

A review of the revision of the Ancient Woodland Inventory in the South East

Natural England Research Report NERR042

A review of the revision of the Ancient Woodland Inventory in the South East

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Natural England



Published on 04 August 2011

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ISSN 1754-1956

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Project details

This report results from research commissioned by Natural England in order to review the revision of the Ancient Woodland Inventory in the South East. The work was undertaken under Natural England by the following staff: Patrick McKernan and Emma Goldberg.

A summary of the findings covered by this report, as well as Natural England's views on this research, can be found within Natural England Research Information Note RIN042 – A review of the revision of the Ancient Woodland Inventory in the South East.

This report should be cited as:

MCKERNAN, P. & GOLDBERG, E. 2011. A review of the revision of the Ancient Woodland Inventory in the South East. *Natural England Research Reports, Number 042*.

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Acknowledgements

The project to revise the Ancient Woodland Inventory in the South East has been assisted by the help, support and advice of a number of people whose contribution to the survey is greatly appreciated:

- Alan Betts, Regional Director (South East), Forestry Commission
- Sally Marsh, Director, High Weald AONB Unit
- Henri Brocklebank (Record Centre Manager), Helen Burgess, Charles Roper, Penny Green and Andrew Lawson at Sussex Biodiversity Record Centre
- Alistair Kirk, Records Centre Manager, Surrey Biodiversity Information Centre
- Hannah Cook (Records Centre Manager), Judith Church and David Giffen at the Kent & Medway Biological Records Centre
- Nicky Court, Manager, Hampshire Biodiversity Information Centre
- Gavin Bird, Oxfordshire Records Centre Manager, Thames Valley Environmental Records Centre
- Dr Keith Kirby, Forestry and Woodland Officer, Natural England
- Dr Tony Whitbread, Director, Sussex Wildlife Trust
- Dr Nicola Bannister, Independent Landscape Archaeologist
- Nick Heasman, Hampshire Area Manager, South Downs National Park Authority
- Kate Ryland of Dolphin Ecological Services

Forestry Commission foreword

The Forestry Commission works to ensure the protection and sustainable management of our woodlands. Ancient woodlands in particular are exceptionally rich in wildlife, and often contain important archaeological and heritage features relating to their past management. The appropriate management and protection of these sites is a key concern for the Forestry Commission, particularly in the heavily wooded South East which contains some 40% of England's ancient woodland resource.

Ancient woodlands are widely recognised as being irreplaceable habitats, but many are not protected through designation. Local authorities have a key role to play in the protection of this unique resource through the planning process. This role was strengthened by the publication of Planning Policy Statement 9, which includes a requirement for local authorities to identify any areas of ancient woodland that do not have statutory protection. The Forestry Commission recognises that this is a complex and potentially time-consuming task and has therefore provided both funding and support for the revision of the Ancient Woodland Inventory in the South East since the first survey was piloted in Wealden district in 2004.

This project has resulted from a strong partnership between local authorities, Natural England, AONBs, the Forestry Commission and many other partners. The Forestry Commission believes that such partnerships provide an important means for increasing the understanding, protection and sustainable management of our historic ancient woodlands.

Alan Betts
Regional Director
South East England Conservancy
Forestry Commission

Summary

This report summarises work to date on an ongoing project in the South East of England which has been updating the Ancient Woodland Inventory. The project produces a complete revision of the inventory, but also for the first time, includes woods under two hectares. The result is a net gain of ancient woodland, although sites have been removed from the inventory either because woods have been destroyed or through validation of the dataset.

Areas where the survey has been completed include Wealden district, Hastings borough, and Lewes and Rother districts in East Sussex, Tunbridge Wells, Ashford, and Tonbridge and Malling boroughs in Kent, Brighton and Hove, and the counties of West Sussex and Surrey.

The revision to the inventory is ongoing in Canterbury, Maidstone and Sevenoaks districts in Kent; the Chilterns AONB and surrounding districts, Eastbourne borough in East Sussex, and in Hampshire (focussing on the South Downs National Park area).

The survey in the South East has provided a detailed and thorough revision of the Ancient Woodland Inventory, and has secured considerable external funding and support to achieve its aims. The overall success of the project has been its wide partnership engagement, and the high degree of accuracy with which it has identified and mapped ancient woodlands. The survey's thorough methodology, with the use of both desk-based and field work, and digital mapping technology, means that the project represents the most complete and detailed update of the inventory yet undertaken at the regional scale.

The revised inventory has also enabled a better assessment of the extent and quality of the ancient woodland resource to be made, and has ensured that planning decisions affecting this habitat can be made on the basis of a robust evidence base. The survey continues in the South East, with the overall aim of extending the work into the remaining areas of Hampshire, Kent, and other parts of the region. In the rest of the country, projects of this nature and at this standard would be welcomed by Natural England, especially where smaller areas of woodland make an important contribution to the landscape.

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1 Introduction

- 1.1 Ancient woodland is defined as woodland that has been in continuous existence since at least 1600 AD (Spencer and Kirby 1992). An inventory of ancient woodland was first initiated in 1981 by the Nature Conservancy Council (a predecessor to Natural England), but only included woodlands greater than two hectares.
- 1.2 In 2004, a pilot project was set up to revise the Ancient Woodland Inventory (AWI) in Wealden district in East Sussex. The project utilised computer mapping technology and targeted field surveys to produce a complete revision of the inventory, including, for the first time, woodlands less than two hectares. The success of the project led to this approach being undertaken across much of the South East (Westaway 2006), England's most wooded region (Natural England 2008). For the purposes of this report, 'South East' refers to the English region, comprising the counties of Kent, Sussex, Surrey, Hampshire and the Isle of Wight, Berkshire, Buckinghamshire, and Oxfordshire.
- 1.3 At the time of publication, the project has completed the revision of the inventory in Surrey and almost all of Sussex, and is undertaking surveys in the Chilterns, Kent, and Hampshire.
- 1.4 This report summarises the results from the first ten surveys, in Sussex, Kent and Surrey from 2004 to 2011. As well as providing the background to the project and its methodology, the report discusses the benefits of the work, with particular reference to how the ancient woodland inventory is now being used, and considers whether these benefits justify applying similar revisions across the country.

2 The original Ancient Woodland Inventory

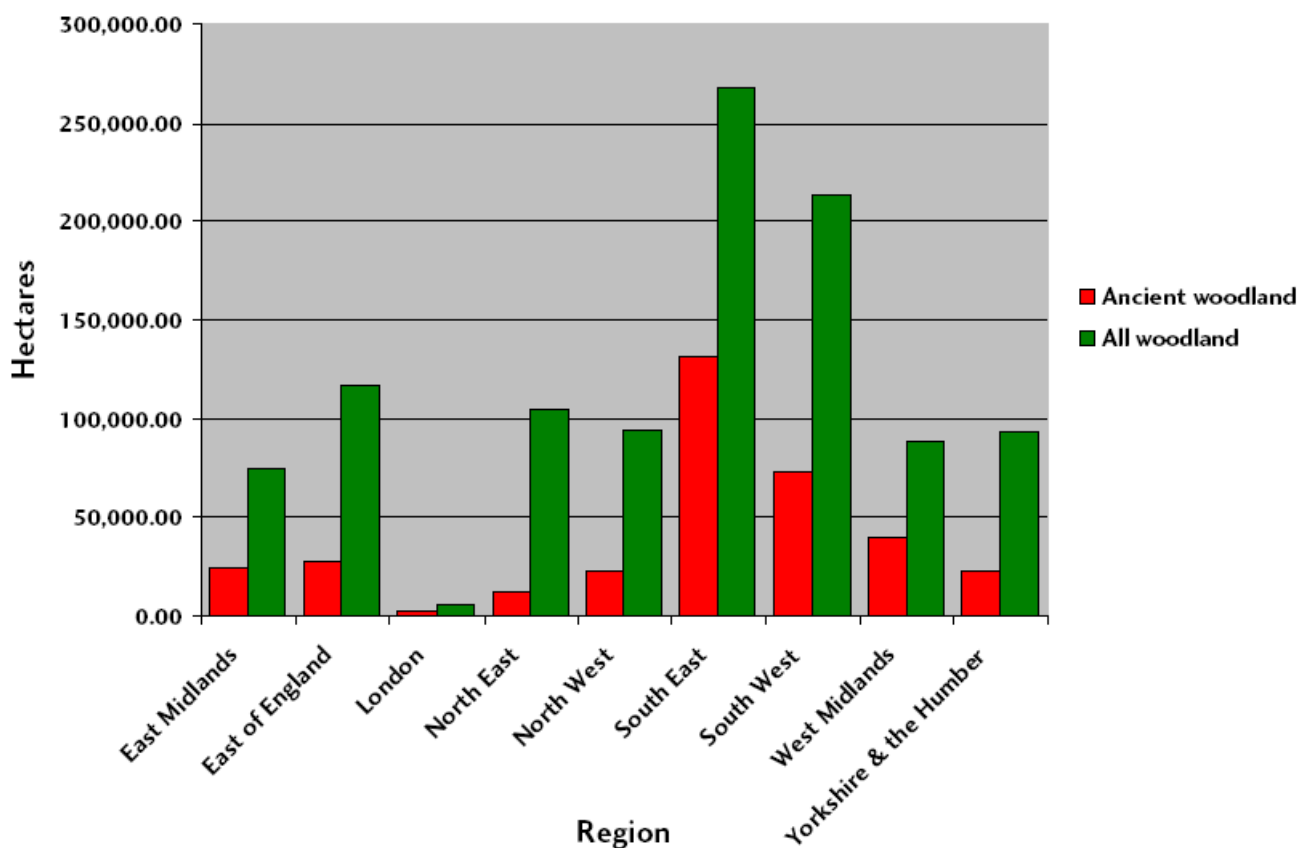
- 2.1 The first ancient woodland inventories were compiled by the Nature Conservancy Council on a county basis between 1981 and 1992, with further revisions between 1995 and 1999. Originally, all of the county inventories were only available as printed maps, but between 1998 and 2000 they were digitally mapped (digitized) by the Forestry Commission.
- 2.2 This first digitization is the electronic version that most resembles the original printed inventories, which have a published methodology, although it does include some changes made since the paper versions were produced. For the purposes of the South East survey, a comparison is made in the final reports between the revised inventory and the digitized inventory which became available in 2000.
- 2.3 The digital dataset produced in 2000 was subsequently updated on a case-by-case basis by English Nature (now part of Natural England), the successor to the Nature Conservancy Council, and is now held and managed by Natural England. In 2005, the national inventory was also aligned with Ordnance Survey's MasterMap in order to make it compatible with other national datasets.
- 2.4 The original methodology used for the first Ancient Woodland Inventories was based on one developed in Norfolk (Goodfellow and Peterken 1981), which only identified woodlands over two hectares (Spencer and Kirby 1992). Computer-based digital mapping was not widely available as a tool at this time, and the mapping for the inventories, by hand, was a laborious process. As a result, the benefits of looking at woodlands below two hectares was not considered sufficient to merit the additional effort required to map them.

3 The inventory and ancient woodland policy and protection

- 3.1 The Ancient Woodland Inventory has become an important tool for policy makers and planners (Goldberg et al. 2007). Although ancient woodland may be a feature of statutorily designated sites, it is not in itself a statutory designation. However, ancient woodland is given considerable protection through the planning process. In particular, Planning Policy Statement 9 (PPS9) on biodiversity and geological conservation (ODPM 2005) includes guidance to local authorities on protecting ancient woodland from damaging development.
- 3.2 PPS9 requires local planning authorities to 'identify any areas of ancient woodland that do not have statutory protection.' PPS9 does not state a minimum size threshold for ancient woodland, so the absence of woodlands below two hectares on the inventory means that it is insufficient to meet the needs of local planning authorities. As well as supporting planning casework, the revised inventory also contributes towards the evidence base for Local Development Documents, and helps secure baseline information for sustainability appraisals. This is of particular relevance in the heavily wooded South East, where the need for accurate information on ancient woodland extent and distribution has been a key reason behind local authorities supporting the inventory revision.
- 3.3 The importance of ancient woodland has also been increasingly recognised in forestry policy. The 'Keepers of Time' (Forestry Commission/ Defra 2005) policy statement set out a number of strategic objectives for the protection and enhancement of the special wildlife and heritage values of ancient woodlands. Keepers of Time marked a radical change in emphasis for forestry in England, placing ancient and native woodland at the heart of forestry policy. Its aims (reflecting those in the Biodiversity Action Plans) include encouraging the restoration to native broadleaves of plantations on ancient woodland sites (Goldberg 2003).

4 Rationale for and aims of the revision project

- 4.1 The South East is England's most wooded region (see Figure 1), and contains some 40% of the ancient woodland resource in England (South East Forestry Framework Steering Group, 2004). The extent of woodland in the region, and the absence of small woods in the Ancient Woodland Inventory were important factors in the decision to undertake the revision in the South East. Another important consideration was the need to address the inaccuracies in the original inventory arising from the technical limitations of the mapping process. Since the original inventories were produced, the availability of Geographic Information Systems (GIS) for digital mapping, as well as access to a wide range of digitally mapped historic data sources, have enabled ancient woodland to be identified and mapped with far greater accuracy.
- 4.2 Each survey works closely with local authorities and other partners, targeting survey work to areas of strategic planning need. Ancient woodlands, including those below two hectares, are added where the evidence supports their inclusion, but in addition, sites on the existing inventory are also subjected to a systematic review through examining multiple evidence sources. Many of these (such as tithe maps) were not available at the time the original inventories were produced and have been obtained and digitized especially for the purpose of revising the inventory.
- 4.3 Overall, the aims of the survey are:
- To carry out a complete revision of the Ancient Woodland Inventory in the South East, including woodlands under two hectares for the first time.
 - To provide a robust evidence base for informing planning and environmental decision making.
 - To help identify threats to the resource, and increase the understanding and awareness of the ecological and cultural importance of ancient woodlands.



(Based on the National Inventory of Woodland and Trees [Forestry Commission, 2000] and the Ancient Woodland Inventory).

Figure 1 Woodland cover by region in England

The extent of the survey

- 4.4 The Ancient Woodland Inventory revision in the South East was piloted in Wealden district. This project, which started in 2004, was a partnership between the local authority, Wealden District Council, and a wide range of environmental bodies, including English Nature (now replaced by Natural England), the Forestry Commission, the High Weald Area of Outstanding Natural Beauty (AONB) Unit, Sussex Wildlife Trust, and the Woodland Trust.
- 4.5 The pilot was considered successful and the survey was extended to neighbouring districts, initially those intersecting the High Weald AONB, but then other areas across the South East. Within Sussex and Kent, the work has been undertaken under the umbrella title of the Weald and Downs Ancient Woodland Survey.
- 4.6 In terms of county coverage, the revision, at the time of publication, has been completed in West Sussex and Surrey, and East Sussex is shortly to be finalised. About a third of Kent has so far been completed, and the survey in this county is continuing, along with ongoing surveys in the Chilterns and Hampshire. The aim is to continue the survey to complete Kent and Hampshire and possibly extend further. The progress of the survey to June 2011 across the region is shown in Table 1 and Figure 2.

Table 1 Progress on revision of the inventories in the South East to June 2011

Survey area (in order of start date)	County	Start date	End date
Wealden district	East Sussex	February 2004	March 2006
Mid Sussex district	West Sussex	October 2005	February 2007
Tunbridge Wells borough	Kent	October 2006	October 2007
Ashford borough	Kent	November 2006	March 2009
West Sussex (county, with minor revisions to Mid Sussex, originally completed 2007) and Brighton and Hove	West Sussex and Brighton and Hove unitary authority	October 2007	January 2010
Tonbridge and Malling borough	Kent	November 2007	March 2010
Hastings borough	East Sussex	November 2007	April 2010
Rother district	East Sussex	November 2007	October 2010
Surrey (county)	Surrey	January 2009	June 2011
Lewes district	East Sussex	June 2009	November 2010
Canterbury, Maidstone and Sevenoaks districts	Kent	April 2010	August 2012
Chilterns AONB and surrounding districts	Buckinghamshire and parts of Bedfordshire, Hertfordshire and Oxfordshire	May 2010	May 2012
Eastbourne borough	East Sussex	August 2010	August 2011
Hampshire (focus on South Downs National Park area)	Hampshire	January 2011	November 2011

Note that the length of each survey differed, depending on whether it was carried out full or part time, or with one or more surveyors.

Survey partnerships

- 4.7 Each ancient woodland survey is funded and supported by a range of partners, including Natural England, the Forestry Commission, local authorities, county councils, AONBs, the South Downs National Park Authority, wildlife trusts, the Woodland Trust, and Environmental Records Centres. Typically, local authorities and county councils together provide the greatest part of the funding contributions per project (see example in Table 3, below) while Natural England and the Forestry Commission have been continuous funding partners for each survey. A steering group comprising representatives of the funding bodies advises each project.

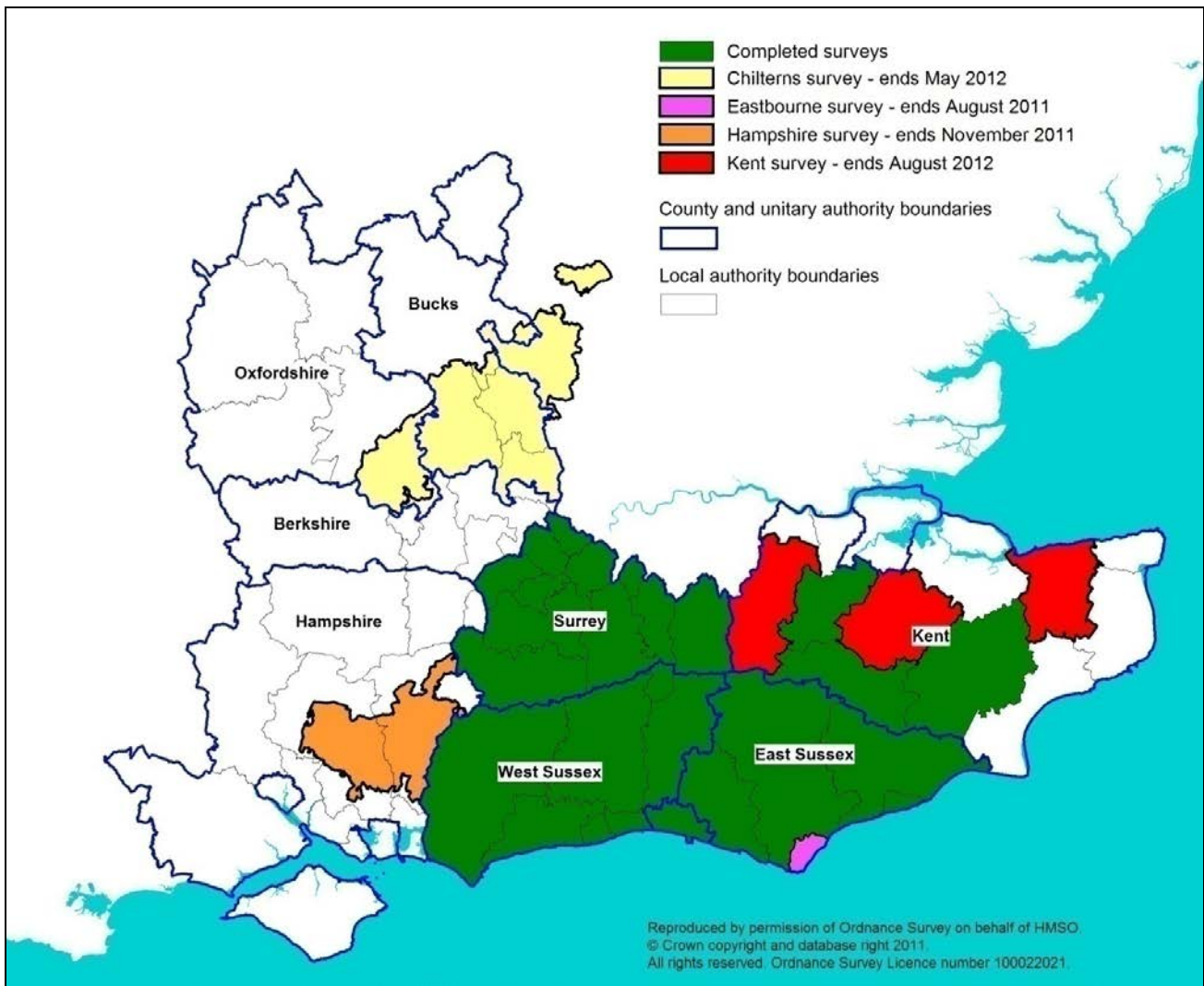


Figure 2 Survey progress in the South East up to June 2011

4.8 Each survey is hosted by either an AONB, or an Environmental Records Centre, as shown in Table 2, below. The High Weald AONB in particular has been a core supporter of the work since 2004, and continues to host the Weald and Downs Ancient Woodland Survey in East Sussex and Kent.

Table 2 Hosting organisation for the ancient woodland surveys

Surveys	Host
Chilterns AONB and surrounding districts	Chilterns Conservation Board/ Thames Valley Environmental Records Centre
East Sussex and Kent	High Weald AONB
Hampshire	Hampshire Biodiversity Information Centre
Surrey	Surrey Biodiversity Information Centre
West Sussex, Brighton and Hove	Sussex Biodiversity Record Centre

Project funding

4.9 The costs for each survey are based on the employment and hosting of an ancient woodland survey officer, the purchase of historic maps that may be needed, and any supplementary contracts, such as additional field survey work or the entering of field survey data into databases. As an example, the total cost of the survey for the county of Surrey, a project undertaken from January 2009 to June 2011, was £120,000. The funding for the project was provided by the partners shown in Table 3. In addition, Surrey Biodiversity Information Centre provided in-kind contributions through hosting the project.

Table 3 Funding contributions for the Surrey ancient woodland survey

Funding partner	% contribution (rounded)
Local authorities	48
Surrey County Council	25
Natural England	17
Surrey Hills AONB	4
Surrey Wildlife Trust	3
Forestry Commission	3
Total	100

5 Methods

Methodology for the original Ancient Woodland Inventory

- 5.1 The methodology for the original Ancient Woodland Inventory involved selecting candidate sites over two hectares shown on the OS 1:25 000 1st Series maps, surveyed between 1880 and 1960. The areas of semi-natural, replanted and cleared woodland were measured to the nearest hectare using a dot grid overlay (or romer) on flat projections of the maps. For each site selected, historical, cartographical and field survey evidence was collected. Likely areas of ancient woodland were identified on the basis of their presence on the early 19th century OS 1st Edition maps along with various map features indicating ancient woodland including the woodland's name, or its situation in the landscape.
- 5.2 Other maps, especially the large-scale county maps of the 18th and early 19th centuries, were used as a guide where available. Some of these maps, however, are diagrammatic, or may only have patchy distribution of woods, for example where they appear as landmarks. Another difficulty is that in hilly areas, the hachuring to depict contours on some historic maps may obscure woodland. Sites absent from any of the older map series were deleted from the inventory only where there was a clearly depicted alternative land use on an historical map, or supporting evidence for a recent origin from other sources (Spencer and Kirby 1992).

The methodology for the Ancient Woodland Inventory revision in the South East

- 5.3 The Ancient Woodland Inventory revision in the South East involves a complete and systematic rebuilding of the Ancient Woodland Inventory dataset. The survey draws on the established intelligence contained in the original inventory (and its subsequent amendments) but also reappraises this information by examining a range of additional evidence sources. Once completed, each revision is added to the national Ancient Woodland Inventory and replaces the previously mapped ancient woodland data for that area.
- 5.4 The detailed methodology for each survey is provided in its final report (see section 6.6), however, the following sections provide an overview of the survey methodology developed by and used for the South East inventory revision.

Software

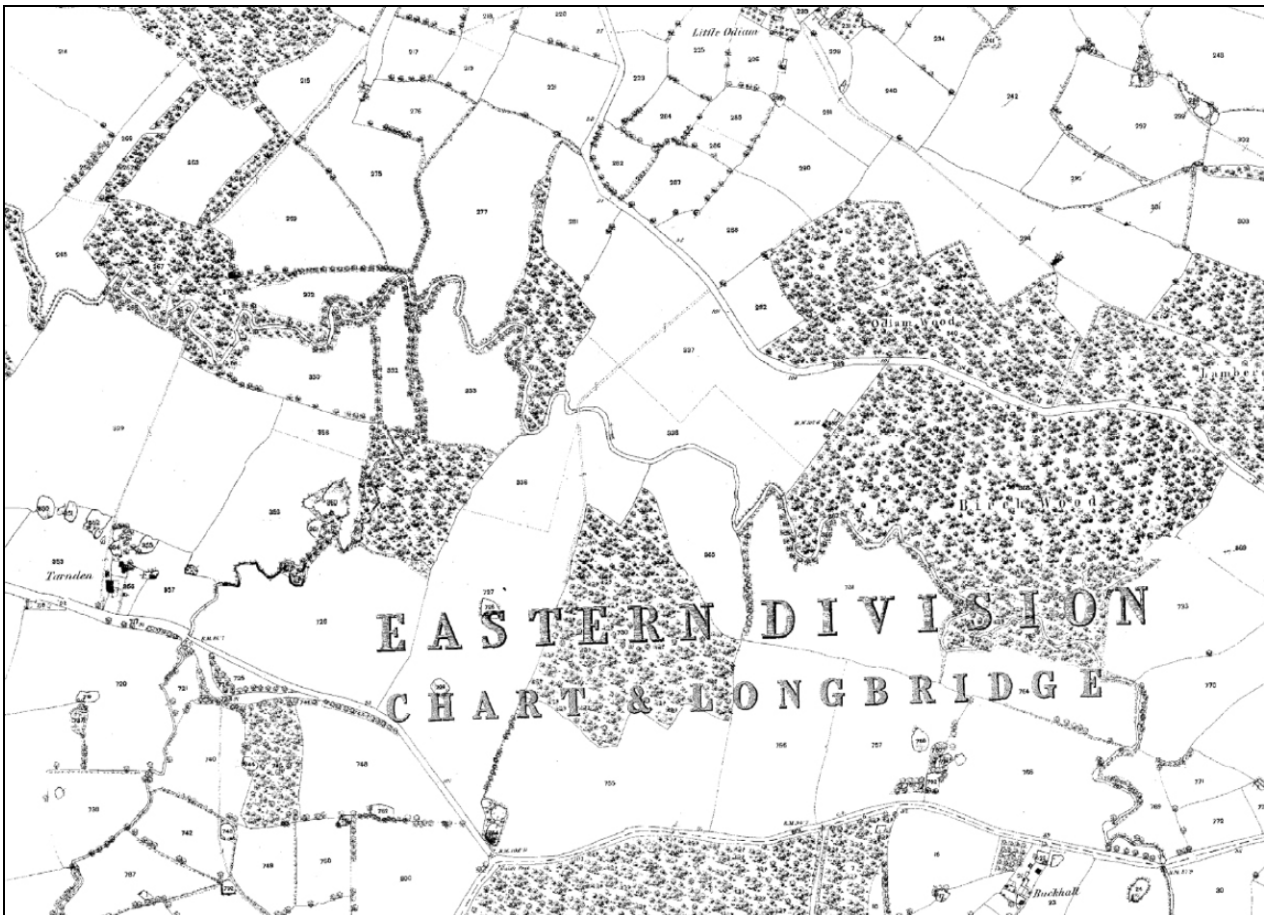
- 5.5 The mapping of woodland and much of the map research underpinning the final datasets are carried out using GIS using ArcMap software (ESRI 2009). This allows the relatively rapid comparison and combination of a variety of spatial data sources. The resulting GIS database can be linked to external databases which hold more detailed site survey and archive data. Data accrued from the woodland site surveys is held in a Recorder 6 database (JNCC 2007) from which a report outlining the main survey findings can be generated for each site.

Procedure

- 5.6 The approach to mapping ancient woodland in the South East inventory revision is deductive. First, a relatively large set of woods is captured from highly accurate and reliable, but relatively recent map evidence. This 'indicative ancient woodland dataset' is then sequentially refined and filtered by interpretation of further sources of evidence - historical, ecological and archaeological. The procedure for revising the ancient woodland inventory has three interlinked elements:
- a) Desk-based mapping – capture of the dataset.
 - b) Research using historical maps and documents – refinement of the dataset.
 - c) Field survey work – refinement of the dataset.

Desk-based mapping - capture of the dataset

- 5.7 The initial mapping stage identifies a subset of the present-day woodland resource which can clearly be demonstrated to be long-established woodland. Woods of late 19th century and 20th century origin are thereby eliminated from the search. This capture of potentially ancient woodland sites employs two key map resources:
- The current Ordnance Survey MasterMap Topographic Layer displayed over recent high-resolution aerial photographs.
 - Ordnance Survey First Edition County Series 25 inch to 1 mile maps: produced in the mid-to late-19th century (known to historians as 'Epoch 1'). For further information see: <http://www.bl.uk/reshelp/findhelprestype/maps/ordsurmapgb/lsosgbmaps.html>
- 5.8 The comparison and integration of these sources provides a robust method for the accurate capture of historic woodland boundaries, including small woods, as a first stage in revising the Ancient Woodland Inventory. Working systematically through a grid of 500m x 500m cells covering the survey area, all MasterMap polygons which are visibly woodland on the aerial photographs are compared with the Epoch 1 maps in order to identify those areas of woodland common to both.
- 5.9 Epoch 1 maps are very detailed and contain a wealth of information about the woods under review beyond that of simple presence or absence (see Figure 3, below). It is also possible to discern from these maps which woods were enclosed and which were not, as well as to see features within woods such as buildings and enclosures. Because of the high level of accuracy of this source, absence of a wood on these maps is considered highly significant. However, whilst more recent woods can sometimes be identified as regularly shaped enclosures or having map symbols that indicate a previous non-woodland use or recent planting, Epoch 1 maps do not always give grounds for elimination of such sites.



produced for the county 1858-73, showing the woods and shaws of a valley of a tributary of the River Beult northwest of Bethersden.

Figure 3 Example of the Ordnance Survey First Edition County Series 25 inch to 1 mile map for Kent

Research using historical maps and documents

5.10 The next stage in the methodology consists of checking the indicative dataset against the evidence of a range of other historical map sources held in both digital form and in traditional archives. The main historic datasets used for the survey are described below.

Tithe maps (produced c.1830s to 1840s)

5.11 Tithe maps and their accompanying schedules record the state of cultivation of every parcel of land in each tithe district. This information is an importance evidence source for the surveys. Examination of the Epoch 1 and MasterMap-derived polygons in the light of tithe map evidence often results in further edits to the dataset being made, for example where the tithe maps record all or part of a woodland as being a field at the time.

Ordnance Survey Drawings, 2 to 6 inches to 1 mile (1789 to c.1840s) prepared for the First Edition Ordnance Survey maps

5.12 The Ordnance Survey Drawings (see Figure 4 for an example) are the manuscript maps upon which the first fully triangulated large scale published maps of south-east England were based (Hodson and Campbell 1989). Particular attention was paid to rivers, roads, woods that could provide cover or obstruction, and the contours of hills. Given their widespread coverage, and relatively early date, they are an important data source for the surveys. However, absence of a wood from these maps cannot be taken as proof of a woodland not existing at the time they were produced. For instance, comparison with estate maps of similar age sometimes reveals the apparent omission of sizeable woodlands from the Ordnance Survey Drawings.

- 5.13 The experience of the survey seems to suggest that while enclosed woods containing significant timber would generally be accurately depicted, simple coppices (without standards) could be omitted. Similarly, where steep ground was occupied by woodland or scrub, the surveyors often placed priority on conveying the physical relief of the land above depiction of the vegetation cover. The suggestion has also been made that woods which had recently been cut were simply overlooked by the surveyors, or that they mistook recent woodland harvesting for conversion to agriculture (Hodson and Campbell 1989).
- 5.14 Where woodland is recorded on these maps, this is considered to be reliable and gives a strong indication of possible ancient woodland status when this is supported by the context of the site and evidence from other sources.



by Thomas Budgen, pen and ink on paper at 2" to 1 mile, produced 1798.

Figure 4 Example of an Ordnance Survey Drawing showing woodland near Ditchling Common in East Sussex

Other historic maps

- 5.15 While not comprehensive, examples of other sources of maps used in the survey include:
- Estate maps.
 - Andrews, Dury & Herbert's 'A topographical map of the county of Kent', 2 inches to a mile, 1769 (Andrews et al 1769).
 - Hasted's maps of the Hundreds of Kent (Hasted 1797).
 - Ordnance Survey First Edition, 1 inch to 1 mile, 1813.
 - Rocque's map of Surrey, 2 inches to 1 mile, c.1762 (Rocque 1762).
 - Yeakell & Gardner's map of Sussex, 2 inches to 1 mile, 1778 – 1783 (Yeakell and Gardner 1778-83).

Other evidence sources

- 5.16 The revision of the inventory in the South East is primarily a mapping exercise supported by research on historical maps and field survey, and evidence from these sources are given the

greatest weight. However, there are important additional factors which are brought into interpretations of woodland status during the decision-making process. These include:

Place names

- 5.17 Place names can be used, with caution, as a guide to help reconstruct the landscape (Brandon 2003). For example 'leah' or 'ley' refers to a woodland glade or clearing, 'den' to a woodland swine pasture and 'hyrst' or 'hurst' to a wood or a grove, especially one on a hill. Wood names can also help to identify non-ancient woods as non-ancient wood names are often readily obvious. 'The plantation' or 'The Grove', for example, may indicate more recently planted woodland, particularly where the site is associated with a large house and/or on cultivable land. However, a large degree of caution needs to be exercised because names change over time and 'The Plantation' might well occupy the site of a pre-existing wood (Isaac & Reid 1997).

Woodland shape and situation in the landscape

- 5.18 The shape or situation of a woodland can provide additional evidence that a woodland may be long-established. Larger ancient woodland sites often survive on parish boundaries or follow steep inaccessible topography, such as the slopes down to a gill or the land surrounding old iron extraction pits. In addition, the boundaries of intact older woodlands are rarely straight and often follow natural features such as streams. Again, caution needs to be applied, as surviving fragments of historically larger woods can often have straight margins where their modern boundaries have been altered by agricultural improvements.

Field survey work

- 5.19 Field surveys are carried out in the spring and summer months in order to facilitate the recording of ancient woodland indicator plants. The survey aim is to make an assessment of each site, recording the key information needed to aid in the identification of ancient woodland. Both biological and cultural heritage features are recorded, including information on plant species, site management, negative impacts, and archaeological features. For each survey, emphasis is placed on recording the following:
- A list of vascular plant species, particularly species characteristic of ancient woodland.
 - Living evidence relating to the past management of a wood, for example, coppice structure, old coppice stools, veteran trees or pollards.
 - Archaeological evidence relating to the past management of the site such as saw pits, charcoal hearths, drainage systems, old banks, mineral diggings, etc.
 - Physical features indicating a previous agricultural land use, such as ridge and furrow plough markings and lynchets.
 - Historical boundary features delineating the wood, such as wood banks, stubbed trees or outgrown laid hedges.
 - Current uses or factors causing disturbance or damage to the wood.
 - Structural and habitat diversity, presence of dead wood, and the presence of streams and ponds following natural courses and depressions.

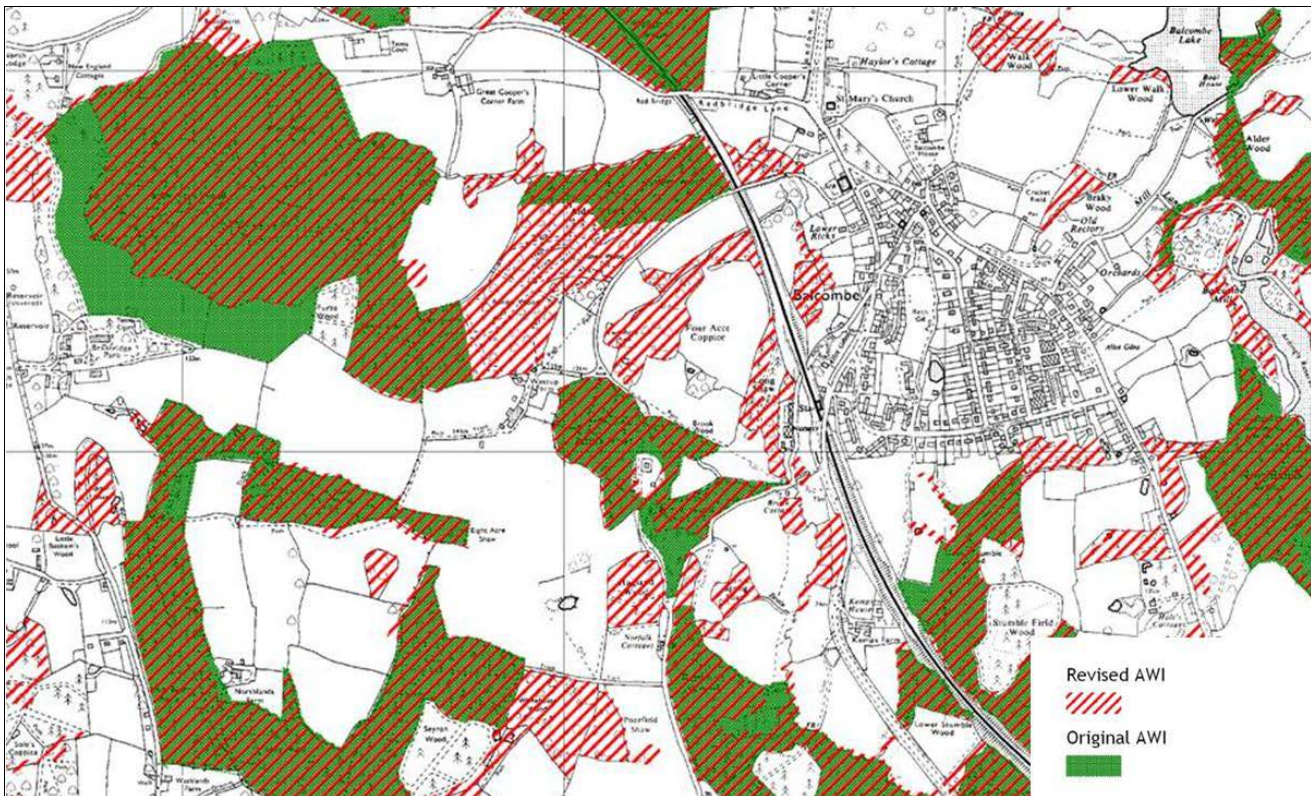
An example of the features recorded from the site surveys is provided in Appendix 1.

Minimum size of a wood to be included in the inventory revision

- 5.20 The lowest size of woodland polygon considered for inclusion in the revised inventory is generally 0.25 ha, making it directly comparable with the Forestry Commission's National Inventory of Woodland and Trees (Forestry Commission 2000). However, each wood is considered separately and factors such as the location and historical extent of the woodland mean that some woods under this size may be included.

6 Results

- 6.1 The inventory revision in the South East has resulted in a considerable net increase in the area of recorded ancient woodland. Areas were also removed from the original inventory, but these deletions were not only as a result of the conversion of ancient woodland to other land-uses since the original inventory was compiled. A combination of inaccuracies and imprecision in the initial mapping process, and misattribution of some woods or parts of woods in the original inventory were all factors that led to sites being refined or removed. Many areas that were removed were simply due to the increased accuracy of the mapping process refining woodland boundaries.
- 6.2 In the Wealden survey in East Sussex, the reason for the majority of the 1,167 hectares being removed from the original Inventory was due to inaccuracies in the initial mapping process and re-examination of the historic map evidence. 75% of the areas removed from the original inventory were shown to have another land use on the First Series OS maps, usually as fields or heath. Throughout the district, there was an actual loss of 250 hectares of ancient woodland, either through conversion to agricultural land, or through being lost to development (Westaway 2006).



This example is from Balcombe parish in West Sussex.

Figure 5 An illustration of how the revision process can change the area of ancient woodland in the inventory

- 6.3 The revised inventory (hatched in red) shows clear boundary changes to the original inventory (in green). The use of GIS, large scale maps and digital map data have allowed the boundaries of these woodlands to be drawn more precisely and accurately. The revised inventory here also shows the addition of several ancient woodlands not included on the original inventory.

Summary of area added to the inventory

- 6.4 In total, the South East revision at the time of publication has resulted in an additional 9,387 hectares being added to the Ancient Woodland Inventory, based on results from the first ten surveys, in Sussex, Kent, and Surrey. This represents an overall rise of 15.8% ancient woodland cover when comparing the revised and original inventories. The results of these surveys are shown in Table 4, below.
- 6.5 Only one survey, Brighton and Hove, saw a reduction in the area of ancient woodland, with the greatest increase in a single district being in Wealden, East Sussex, which saw an overall gain of 1,956 hectares of ancient woodland.

Table 4 Results from the first ten Ancient Woodland Inventory revisions in the South East

Survey area	County	Area recorded in original AWI *	Area recorded in revised AWI	Net area increase/loss	Ancient woodland area % increase
Wealden district	East Sussex	9,754	11,710	1,956	20.1
Tunbridge Wells borough	Kent	4,719	5,391	672	14.2
Ashford borough	Kent	5,801	6,155	354	6.1
West Sussex	West Sussex	17,634	21,375	3,741	21.2
Brighton & Hove	Unitary authority	95	94	-1	-1.0
Tonbridge & Malling borough	Kent	2,560	2,621	61	2.4
Rother district	East Sussex	7,595	8,055	460	6.1
Hastings district	East Sussex	128	145	17	13.3
Lewes district	East Sussex	1,019	1,156	137	13.4
Surrey	Surrey	9,944	11,935	1,991	20.0
Totals		59,249	68,637	9,388	15.8

All areas in hectares. Figures have been rounded.

* 'Original AWI' means here the first digitised version of the Ancient Woodland Inventory, 2000 (see section 2).

Survey reports

- 6.6 Reports for the surveys detailed in Table 5, below, have been published, and each contains full details of the survey methodology, results, and revised inventory maps. The published reports for all of these ancient woodland surveys except Lewes and Surrey can be downloaded from the High Weald AONB's website at:

<http://www.highweald.org/look-after/our-projects/weald-a-downs-ancient-woodland-survey.html>

The Lewes report can be downloaded from Lewes District Council's website at:

http://www.lewes.gov.uk/Files/plan_Lewes_ancient_woodland_survey_report.pdf

Sussex Biodiversity Record Centre also has a section of its website dedicated to the West Sussex survey, at:

<http://sxbrc.org.uk/projects/revised-ancient-woodland-inventory/>

Information on the Surrey survey can be found at:

<http://www.surreywildlifetrust.org/news/145>

Table 5 Publication dates for the Ancient Woodland Inventory revision reports

Survey	Report published
Wealden district, East Sussex	2006
Mid Sussex district, West Sussex	2007
Tunbridge Wells borough, Kent	2007
Ashford borough, Kent	2009
West Sussex	2010
Tonbridge and Malling borough, Kent	2010
Rother District, East Sussex	2010
Lewes district, East Sussex	2010
Hastings district, East Sussex	2010
Surrey	2011

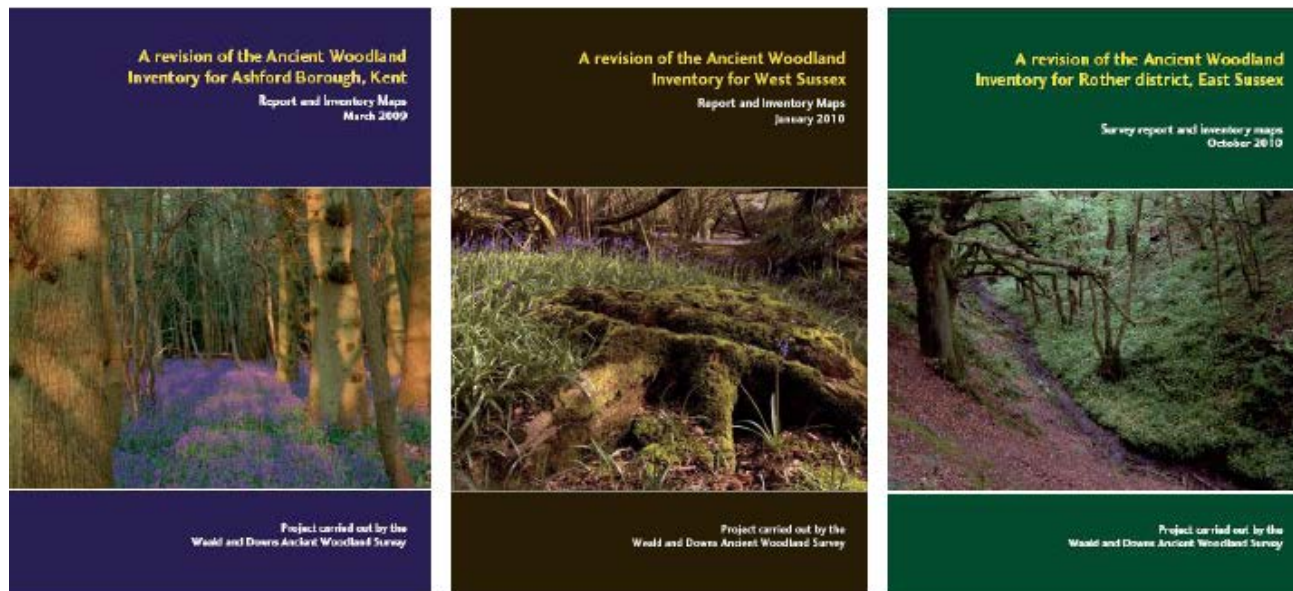


Figure 6 Examples of the ancient woodland survey reports

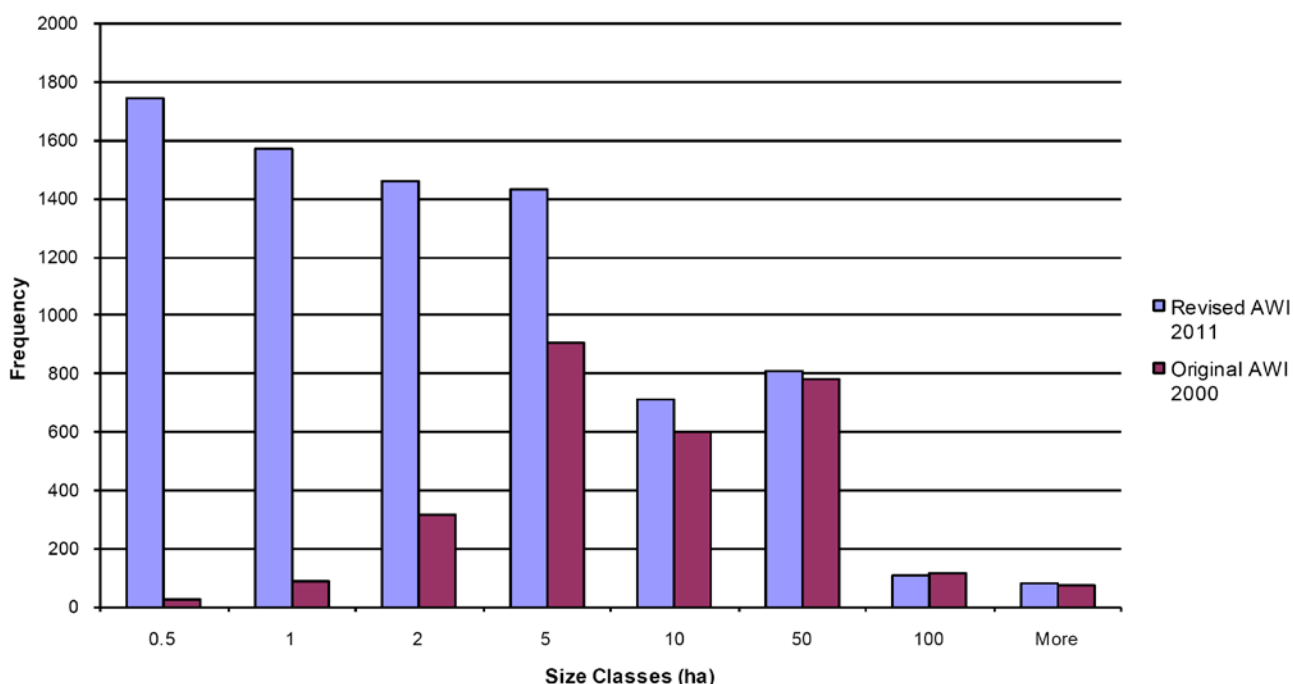
Field survey results

6.7 At the date of publication, the total area of woodland surveyed, including both ancient and secondary woodlands, is in excess of 6,000 hectares. As described in section 5.2.6, the field surveys record information on both biological and cultural heritage features. Although the surveys have generally targeted small woodlands, a systematic survey on this scale has not been undertaken in the South East before. Once the woodland survey data from all of the surveys have been aggregated and analysed, they will provide an invaluable source of information - increasing our understanding of woodland distribution, ecology, management, impacts on the resource, and the abundance and type of historical features.

Size distribution of ancient woodland

6.8 The Ancient Woodland Inventory revision in the South East has also resulted in better evidence of the size distribution of ancient woodland in the surveyed areas. Figure 7, below, provides a comparison between the size distribution of ancient woodlands in the original and revised inventories. The large increase in woodlands below two hectares reflects the size threshold of the original inventory (which excluded woodlands less than two hectares), but also provides a clear indication of the abundance of small ancient woodlands in the South East.

6.9 There has also been a notable increase in the frequency of woodlands up to five hectares in size, as well as increases up to the 50 hectare size class. These results demonstrate that the changes to the inventory are not confined to the addition of small woodlands alone; the inclusion of larger woodlands is likely to reflect the increased accuracy of ancient woodlands identification in the revised inventory work.



* Original AWI means here the first digitised version of the Ancient Woodland Inventory, 2000 (see section 2).

Figure 7 Histogram of size distribution of ancient woodland comparing the results of the South East Ancient Woodland Inventory (AWI) revision to the original AWI*

7 Discussion

- 7.1 The initial pilot survey in Wealden district, started in 2004, has expanded to become a project extending across a large part of the South East. By providing a complete revision of the inventory, and including small woodlands for the first time, the survey has ensured that the effects of development proposals are considered in the light of a robust evidence base. The survey has also raised awareness of, and enhanced the protection for ancient woodlands. The project has so far received significant funding and support from 31 local planning authorities and four county councils, reflecting the importance of the information for their strategic planning and casework support. Recognition of the importance of the project has also been provided through the presentation of a 'Green Apple' environmental award in 2008 to Mid Sussex District Council, the High Weald AONB, Natural England, and the Forestry Commission for the survey in Mid Sussex.

The value of small woodlands

- 7.2 As well as providing an improved evidence base, the revision has included for the time ancient woodlands below two hectares. In general, the conservation value of smaller woods is variable and dependent on a number of different factors. Small woods have less "interior" woodland community and greater woodland edge, relative to large woods, in addition to having fewer overall species under basic species-area relationships. However, ancient woods tend to contain more species than recent woods (Peterken and Game 1984), which holds for small woods as well as larger ones (Hill 2003).
- 7.3 The conversion of semi-natural woodland to plantation happened more quickly in larger woodlands (Peterken 1993), and thus small ancient woodlands can often retain a more semi-natural character than larger, commercially-managed sites. This effect was noted in the report of the Ashford (Kent) inventory revision (Sansum et al, 2009):

'Whilst roughly one third (or perhaps significantly more) of the larger areas of ancient woodland are under a planted crop, usually of non-native species, the majority of the small sites reviewed in this study retain ancient semi-natural woodland characteristics... the accurate mapping of this resource provides important opportunities for understanding and improving connectivity of semi-natural habitats and biodiversity at the landscape scale.'

- 7.4 The number of woodland species associated with small woods will reflect not only woodland management, but will also be dependent upon the surrounding landscape, including the effects of agricultural management, habitat fragmentation, and the proximity of development. The landscape context is also important in terms of connectivity between woodlands. In areas with a high density of woodland cover, such as the High Weald, small woodlands are typically not isolated habitats surrounded by intensive agriculture. Rather, they form an integral part of a complex mosaic of large and small woodlands, unimproved grassland and species-rich hedgerows. In this context, small ancient woodlands make a valuable contribution to habitat networks, as well as being irreplaceable habitats in their own right.

Planning and ancient woodland

- 7.5 The increasing protection for ancient woodland in the planning system, particularly through its specific inclusion in PPS 9, has arguably lessened the threat of ancient woodland loss to development. However, it has also meant that the Ancient Woodland Inventory has come under increasing scrutiny. This issue is well understood by local planning authorities in the South East, and the need for an improved evidence base to support planning decisions has been one of the principle reasons behind local authorities supporting the project.

- 7.6 The inclusion of small ancient woodlands in the Ancient Woodland Inventory as a result of this project will also help increase their protection through the planning process, their importance as irreplaceable natural assets being reflected in the absence of any size threshold in PPS9.
- 7.7 The importance of the survey in the South East has also been recognised in government policy documents. The companion guide to PPS9, Planning for Biodiversity and Geological Conservation – A Guide to Good Practice (ODPM, 2006) cited the survey in Wealden district as an example of best practice:

'PPS9 requires local planning authorities to identify areas of ancient woodland in their areas that do not have statutory protection (for example, as a SSSI). The Wealden Ancient Woodland Project demonstrates good practice on how to address this and local authorities should consider taking a similar approach to their area.'

- 7.8 The Action Plan for Keepers of Time (Defra/ Forestry Commission 2005) also recognised the importance of the survey, its action plan stating the need to continue the revision of the Ancient Woodland Inventory in the High Weald and apply the methodology more widely as applicable.

Four Acre Wood – an example of the use of the revised inventory in ancient woodland protection through the planning system

- 7.9 Four Acre Wood, an ancient woodland in West Sussex added to the inventory by the Mid Sussex survey, provides an example of the implications of the revision, as well as the level of scrutiny that can be placed on the inventory itself. The site was threatened by development proposals which were subject to a public inquiry (Asquith 2007). The inquiry considered, amongst other matters, whether the need for residential development outweighed the loss of the area of ancient woodland. This site had been allocated for development prior to its being identified as ancient woodland in the inventory revision.
- 7.10 In reaching his decision (Asquith 2007), the Inspector considered both the viability of the proposed scheme if the woodland were excluded from the development area (in effect, an economic test), and an ecological test when weighing up the requirements of PPS9 in relation to the effects of the proposed development on the area of ancient woodland. In his report, the Inspector concluded that Four Acre Wood:

'... is ancient woodland and is an ecologically important habitat which should be conserved. Up-to-date planning policy guidance in PPS 9 supports this... The need for and benefits of potential development in this location would not outweigh the loss of this habitat. I consider that these constitute relevant material considerations sufficient to outweigh the site's allocation for residential development within the Mid Sussex Local Plan.'

- 7.11 The inclusion of the site on the inventory had been challenged because there was evidence that part of the woodland had been through a period without tree cover. However, arguments led by the West Sussex County Ecologist and supported by Natural England (see Appendix 2) were successful in demonstrating that despite this open phase, the area could still be defined as ancient woodland. The inquiry decision has been seen as an important landmark in ancient woodland protection, and provides useful guidance for the interpretation of PPS9.

Natural England's ancient woodland Standing Advice

- 7.12 Development pressures are high in the South East, with a corresponding pressure on ancient woodland. To help guide planning decisions affecting this habitat, Natural England has produced ancient woodland Standing Advice for all local planning authorities in the region (Natural England 2011). Standing Advice is a material consideration in the determination of applications in the same way as a letter received from Natural England following consultation.

7.13 The Standing Advice provides guidance on ancient woodland policy, and protection of the habitat through Local Development Frameworks and development control, and advice on the decision-making process for local authorities when dealing with applications affecting ancient woodland.

Natural England's ancient woodland Standing Advice is available at:

www.naturalengland.org.uk/Images/standing-advice-ancient-woodland_tcm6-32633.pdf

Limitations of the inventory

7.14 The use of GIS has made the Ancient Woodland Inventory both more accurate and more accessible. However, the digitisation of the dataset is only as accurate as the source material upon which the digital mapping is based. A limitation of digitising the original paper-based inventories was that they were produced to a far lesser degree of accuracy than can be achieved with modern GIS techniques. Consequently, the digital version of the original inventories is considerably less precise than the revisions in the South East.

7.15 However, there are limitations with all of the types of evidence used in assessing ancient woodland status in the revision, and these need to be taken into consideration:

- Woodland surveys are a key evidence source for identifying ancient woodlands, particularly small woodlands, where the historic map evidence may be weakest. However, there has not been either the time or resources available to survey every woodland, so the evidence from the field work is limited to the area covered.
- Field survey evidence also varies in its value as a guide to site origin, and the use of such data is more problematic in heavily disturbed woods and PAWS sites where vascular plant floras are often poor. Individual plant species cannot be used as evidence that a particular wood is ancient and several "indicators" used collectively will be far more reliable. Certain woodland vegetation communities, especially those on acid soils, lend themselves less well to indicators than those on more base-rich soils.
- There are limitations and inaccuracies associated with early map sources, especially where small woodlands are concerned, and no decision based on historical map evidence relating to woodland can be completely infallible.
- Woodland archaeological features, of considerable diagnostic value in interpreting the history of a site, are more conspicuous in the winter and early spring, but ground flora recording dictates that the bulk of field surveying is done in spring or early summer. There are often insufficient resources available to visit a site again later in the year in order to form a more complete picture. Disturbed woodlands and PAWS sites may also have damaged archaeological remains.

7.16 Overall, the decisions on ancient woodland status are based on the best available information, taking into account the necessary resource limitations. Decisions have to be made by weighing up the available evidence and making an informed judgement. Such judgements rely on the skills and experience of the survey team, and advice and support from experts in Natural England and other partner organisations with whom the survey has worked closely over several years.

7.17 The inventory is therefore not a definitive register of ancient woodland. It is described as provisional, as at any stage it is possible that information may become available that shows that woods not currently on the inventory are likely to be ancient or vice versa. Such information, when provided to Natural England, is considered and a decision taken on whether a site should be removed or added to the inventory.

7.18 Nevertheless, the survey's thorough methodology, with the use of both desk-based and field work, and digital mapping technology, means that the project represents the most complete and detailed update of the inventory yet undertaken at the regional scale.

Partnership approach

- 7.19 Without the strong support of all the project partners, it would not have been possible to have undertaken such a comprehensive review of the inventory. The resources required to undertake the level of detail incorporated into the work would probably have been greater than any one organisation would have been able to provide. The support of the partners also underlines the importance of this habitat and the widely recognised need for the best possible evidence to inform its protection and management.
- 7.20 Strong support has been given throughout by the Forestry Commission, which has provided funding from the outset, and the High Weald AONB, which has hosted and part-funded several of the surveys. Environmental Record Centres have also been important partners in the project, through hosting the surveys and strongly supporting the work in their counties.

Revisions to the inventory in other parts of the country

- 7.21 The South East Ancient Woodland Inventory revision has attracted interest in other parts of the country. In some areas there had already been a recognition of the need to map smaller ancient woodlands, and using the same methodology as in the South East provides the advantages of consistency for inclusion of sites into the national inventory. Projects to update the inventory have now been started in Herefordshire, Northumbria, North Yorkshire and the Black Country.
- 7.22 Of these, the Herefordshire project has developed the furthest in collaboration with Natural England. This began with a River Wye Preservation Trust project aiming to update ancient woodland boundaries, including sites under two hectares, as well as map wood pasture and parkland and ancient trees, and collect survey data for key sites. The inventory mapping in Herefordshire has now been completed in over 55% of the county. In common with the South East project, it has used a variety of historic maps sources, and has identified 887 hectares of ancient woodland previously not on the Ancient Woodland Inventory, including 484 woods, totalling 408 hectares, of woods under the two hectare threshold.

Future work

- 7.23 Each of the inventory revision reports in the South East includes a description of the survey methodology, but Natural England will, when resources allow, publish a full version of the method used, including details of the specific GIS techniques. Natural England will also assist other surveys where possible, including making map data available and incorporating revisions, produced to an agreed methodology, into the national inventory.
- 7.24 Both the South West and parts of the West Midlands have high proportions of ancient woodland, and the benefits of increasing the accuracy of the inventory, and adding woodlands below two hectares may also apply in these areas. Ancient woodland in the uplands faces different challenges, particularly with the difficulty of interpreting historic maps in these areas. In terms of woodlands under two hectares, a great deal of ancient woodland is likely to have existed along stream gills, an important landscape feature which enriches the biodiversity of the upland area. The Northumberland ancient woodland project may have lessons to draw upon in capturing these areas.

8 Conclusions

- 8.1 The survey in the South East has provided a detailed and thorough revision of the Ancient Woodland Inventory, and has secured considerable external funding and support to achieve its aims. The overall success of the project has been its wide partnership engagement, and the high degree of accuracy with which it has identified and mapped ancient woodlands.
- 8.2 The revised inventory has also enabled a better assessment of the extent and quality of the ancient woodland resource to be made, and has ensured that planning decisions affecting this habitat can be made on the basis of a robust evidence base. The survey continues in the South East and its overall aim is to continue to work with a wide range of partners to extend the work into the remaining areas of Hampshire, Kent, and other parts of the region. In the rest of the country, projects of this nature and at this standard would be welcomed by Natural England, especially where smaller areas of woodland make an important contribution to the landscape.

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Appendix 1 Summary of findings from the Wealden district site surveys

A total of 634 woods were surveyed over two survey seasons (March to September, 2004 - 05). Of these, 584 woods were included in the revised Inventory and 50 were left out. The vast majority of these sites were less than two hectares, and thus not considered in the original Inventory. The average size of wood surveyed was 1.8 hectares, with an approximate survey time of 30 minutes per wood.

Table A Summary of findings from the Wealden district site surveys

	Occurrence	% Occurrence
Damage		
Invasive species	158	27.05
Rubbish, rubble or garden waste dumping	130	22.26
Livestock and deer damage	42	7.19
Garden extensions/ landscaping	57	8.90
Clearance/ earthworks	37	6.34
Recreation	29	4.97
Damage – invasive species		
Rhododendron	81	13.87
Cherry laurel	73	12.50
Himalayan balsam	31	5.31
Sycamore	24	4.11
Japanese knotweed	15	2.57
Bamboo	7	1.20
Uses		
Garden extension	60	10.27
Recreation (including equestrian uses)	56	9.59
Game keeping	44	7.53
Livestock	21	3.60
Nature reserve	2	0.34
Management		
Unmanaged coppice and coppice-with-standards	435	74.49
Some recent management, planting or felling	107	18.35

Table continued...

Part or whole coniferous plantation	34	5.82
Pollards or veteran trees	21	3.60
High forest (beech and oak)	19	3.25
Boundary features		
Stream or ditch	154	26.36
Remnants of bank and ditch with an outgrown hedge	128	21.92
Pollards, stubs or standards	106	18.15
Remnants of bank with an outgrown hedge	103	17.64
Remnants of bank and ditch	103	17.64
Remnants of an outgrown hedge	46	7.88
Internal habitat features		
Stream through wood	174	29.79
Wet marshy areas	103	17.64
Part gill woodland	41	7.02
Sandstone outcrops	27	4.62
Areas of wet woodland	25	4.28
Rides or glades	12	2.05

Table B Summary of findings from the Wealden district site surveys

	Internal archaeological features	Occurrence	% Occurrence
Iron	Bloomery slag or furnace sites	44	7.53
Pits	Ponds and water-filled pits	137	23.46
	Hollows/extraction pits	109	18.66
	Small embanked pits	20	3.42
	Possible saw pits/ charcoal hearths	13	2.23
Bank/ditch	Internal banks/ bank and ditch	104	17.81
	Drainage ditches	231	39.55
Other	Built structure	10	1.71
	Lynchets or ridge and furrow	6	1.03
	Sunken/ embanked trackways	42	7.19

Appendix 2 Summary of evidence for Four Acre Wood (considered in the public inquiry for Bolnore Village phases 4 and 5 development, Haywards Heath, West Sussex)

Four Acre Wood – question on its origins

Keith Kirby

Forestry and Woodland Officer

Natural England

Summary

- 1) Natural England has been asked to comment on whether or not Four Acre Wood TQ325231 (West Sussex) is ancient woodland. I endorse its inclusion on the revised West Sussex ancient woodland inventory.
- 2) The area referred to as Four Acre Wood in this note was considered, as part of the larger Catts/Pierce/Bolnore block of woodland during the production of the original West Sussex Inventory 1984/1989. The evidence from old maps that it was an ancient woodland site was good, but aerial photographs (1981) suggested that it had been cleared in the 1950s.
- 3) Recently parts of the Sussex Inventory have been revised, taking account of new historical and field survey. The field survey data indicated that much of the woodland interest had survived the clearance; and trees and shrubs were regrowing. The wood was therefore re-instated.
- 4) The reference to 'Continuously wooded' in the definition of ancient woodland used for the inventory does not just mean those areas where there has been a continuous physical cover of trees and shrubs. Open space, both temporary and permanent, is an important component of all temperate woodland systems.
- 5) While woodland soils are relatively undisturbed compared to most agricultural ones, small scale soil disturbances may nevertheless be widespread in ancient woods.
- 6) In the uplands it is common for there to be glades on the edges of the woods where many of the woodland species survive amongst heather or bracken outside the tree canopy and spread again when the canopy is re-established. We believe that this is what has happened at Four Acre Wood – that there has not been a full break in woodland conditions.
- 7) The map and aerial photographic data indicate that the trees and shrubs were cleared in the late 1950s; there appears to have been active management of the vegetation (grazing/mowing) through the 1960s and 1970s, but sometime probably not later than the early 1980s this management ceased allowing regeneration of trees and shrubs to start.
- 8) The number of woodland specialist/indicator species is high for a small area. 19 'ancient woodland indicators' were recorded by Sally Westaway (others are known to be present) which is above average for both the Wealden District surveys (mean 12, range 2 – 31) and the Mid-Sussex Surveys (mean 10.5, range 2-22).
- 9) Using data from other sites for comparison much of the woodland flora that is present now in Four Acre Wood could have survived the clearance period.
- 10) It is less likely, on the information available, that the woodland species in Four Acre Wood have recolonised since the trees and shrubs started to regrow in the 1980s. The conditions

that would be most damaging to persistence, such as ploughing, are also those that would make rapid recolonisation least likely.

- 11) Four Acre Wood is ecologically part of the larger block to the south and west: its treatment, when seen as part of this larger block is not dissimilar to that which is encouraged to create/maintain open space in woods for conservation purposes.
- 12) The soil survey evidence is inconclusive as to the nature and scale of any past soil disturbance and when it might have occurred.
- 13) This is an unusual situation that has not arisen previously in discussions on ancient woodland definitions.
- 14) Clearance of woodland for permanent conversion to another land-use is undesirable.
 - a) Natural England would be likely to advise against the felling and stump grubbing if a proposal, as for Four Acre Wood in the 1950s, were to come up now.
 - b) However in this instance the damage to the woodland system was not, as is normally the case, as complete or irreversible as was believed when the 1984/89 inventory was produced.
 - c) In addition the area is functionally part of a larger woodland block, and the clearance should be seen in this context.
- 15) I conclude therefore that it was reasonable for Sally Westaway to have re-instated the Four Acre Wood on the ancient woodland inventory once it became clear that the trees and shrubs were regrowing and that a rich woodland flora, including specialist species, had survived. I endorse the inclusion of Four Acre Wood on the inventory on the basis of current information.



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