Weald Ancient Woodland Survey

A revision of the Ancient Woodland Inventory for Wealden District, East Sussex

Based on the provisional Inventory of 1989 by
J. Barton, D. Hutton and A. Whitbread

FINAL REPORT 2006

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Foreword

Ancient semi-natural woods are irreplaceable, and should therefore be protected and managed so as to maintain and enhance their special character. Many of the elements found in ancient semi-natural stands survive or can be restored in plantations on ancient woodland sites; hence they are also regarded as important. Knowing where ancient woods are, is therefore a key nature conservation need.

The ancient woodland inventory was compiled by the Nature Conservancy Council (the predecessor to English Nature) between 1981 and 1992, with that for East and West Sussex being produced in 1989. The Inventory was further updated between 1995 and 1999 and was digitised by the Forestry Commission for use on Geographic Information Systems. Since the digitised version has been available on the English Nature website, www.english-nature.org.uk, it has been downloaded more than 2000 times. English Nature is currently undertaking a project to refine the digital boundaries and make them more compatible with other national datasets and OS MasterMap.

The Weald Ancient Woodland Survey report describes a project which took this updating process a stage further, in that it has made use of additional historical map evidence and site surveys to verify the status of sites, and included woodland sites under two hectares. This latter element has provided a great deal of information regarding these small woods in an area that has high development pressure. English Nature will add the information captured by this project to the national dataset.

The value of recording small ancient woodland sites has been discussed at length, and this study shows how much work it involves, as the number of sites captured increased from 949 to 2323, including an additional 3123 hectares not previously mapped in the Wealden District. This has not been a light undertaking, but the conservation value of small woods is greater in a densely wooded landscape such as the south east, because there is often greater connectivity between woods.

This report has been an extremely valuable exercise and English Nature hopes it encourages partner organisations in other counties to work in partnership to provide similar updates.

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1. Summary

Ancient woodland is a nationally important and threatened habitat. Its existence over hundreds of years has preserved irreplaceable ecological and historical features. The South East has approximately 40% of the ancient woodland in England, but this valuable resource is increasingly under threat from development pressures in this densely populated region. The Weald Ancient Woodland Survey was set up in recognition of the increasingly important role of ancient woodlands and the deficiencies of the existing ancient woodland inventories.

This report summarises the methodologies and findings of a two year pilot project in Wealden District. The Weald Ancient Woodland Survey has worked with Wealden District Council, the Forestry Commission, English Nature, the Woodland Trust and the High Weald AONB Unit to update the Inventory for Wealden District providing a robust evidence base upon which to assign ancient woodland status.

The whole of the district's ancient woodland resource has been re-examined. 1374 woodland parcels have been added to the Inventory amounting to approximately 2.5 per cent of the total land area of Wealden District. Overall the total ancient woodland cover in Wealden has risen from 12% to 14% as a result of this revision. An actual loss in ancient woodland area of approximately 250 hectares was recorded since the original Inventory was published in 1989.

The revised Inventory will assist Wealden District planners to make decisions about development within the district, thus ensuring that the affects of any development proposals on ancient woodlands can be properly assessed and considered in these decisions. The revised inventory will also enable a better assessment of the extent and quality of Wealden District's ancient woodland resource to be made, indicating the main threats and identifying areas for future resource allocation.

2. Introduction

2.1 Background

The importance of ancient woodlands for wildlife is well documented. English Nature's position statement on environmentally sustainable forestry and woodland management emphasises the importance of ancient semi-natural woods as supporting particularly rich communities of animals, plants and fungi (1). The 'Keepers of Time' (2005) policy statement from Defra and the Forestry Commission (2) describes ancient woodlands as our richest wildlife habitat. "Ancient and semi-natural woodlands are the jewels in the crown of English forestry, and protecting and enhancing them will be a high priority".

Ancient woodlands have had a long time to acquire species and form stable flora and fauna communities. Many species are confined to and dependent on ancient woodland habitats due to their limited powers of dispersion and inability to tolerate disturbance (3). The UK Biodiversity Action Plan (BAP) (4) highlights the importance of native woodland for biodiversity. Broadleaved woodlands contain a higher number of priority UK BAP species than any other habitat and the majority of these woodlands are ancient. In Wealden District ancient woodlands are important for a number of priority species such as dormice, the pearl-bordered fritillary butterfly, a number of bat species and the black-headed cardinal beetle (5).

There has been a decline of many such woodland species due to lack of appropriate management, for example the pearl-bordered fritillary which has declined dramatically in its former stronghold of the South East. This species still occurs at one site in Wealden District. Pearl-bordered fritillaries require open areas within woodlands and their population has decreased significantly since the decline of traditional coppice management practices (6).

As well as fulfilling an essential biodiversity function, ancient woodlands provide a vital link to the past. Evidence of former woodland industries and the associated management practices can often be observed, and the lack of disturbance means that many ancient woods preserve archaeological features, such as burial mounds, that might otherwise have been destroyed.

The historical and landscape features of ancient woodland together with the ecological diversity and the often undisturbed woodland soils comprise an irreplaceable asset of great importance which, once destroyed, can never be recreated (1).

Recent policy changes have led to an increased focus on ancient woodland and its protection. This has highlighted some of the shortcomings of the existing provisional ancient woodland inventories. These limitations include spatial accuracy and classification anomalies and perhaps most importantly the omission of smaller pockets of ancient woodlands. This is especially relevant in densely wooded areas such as the Sussex Weald. The Wealden Ancient Woodland Survey set out to address some of these problems.

2.1.2 Ancient woodland inventories

The Ancient Woodland Inventories (AWIs) in England are administrated by English Nature. At present only ancient woodland over two hectares in size are recorded in the Inventories, which were originally compiled in the 1980s and 1990s for England and Wales by the Nature Conservancy Council, English Nature's predecessor. (7)

The first draft of the AWI for East Sussex was compiled by S. Peay in 1984(8); this was subsequently updated by J. Barton, D. Hutton and A. Whitbread and published in 1989(9). This Inventory provided an important baseline against which future change could be measured.

The Ancient Woodland Inventories have become an important tool for policy makers and planners, providing a non-statutory designation that enables the effects of planning proposals on ancient woodland sites to be assessed more effectively. The Inventories also assist in the identification of key areas for the restoration and planting of native woodlands, and have increased awareness of the importance of ancient woodland.

The Inventories were always intended to be provisional. The main information sources used to compile them were historical maps which varied in both geographical coverage and quality (7).

Modern computer-based mapping techniques, together with an increased ecological understanding of the importance of small woodlands, mean that some of the initial inaccuracies can now be addressed, and that woodlands under two hectares in size can be included. This report summarises the methods and findings of the third AWI update for Wealden District. Any changes since the original publication are documented.

2.1.2 Project aims

The primary aim of the Wealden Ancient Woodland Survey was to re-examine all available information and to present a revised Ancient Woodland Inventory for Wealden District. For the local authority this will enable the District's ancient woodlands to be given appropriate recognition in accordance with planning guidance and policy.

Additional aims of the survey were;

- To develop and implement a robust methodology of archive research and field survey that could inform a wider revision of the Inventory particularly in the South East region.
- To raise awareness of the Ancient Woodland Inventory amongst neighbouring local authorities and to assist them in carrying out a similar revision.
- To develop a better understanding of our ancient woodland resource.

2.1.4 Project funding

The Survey was jointly funded by Wealden District Council, English Nature, the Forestry Commission, the Woodland Trust, and the High Weald Area of Outstanding Natural Beauty (AONB) Unit. Additional support for the project was provided by East Sussex Records Office, East Sussex County Council, Sussex Wildlife Trust and the Sussex Biodiversity Record Centre. Funding for the printing of this report and for data completion was also drawn from the INTEREG IIIB Programme "Lifescape your Landscape".

2.1.4 Ancient woodland policy

The profile of ancient woodland has been raised with the recent publication of several key policy and strategy documents.

Planning Policy Statement 9 (10) (PPS9) on biodiversity and geological conservation (2005) includes a section on the value and need to protect ancient woodland from development. It requires local planning authorities to 'identify any areas of ancient woodland that do not have statutory protection.' No minimum size is specified with the resulting implication that in areas of high woodland cover, such as Wealden District, the current Inventory may be insufficient to meet the needs of local planning authorities.

Defra and the Forestry Commission's policy for England's ancient and native woodlands, 'Keepers of Time' (2005) (2) published in 2005 sets out a number of strategic objectives to protect and enhance the special wildlife and heritage values of ancient woodlands. The new policy represents a radical change in emphasis for forestry in England, placing ancient and native woodland at the heart of forestry policy.

The UK Biodiversity Action Plan calls for the maintenance of the current extent of ancient woodland, with encouragement of management to conserve the special characteristics of ancient woodland (5).

The South East regional forestry framework (11) (2004) includes an outcome that woodlands and trees, especially ancient woodlands and veteran trees should be protected from loss. The Framework recommends that these areas are identified and recognised under planning guidance and development strategies.

2.2 Ancient woodland definitions

Currently Britain's woodlands can be grouped into two categories; ancient woodlands or more recent woodlands, depending on their history.

2.2.1 Recent woodland

This is woodland that has arisen within the last 400 years by planting or through natural regeneration on abandoned or un-grazed land. Recent woodland sites can show similarities to ancient woodland depending on their age, proximity to ancient sites and the diversity of microhabitats within the site. However, generally their biological diversity is not as great as that of ancient woodland. These woods are therefore excluded from the Inventory (7).

2.2.2 Ancient woodland

Ancient woodlands are defined by English Nature as those where there is believed to have been continuous woodland cover since at least 1600 AD.

This definition includes (12):

- Areas with continuous woodland cover.
- Areas managed or periodically cleared for timber or underwood production.
- Areas regenerating following woodland management.
- Open grazed areas within the woodland site (at least 20% canopy woodland over 80% of the site).
- Temporary clearings that may have been created within the woodland complex but which have regenerated, or are regenerating, back to woodland.

Ancient woodland is then further divided into two categories:

1. Ancient semi-natural woodland (ASNW).

These are areas of woodland composed predominantly of tree and shrub species native to the site that do not obviously originate from planting but have arisen from natural regeneration or coppice re-growth (9). This includes small areas of secondary woodland within ancient sites which may have developed on former settlements, gravel pits or disturbed ground, semi-natural woods which have been slightly modified for example woods with a scattering of ornamental conifers, and woods containing some self sown sycamore. In the South East sweet chestnut coppice is also included in this category (13).

2. Plantations on ancient woodland sites (PAWS).

These are areas of ancient woodland where the original native tree cover has been felled and replaced by planted stock most commonly of a species not native to the site; this can be coniferous or broadleaf tree species or a mixture. For the purposes of this survey broadleaved woodlands are defined as those with 10% or fewer conifers in the canopy and coniferous woodlands those with less than 10% broadleaf species in the canopy (4). The UK woodland assurance scheme stipulates the full or partial restoration of PAWS (14).

Both woodland types are classed as ancient woodland.

The existence of a woodland since at least 1600 is now widely accepted as the basis for judging whether it is ancient. The argument being that 'the threshold date of 1600 AD marks the time at which cartographic evidence of the existence of woodland begins to be more widely available and the beginning of the period in which the planting of trees and woods became widespread.' (9)

The presence or absence of a wood at this date is often difficult to verify due to the lack of historic evidence. There are some excellent examples of estate maps and other historic documents verifying woodland presence from around 1600. However, these sources are fairly uncommon, and no reliable, country-wide historic map source is available for England until the late 18th century. This was recognised by Kirby and Spencer (1992) who considered that 'comparatively few woods have a readily available documented history dating back to the threshold date of 1600 AD' (9). The original Inventories were based on later map sources, mostly from the 19th century onwards.

2.2.3 Pasture Woodland

Wood pasture describes woods derived from ancient pasture woodland managed for both trees and livestock or deer (15, 16). These woodlands are usually associated with ancient deer parks, Royal Forests or wooded common land. They frequently occur in a mosaic with other habitats and the boundaries are often poorly defined. Wood pasture was previously included on the original Inventories as ASNW where recognisable stands of trees evident on old maps remain unchanged, parkland sites with wide spaced trees were omitted (9). However the map sources used were often inconsistent with only a partial coverage.

Revision of the AWI in Wealden District highlighted the problems of classifying woodland sites in historically more open areas such as the Ashdown Forest and other former commons and hunting forests found across the sandstone ridge of the Weald. Some of these woodlands have been classified on the original Inventory as ancient whilst others have been

omitted, however, a re-examination of the historic map and other evidence doesn't always appear to support these decisions. Detailed examination of the historical extent of these sites can reveal a complex management history with a mixed pattern of woodland, grazing and shifting agricultural use (17). It is important to recognize that ancient woodland is not a homogenous habitat across the whole of the UK and there will be areas which will not fit the traditional definition of ancient woodland.

Within the revised AWI for Wealden District these habitats were classed as a subcategory of ancient woodland, pasture woodland, whilst keeping the ASNW/ PAWS split. This survey attempts to re-examine the map evidence and so identify these sites using the following criteria to define the subcategory:

- Wooded today (at least 20% tree cover over 80% of the site).
- Woodland shown on the First County Series OS map (1873), with the cartography indicating at least 20% tree cover over 80% of the site.
- Former enclosed Forest or common land as identified on the OS surveyors drawing maps (c.1800).
  (See section 3.2.3 for a fuller description of these map sources)

Many of these areas would have been actively managed for underwood and so will have been wooded for long periods of time, retaining some of their woodland seed bank. However, throughout history, sections within many of these woodlands will also have been intensively used, disturbed or grazed, so that they may not retain some of the unique characteristics of ancient woodland habitats, such as the relatively undisturbed woodland soils. However, this could also apply to areas that have been used as intensive forestry plantations or those that have been disturbed by heavy recreational usage.

Pasture woodland is therefore defined as a semi-natural habitat that has retained a wooded nature throughout recent history as documented by the above map sources and hence is included in this Inventory revision.

2.3 Wealden District revision

2.3.1 General

Wealden is the largest district in East Sussex, with a population of around 140,000. It covers 837 square km and extends across the county from the Kent border near Tunbridge Wells to the English Channel near Eastbourne (Map 1).

Much of the district falls within the protected landscapes of the High Weald and South Downs Areas of Outstanding Natural Beauty (AONBs). The district's value for wildlife is recognised by 32 Sites of Special Scientific Interest including the designation of Ashdown Forest as European Special Protection Area (SPA) and Special Area of Conservation (SAC) and the Pevensey Levels as a Ramsar site - a wetland of international importance.

The Wealden non statutory Local Plan (2005) recognises that it is vital to ensure that the district's valued environmental resources are protected and enhanced wherever possible, and that where development takes place it recognises and respects them (18). However, development pressures in the South East are posing a threat to these resources. These pressures, combined with the density and importance of ancient woodland in the district, were important factors behind the choice of Wealden District as a pilot for the Inventory revision.

2.3.2 Geology, land use and landscape

The landscape character and hence the woodlands of Wealden District are strongly influenced by the underlying geology (Map 1). Geologically, Wealden can be divided into four broad zones each with its own distinctive character as defined by the English Nature/ Countryside Agency Joint Character Areas (19).

The High Weald in the north of the district is formed of Wadhurst clays, Tunbridge Wells sands and Ashdown sands. The difficulty of working the heavy clay soils, and the convoluted topology of the High Weald have resulted in many woodlands escaping conversion to agriculture. Today the area still retains large concentrations of ancient woodland with 75% of the district's ancient woodlands occurring on these soils.

The adjoining Low Weald is predominantly formed of Weald clay, and the scarp foot of the Downs of Greensands and Gault clays. The often water-logged heavy soils make farming difficult in this area, reflected in the small fields, high proportion of small woodlands and dense network of hedgerows.

In the south of the district, on the chalk downland of the South Downs, the light soils were easy to clear and very little ancient woodland remains. Today the main land uses are agricultural and livestock grazing. The coastal levels around Pevensey in the south east of the district are mainly reclaimed marshland and were never heavily wooded.

2.3.3 Woodland resource

Wealden has one of the greatest concentrations of ancient woodland in the country, with around 3% of England's ancient woodlands found in this district. This makes woodland an integral part of the landscape characteristic of the area; woodlands also contribute to the ecological, recreational and economic value of the district (18). Approximately two thirds of Wealden's woodlands are currently classified as ancient. Many of these woodlands are less than two hectares in size, often surrounding ancient disused historic features such as marl and iron pits, occupying narrow linear features such as gills, or surviving as field boundary shaws. Approximately 6% of the area of woodland in the district consists of small woods of less than two hectares.

The most common woodland type in Wealden District using the National Vegetation Classification (NVC) (20) system, is type W10. This occurs on the base-poor brown earth soils of the weald clays and is the characterised by pedunculate oak *Quercus robur*, bracken *Pteridium aquilinum* and bramble *Rubus fruticosus*. The shrub layer is generally dominated by hazel *Corylus avellana*, often with an extensive spring carpet of bluebell *Hyacinthoides non-scripta* and wood anemone *Anemone nemorosa*. Variants of this type, supporting both sweet chestnut *Castanea sativa* and hornbeam *Carpinus betulus* coppice, are also relatively common.

Other woodland types include the ash *Fraxinus excelsior*, field maple *Acer campestre* and dog's mercury *Mercuralis communis* community in areas of base enrichment (NVC type W8). On freer draining sandy soils, found on higher ground, pedunculate oak, silver birch *Betula pendula* and beech *Fagus sylvatica* woodlands occur with bracken frequently dominating the ground flora (NVC type W16).

Also found in the Weald are steep sided gill woodlands formed by streams which have cut into the underlying sandstone. These gill woodlands are ecologically important sites

providing a stable moist microclimate that often supports unique assemblages of bryophytes. They are thought to represent a relict flora from the forests of the Atlantic period of over 5000 years ago (7), and are unlikely to be able to colonise recent woodlands. Small patches of wet alder woodland (primarily NVC types W6 & W7) are also common along-side streams and in low-lying areas.

One or more of these woodland types can occur within a relatively small area of woodland often with ecotones containing elements of both woodland types between them.

2.3.4 History of Wealden woodlands

Major woodland clearance in the South East began in the Neolithic period (21) and during the Neolithic, Bronze and Iron Ages, with most of the woodland on the South Downs was cleared for agriculture and livestock (22). Clearance on the heavier clay soils of the Weald took place at a much slower rate (23).

From pre-Roman to late medieval times woodlands in the Weald were heavily exploited for iron ore (23). This is documented by the number of primitive bloomeries, extraction pits and furnace sites recorded in the woods of the Weald (24). One bloomery site near Mayfield has been dated to 220 BC (25). The richest and most accessible ores were often found exposed in steep gills near the junction of Wadhurst clay and Ashdown sandstone. Furnaces were frequently situated in these wooded gills where wood for fuel, ore and water for the smelting process were all available (26). Large areas of woodland were needed to supply the underwood for fuel. Rackham (2003) suggests that in order to ensure a constant fuel supply, the Roman industry probably actively managed its fuel supply by a stable coppice system (16). The majority of woodland in the Weald would probably have been managed as coppice or coppice with standards by the late middle ages providing both underwood and timber.

Transhumance, the seasonal movement of stock, was at its peak in the late Iron Age. Weald woodlands were used as a seasonal source of food for livestock; farmers would drive their animals from their settlements on the Downs and coastal plains into the woods to feed on acorns and beech mast (27). The frequent passage of livestock resulted in the characteristic sunken lanes and tracks found leading to and crossing woods in many parts of Wealden District.

Medieval woodlands would probably have been very well organised, with wooded commons, wood pasture for stock feeding and timber and enclosed woods for timber and fuel (28). Medieval forests and deer parks would also have been a common feature in parts of the Weald; used as deer hunting grounds these would have been well-wooded with widespread pollarding (23). Many former deer parks are prime examples of relic woodlands, one of the best remaining medieval deer parks in the Weald is at Eridge, which supports the richest epiphytic lichen flora of any ancient forest recorded in Britain (23).

Concerns over depletion of the woods by the iron and glass industries led to King Charles II commissioning John Evelyn's Sylva (29) published in 1664. This work was the impetus for widespread planting of both deciduous and conifer plantations across the country. During the 18th and 19th centuries many landowners began formalising and landscaping their estates. The planting of large areas with trees became common together with the introduction of many exotic species into formal parks and gardens (28).

From the 17th century, woodland industries began to decline in the Weald, primarily as a consequence of the Industrial Revolution when coke from coal became the preferred fuel for

iron production (28). Industries using coppice products declined during the 19th century as they became increasingly uneconomic and timber production replaced coppice systems. The Forestry Commission was established in 1919 after the First World War. Its remit was to promote afforestation in order to rebuild and maintain a strategic timber reserve, and large conifer plantations were created (30).

Traditional woodland management had ceased almost entirely by the end of World War II and the planting conifers became widespread in the 1960s and 1970s. However, the increasing recognition of broadleaved trees for conservation, and declining timber markets, both led to the decline of plantation management. Today many woods in the Weald are dominated by a high forest of derelict broadleaved coppice or conifer plantations with woodlands now often seen primarily as a recreational resource.

Many of the woodlands in Wealden District have a complex history and traces of past uses and management can still be seen today. Ancient coppice stools reveal previous management practices, and pits and hollows provide evidence of former industries such as timber conversion and iron ore extraction. Pales and pollards indicate a previous parkland use and trenches and pits provide evidence of more recent strategic uses.

3. Methodology

The methods used for the Inventory revision were based on those used to compile the original Inventory, extended to include a combination of digital map sources, field surveys and archive research. By necessity, the methods were relatively simple and quick with detailed historical and field surveys confined to those sites with a contentious status. The Inventory is therefore inclusive, meaning that the default for borderline sites, or those for which data is lacking, is that they are retained on the Inventory, thus ensuring they can be considered in future surveys (9).

3.1 Software

All mapping work was carried out using a Geographic Information System (GIS). The use of GIS was central to this project, enabling the comparison and combination of a variety of spatial data sources. The GIS software used for this work was ESRI ArcMap 8.3 (31). All map data associated with each woodland parcel, or polygon, is held within a GIS attribute table. This table can then be linked to an external database (Recorder 2002) which holds more detailed site and survey data.

Woodland survey data is held in a Recorder 2002 (32) database from which a report for each site outlining the main survey findings can be generated. Recorder 2002 is specifically designed for biological recording. It allows species observations and habitat data to be captured in an electronic format that is compatible with the National Biodiversity Network. This enables the methods of data storage to be easily reproduced and also allows easy exchange of data.

Where possible OS MasterMap derived polygons were used to map boundaries of woodland sites. The OS MasterMap layer used is a frozen layer from August 2005 at a 1:1250 scale. The advantage of using this map base is that it gives a reproducible boundary ensuring consistency of mapping efforts. The map does have some drawbacks, with some polygons needing clipping to fit in with field boundaries. Each MasterMap polygon also has its own unique identifying code or 'Toid' which can be used to keep the digital boundaries up to date with any updates in OS mapping. Two GIS layers are available, one

with the MasterMap polygons merged into individual woods, with woodland details such as name and area recorded in this layer, and one with just the constituent MasterMap polygons and their unique identification codes. An additional layer containing the revised boundaries of PAWS and ASNW is also available.

3.2 Inventory Revision

Revision of the Inventory was carried out in three distinct stages.

3.2.1. Desk-based mapping

At the initial mapping stage areas of more recent and secondary woodland were eliminated by checking the presence of each wood against available digital data sources. A 500m square grid was overlaid to ensure a complete search of the whole district. Any continuous blocks of woodland were regarded as discrete sites with historical or ownership boundaries disregarded; ponds or open areas within the wood less than one hectare in size were included.

The datasets used for the base-mapping process were:

- The First County Series Ordnance Survey 25"to 1 mile maps (1873 for East Sussex)

These are scanned geo-referenced raster images of the original Ordnance Survey 1: 2500 historic mapping. They are very accurate maps which record a great deal of detail. The main disadvantage of these maps is the relatively recent date, although more recent woods can often be identified as regularly shaped enclosures or having map symbols that indicate a previous non-woodland use. Because of the high level of accuracy of this source, absence of a wood from these maps is considered highly significant.

- Surveyor's drawings for the 1st Edition Ordnance Survey 2.5" to 1 mile maps (c.1800)

These sheets have been geo-referenced by the High Weald AONB Unit to fit the British National Grid using ArcMap and a 50,000 modern OS base. The original drawings are held by the British Library, and scans of this data were used for this coverage.
Individual sheets were often produced by different surveyors and map styles and dates can vary accordingly. They are considered to relatively reliable where woodland is recorded, as features of military significance were mapped in great detail; however absence cannot be reliably used as proof of a woodland not existing, especially with smaller areas.

- Thomas Yeakell and William Gardner's 1778-1783 county map (2" to 1 mile)

Although fairly stylistic this map clearly shows woodland, parkland, settlements and other features and is considered to be the most accurate mapping of this time, however it was only completed for the southern half of Sussex. This map was used in preference to the surveyors drawings where available.

- Modern aerial photography (1999)

Aerial photographs were used to check for presence today, to document any changes, and to confirm or alter the existing AWI boundaries.

This three-stage process formed the basis of the desk study. A judgement was made at this stage and a preliminary list of woodlands created. The list was generous, showing too many rather than too few woods, and sites were deleted as more information came to light.

Semi-natural/ plantation ancient woodland

The Forestry Commission's National Inventory of Woodland and Trees (NIWT) (33) was used as the core dataset to redefine the boundaries of PAWS and ASNW. This Inventory is based on interpretation of aerial photography; it classifies woodland into broad categories including broadleaved, coniferous and coppice woodlands. Boundaries were then further refined using aerial photography, the existing AWI boundaries, OS MasterMap boundaries and the results from survey work.

The reliance on aerial photography for identifying PAWS will mean there are obvious inaccuracies for example in distinguishing between mature broadleaved plantations and stands of semi-natural woodland. However, as the majority of replanted areas were coniferous or mixed and were readily identified, this was not considered to be a significant cause of error in Wealden District. Ancient Semi-Natural Woodland was used as the default classification where it was not possible to determine the woodland type.

Size of a woodland

In general 0.25 hectares was the lowest size of woods considered, allowing the revised AWI to be comparable with the Forestry Commission's NIWT. However each wood is considered separately and factors such as the location and historical extent of the woodland mean that some woods under 0.25 ha are included. For example, smaller sections of woodland that were previously part of a larger woodland block, as shown by historic map evidence. This allows these woods to be considered when looking at habitats habitat fragmentation and re-connection. Querying the GIS attribute table will allow a size restriction to be imposed if required.

Smaller woods are influenced to a greater extent by their location and by the surrounding land uses and the ecological concept of ancient woodland may lose its meaning. However, in a heavily wooded landscape, such as the Weald, size is not as important. It has been shown that as woodland density increases individual woodland parcels tend towards a functional whole and become more ecologically resilient to isolation (34).

3.2.2 Field survey work

Field survey work was carried out on a targeted selection of woodlands. Priority was given to woods less than two hectares, to those not recorded on the existing Inventory, and to areas where the existing boundaries appear to have changed. In consultation with Wealden District Council, an additional list of priority sites was drawn up including areas of woodland falling in or adjacent to proposed development sites as well as sites affected by planning applications and appeals.

Due to the large area covered and the volume of woods to be surveyed, the time available to survey each wood was limited. Survey work was therefore focused on confirming site boundaries and recording key information to aid in the identification of ancient woodland.

A standard survey looked for the following information:

- Any evidence relating to the management history of a wood, for example a coppice structure, veteran trees or pollards.

- The presence of archaeological features such as saw pits, charcoal hearths, drainage systems, old banks or the remnants of iron workings.

- Features which indicate a previous agricultural land use, such as ridge and furrow plough markings and lynchets.

- Features, such as woodbanks, stubbed trees or outgrown laid hedges, delineating the boundary of the wood.

- The main canopy, shrub and ground flora species, ancient woodland vascular plant indicator species and any other significant species.

- Any current uses or factors causing disturbance or damage to the wood.

- Dead wood, structural and habitat diversity and the presence of streams and ponds following natural courses and depressions.

These features can all provide evidence of past land use and so help a decision to be made on ancient woodland status.

Distinct wood banks are characteristic indicator features of lowland ancient woodlands. A wood bank consists of an earth bank, often though not always with an associated ditch, constructed at the boundary of a woodland or of compartments within it (16). These banks, which were constructed to keep out both grazing animals and human intruders, would in most cases have been topped by a hedge or fence (16).

Lists of vascular plant species strongly associated with ancient woodland sites known as 'indicators' have been compiled for different geographical areas of the British Isles. These lists are based on the occurrence of species in known ancient woodland sites, the species are also chosen for ease of recognition (35). The South East list used in this revision is appended.

The presence of these vascular plant indicator species can aid in the identification of ancient woodland and ancient woodland sites tend to be richer in terms of their species composition (35). However, care is required as other factors affect the presence and abundance of these species. These factors include the area of the wood, the date of the survey, the diversity of habitats within the wood, soil type and the position of wood relative to other wooded areas. Current uses, including disturbance, damage or invasive species may also affect species diversity and the time spent surveying will affect the number and abundance of species recorded as well as the likelihood of other features being recorded.

Where possible, survey work was carried out from public rights of way, roads and tracks. Where access to a private site was required, owners were contacted to obtain permission. Only six of the woodland owners approached out of 634 woods visited refused access for the survey indicating a good level of cooperation and enthusiasm for the project aims and objectives.

3.2.3 Archive research

Further archive research was carried out on a selection of woods at the East Sussex Record Office (ESRO). The record office contains a wealth of historical documents that can aid in determining the antiquity of a wood and these resources were used to confirm the status of woods and to further refine the layer. Information from this research is held in the GIS layer. Due to time constraints, archive evidence was not checked for the entire district and woodland presence was verified against just two key historical map sources:

- Parish Tithe maps (c.1840)

Tithe maps provide an important record of land use in the 19th century. They were drawn up between 1836 and 1850 when tithes to the parish church were replaced by payments in rental value. Woodland in the Weald was non-Titheable and for this reason was recorded accurately. The maps are large-scale (between 12" and 25" to 1 mile) showing the fields, woodlands, and villages of the parish. An accompanying apportionment schedule details the owner or occupier, the field name and a land use description. Tithe descriptions such as "copse" and "shaw" relate to a definite woodland use, however descriptions such as "Firs" or "Plantation" may be indicative of secondary woodland.

- Estate maps and records (pre-1800 only)

Estate maps provide a major source of information for the post-medieval period. Records were drawn up for a specific purpose usually to show land boundaries, buildings, issues of ownership and land use. They can include correspondence, accounts, surveys and maps. Farms within the estate will usually have had a map drawn up showing the boundary, land use of individual fields and wooded areas within the holding. They vary significantly in their quality and accuracy and do not give a complete coverage of the district. The earliest estate maps consulted was the Buckhurst Terrier (1597 - 1598). This map of the Buckhurst Estate covers a large area to the north of Ashdown Forest, with woodland clearly shown.

3.2.4 Other evidence sources

In addition to the wood being present on a wide suite of historical maps and any evidence from ground survey work, there are a range of other factors which may be indicative of ancient woodland that are worth considering, these include:

- Wood name

The value of historic place names is their survival long after the features they describe have disappeared. They can therefore be used as a guide to help reconstruct the landscape (23). 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 (23, 16).

Wood names can also be used to identify non-ancient woods. 'The plantation', for example, may indicate more recently planted woodland. However, a degree of caution should be exercised as names can change over time and 'the plantation' could also be an ancient site within which some planting has taken place (36).

- Woodland shape and situation in the landscape

Ancient woodlands 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. The boundaries of older woodlands are rarely straight and often follow natural features such as streams.

- Any existing survey data or other records

This includes species data from the Sussex Biodiversity Records Centre (SxBRC), previous survey work carried out on selected woodlands, Wealden Iron Research Group data, and Sites and Monuments Records.

3.2.5 Decision on ancient woodland status

Each separate area of woodland differs, with the above factors having varying degrees of significance. It is therefore important to use a combination of all the evidence outlined above when assessing every woodland (16).

These factors are weighed in terms of their significance and a decision is made on whether to include a wood on the revised Inventory. Ancient woodland status can generally be assumed where good quality survey data exists and where the wood appears on a range of historic maps. When the available evidence is less extensive, ancient woodland status cannot be as readily certified. Thus, although every effort has been made to make this revision as accurate as possible, the Inventory is still regarded as provisional.

Case studies outlining the evidence used to add or remove woods from the revised Inventory are appended.

3.2.6 Volunteers

Both the woodland survey work and the archive research work were assisted by a small team of skilled and dedicated volunteers. Woodland survey work was carried out by experienced botanists and members of the Sussex Botanical Recording Society. The local knowledge and dedicated work of volunteers especially within the Parishes of Mayfield, Rotherfield, Fletching, Isfield and Warbleton contributed significantly to the project's outcomes.

4. Results

The results of the Ancient Woodland Inventory revision for Wealden District are primarily stored in a digital format and these files will be available to download on line. The revised map boundaries are also available as a series of maps and tables.

4.1 The ancient woodland resource

4.1.1 Extent of ancient woodland

The total amount of all woodland within Wealden District, as recorded in the National Inventory of Woodland and Trees, is 16,700 hectares. This accounts for almost 20% of the district area, and as such is well above the national average of 7.5%.

The original AWI (7) contained 9,754 hectares of ancient woodland covering 12% of the district's area. The revised Inventory contains 11,710 hectares of ancient woodland and now covers 14% of the district's area (Map 2).

Woodland re-mapped from the original Inventory accounts for 8,587 hectares of the revised area. This represents a reduction of 1,167 hectares compared with the original Inventory, meaning that 3,123 hectares have been newly mapped through the project.

The balance of the new area added minus the area lost, gives a net increase of 1,956 hectare for the total area of woodland on the revised Ancient Woodland Inventory for Wealden District. This mostly occurs in small sub-two hectare woodlands.

Table 1: Summary of the woodland area and number of woodland parcels from the Forestry Commission's National Inventory of Woodland and Trees, NIWT (2000), the original Nature Conservancy Council AWI (1989), and the revised AWI.

	NIWT *all woodland*	**Original AWI** *ancient woodland only*	**Revised AWI** *ancient woodland only*
Total Wealden District woodland area (ha)	16,700	9,754	11,710
Total number of Wealden District woodland polygons	3,146	949	2323
Average area of woodland parcel (ha)	5.3	10.3	5.0

The majority of the 1,167 hectares removed from the original Inventory were due to inaccuracies in the initial mapping process and were removed following re-examination of the historic map evidence. The availability of the First County Series OS maps in a digital format has meant that the boundaries of the revised Inventory can be mapped far more accurately. 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, approximately 87 sites have been affected by loss of woodland area since 1989, amounting to an actual loss of 250 hectares. Three quarters of this area were converted to grassland or agriculture, with the balance, approximately 60 hectares lost to development.

A study of woodlands in Wealden District carried out in 1979 (25) estimated the total woodland cover in Wealden, based on the OS 1st edition (1814), to be 17.5% of the district's area. This suggests that there has been a significant increase in total woodland cover. This increase may be partially due to large forestry plantations such as Friston Forest in the south of the district, but is also likely to result from inaccuracies in the 1st edition OS map. At one inch to the mile the map omits many small woodlands and detail is often obscured by heavy topographical shading. This map was also the primary source used in the original AWI.

4.1.2 Woodland distribution

The majority of the ancient woodland in Wealden District is located in the north of the district in the High Weald AONB and adjoining Low Weald. This corresponds to the geology and land use history of the district.

Wealden District's ancient woodland resource is highly fragmented with approximately two thirds of the woods on the revised Inventory occurring as small woodland parcels of less than 2 hectares in size (Fig. 1). Less than 5% of all ancient woodlands in the district are larger than 20 hectares and only 12 woods are greater than 100 hectares. The average size of woodland in the revised AWI is 5.0 hectares.

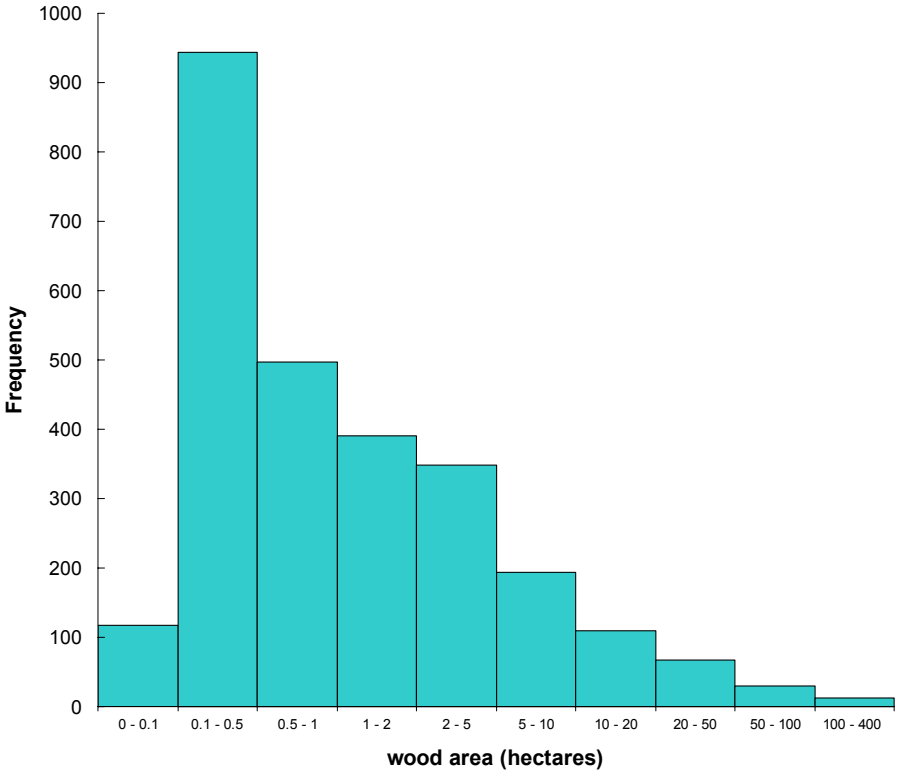

Figure 1: The size distribution of ancient woodlands (revised inventory) in Wealden District.

4.1.3 Plantation on Ancient Woodland Sites

Approximately 200 ancient woodlands in Wealden District have some degree of replanting, amounting to 2896 hectares of woodland. Such areas are known as Plantations on Ancient Woodland Sites (PAWS). Most of the PAWS in Wealden are made up of conifer species such as Scots pine *Pinus sylestris*, sitka spruce *Picea sitchensis*, Japanese larch *Larix kaempferi* or Western hemlock *Tsuga heterophylla*. The Inventory draws no distinction between different types of plantation, there are some areas of broadleaf plantation in Wealden District which are recorded as PAWS, but these areas are less readily identifiable.

PAWS are primarily located in the north of the district. The agriculturally unproductive, infertile sandy soils were probably considered most useful for conifer cultivation. Smaller woods were least affected by replanting, with the average size of replanted site being around 12 hectares.

4.1.4 Conservation status and ownership

3,198 ha or 27% of the ancient woodland area in Wealden District has some type of formal nature conservation designation or status

A total of 46 sites (910 ha) fall within Sites of Special Scientific Interest (SSSIs). 89 woods (1,591 ha) are Sites of Nature Conservation Importance (SNCIs).

247 sites (2,371 ha), containing approximately 20% of the ancient woodland area in Wealden District, are currently receiving funding for management or recreation under the Forestry Commission's Woodland Grant Scheme.

Table 2: Summary of ancient woodland in Wealden District wholly or partially in the ownership of statutory or voluntary organisations.

	Number of woods	Area (ha)
Woodland Trust	10	66
Forest Enterprise	13	495
Sussex Wildlife Trust	2	51
National Trust	8	85

The district includes parts of two Areas of Outstanding Natural Beauty (AONBs), the High Weald, and the Sussex Downs. 1,632 woodland parcels (8,960 ha) or 75% of the ancient woodland area on the revised Inventory fall within the High Weald AONB and a further 21 ha fall within the Sussex Downs AONB.

4.1.5 Accuracy of the Inventory

Within the limitations outlined in section 6.1, the Inventory is considered to be accurate. More ground survey work and in-depth archive searches will add to the data already collected and allow the Inventory to be further refined.

Revisions made to the original Inventory relating to areas of woodland over two hectares have also been checked against the original English Nature datasheets (held at the English Nature, Sussex and Surrey Team office in Lewes). If the site had been previously considered the reason for the change in decision will be summarised in the GIS attribute table:

1. Previously unchecked historical map/ archive evidence.
2. Ground survey evidence (ecological and archaeological).
3. A combination of map and survey evidence.

4.2 Results from woodland survey work

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.

A summary table of the main survey findings is appended. Survey data is held by the Sussex Biodiversity Record Centre.

In order to make the most of the relatively short woodland survey season, survey work commenced within a few weeks of the project start date. This meant that initial survey effort was not maximised with both base mapping and survey work being carried out in tandem. As the data layer was verified and additional map sources were considered, some of the woods initially surveyed were subsequently removed.

However, the largest proportion of woods left out of the revised Inventory following survey work, were removed because they were severely degraded. Twenty of these were small woods which had been irrecoverably disturbed or damaged, for example, where most of the tree cover had been removed and where there had been extensive disturbance of the soil profile by earthworks or heavy livestock usage. A further 11 woods were found to have been wholly converted into gardens.

4.2.1 Damage and woodland uses

Woodland use was taken to mean any use of the woodland not directly linked to its management, and damage to mean any external force causing a detrimental imbalance in the ecology of the woodland.

Photograph 1: Removal of a section of a small ancient wood in Heathfield parish

The main use of small woodlands in Wealden District was as an extension to a landowner's garden or curtilage. This was recorded to some extent in over 10% of the woods surveyed. In some cases a wood had been modified to such an extent that it was not included in the revised Inventory. For the most part, however, there was just a small amount of curtilage encroachment with only a minor damaging effect. As well as being used as garden extensions, 22% of the woods surveyed suffered some form of dumping, either of garden waste, rubbish, rubble or soil.

There was a high degree of correlation between the use of the woods and the factors causing damage within them. For example, a recreational use was recorded in 9.5% of woods and this was considered to be causing significant damage in roughly half of these.

However, the largest cause of damage, recorded in 158 of the woods surveyed, was the presence of one or more invasive species, predominantly rhododendron *Rhododendron ponticum* and cherry laurel *Prunus lauroserasus*. Both species are highly invasive casting a dense shade and acidifying soils. Himalayan balsam *Impatiens glandulifera* was also recorded in 5% of the woods surveyed, usually forming a monoculture along stream or river banks.

Livestock and deer were also considered to be causing a significant amount of damage in around 7% of woods surveyed. Grazing or trampling prevents natural regeneration, can damage archaeological features and disturbs the ground flora. In some woods the underwood had been cleared and the wood sown with grass to allow livestock grazing.

4.2.2 Woodland management

The most common type of management recorded was a coppice or coppice with standards traditional pattern of woodland management, still evident to some extent in 74.5% of woodlands surveyed. However, the majority of these woods were found to be neglected, with an unmanaged understorey of over-mature coppice. Predominant coppice species were hazel, hornbeam and sweet chestnut, with mature oak and ash standards. The dense canopy of unmanaged coppice restricts regeneration and without active management the structural and ecological diversity of these woods will continue to decline.

Photograph 2: Hazel coppice with a carpet of bluebells

Evidence of some recent management, such as marked trees, cut stumps, wood piles, or recent coppicing was only seen in 8.6% of the woods surveyed, with these features usually found in small areas. Some felling or tree planting was recorded in 9.8% of woods.

The small number of woods that contained areas of coniferous plantation (5.8%) reflects the fact that survey work focused on smaller woods and conifers are usually planted in larger parcels.

4.2.3 Habitat features

Nearly 5% of all woodland surveyed contained a distinct area of wet woodland usually outgrown alder coppice in low-lying wet marshy areas adjacent to streams. Wet woodland is a UK BAP habitat and woods containing areas of wet woodland have now been mapped, this information will help to inform the Sussex Habitat Action Plan.
36.8% of the woodlands surveyed contained a stream usually following a natural course. Of these, 7% were deep cut gill streams, a particular feature of the Weald. Sandstone outcrops (4.6%), and wet marshy areas (17.6%) were also frequently observed and add to the overall diversity of a wood.

4.2.4 Archaeological and boundary features

The majority of woodlands surveyed showed evidence of some sort of boundary feature on at least part of the wood edge. The remnants of an external wood bank, sometimes with an outgrown hedge and/or a ditch, were recorded in three quarters of all woods. Streams and ditches were also common boundary features found in 26.4% of woods.

Photograph 3: Distinct moss covered double wood banks

The extent and quality of the boundary features varied. Often features had been obviously disturbed, for example where stock-fencing had been constructed on bank tops, or through livestock damage where woods were open to the fields.

Photograph 4: Outgrown hornbeam hedge on a bank marking a wood boundary

Direct evidence of iron workings in the form of primitive bloomery or furnace sites were seen in 7.5% of all woods. Many of the woods surveyed were formed around or contained old mineral extraction pits, ponds and water-filled pits and depressions. These were found in 42.1% of woods. Saw pits and charcoal hearths were less common, possibly due to the fact that they are harder to recognise, especially later on in the survey season. These were seen in only 2.2% of woods with about the same number of unclassified small embanked pits recorded.

Evidence of some sort of internal drainage system was recorded in roughly 40% of all woods and internal bank and ditches in 17.8% of woods. Drainage ditches are a common feature of older woods on clay (28). These ditch systems range from simple systems linking up existing small streams to well-planned and laid out ditches feeding into the main natural drainage network of the wood. The shape and extent of these systems can indicate the age of a wood.

Other archaeological features recorded in just three woods included possible lynchet systems, and evidence of ridge and furrow ploughing indicating a former agricultural use of the wood. Sunken or embanked tracks were also relatively common, recorded in 7.2% of woods.

4.2.5 Species data

The mean number of vascular plant species recorded per site was 37, and of these roughly a third were ancient woodland indicator species. Pedunculate oak *Quercus robur*, holly *Ilex aquifolium*, bramble *Rubus fructicosus agg*, hazel *Corylus avellana* and bluebell *Hyacinthoides non-scripta* were the most commonly recorded species, all found in over 90% of sites surveyed. This reflects the main woodland type found in Wealden District, the oak, bracken and bramble community of NVC W10 (20).

Wood anemone *Anemone nemorosa* was recorded in 40% of sites. Wood anemone is known to be an ancient woodland specialist (16). It is very slow to colonise new areas, making it a good indicator of the antiquity of a wood, especially where it occurs in abundance. In total 77 out of the 100 vascular plant indicator species thought to be indicative of ancient woodland in South East England were recorded at least once.

Photograph 5: Spring carpet of wood anemone

The number of ancient woodland indicator species recorded ranged between 2 and 31, with a mean figure of 12 species per site. Certain species such as wood anemone and moschatel *Adoxa moschatellina* are most evident early on in the survey season. By looking at the dates species were recorded, it is possible to ascertain the best times to carry out woodland survey work and the months that individual species can be recorded in.

Table 3: The seasonal variation in the number of ancient woodland indicator species recorded

Month	Number of woods surveyed	Number of ancient woodland indicator species recorded	Mean number of ancient woodland indicator species per wood
March	30	196	7
April	100	1,096	11
May	124	1,579	13
June	111	1,447	13
July	129	1,569	12
August	69	743	11
September	4	45	11
Other	4	45	11

The average number of ancient woodland indicator species recorded per site was relatively even throughout the survey season with significantly less species being recorded only in March. However the small number of woods surveyed in September and in other months means that these figures may not be representative. These figures are also based on presence or absence, species abundance is far harder to ascertain at the beginning or end of a survey season.

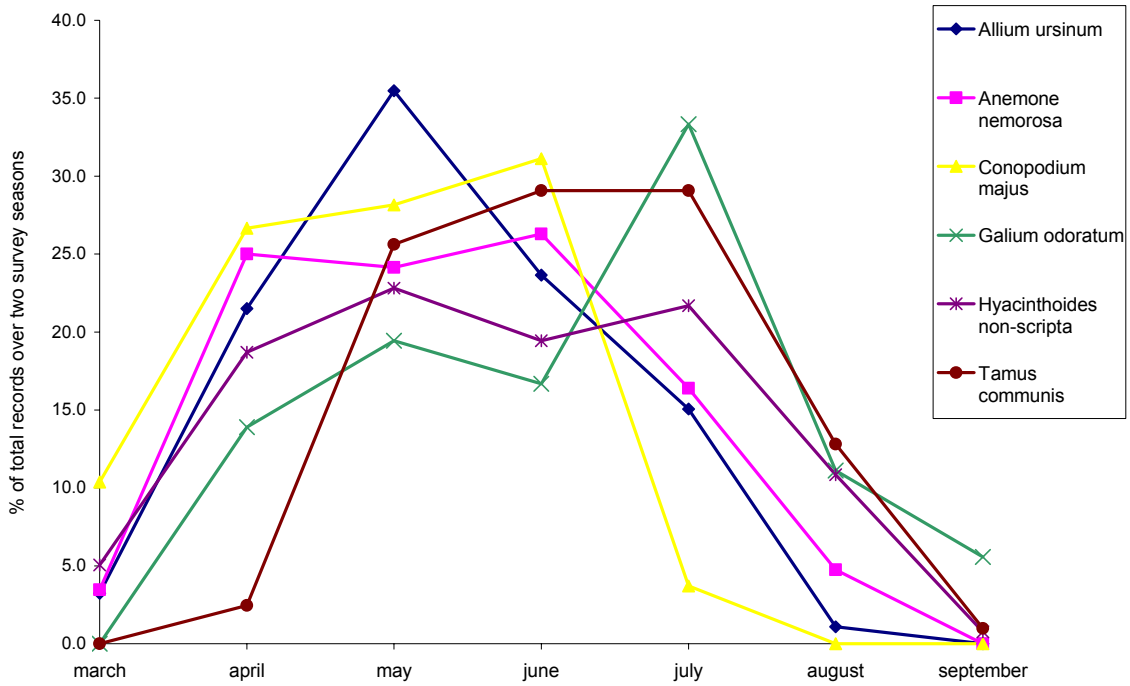

Figure 2: Proportion of the total number of records recorded in each month over the woodland survey season for five key ancient woodland indicator species

May and June were the best months for recording most vascular plant species. However, definite seasonal variations in species occurrence were observed, with woodruff *Galium odoratum* peaking in July. Pignut *Conopodium majus* and wild garlic *Allium ursinum* were primarily recorded earlier on in the season. Figure 2 displays only five of the most common ancient woodland indicator species. This information highlights the issues with comparing species data from woods surveyed at different stages over the season.

A full list of the species recorded along with the number of woods in which they were found is appended (Appendix 4).

4.3 Wealden District Council appeals

Map and survey evidence were provided to support Wealden District Council in planning appeals and applications relating to known and possible ancient woodland sites. Key sites included Kiln Wood in Ninfield parish, Mayfield College and Longfields Shaw in Hailsham.

In addition, 49 woodland sites that fell within or adjacent to Wealden District Council proposed housing allocation sites were also surveyed. Four of these sites were removed from the database after reviewing the map and survey evidence. The sites surveyed were mostly small woodlands in predominantly urban settings and 10 of the sites were found to be heavily disturbed and/or modified. Details of the survey along with the revised map boundaries were provided to the district's planning service.

5. Outputs

Maps 4 - 8 at the end of the report show the revised Ancient Woodland Inventory for Wealden District on an OS 1:50,000 base map. Due to the map scale and the volume of small woods added to the Inventory this map should be used as indicative only. The paper maps also only represent a snapshot in time and will not show any subsequent revisions. Digital boundaries will be available to download on line (www.magic.com) or alternatively printed copies can be obtained on request from Wealden District Council or English Nature.

By its nature the revised Inventory is still provisional, but represents an important advance in establishing ancient woodland status using a wide range of evidence and making full use of advances in modern technology. There will however be facts that come to light in the future that may alter or reinforce the decisions taken in this survey. The database is set up in such a way as to incorporate any future modifications or additional information. The intellectual copyright to the final data will rest with the project steering group, with editing rights assigned to English Nature.

The revised Inventory is an important information base on which to inform planning policy, and will enable planning decisions relating to wooded areas within Wealden District to be made in the light of an improved evidence base.

The recently published Planning Policy Statement 9 (10) strengthens the protection granted to areas of ancient woodland. The new guidance requires local authorities to identify all areas of ancient woodland within their administrative area. The identification of 1,374 new ancient woodland parcels in Wealden District not only affords these woodlands a higher degree of protection, but also emphasises the need for a review of the Inventory in other heavily wooded areas. In this respect Wealden District Council has led the way. The methodology piloted in Wealden District can now be used to assist other local authorities in carrying out similar updates to the Ancient Woodland Inventory, with a particular focus on small woodlands which have previously been omitted.

The South East Regional Forestry Framework (11) emphasises the value of linking ancient woodland fragments. The inclusion of smaller sub-two hectare ancient woodlands, which are often gills or shaws connecting larger wooded areas, means that the revised Inventory contains many more such 'linkage' woods.

The use of GIS and the presentation of the revised Inventory in a digital format allows it to be examined in conjunction with different datasets, highlighting landscape-scale interconnectivity and fragmentation. This could aid the creation of a more ecologically viable landscape in Wealden District by identifying both opportunities for re-connecting habitats and any gaps in the current habitat network. These more ecologically functional landscapes allow a greater mobility of woodland species, provide buffering from surrounding environmental impacts (11), and may help to combat some of the potential effects of climate change (2).

Knowledge of the location of ancient woods within a habitat network can also help to identify areas of opportunity for environmental enhancement, allowing more strategic distribution of funding for woodland management programmes, such as the England Woodland Grant Scheme (EWGS) or the new government agri-environment schemes, which now include small farmland woods.

The revised Inventory and data collected during the survey will be useful to inform the Sussex woodland Habitat Action Plans (HAPs) and BAPs. It will also feed into other work being carried out in the area such as the historic landscape characterisation project for Sussex (38).

The survey has raised the profile of ancient woodland within Wealden District and demonstrated the value of the Inventory. It has helped to build a closer relationship with the public via the volunteer programme and publicity material.

6. Discussion

Wealden district contains one of the highest proportions of ancient woodland of all English local authorities, making woodland an important ecological resource and landscape characteristic of the district.

Approximately 2000 hectares of ancient woodland have been added to the Wealden District Inventory. The completion of the revised Inventory and identification of a significant additional ancient woodland resource has increased the value placed on ancient woodlands within the district.

Three quarters of the woodland removed from the original Inventory can be explained by inaccuracies in the original mapping process which have been now been addressed. However, an actual loss of around 250 hectares ancient woodland area was recorded since the original Inventory publication in 1989. The primary cause of this woodland loss has been to grassland and agricultural uses, with the balance of approximately 60 hectares lost to development. Survey work revealed further depletion of the ancient woodland resource, with several sites having been completely cleared since the aerial photographs were flown in 1999. This highlights the need to identify these sites and enforce policy measures to protect these woodlands.

The project completed a systematic survey of 634 woods in Wealden District providing a unique opportunity to study the ecology, history, management practices and uses of small woods across Wealden District.

8% of woods surveyed were removed from the Inventory following survey. The majority of these woods were removed because of their degraded status. This finding has implications for the rest of the woods on the revised Inventory especially the smaller new additions, which are more susceptible to edge effects, damage, or curtilage extensions. It also highlights the importance of the survey in identifying and mapping these woods. However, it also implies that a significant proportion of un-surveyed woods on the revised Inventory may have been damaged or degraded in a similar manner. Damage mitigation measures used by Wealden District Council's planning officers include recommending the use of 10 metre buffer zones as a barrier around ancient woodland sites.

The most common use of the small woodlands surveyed was as a garden extension or a waste dump, and the most common management type was unmanaged coppice, this suggests a neglected resource. However, many small woodland owners are enthusiastic about their woodlands, as reflected in the number of enquiries for management advice and contact over the survey period.

There are, however, very few economic advantages to owning small woodlands today and management can be an expensive or time-consuming undertaking. Many farmland woods

remain only as game bird rearing sites, as shelters for livestock or simply because the woodland is a landscape feature and has always been there (25). Unless fenced and managed, these small farm woods will continue to fall into a state of decline.

Much of Wealden's woodland resource is small and fragmented, and this also has implications for future management. Small woods are less viable to manage and small woodland owners generally do not have the necessary expertise for commercial management of their woodlands. Nor is there always sufficient woodland industry infrastructure available to help in the management of small woodlands. Whilst management grants and advice are available, in order to reinstate management practices such as coppicing back into the majority of Wealden's small woods, these practices need to become economically viable.

Although ancient woodlands are well documented as having higher biodiversity value than recent woods (37), the biodiversity value of a woodland is often also linked to current management practices and not just ancient or recent status. In densely wooded landscapes with a long history of woodland cover, such as the Sussex Weald secondary woodlands can gain woodland species rapidly (34). The ancient woodland resource provides a potential reservoir from which specialist woodland species can re-colonise more recent woodland, therefore knowledge of the location of ancient woodlands is important when planning habitat reconnection and management initiatives.

Plantations on ancient woodland sites (PAWS) make up 25% of the total area of Wealden District's ancient woodland resource. There has been an increasing focus in the forestry and conservation sector on the restoration of PAWS, particularly with the publishing in July 2005 of the joint Defra/ Forestry Commission 'Keepers of Time ' policy (2). The delivery of the new policy will involve, amongst other initiatives, a major programme of tree felling and thinning in those ancient woodlands converted to plantations in the last century.

Though reduced in their species diversity, many replanted ancient woods still retain a high conservation value, particularly in rides and clearings. Many PAWS in the South East are not seen as economically viable in terms of timber production. A large number of these sites have already started to develop more semi-natural elements as plantation management and the use of herbicides are discontinued.

The Forestry Commission has developed a practice guide for restoration of native woodland on ancient woodland sites (39). The guide stresses the need for local circumstances to be taken into account. This is especially relevant in parts of the High Weald, where some woodlands have a complex management history and where a dynamic pattern of woodland and historically more open grazed areas often exists (40).

The revised Inventory has remapped PAWS in Wealden District, this will help to identify key sites for restoration. The project has also re-examined the map evidence and identified a sub category of "pasture woodland". This category will help to inform PAWS restoration programmes, recognising that the historic map evidence for these ancient woodland sites indicates a pattern of shifting habitat mosaics with open and more densely wooded areas moving over time.

The results of the woodland survey work have helped to identify the key issues and threats facing smaller ancient woodlands in Wealden District. The importance of semi-natural ancient woodland is widely acknowledged (1, 2, 5, 11). This resource is increasingly threatened by development pressures and lack of appropriate management. It is now a national

priority to prevent further reduction in the area and the biodiversity value of the remaining ancient woodland.

It is hoped that these findings together with the revised Ancient Woodland Inventory will make a useful contribution towards the long-term protection and appropriate management of this irreplaceable resource.

6.1 Limitations of the survey

The project constraints were predominantly the time available to carry out both site surveys and full archive searches and seasonal factors during site visits. The optimum woodland survey season runs from March through to June and seasonal variations in the flora must be accounted for when interpreting the survey results. Woodland archaeology features are also less easy to recognise in the summer months as the vegetation is more dense. The time allocated for survey work meant it was impossible to carry out a full archaeological survey or a NVC woodland survey for each site.

There are limitations with all of the types of evidence used in assessing ancient woodland status which should be considered.

Field survey evidence varies in its value as a guide to site origin (1). Individual plant species can not be used as evidence that a particular wood is ancient and several "indicators" used collectively will be far more reliable. Although counts of ancient woodland indicator species may be able to separate larger ancient and secondary woods, a greater degree of cross over has been found in smaller ancient and secondary woods (37).

Ground survey work is also less revealing in heavily disturbed woods and PAWS sites which often have impoverished vascular plant floras and may also have damaged archaeological remains.

Other limitations include the inaccuracies often associated with early map sources, especially where small woodlands are concerned, and the fact that wood names and shapes can change throughout history. For example, a straight edge may actually indicate a more recent woodland clearing rather than woodland planting.

6.2 The future of the Inventory

The Wealden methodology is put forward as a useful model for a wider revision of the Ancient Woodland Inventory. The survey has recently been extended into the neighbouring Mid Sussex District and it is hoped to encourage a wider take up of the survey with other local authorities.

English Nature is in the process of revising all boundaries on the existing national Ancient Woodland Inventory using OS MasterMap boundaries. It is also updating the ASNW or ancient replanted status of the Inventory by comparison with the Forestry Commission's National Inventory of Woodland and Trees. This process has identified significant losses beyond mapping errors. These revisions, however, are limited in their use of historic data sources, and do not include sub-two hectare woodlands.

The value of the Wealden survey has been recognised by English Nature and The Forestry Commission, and a wider revision of the Inventory for the densely wooded South East region has now been proposed, following the methodology piloted in this project

7. Acknowledgements

The project would like to thank everyone who contributed to this project. Especially all of the people who gave their time up in a voluntary capacity to assist with the survey and archive research: Rachel Nicholson, Jean Byatt, Carol White, Pat Donovan, David Brown, Janet Wirdnam, Shelagh Gray, Derek Bonfield and Neville Harrison. Also the High Weald AONB Unit staff; Sally Marsh, Matthew Grose and Gemma Swallow; and for help with data entry Sophie Williams, Sally-Anne Hall and Simon Turk. Acknowledgements are also due to all of the project steering group in particular, the following staff at Wealden District Council; Chris Hannington, Hazel Carter and David Phillips; Patrick McKernan (SE AONBs Woodland Officer) for all his support and advice throughout the project; Henri Brocklebank and Charles Roper at the Sussex Biodiversity Record Centre; Jonathan Harding (Forestry Commission), Tony Whitbread (Sussex Wildlife Trust), Christopher Whittick (East Sussex Record Office); Keith Kirby and Emma Goldberg (English Nature); and many others.

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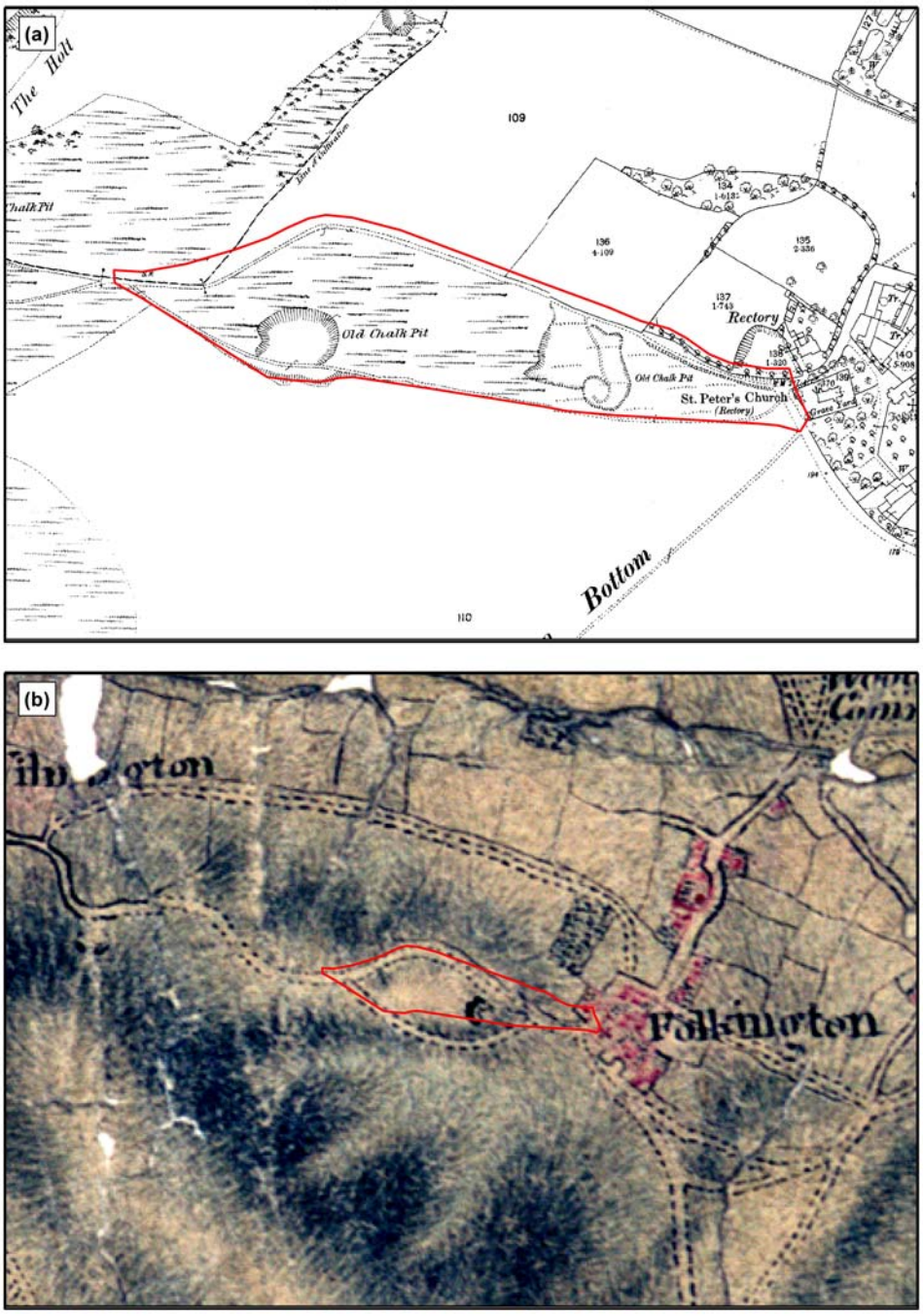
9. Appendices

Appendix 1: Examples of revisions made to the original AWI



Gillett's Lane, Long Man (TQ596168). (a) First County Series OS Map (1873) with the wood outlined in red. (b) OS Surveyors drawing (c.1800) showing the same wood.

This is a 5.7 hectare wood which was included on the original AWI. However, it doesn't appear as wooded on either the OS surveyors drawing (b) or the First County Series OS map (a), this map shows the area as rough pasture and old chalk pits. Both these map sources point to this woodland being secondary. Yeakell and Gardner's 2" to 1 mile Sussex Map (1778 - 1783) also confirms this. This wood has therefore been removed from the revised Inventory for Wealden District.

Bletchingley Shaw, Rotherfield (TQ 573302). (a) First County Series OS Map (1873) with the wood outlined in red. (b) OS Surveyors drawing (c.1800) showing the same wood.

This 2.5 hectare woodland was not included on the original AWI, but has now been added to the revised Inventory for Wealden District. It is present as a distinct woodland on both the OS surveyors drawing and the First County Series OS map. The boundaries are irregular, the woodland follows a stream. The name of the wood appears in a nearby settlement.

A survey carried was carried out in June 2004. The wood contains a deep-cut stream; drainage ditches (straight and sinuous) cross the wood. There are some large beech boundary stubs.
The woodland structure is varied, mostly younger Hazel and Alder coppice stools with occasional oak standards and some fallen and standing dead wood. The ground flora is diverse with a bluebell and anemone carpet throughout. 59 vascular plant species were recorded in total of which 23 were 'ancient woodland indicator species'.

Appendix 2: Case Study: Five Hundred Acre Wood

In 1693 a number of sites were excluded from the common land of Ashdown Forest. These included Broadstone Warren, Hindleap Warren, and Pippingford Park all of which were included on the original 1989 Ancient Woodland Inventory. 500 Acre wood was also enclosed at this time but was not included on the 1989 Inventory. Of all these four sites, 500 Acre Wood has by far the best and most consistent map evidence of it being shown as wooded.

c. 1693	Map of Ashdown Forest by Barry Lucas after Kelton
1747	Map of Ashdown Forest or Lancaster Great Park by John Kelton
1795	1" to 1 mile map of Sussex produced by William Gardner and Thomas Gream
c.1800	OS surveyors drawing map
1825	1"to 1 mile map of Sussex produced by Christopher and John Greenwood
1873	First County Series OS map

Five hundred acre wood has now been added to the revised Inventory for Wealden District.

Appendix 3: Ancient woodland vascular plant 'indicator species'

GRASSES, SEDGES, RUSHES & FERNS		Black bryony		Stinking iris	
Bearded couch		Bluebell		Three-veined sandwort	
Common polypody		Broad-leaved helleborine		Toothwort	
Creeping soft-grass		Bush vetch		Tutsan	
Giant fescue		Chaffweed		Violet helleborine	
Great wood-rush		Columbine*		Wild daffodil*	
Hairy brome		Common Solomon's-seal		Wood vetch	
Hairy wood-rush		Common cow-wheat		Wood spurge	
Hard shield fern		Early dog-violet		Wood speedwell	
Hard fern		Early-purple orchid		Wood anemone	
Hart's-tongue fern*		Goldenrod		Wood-sorrel	
Hay-scented buckler fern		Goldilocks buttercup		Woodruff	
Lemon-scented fern		Greater butterfly orchid		Yellow archangel	
Narrow buckler fern		Greater burnet-saxifrage		Yellow pimpernel	
Pale sedge		Green hellebore		**TREES & SHRUBS**	
Pendulous sedge*		Herb-paris		Alder buckthorn	
Remote sedge		Ivy-leaved bellflower		Aspen	
Scaly male fern		Lady orchid		Bilberry	
Smooth-stalked sedge		Large bitter-cress		Black currant*	
Soft shield fern		Lesser skullcap		Butcher's-broom	
Southern wood-rush		Lily-of-the-valley*		Crab apple*	
Thin-spiked wood sedge		Marsh violet		Field maple*	
Wood melick		Moschatel		Field rose	
Wood meadow-grass		Narrow-leaved everlasting-pea		Guelder-rose	
Wood small-reed		Nettle-leaved bellflower		Holly	
Wood sedge		Opposite-leaved golden saxifrage		Hornbeam*	
Wood millet		Orpine		Midland hawthorn	
Wood club-rush		Pignut		Red currant*	
Wood horsetail		Primrose*		Sessile oak*	
WILD FLOWERS		Ramsons		Small-leaved lime*	
Allseed		Sanicle		Wild cherry	
Barren strawberry		Saw-wort		Wild service tree	
Betony		Slender St John's-wort		Wych elm	
Bird's-nest orchid		Small teasel			
Bitter vetch		Spurge-laurel			

* *Only where these species occur well within a wood and do not appear to have been planted.*

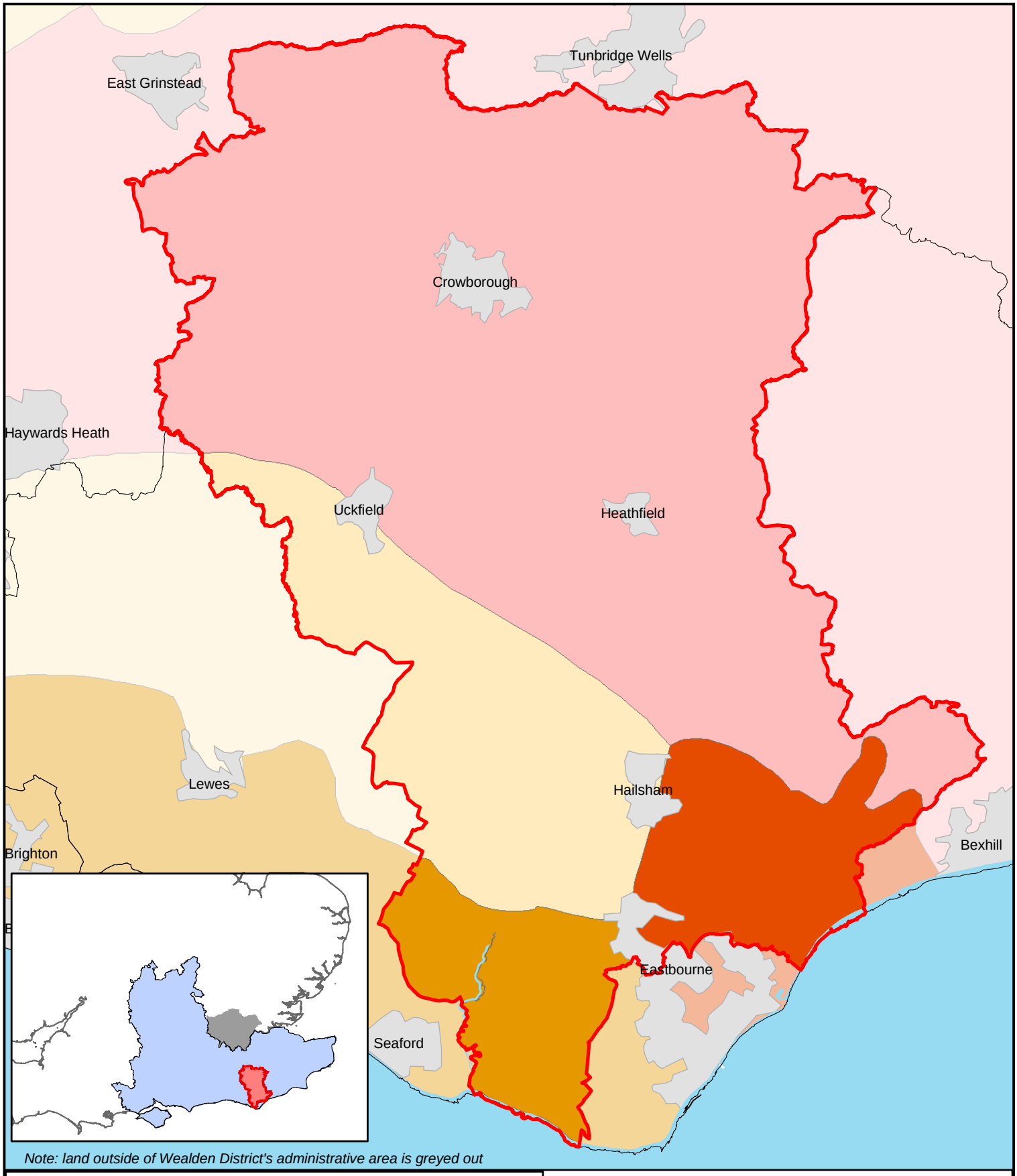
Appendix 4: Summary of findings from woodland survey work

Damage		Occurrence	% Occurrence
invasive species		158	27.05
rubbish, rubble or garden waste dumping		130	22.26
livestock and deer damage		42	7.19
garden extensions/ landscaping		52	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 or coppice-with-standards		435	74.49
some recent management, planting or felling		107	18.35
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 & 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
	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 & 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 track-ways	42	7.19

Appendix 5: Proportional occurrence of ancient woodland 'indicator species'

Taxon name	Species name	number of sites species recorded	% of the total number of sites surveyed
Hyacinthoides non-scripta	Bluebell	544	93.2
Ilex aquifolium	Holly	537	92.0
Primula vulgaris	Primrose	335	57.4
Veronica montana	Wood speedwell	334	57.2
Acer campestre	Field Maple	278	47.6
Carpinus betulus	Hornbeam	256	43.8
Carex pendula	Pendulous Sedge	250	42.8
Moehringia trinervia	Three-veined Sandwort	237	40.6
Anemone nemorosa	Wood Anenome	235	40.2
Carex sylvatica	Wood Sedge	208	35.6
Carex remota	Remote Sedge	207	35.4
Tamus communis	Black Bryony	206	35.3
Oxalis acetosella	Wood-sorrel	203	34.8
Lamiastrum galeobdolon	Yellow Archangel	202	34.6
Lysimachia nemorum	Yellow pimpernel	196	33.6
Chrysosplenium Oppositifolium	Opposite leaved Golden-saxifrage	189	32.4
Ribes rubrum	Red Currant	178	30.5
Prunus avium	Wild cherry	168	28.8
Adoxa moschatellina	Moschatel	146	25.0
Melica uniflora	Wood Melick	142	24.3
Conopodium majus	Pignut	136	23.3
Rosa arvensis	Field Rose	129	22.1
Potentilla sterilis	Barren Strawberry	126	21.6
Blechnum spicant	Hard Fern	111	19.0
Crataegus laevigata	Midland hawthorn	106	18.2
Silene dioica	Red campion	105	18.0
Allium ursinum	Ramsons	94	16.1
Viburnum opulus	Guelder Rose	94	16.1
Dryopteris affinis	Scaly Male Fern	79	13.5
Orchis mascula	Early Purple Orchid	74	12.7
Phyllitis scolopendrium	Hart's-Tongue Fern	62	10.6
Luzula pilosa	Hairy Wood-Rush	42	7.2
Polystichum setiferum	Soft Shield Fern	41	7.0
Ribes nigrum	Black Currant	39	6.7
Galium odoratum	Woodruff	37	6.3
Holcus mollis	Creeping Soft-Grass	37	6.3
Sanicula europaea	Sanicle	28	4.8
Euphorbia amygdaloides	Wood Spurge	25	4.3
Hypericum androsaemum	Tutsan	24	4.1
Populus tremula	Aspen	23	3.9
Viola reichenbachiana	Early Dog violet	23	3.9
Poa nemoralis	Wood Meadow-Grass	21	3.6
Hypericum pulchrum	Slender St John's-wort	18	3.1
Luzula sylvatica	Great Wood-Rush	17	2.9
Milium effusum	Wood Millet	17	2.9
Bromopsis ramosa	Hairy Brome	16	2.7
Festuca gigantea	Giant Fescue	16	2.7
Polypodium vulgare agg.	Common Polypody	16	2.7
Ranunculus auricomus	Goldilocks Buttercup	16	2.7
Dryopteris carthusiana	Narrow Buckler Fern	13	2.2
Vicia sepium	Bush vetch	13	2.2
Cardamine amara	Large Bittercress	12	2.1

Taxon name	Species name	number of sites species recorded	% of the total number of sites surveyed
Stachys officinalis	Betony	12	2.1
Polystichum aculeatum	Hard Shield Fern	10	1.7
Sorbus torminalis	Wild-service tree	10	1.7
Ulmus glabra	Wych elm	10	1.7
Melampyrum pratense	Cow wheat	7	1.2
Vaccinium myrtillus	Bilberry	7	1.2
Carex strigosa	Thin-Spiked Wood Sedge	6	1.0
Epipactis helleborine	Broad leaved Helleborine	6	1.0
Oreopteris limbosperma	Lemon-Scented Fern	6	1.0
Scirpus sylvaticus	Wood Club Rush	6	1.0
Frangula alnus	Alder buckthorn	5	0.9
Quercus petraea	Sessile oak	5	0.9
Ruscus aculeatus	Butcher's Broom	4	0.7
Iris foetidissima	Stinking Iris	3	0.5
Daphne laureola	Spurge laurel	2	0.3
Helleborus viridis	Green Hellebore	2	0.3
Solidago virgaurea	Golden-rod	2	0.3
Viola palustris	Marsh violet	2	0.3
Carex laevigata	Smooth-Stalked Sedge	1	0.2
Dryopteris aemula	Hay-Scented Buckler Fern	1	0.2
Epipactis purpurata	Violet Helleborine	1	0.2
Lathyrus linifolius	Bitter vetch	1	0.2
Sedum telephium	Orpine	1	0.2
Tilia cordata	Small-leaved lime	1	0.2



Wealden District

Settlements

South East region

English Nature/ Countryside Agency Joint Character Areas

South Downs

Pevensey Levels

Low Weald

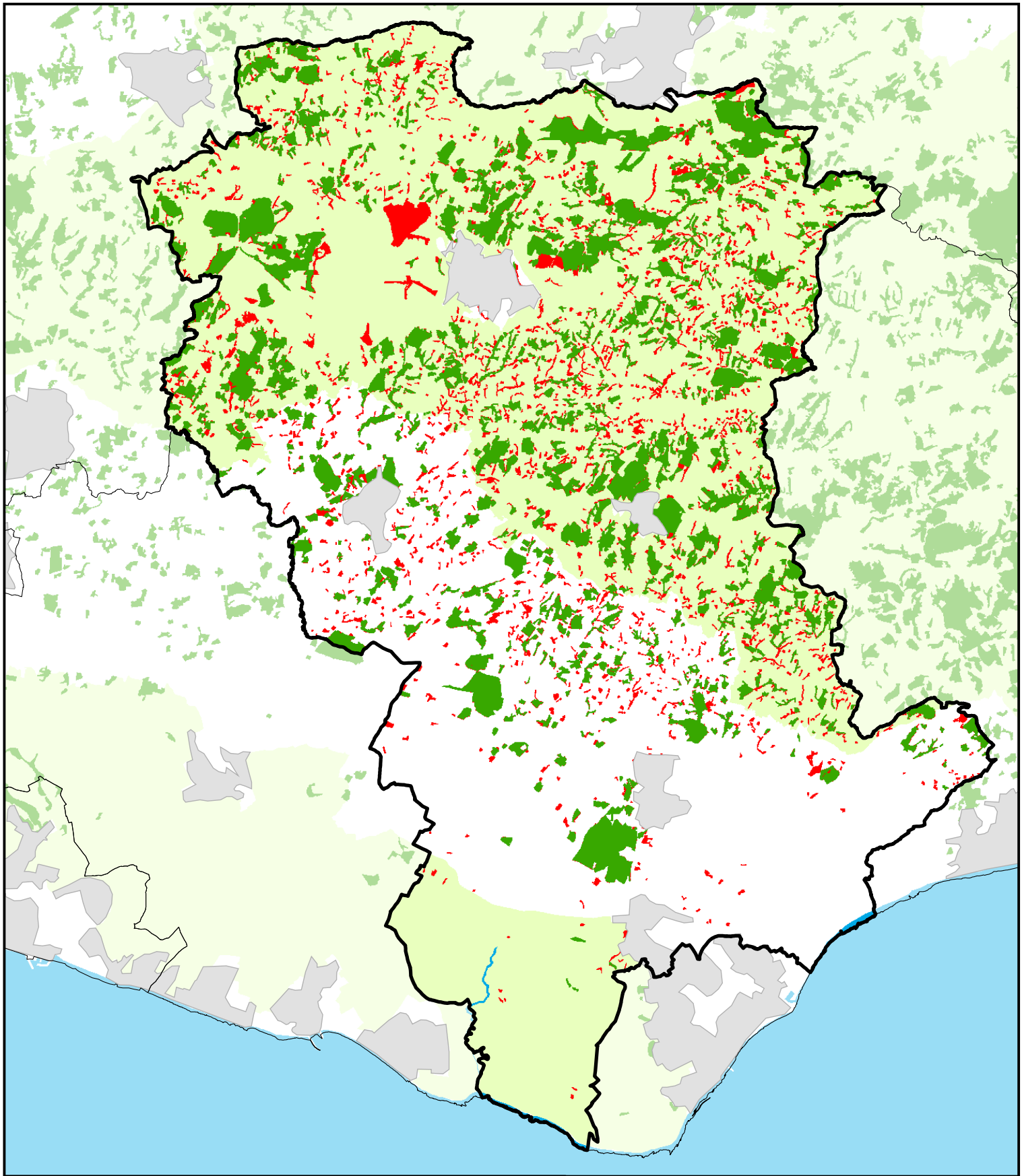
High Weald

Map 1: Wealden District Council administrative area showing the English Nature/ Countryside Agency Joint Character Areas and the location of Wealden District within the South East Region (inset).

0 2.5 5 10 Kilometres

N

Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



Wealden District

Original Provisional Ancient Woodland Inventory (FC)

Settlements

Areas of Outstanding Natural Beauty

Additional Areas on the Revised Inventory for Wealden District

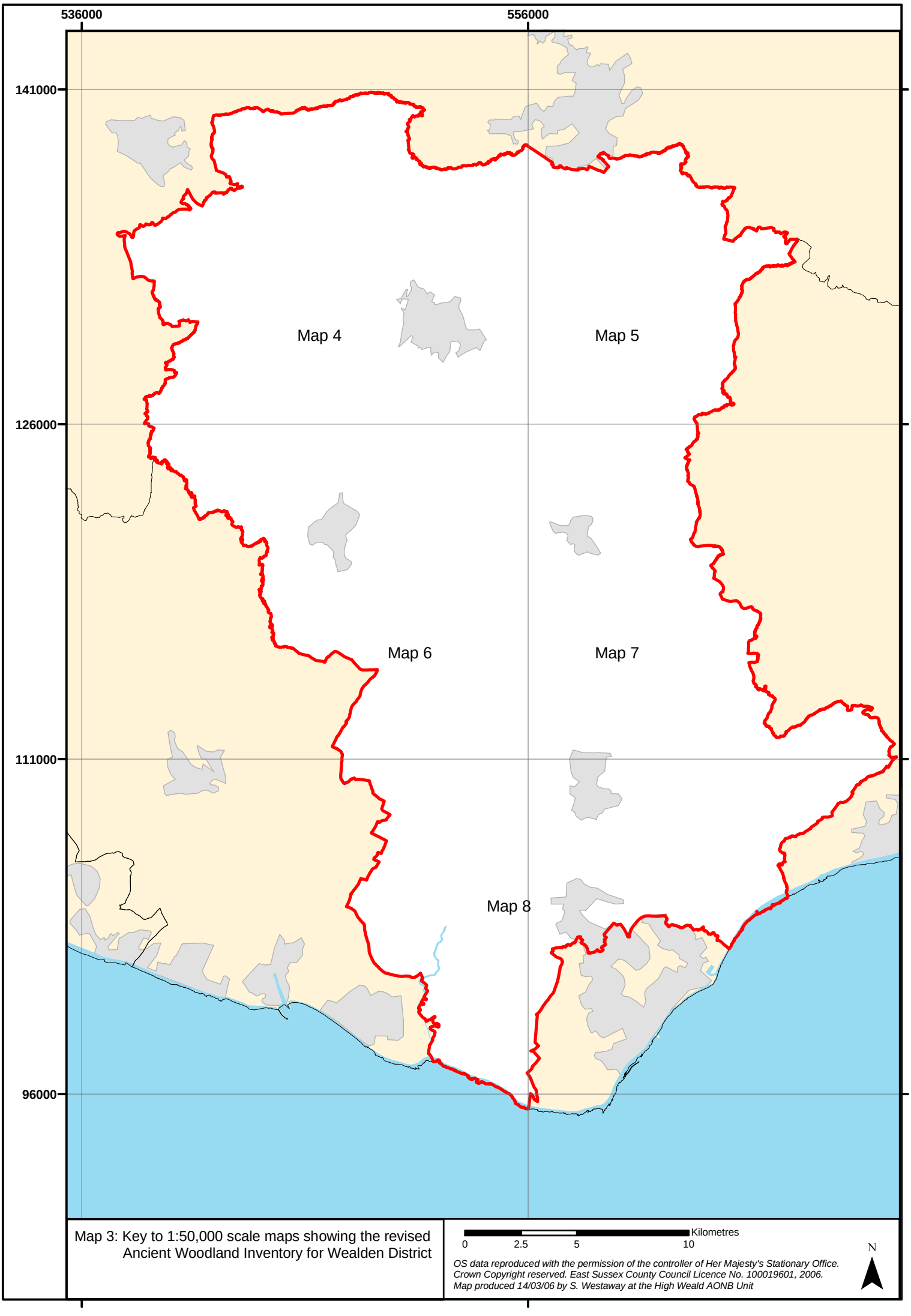
Note: land outside of Wealden District's administrative area is greyed out

Map 2: Revised Ancient Woodland Inventory for Wealden District showing additions since the original publication in 1989

N

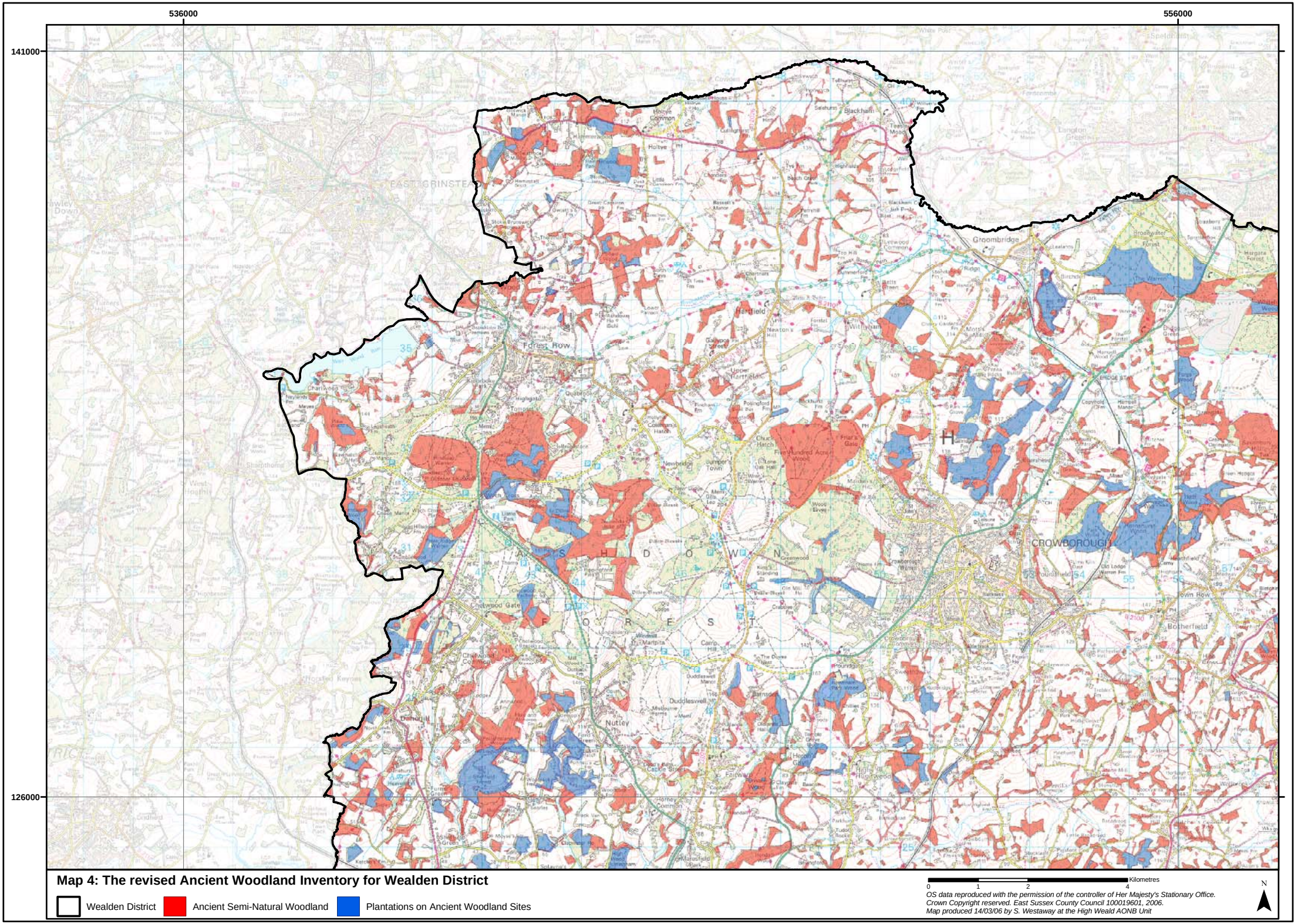
0 2.5 5 10 Kilometres

Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



Map 3: Key to 1:50,000 scale maps showing the revised Ancient Woodland Inventory for Wealden District

Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



Map 4: The revised Ancient Woodland Inventory for Wealden District

Wealden District | Ancient Semi-Natural Woodland | Plantations on Ancient Woodland Sites

Kilometres
0 1 2 4

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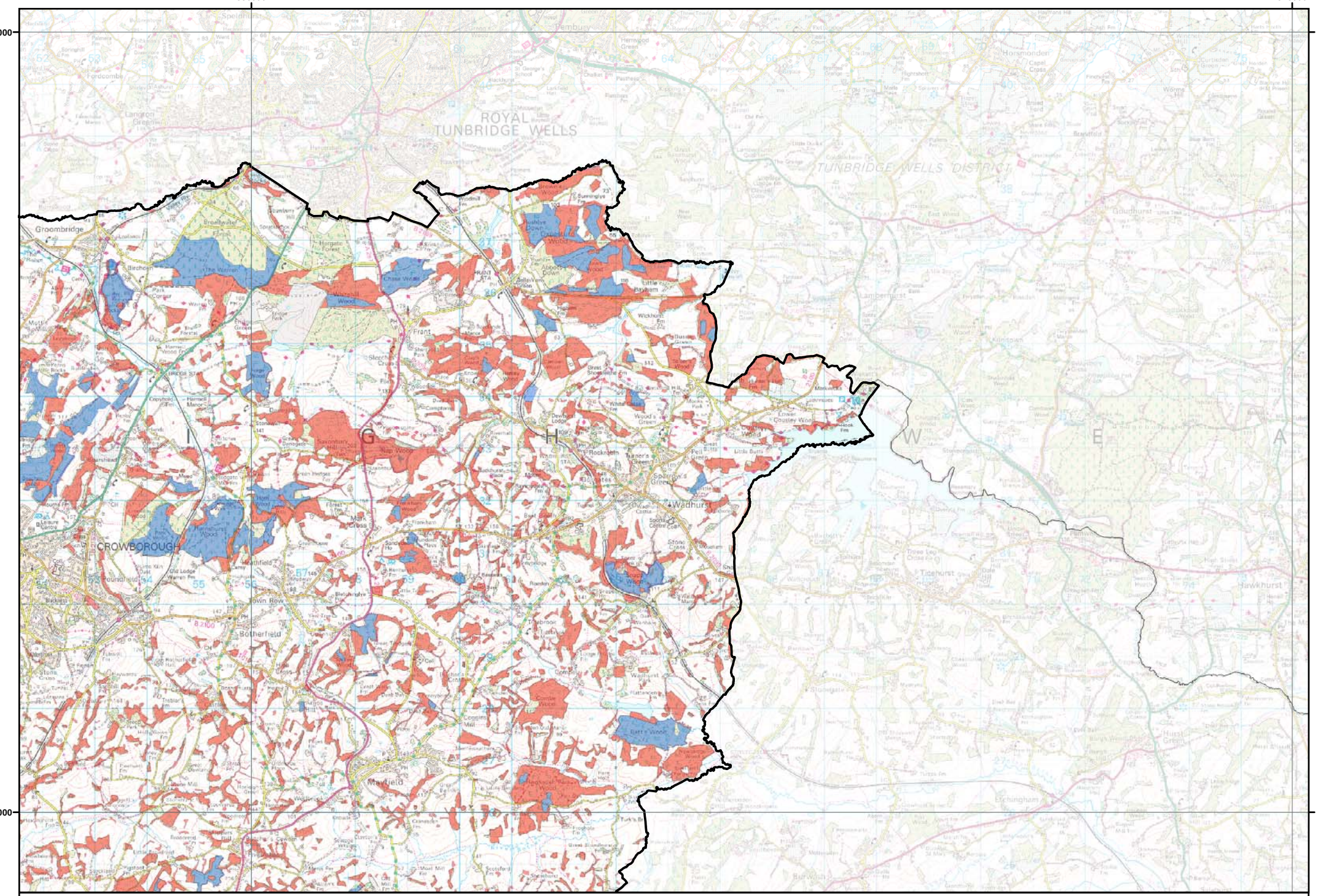
Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



Map 5: The revised Ancient Woodland Inventory for Wealden District

Wealden District | Ancient Semi-Natural Woodland | Plantations on Ancient Woodland Sites

Kilometres
0 1 2 4

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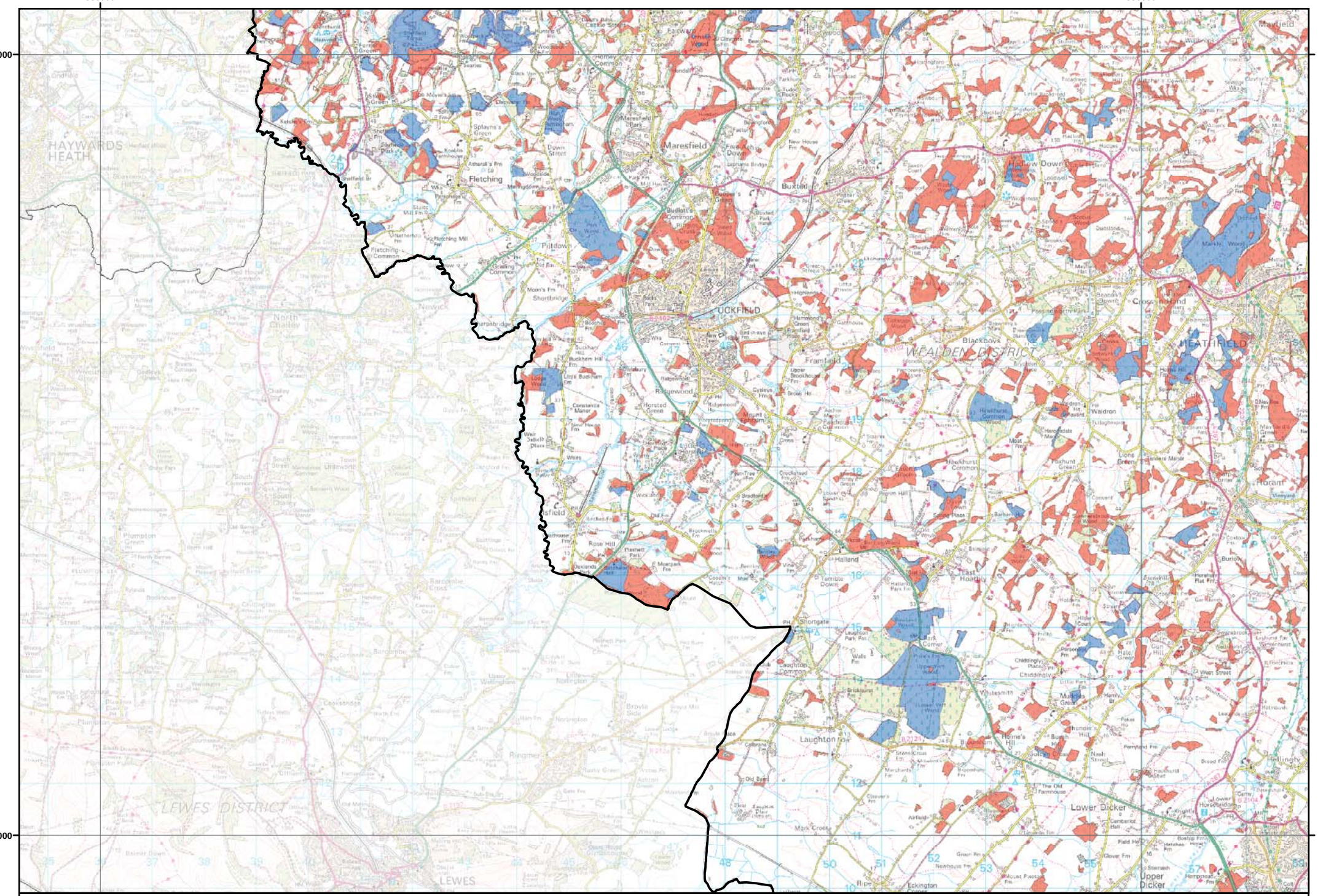

Map 6: The revised Ancient Woodland Inventory for Wealden District

Wealden District | Ancient Semi-Natural Woodland | Plantations on Ancient Woodland Sites

Kilometres 0 1 2 4

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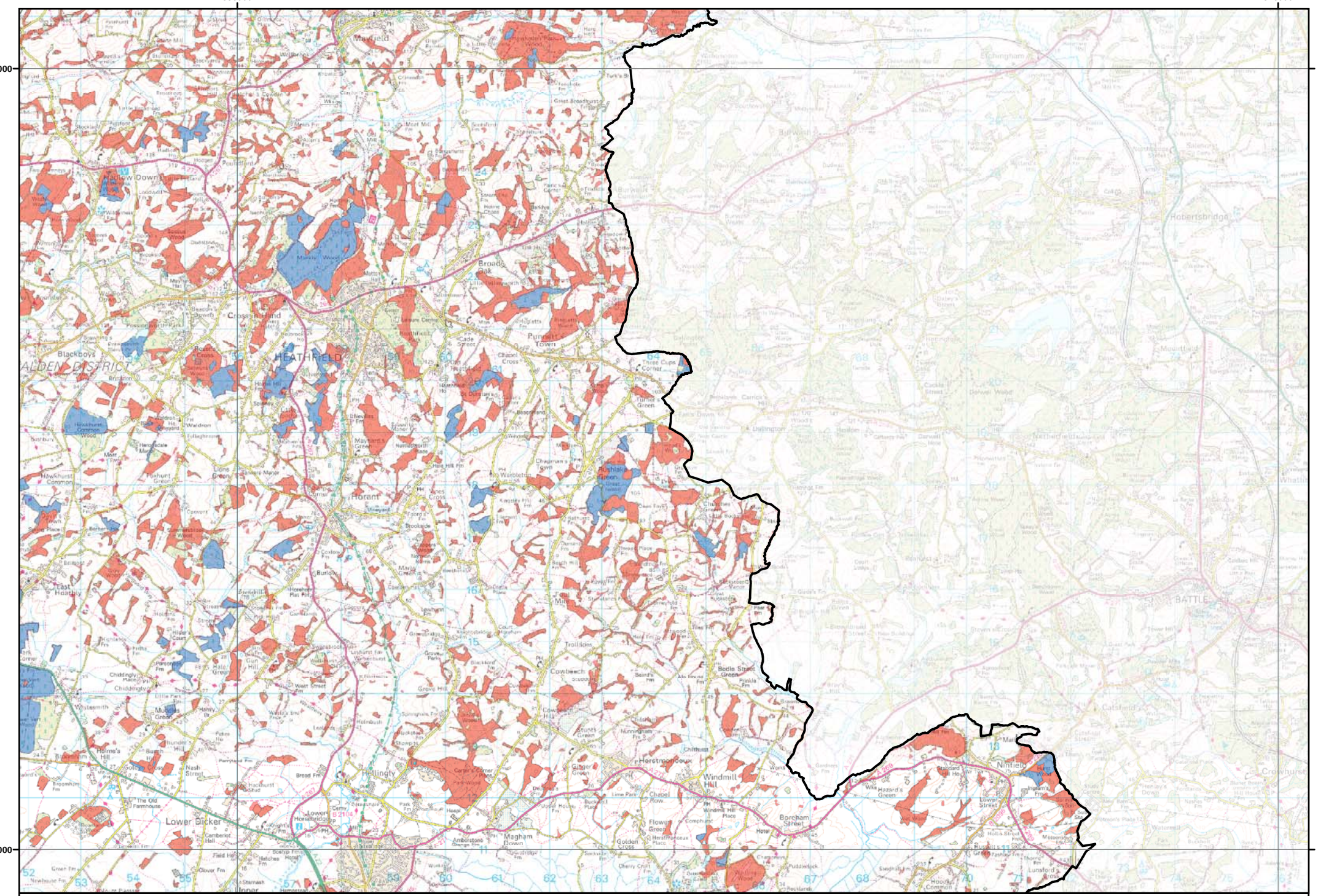
Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



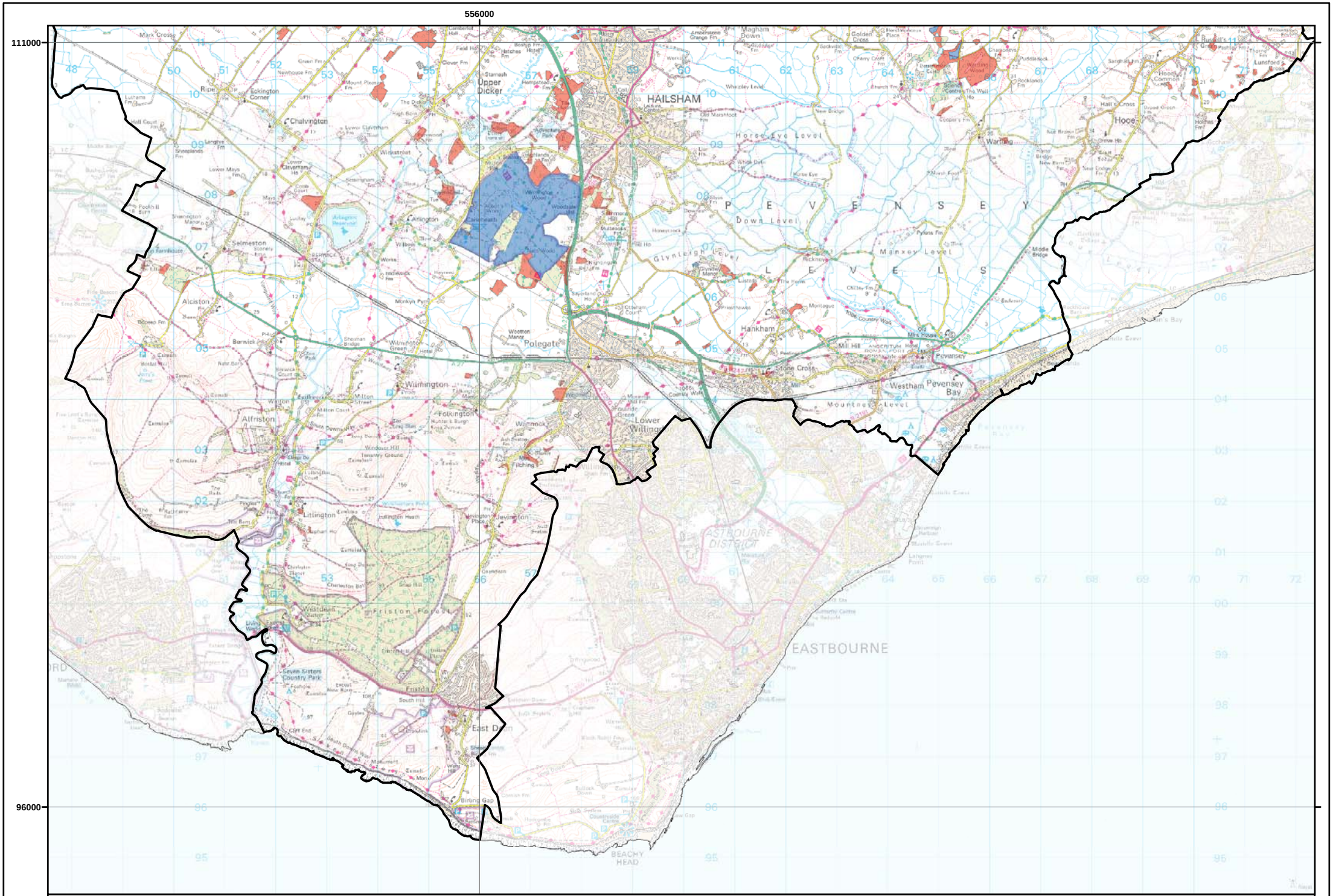
Map 7: The revised Ancient Woodland Inventory for Wealden District

Wealden District | Ancient Semi-Natural Woodland | Plantations on Ancient Woodland Sites

Kilometres
0 1 2 4

N

Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit



Map 8: The revised Ancient Woodland Inventory for Wealden District

Wealden District | Ancient Semi-Natural Woodland | Plantations on Ancient Woodland Sites

Kilometres
0 1 2 4

N

Map produced 14/03/06 by S. Westaway at the High Weald AONB Unit