning to ash of green vegetation. The other evidence is in variable and often shallow depressions and quite large earth pits. The larger pits are rather amorphous and can look superficially like stone-getting pits or even crude Q-pits. There are many shallow, often rounded pits in ancient woodlands, and these could well be the site of less intensive ash burning.

- **Processing and storage platforms** are both large and small levelled areas, formerly cleared of smaller trees and undergrowth. They will be connected by a road or path (best recorded as a linear feature), which usually gives access to a public road near the wood. Processing platforms were common in the past to store

finished products prior to either use, or to transporting out of the wood. These platforms will most easily be recognisable in woods located on slopes and are often found in association with charcoal hearths, settlement areas and Q-pits.

Other features which may or may not be linked to woodland continuity include:

- **Settlements sites and structure –** may indicate gaps in cover or may be linked to workers involved with woodland industries, who often lived where they worked, at least seasonally

.

- **Ponds** are common in woods and many were associated with woodland industries. Water power was of vital importance to many early industries, so it was usual for the main industrial site to be located adjacent to a natural water course, where a string of ponds could be constructed to power a sequence of water wheels. Water was also needed for the woodland craftsmen and often their families and for livestock too.

- **Turf cutting** was needed for charcoal making. Turf was widely used to cover the stack in order to stop air getting to the charring wood. It is worth looking for signs of turf stripping in a wood where charcoal making is suspected or known to have taken place.

- **Ornamental features in designed landscape woodlands**
  Ancient woodlands incorporated into post-medieval designed landscapes may contain a wide variety of ornamental point features dating to the post-medieval period, all contributing to the character of the woodland today. These include shady grottoes, monuments and ruins built as eye-catchers, ice houses, fish ponds and pet cemeteries, as well, of course, as exotic species of imported trees and shrubs. Faint traces of earlier garden designs may be masked by later earthmoving and planting

Archeological features associated with non woodland uses include:

- Features associated with agriculture, including plough features – ridge and furrow, plough marks on stones, hedges etc.

- Features associated with industry (although there are also woodland industries – see above). These include: limekilns, mine entrances and ventilation shafts, open-cast pits (although these can are be found in woodlands)

- **Military remains** from the Second World War in particular, but also at other times of conflict, especially those that formed part of Ministry of Defence land, were widely used as training grounds for both regular infantry and Home Guard troops. Other woodlands were used to provide camouflage for vehicles, ammunition and massing troops, with the intention of protecting them from detection and aerial attack. In some woods, military remains are abundant, including pillboxes, weapons pits and slit trenches, concrete bases of Nissen huts and other buildings, and networks of tracks and areas for storage and vehicle parking.

- **Stone pits and quarries** these form a diverse range of feature too great to describe here. Some may relate to the woodland itself where the objective of stone extraction was to build for example a wood boundary.

- **Buildings and other structures** you will find that most ruined buildings, along with structures such as bridges, troughs and boundary stones, will have been diligently mapped by the Ordnance Survey in the past, even if they are no longer depicted on modern maps. This will allow you to obtain an accurate grid reference for your record of the point feature, but not necessarily to work out its precise function.

Mounds and pits created by natural processes in woodlands which may be confused with archaeology include**:**

- Tree throw pits
- Landslips
- Water created features
- Animal burrows
- Tree stumps
- Glacial features

4 Analysis and interpretation of findings

No survey of a woodland is ever likely to cover the whole of the woodland except in the case of very small woods. When we are comparing numbers of indicators in woodlands therefore we are generally not comparing the total richness of AWIs, but a measure of that richness. The richness of ancient woodland indicators is affected by the survey approach used. The method used to survey a woodland, the levels of effort put into surveying a woodland and which parts of a woodland are surveyed will all affect the numbers of indicators identified. Whilst the total number of indicator species is a useful measure, it is important to recognise factors which may have affected this number.

Ancient Woodland Indicators are not strictly Ancient Woodland Indicators. Rather, they perform this function because ancient woods tend to have characteristics which may be only loosely linked to history individually, but collectively, make these species more common in ancient woods. They do, as Hermy et al (1999) have shown for continental species and Kirby (1988) has for British ones, tend to have a distinct set of characters; i.e. they are more shade tolerant, less competitive etc. so that they are worth classing as woodland specialists. Ancient Woodland indicator species can therefore provide useful information about the current ecology and history of a woodland but should be used in combination with other field evidence and archive evidence to interpret the current status and history of a woodland.

In analysis of the results of field surveys, multiple pieces of evidence should be used. Ancient Woodland Indicators, in combination with evidence from working and veteran trees and woodland archaeology can provide the maximum amount of evidence regarding a woodlands history and its potential status as an Ancient woodland site.

The value of an Ancient Woodland or woodland generally is not just in its indicators, its value may be in the biodiversity it supports, rare species and or habitats, the heritage and archaeology it contains, its cultural value etc. In making decisions which affect woodland all such values need to be considered.

In determining whether a site is an Ancient Woodland, ancient woodland indicator species alone should not be used to make a determination. Field evidence should be considered alongside archive evidence in making such a determination.

In analyzing the results of any field surveys there needs to be recognition of any limitations on the data collected, e.g. time of year of survey, coverage of survey etc. Any surveys which are undertaken outside the optimal survey periods need to be considered to be provisional.

Ideally several surveys at different times of the year, using relevant qualified ad experienced individuals should be undertaken. Where this is not possible this needs to be recognised in the analysis.

5 Main recommendations for field surveys – checklist

In assessing your own ancient woodland survey or a survey undertaken by someone else you may find the following checklist of use:

Ideally several types of surveys of a woodland should be undertaken?	
Have the surveys been undertaken at the optimal times of the year?	
Has the whole woodland been surveyed, including its perimeter and all habitats and geographical features?	
Do the surveyors have appropriate expertise in the surveys undertaken?	
Has training been provided for less expert surveyors?	
Have survey limitations been recognised? This may include: sub optimal survey periods, failure to survey the whole site etc.	
Have indicator species been searched for at least twice?	
Has a relevant recognised local list of indicator species been used?	
Have other species, beyond indicators, been surveyed and their results included in the analysis?	
Does the analysis recognise that indicators just indicate ancient woodland and are not necessarily the valuable features of an ancient woodland?	
Has the location and abundance of indicators been mapped and analysed?	
Has the survey looked at trees and woodland structure?	
Does the report analyse the worked and veteran trees which have been found?	
Does the survey cover woodland archaeology?	
Has the woodland archaeology survey looked at living archaeology (i.e trees) and surface features?	
Has the field survey been supported by appropriate archive surveys?	
Have previous site records (species and archaeology) been obtained and analysed?	
If the report makes any conclusions regarding the potential status of the site as an ancient woodland – does it explain and justify the evidence used to reach that conclusion?	
Have the results of the survey been used to evaluate the current value/status of the site?	

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Appendix 1 Ancient Woodland Indicator Lists for Traditional Counties

Please note that some lists cover several counties, over cover just part of a county.

County	AWI List Details	Available from (where known)
Bedfordshire		Bedfordshire & Luton County Wildlife Selection Guidelines Jan 2009
Berkshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Buckinghamshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Cambridgeshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Cambridgeshire		Cambridgeshire County Wildlife Site Selection Criteria Version 4.3 2006
Cheshire		
Cornwall	K. Kirby 2004 list	Rose, F. The Wildflower Key
Cumberland		
Derbyshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Devon	K. Kirby 2004 list	Rose, F. The Wildflower Key
Devon	S. Whild et al 2003	Shropshire Botanical Society Newsletter Spring 2003
Dorset	K. Kirby 2004 list	Rose, F. The Wildflower Key
Durham	K. Kirby 2004 list	Rose, F. The Wildflower Key
Essex	K. Kirby 2004 list	Rose, F. The Wildflower Key
Gloucestershire		
Hampshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Herefordshire		
Hertfordshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Huntingdonshire		
Kent		
Lancashire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Leicestershire		
Rutland		
Lincolnshire	G F Peterken 2000	On line at www.lincsbiodiversity.org.uk/docs/LWS
Middlesex	K. Kirby 2004 list	Rose, F. The Wildflower Key
Norfolk	K. Kirby 2004 list	Rose, F. The Wildflower Key
Northamptonshire		
Northumberland	K. Kirby 2004 list	Rose, F. The Wildflower Key
Nottinghamshire		Summary of National Vegetation Classification woodland descriptions Whitbread, A. M. and Kirby, K.J. 1992
Oxfordshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
North Oxfordshire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Shropshire	S. Whild et al 2003	Shropshire Botanical Society Newsletter Spring 2003
Somerset	K. Kirby 2004 list	Rose, F. The Wildflower Key
Avon/Somerset/South Gloucestershire	K. Kirby 2004 list	Rose, F. The Wildflower Key
Staffordshire		
Suffolk	K. Kirby 2004 list	Rose, F. The Wildflower Key
Surrey	K. Kirby 2004 list	Rose, F. The Wildflower Key

Sussex	K. Kirby 2004 list	Rose, F. The Wildflower Key
East Sussex	S. Peay 1984	Weald Ancient Woodland Survey 2006
Warwickshire		
Westmorland		
Wiltshire	K. Kirby 2004	Rose, F. The Wildflower Key
Worcestershire	K. Kirby 2004	Rose, F. The Wildflower Key
West Yorkshire		
North Yorkshire	R.Gulliver 1995	Ecological Issues undated Online at: www.forestry.gov.uk/pdf/Nympart2.pdf/$FILE/Nympart2.pdf
North Yorkshire		Guidelines for Site Selection. N. Yorkshire SINC Panel 2002
South Yorkshire	M. Jones 1987	
South Yorkshire	M. Jones 1995	Jones, M. Rotherham's Woodland Heritage
Wales		
Anglesey/Sir Fon	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Brecknockshire/Sir Frycheiniog	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Caernafonshire/Sir Caernafon	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Carmarthenshire/Sir Gaerfyrddin	K. Kirby 2004	Rose, F. The Wildflower Key
Cardiganshire/Ceredigion	Castle et al 2008 West Wales list	Countryside Council for Wales. Contract Science Report No. 819
Denbighshire/Sir Ddinbych	Castle et al 2008 North West Wales list	Countryside Council for Wales. Contract Science Report No. 819
Flintshire/Sir Fflint	Castle et al 2008 North West Wales list	Countryside Council for Wales. Contract Science Report No. 819
Glamorgan/Morgannwg	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Merioneth/Meirionnydd	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Monmouthshire/ Sir Fynwy	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Montgomeryshire/Sir Drefaldwyn	G. Castle, J. Latham & R. Mileto 2008	Countryside Council for Wales. Contract Science Report No. 819
Pembrokeshire/Sir Benfro	Castle et al 2008 West Wales list	Countryside Council for Wales. Contract Science Report No. 819
Radnorshire/Sir Faesyfed	G. Castle, J. Latham & R.	Countryside Council for Wales. Contract Science Report No. 819

	Mileto 2008	
Scotland		
Aberdeenshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Angus/Forfarshire *	Tidswell	Scottish Woodland Plant Species. Unpublished list from Scottish National Heritage
Argyllshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Ayrshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Banffshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Berwickshire *	Badenoch 2006	Ancient Woodland Indicators in Scotland. Unpublished species list
Buteshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Cromartyshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Caithness	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Clackmannanshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Dumfriesshire *	Badenoch 2006	Ancient Woodland Indicators in Scotland. Unpublished species list
Dunbartonshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
East Lothian *	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Fife	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Inverness-shire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Kincardineshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Kinross-shire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Kirkcudbrightshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Lanarkshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Midlothian *	Crowther 2006 Ray, D. & Moseley, D. 2007 Badenoch 2006	Using shade tolerant plants to identify broadleaved lowland ancient woodland in Midlothian. Edinburgh Natural History Society Journal 2006. pp 17-19.
Morayshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Nairnshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009

Orkney	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Peeblesshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Perthshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Renfrewshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Ross shire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Roxburghshire *	Badenoch 2006	Ancient Woodland Indicators in Scotland. Unpublished species list
Selkirkshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Shetland	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Stirlingshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Sutherland	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
West Lothian/Linlithgowshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
Wigtownshire	C. L. Crawford 2006	Scottish Forestry Vol. 63 No. 1 2009
All Scotland *	Tidswell 1993	Scottish Woodland Plant Species. Unpublished list from Scottish National Heritage
Northern Ireland and counties*	Woodland Trust 2007	Back on the Map. An inventory of Ancient & Long-established woodland for Northern Ireland. Preliminary report.
Isle of Man *	A. Dubbledam undated	Isle of Man Wildlife Trust
North & Central Europe *	Hermy, M et al 1999	An ecological comparison between ancient and other forest plant species of Europe, and the implications for forest research. Biological Conservation 91. pp9-22.

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