

Priority Habitat Definition Statement Lowland Mixed Deciduous Woodland – v1.2

1. Introduction

1.1 HAP woodland criteria

Please note: As outlined by the UK Native Woodland HAPs Definitions Working Group report ¹⁵, woodland must fit into one of the following categories to qualify as being in the current area of broadleaved woodland HAPs.

- Ancient semi-natural woods (semi-natural stands on ancient sites).
- Other semi-natural woods (semi-natural stands on more recent woodland sites).
- Planted woods on ancient woodland sites where the composition is mainly site native species (over 50% of the canopy).
- Other planted woods of mainly native species (over 50% of the canopy is site-native species), where the agreed aim is to manage towards a more semi-natural structure and composition.
- New Native Woodlands created to mimic the natural composition of the woodlands on the site.

To qualify as HAP woodland, a site must have:

- 20% or more canopy cover, or the potential to achieve this in the case of newly planted stands.
- A canopy composed of 50% or more site-native species of trees or shrubs (or will be at canopy closure in the case of younger stands). Site native trees are those which are native to the locality and capable of growing naturally on the site, ie. they can successfully colonise and complete their life cycle. Peterken and Soutar (1989) 'Native trees and shrubs for wildlife' ¹² can be used as a guide, but it gives a broad indication only. Local knowledge is more important.

When determining if a site is part of the lowland mixed deciduous woodland HAP resource, the above criteria should be met before the description of lowland mixed deciduous woodland that follows is applied.

1.2 General description of lowland mixed deciduous woodland

This is a large category that incorporates most of the semi-natural woodland in southern and eastern England, and in parts of lowland Wales and Scotland (as well as relevant planted native broadleaved woods). In many respects it is complementary to the upland oakwood and upland mixed ashwood types. Despite great variety in the species composition of the canopy layer and the ground flora, some features are common to many stands:

- **Occurs largely within enclosed landscapes, usually on sites with well-defined boundaries compared with, for example, upland oak or native pine woodlands.**
- **Many are ancient woods.**
- **Most sites are relatively small, less than 20 ha.**

- Most were traditionally coppiced, particularly those on moderately acid to base-rich soils; on very acid sands the type may be represented by former wood-pastures of oak and birch.
- Pedunculate oak (*Quercus robur*) is generally the commoner oak (although Sessile oak (*Quercus petraea*) may be abundant locally) and may occur with virtually all combinations of other locally native tree species.¹¹

Oak and ash dominated woods are the most usual woods under this HAP, with hazel as the commonest underwood species. Field maple, wych elm, wild cherry suckering elms and sallows are frequent within W8, whilst silver birch, small-leaved lime, hornbeam and alder may be present in W10. Conifers are naturally absent, save for yew on a few limestone outcrops. Mixed woods with just a few beech can occur. Sycamore, sweet chestnut and other non-native trees have colonised many woods. Within these woods there is therefore considerable variation in stand composition, giving rise to a complex, small-scale patchwork of different dominants. Hawthorns, dogwood, spindle and other shrubs are frequently found in the underwood. Wild service occurs sparingly. In W8 woodland, dog's mercury *Mercurialis perennis* is the characteristic field layer dominant, but bluebell *Hyacinthoides non-scripta*, enchanter's nightshade *Circaea lutetiana*, bramble *Rubus fruticosus*, yellow archangel *Lamium galeobdolon*, primrose *Primula vulgaris*, wood anemone *Anemone nemorosa* and many others are often common. In W10, the ground flora is poorer than W8, with bluebell, wood anemone, bramble, honeysuckle *Lonicera periclymenum* and bracken often dominating at different seasons. A typical example is a wood of 10-30ha, growing on a flat or gently sloping site at or below 300m altitude, entirely surrounded by farmland, dominated by mixtures of oak, ash, and hazel, which was treated as coppice until 30-70 years ago.⁶

Some woods within this HAP may appear as oak-birch woods. Pedunculate oak, sessile oak and two birch species (*Betula pubescens* and *B. pendula*) can predominate, or grow in mixtures, often with a few beech, sweet chestnut, Scots pine or aspen. Holly, rowan, alder buckthorn and elder commonly occur as an underwood, but hazel, hawthorn and ash are extremely rare. Many woods have been overtaken by Rhododendron. The ground vegetation is extremely poor and generally sparse, characteristically including wavy hair grass *Deschampsia flexuosa*, bracken, bilberry *Vaccinium myrtillus*, wood sage *Teucrium scorodonia*, tormentil *Potentilla neumanniana*, foxglove *Digitalis purpurea*, hard-fern *Blechnum spicant* and buckler ferns (*Dryopteris*)⁵. In the west these woods are more likely to be included in the upland oakwood HAP.

1.3 Summary of existing information

1.3.1 Information sources

The UK Native Woodland Habitat Action Plans – Report of the Definitions Working Group (unpublished) provided general guidance on defining the native woodland HAPs.

Four key documents were identified as the main sources of guidance for defining lowland mixed deciduous woodland, and in many cases they are quoted from directly in this statement:

- Lowland Mixed Deciduous Woodland: Draft Habitat Action Plan (Version 2 attached as **Appendix 2**).
- JNCC Report No. 288 - The Relationship between Biodiversity Action Plan Priority and Broad Woodland Habitat Types, and other woodland classifications.

- Forestry Authority Forestry Practice Guide 1 – Lowland Acid Beech and Oak Woods.
- Forestry Authority Forestry Practice Guide 3 – Lowland Mixed Broadleaved Woods.

These and other documents used to develop this definition statement are listed in **Appendix 1**.

1.3.2 Existing inventories

National-scale woodland inventories do exist, principally the National Inventory of Woodland and Trees (Forestry Commission) and Ancient Woodland Inventory (English Nature), however these do not spatially represent the distribution of woodland priority habitat types.

1.4 Key issues with mapping and discriminating from other habitats

- Please refer to Section 1.1 as a guide to woodland that qualifies as belonging to one of the woodland HAPs. Based on this guidance, any planted woodland that is not on an ancient woodland site, where management is not known, should be included in the “maybe” rather than “definitely” or “definitely not” categories.
- The minimum mappable unit (MMU) for this habitat is 0.25ha, and the minimum width is 15m. Please refer to Section 11 for further details.
- Areas of open ground within woods (e.g. glades, rides) should only be included as part of the woodland resource if they do not qualify to be mapped as a polygon belonging to one of the other priority habitats and are not greater than 0.25 ha in area. (Note that they will however usually be included as part of the “woodland” for management scheme purposes).
- Scrub of 0.25ha or over and 20% or greater cover should be included as part of the appropriate woodland HAP.
- Except for lowland wood pasture and parkland, woodland priority habitats are mutually exclusive of each other and there should be no overlap between polygons belonging to different woodland priority habitats. Please refer to Section 9 for further details.
- In many respects this HAP is complementary to the upland oakwood and upland mixed ashwood types. The boundary between lowland mixed deciduous woodland and these upland counterparts can be difficult to determine. In these situations, a division based on Natural Areas may be helpful. **Appendix 3** provides this guidance.
- Please refer to Section 4 for resolution of classification types that may be allocated to this habitat as well as to other woodland priority habitats.
- In distinguishing this habitat from other non-woodland habitats, any site of over 0.25ha with 20% or greater canopy cover will be a woodland rather than a non-woodland habitat. For further rules on dealing with relationships with non-woodland habitats, see Section 9.

2. Physiographical description

2.1 Structural/physical components

No typical associations, can occur almost anywhere.

2.2 Applicability of aerial photos and other remote sensing technologies

Dependant on factors such as the time of year the photographs were taken, their scale, and the experience of the interpreter, it is possible to distinguish broadleaved from coniferous species from aerial photographs, and sometimes certain individual species types. It is however unlikely that aerial photography alone would provide enough information to identify individual woodland priority habitat types.

Unknown as to the value of using airborne remote sensing instrumentation such as 'LIDAR' (Light Detection and Ranging), and 'CASI' (Compact Airborne Spectrographic Imagery). May have some use for distinguishing woodland types at a fairly crude scale.

3. Altitudinal limits

Although this habitat typically occurs at relatively low altitudes, altitude is not a defining feature ¹¹. Therefore there are no lower altitudinal limits to the occurrence of this habitat and its upper limit is only restricted by altitudes where trees are not able to grow. At higher altitudes mainly in west however, it is likely to be replaced by upland ash or upland oak.

4. Habitat classification

(based on JNCC Report 288⁸, with additions)

CLASSIFICATION and version date	CODE	(HIS CODE)	DESCRIPTION	RELATIONSHIP*	COMMENTS
BAP priority habitat (1995)		WB36	Lowland mixed deciduous woodland		
BAP broad habitat (1998)		WB0	Broadleaved, mixed and yew woodland	>	
Phase 1 (1990)	A1.1.1 A1.1.2 A1.3.1 A1.3.2 A2.1 A3.1 A3.3 A4.1 A4.3		Broadleaved semi-natural woodland Broadleaved plantation woodland Mixed semi-natural woodland Mixed plantation woodland Dense/continuous scrub Broadleaved parkland/scattered trees Mixed parkland/scattered trees Recently-felled broadleaved woodland Recently-felled mixed woodland	# # # # # # # # #	A4.1 and A4.3 are only relevant if the intention is to keep the site as woodland.
NVC (1991)	W8 a b c d (e) (f) (g) W10 a b c d (e) W16 a (b)		<i>Fraxinus excelsior</i> – <i>Acer campestre</i> – <i>Mercurialis perennis</i> Sub-communities: a – <i>Primula vulgaris</i> – <i>Glechoma hederacea</i> b – <i>Anemone nemorosa</i> c – <i>Deschampsia cespitosa</i> d – <i>Hedera helix</i> (e – <i>Geranium robertianum</i>) (f – <i>Allium ursinum</i>) (g – <i>Teucrium scorodonia</i>) <i>Quercus robur</i> – <i>Pteridium aquilinum</i> – <i>Rubus fruticosus</i> Sub-communities: a – Typical sub-community b – <i>Anemone nemorosa</i> c – <i>Hedera helix</i> d – <i>Holcus lanatus</i> (e – <i>Acer pseudoplatanus</i> – <i>oxalis acetosella</i>) <i>Quercus</i> spp. - <i>Betula</i> spp. - <i>Deschampsia flexuosa</i> Sub-communities: a – <i>Quercus robur</i> (b – <i>Vaccinium myrtillus</i> – <i>Dryopteris dilatata</i>)	< < < < < < < < < < < < < < < < < <	The boundary between lowland mixed deciduous woodland and its two upland counterparts can be difficult to determine, as the same NVC types may occur in either. Where it is not clear-cut, a division based on Natural Areas may be helpful (see Appendix 3) The bulk of this priority habitat falls into W8 and W10. Infrequently W8a-c may correspond to upland mixed ashwoods, but normally when in mosaic with other upland mixed ashwood NVC types. W8d may also correspond to upland mixed ashwoods, although not stands that occur in the south-east of England. W8e is normally associated with upland mixed ashwoods, although not stands that occur in the south-east of England. W8f and g are also normally associated with upland mixed ashwoods. W10e is normally referred to the upland oakwood or upland birchwoods HAP. Lesser amounts of this priority habitat fall into W16, and mainly W16 a. W16b is usually associated with upland oakwoods.
Forestry Commission guide types (1994)	3 1		Lowland mixed broadleaved woods Lowland acid beech and oak woods	< #	Most woods included in this priority habitat should be considered under Guide 3. Beech-dominated stands whose management is considered under Guide type 1 are included in the lowland beech and yew priority habitat type. Lowland woods on acid soils which lack beech and are dominated by oak, hornbeam, lime etc. are considered as part of the lowland mixed deciduous woodland habitat type.

Peterken stand types (date?)	(1A) 1B 2A 2B 2C 3A 3B 4A 4B 5A 5B 6C 6D (7C) 9A 9B 10 (12)		(Calcareous ash-wych elm woods) Wet ash-wych elm woods Wet ash-maple woods Ash-maple woods on light soils Dry ash-maple wood Acid pedunculate oak-hazel-ash woods Southern calciferous hazel-ash woods Acid birch-ash-lime woods Southern calciferous hazel-ash woods Acid pedunculate oak-lime woods Acid sessile oak-lime woods Lowland sessile oak woods Lowland pedunculate oak woods (Plateau alder woods) Pedunculate oak-hornbeam woods Sessile oak-hornbeam woods Suckering elm woodland (Birch woodland)	< < < < < < < < < < < < < < < < < <	1A may rarely occur, although is more usually associated with upland mixed ashwoods. 7C is normally associated with wet woodland, although some examples may be better placed with the lowland mixed deciduous woodland. 12 may rarely occur, although is more usually associated with wet woodland, upland oakwood, native pine woodland, or upland birchwoods.
EUNIS (date?)					
Palaeartic (date?)					
CORINE (1991)	41.23 41.32 41.24 41.51 41.525		Sub-Atlantic oxlip-ash-oak forests. British ash-field maple-dogs mercury forests. Sub-Atlantic oak-hornbeam forests. Pedunculate oak and birch woods. English pedunculate oak-birch-wavy hair-grass woods.	< < < < <	41.32 may also correspond to upland mixed ashwoods. See Appendix 3 for guidance. Conceivably a few stands of 41.524 could fall into this habitat also.
Habitats Directive Annex 1 (1997)	41.4 41.24 41.51 (44.3)	WB363 WB362 WB361 WB341	' <i>Tilio-Acerion</i> ravine forests' ' <i>Stellario-Carpinetum</i> oak-hornbeam forests' 'Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains' 'Residual alluvial forests'	< < < <	41.4 is normally associated with upland mixed ashwoods, although a few outlying stands on the southern chalk in Hampshire and Sussex should be placed in the lowland mixed deciduous type. 44.3 is normally considered with wet woodland, although if there are no alders or willows present, and depending on the size of the stands, such woodland could be considered under the lowland mixed deciduous woodland habitat type.
Habitats Directive Annex 1 (date?)	9180 9160 9190 (91E0)	WB363 WB362 WB361 WB341	' <i>Tilio-Acerion</i> ravine forests' of slopes, screes and ravines Sub-Atlantic and medio-European oak and oak-hornbeam forests of the <i>Carpinion betuli</i> 'Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains' Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	< < < <	9180 is normally associated with upland mixed ashwoods, although a few outlying stands on the southern chalk in Hampshire and Sussex should be placed in the lowland mixed deciduous type. 44.3 is normally considered with wet woodland, although if there are no alders or willows present, and depending on the size of the stands, such woodland could be considered under the lowland mixed deciduous woodland habitat type.

* relationship of classification type to priority habitat:
= equal, < narrower, > wider, # overlap, ? not determined

5. Species composition

Lowland mixed deciduous woodland is among the richest habitats for wildlife in the lowlands and in many eastern counties forms the main reservoirs of semi-natural habitat in the agricultural matrix. They include the best examples of bluebell woods for which the UK has particular responsibility. ¹¹

Section 1.2 gives a description of the characteristic tree, shrub, and ground flora species for this habitat.

A list of priority species associated with this habitat, from 'Biodiversity - Making the Links' ³, is included as **Appendix 4**.

6. Geographical restrictions

6.1 Geographical coverage and restrictions in the UK

Lowland mixed deciduous woodlands are concentrated in southern and eastern England, but also occur sparingly in the Scottish and Welsh lowlands and the upland margins. ¹¹

6.2 Climate requirements

Tends to be found in the dryer, warmer parts of the UK.

7. Geology and soils

No specific links to geological strata, although mainly associated with the younger rocks that comprise the south-east rather than the north-west of Britain.

This HAP spans woodland growing on the full range of soil conditions, from very acidic to base-rich. W8 woodland occurs on alkaline and neutral soils, many of which are heavy and poorly-drained. W10 woodland occurs on acid soils ranging from poorly-drained clays to lighter, base-poor sandy loams. W16 woodland is associated with strongly acid soils, most of which are light, freely-drained and podzolic. ^{5, 6, 11}

8. Hydrology

Not found on water-logged soils since these would be classed as wet woodland.

9. Relationship with other habitats

	Lowland mixed deciduous woodland
Upland oakwood	Separate by NVC and other vegetation criteria, as well as Natural Area presumptions (Appendix 3).
Lowland beech and yew woodland	Separate by NVC and other vegetation criteria.
Upland mixed ashwoods	Separate by NVC and other vegetation criteria, as well as Natural Area presumptions (Appendix 3).
Lowland wood-pasture and parkland	Allowable overlap – sites can be recorded as part of both HAPs.
Upland birchwoods	Separate by NVC and other vegetation criteria.
Lowland wood pasture and parkland	Unavoidable overlap – sites can be recorded as part of both HAPs.
Wet woodland	Separate by NVC and other vegetation criteria.
Ancient and/or species rich hedgerows	Separate by width and area protocols. Hedgerows by definition must be under a width of 5m by definition. Strips of woodland below a width of 5m will be mapped as a linear feature and will therefore not contribute to the area of the woodland HAP.
Coastal and floodplain grazing marsh	Lowland mixed deciduous woodland occurring in coastal and floodplain grazing marsh should be mapped as this woodland if meets the minimum mappable unit size. Smaller areas of woodland may be included within CFPGM polygons.
Coastal sand dunes	Allowable overlap. Area may be mapped as part of both inventories.
Maritime cliff and slopes	Allowable overlap. Area may be mapped as part of both inventories.

10. Management

Many of the ancient woodland examples were coppiced, particularly those on moderately acid to base-rich soils, or treated as coppice with standards. For most woods coppicing ceased during the 20th Century and they may now be neglected. Consequently many woods may now appear as high forest. In addition high forest stands develop where densely stocked oaks have grown to closed canopy stands, or where suckered elm clones have been allowed to grow up. Some mixed woodlands have a history as wood-pasture. ^{5, 6, 11}

11. Size of mappable units

Minimum mappable unit (MMU): 0.25 ha

Minimum width: 15 m

The UK Native Woodland HAPs Definitions Working Group report ¹⁵ states that although all national inventory and reporting should distinguish between woods over and under 2ha, smaller units should be distinguished if possible. Experience from mapping work (SERC, EN Wetland Inventory Project) has show that is not significantly more time consuming to map small blocks of woodland. (Areas below 2ha may however be treated as part of the surrounding woodland type for management planning purposes).

12. Regional differences

Because this priority habitat is fairly broad, it includes many variants, some of which are restricted in their distribution. For example, hornbeam woods are common in Kent, Sussex and East Anglia, lime is particularly common in Lincolnshire.

Appendix 1 Information Sources

- ¹ Action for Biodiversity in the South West – a series of habitat and species plans to guide delivery (June 1997). Nature conservation bodies and South West Regional Planning Conference partnership document
- ² Castle, G. and Mileto, R. (Eco Tech)(1999). UKBAP Native Woods Inventory and Reporting: A needs assessment and review of current resources and future opportunities (undertaken on behalf of the Forestry Commission). Unpublished
- ³ English Nature (1999) Biodiversity : making the links. English Nature
- ⁴ Forestry Commission Native Woodland Habitat Action Plans Information Note (draft). Unpublished.
- ⁵ Forestry Practice Guide 1 – Lowland acid beech and oak woods. Forestry Authority, Edinburgh.
- ⁶ Forestry Practice Guide 3 – Lowland Mixed Broadleaved Woods. Forestry Authority, Edinburgh
- ⁷ Gibson, C.W.D. (1998). Harmonisation of Habitat Classifications. JNCC Report, No. 279.
- ⁸ Hall, J.E. and Kirby, K.J. (1998). The relationship between Biodiversity Action Plan Priority and Broad Woodland Habitat Types, and other woodland classifications. JNCC Report, No. 288.
- ⁹ Jackson, D.L. (2000). Guidance on the interpretation of the Biodiversity Broad Habitat Classification (terrestrial and freshwater types): Definitions and the relationship with other habitat classifications. JNCC Report, No. 307.
- ¹⁰ NCC (1990). Handbook for Phase 1 habitat survey: a technique for environmental audit field manual NCC, Peterborough
- ¹¹ Lowland Mixed Deciduous Woodland: Draft Habitat Action Plan (Version 2).
- ¹² Peterken, P. and Soutar, R. (1989). Native Trees and Shrubs for Wildlife. In Forestry Commission (1990) Forest Nature Conservation Guidelines, HMSO.
- ¹³ Rodwell, J.S.(ed) (1991). British Plant Communities. Vol. 1: Woodlands and scrub. Cambridge University Press, Cambridge
- ¹⁴ SERC (2001) The Integrated Habitat System
- ¹⁵ UK Native Woodland Habitat Action Plans – Report of the Definitions Working Group (unpublished)
- ¹⁶ Whitbread, A.M. and Kirby, K.J (1992). Summary of National Vegetation Classification woodland descriptions. UK Nature Conservation 4 JNCC

Appendix 2

Lowland Mixed Deciduous Woodland: Draft Habitat Action Plan (Version 2, Autumn 2001)

1. Current status

1.1 Biological status

- 1.1.1 Lowland mixed deciduous woodland includes woodland growing on the full range of soil conditions, from very acidic to base-rich, and takes in most semi-natural woodland in southern and eastern England, and in parts of lowland Wales and Scotland (Map 1). It thus complements the ranges of upland oak and upland ash types. It occurs largely within enclosed landscapes, usually on sites with well-defined boundaries, at relatively low altitudes, although altitude is not a defining feature. Many are ancient woods and they include the classic examples of ancient woodland studied by Rackham (1980) and Peterken (1981) in East Anglia and the East Midlands. The woods tend to be small, less than 20 ha. Often there is evidence of past coppicing, particularly on moderately acid to base-rich soils; on very acid sands the type may be represented by former wood-pastures of oak and birch.
- 1.1.2 There is great variety in the species composition of the canopy layer and the ground flora, and this is reflected in the range of associated NVC and Stand Types. *Quercus robur* is generally the commoner oak (although *Quercus petraea* may be abundant locally) and may occur with virtually all combinations of other locally native tree species.
- 1.1.3 In terms of the National Vegetation Classification the bulk of this type falls into W8 (mainly sub-communities a to c in ancient or recent woods; in the lowlands W8d mostly occurs in secondary woodland) and W10 (sub-communities a to d) with lesser amounts of W16 (mainly W16a). Locally, it may form a mosaic with other types, including patches of beech woodland, small wet areas, and types more commonly found in western Britain (particularly in south-east England). Rides and edges may grade into grassland and scrub types. Such variations may be mapped separately, although are likely to be included in the overall management plan for the mixed deciduous stands.

Main NVC types (not exhaustive):

- W8 *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* woodland
- a) *Primula vulgaris* - *Glechoma hederacea* sub-community
 - (b) *Anemone nemorosa* sub-community
 - (c) *Deschampsia cespitosa* sub-community.
 - (d) *Hedera helix* sub-community.
- W10 *Quercus robur* - *Pteridium aquilinum* - *Rubus fruticosus* woodland
- (a) Typical sub-community
 - (b) *Anemone nemorosa* sub-community
 - (c) *Hedera helix* sub-community
 - (d) *Holcus lanatus* sub-community
- W16 *Quercus* spp. - *Betula* spp. - *Deschampsia flexuosa* woodland
- (a) *Quercus robur* sub-community

- 1.1.4 The canopy variations are particularly well-represented through the Stand Type system. These include most of the field maple (2), lime (4, 5), suckering elm (10) and hornbeam (9) Stand Groups, and substantial proportions of the wych elm (1), ash (3) and oak (6) Stand Groups. More rarely, birch (12) and some alder stands (7C) may also occur. Some of these will require separate management treatments.

Main Stand Types (not exhaustive):

- 1B Wet ash-wych elm woods
- 2A Wet ash-maple woods
- 2B Ash-maple woods on light soils
- 2C Dry ash-maple woods
- 3A Acid pedunculate oak-hazel-ash woods
- 3B Southern calcareous hazel-ash woods
- 4A Acid birch-ash-lime woods
- 4B Maple-ash-lime woods
- 5A Acid pedunculate oak-lime woods
- 5B Acid sessile oak-lime woods
- 6C Lowland sessile oak woods
- 6D Lowland pedunculate oak woods
- 7C Plateau alder woods
- 9A Pedunculate oak-hornbeam woods
- 9B Sessile oak-hornbeam woods
- 10 Suckering elm woodland

- 1.1.5 Most woods included here should be considered under Forestry Practice Guide 3, Lowland mixed broadleaved woods (Forestry Authority 1994c). Some very acid oak, chestnut, hornbeam and lime stands may be better treated under Guide 1, Lowland acid beech and oak woods (Forestry Authority 1994a).

- 1.1.6 The boundaries between some stands of lowland mixed deciduous woodland and upland mixed ashwoods may be unclear in places, for example in Somerset and South Wales, because the two types form an ecological continuum determined by climate, soils and past treatment. In England, Natural Areas will be used to assign stands in the overlap zone to one or other type in a consistent way; where it is not otherwise clear (Appendix 1 gives a listing of the default assignments of types by Natural Areas); similar approaches may be needed in parts of Wales and Scotland. In Northern Ireland the UK Woodland HAP Steering Group proposes that all such stands should be referred to the upland oak or upland ash types as appropriate. In parts of the south-east England mixed deciduous woodland may also merge with beechwoods on base-rich soils (see the Lowland beech and yew woodland habitat action plan), for example where there is low percentage of invading beech, or where regeneration in a beech woodland is predominantly of ash. In general the stand should be placed with its surroundings in such situations for management purposes. In stands with much planted beech in areas where its status is uncertain the assignment to beech or lowland mixed broadleaves should be made on the basis of the proposed future management of the beech.

- 1.1.7 There are no precise data on the total extent of lowland mixed deciduous woodland in the UK, but in the late 1980s the Nature Conservancy Council estimated the total extent of this type to be about 250,000 ha. Work is underway to improve this estimate through analysis of the National Inventory of Woodland and Trees and the definition of total extent and targets will be reviewed accordingly. There is however no doubt that the area of this priority type has declined in area by clearance, overgrazing and replanting with non-native species, by about 30-40% over the last 50 years.

1.2 Links to species action plan

- 1.2.1 Lowland mixed deciduous woodland is among the richest habitats for wildlife in the lowlands and in many eastern counties forms the main reservoir of semi-natural habitat in the agricultural matrix. The type includes the best examples of bluebell woods for which the UK has particular responsibility. BAP species for which this is an important habitat include the beetles *Byctiscus populi* (on aspen in SE England); *Ernoporus tiliae* (on lime in N Lincs and Yorkshire), birds such as *Turdus philomelos*, *Muscicapa striata*, butterflies such as *Mellicta athalia*, *Boloria euphrosyne*, mammals such as the red squirrel on the Isle of Wight, dormouse throughout southern England and various moths.

2. Current factors affecting the habitat

2.1 The main factors affecting the habitat are considered to be as follows.

- 2.1.1 Overgrazing through expansion of populations of deer in southern regions, leading to change in the woodland structure, ground flora impoverishment and difficulties for regeneration. In some sites formerly managed as wood-pastures there is the contrasting issue of too little grazing by domestic stock.
- 2.1.2 Development including urban growth, quarrying, golf-course creation has destroyed and continues to threaten some sites, both directly and indirectly where it occurs next to sites, leading to increased trampling, disturbance, pollution etc. Surveys are underway to try to quantify this impact.
- 2.1.3 Replacement of native trees with planted conifers was a major threat until the early 1980s. While this threat has receded large-scale felling and modification of the composition of the woodland by intensive planting of even native broadleaved species may reduce the diversity of the woodland. However on the positive side extensive areas of plantation on ancient sites are being restored to native broadleaves.
- 2.1.4 Agricultural practices may lead to simplification of the landscape and greater ecological isolation of these woods through the removal of hedgerow trees and small patches of scrub in fields. Locally nutrient enrichment leading to changes in soils and ground flora may occur from spray drift or runoff from adjacent agricultural land.
- 2.1.5 Cessation of traditional management practices such as coppicing has in some areas lead to a reduction in structural diversity within the woods, in particular the loss of open space. Butterflies such as the fritillaries are thought to have particularly been affected by this process.
- 2.1.6 Climate change is likely to affect the distribution of various species that are components of this type and may lead to changes composition of this and other types. However its broad appearance is likely to stay the same.
- 2.1.7 Invasion by sycamore and other species which are generally not native to these woods, leading to changes in the composition of the woods.
- 2.1.8 Dutch elm disease has changed the structure and composition of many woods since the early 1970s, and recurrences may still be affecting them. Canopies opened by disease may be subject to higher rates of windthrow, and invasion of the gaps by unrepresentative species becomes more likely. Recently there has been increasing concern about the loss of oak through dieback, although it is not clear whether this is an ongoing trend or a temporary response to a series of dry summers.

3. Current action

3.1 *Legal Status*

- 3.1.1 National forestry policy includes a presumption against clearance of broad-leaved woodland for conversion to other land uses, and in particular seeks to maintain the special interest of ancient semi-natural woodland. Felling licences from the Forestry Commission (FC) are normally required if the woods are not managed under plans approved by them. Some woods may receive additional protection through policies and strategies within development plans, through National Park Management plans or by being subject to Tree Preservation Orders.
- 3.1.2 Designation as Sites of Special Scientific Interest (SSSI) or as Areas of Special Scientific Interest (under the Nature Conservation and Amenity Lands Order (NI) 1985) of about 20-30% of the more important areas of lowland mixed deciduous woodland ensures compulsory consultation with the statutory nature conservation agencies over management operations and development proposals. Some lowland mixed deciduous woodland that include habitats identified under Annex 1 of the EC Habitats Directive, for example *Stellario-Carpinetum* forests, Old oakwoods on sandy plains, have also been proposed as Special Areas of Conservation (SACs). Examples of Tilio-Acerion woodland in south-east England are also included.
- 3.1.3 Some significant sites receive protection through the Inheritance Tax Exemption scheme and National Trust and National Trust for Scotland properties can be declared to be inalienable land.

3.2 *Management, research and guidance*

- 3.2.1 There are a number of significant inventories on woodlands available, including the Forestry Commission's National Inventory of Woodland and Trees (NIWT), initiated in 1995, which provides information on the extent, distribution and composition of woodland in the whole of GB. Information on woodland type and management is also collected as part of the FC's Woodland Grant Scheme (WGS) documentation, through local woodland management initiatives or information held on the Forest Enterprise compartment database. The country conservation agencies also hold relevant information in Ancient Woodland Inventories as well as information from individual surveys of statutory protected sites.
- 3.2.2 Other relevant information is gathered through Local Authority and non-governmental organisation site and species survey and monitoring programmes, and local and national recording schemes and centres covering relevant species and sites. Increasingly such information is being linked via Local Record Centre participation in the National Biodiversity Network.
- 3.2.3 All woodland is expected to be managed according to the UK Forestry Standard. Country woodland and forestry strategies provide broad policies supporting the conservation and expansion of native woodland.

- 3.2.4 Grants for and advice on management, including regeneration, planting and some other operations, are available from Forestry Commission and in some circumstances from other government agencies and local authorities (including the national park authorities). Some Environmentally Sensitive Areas, the Habitat Scheme and the all Wales agri-environment scheme Tir Gofal) include woodland prescriptions or require the agreement holder to seek management advice and provide incentives for woodland and wetland management. Local woodland initiatives and fora (such as Coed Cymru, Marches Woodland Initiative) promote the expansion and/or management of these woods in their areas.
- 3.2.5 The Forestry Commission guide to the management of lowland mixed broadleaved woodland was published in 1994; that on lowland acid oakwoods will also be relevant in places. Management should follow these guides, as well as other FC guidelines in order to qualify for grant aid or felling licences. The Forest Enterprise are also expected to follow these guides on their land. Guidance on ways of creating new native woodland is also available in the FC Bulletin 112 and on desirable locations for new woods from reports by SNH, CCW and EN. (This guidance is being reviewed and revised).
- 3.2.6 Woodland management advice is available locally through the statutory conservation agencies, the Farming and Wildlife Advisory Group, DEFRA, the Countryside Advice and Information Service (Wales), plus the voluntary and commercial sectors (e.g. the Wildlife Trusts, and local woodland initiatives). The experience of woodland managers is also developed and promoted through organisations such as the Small Woods Association, the Timber Growers Association, Royal and Royal Scottish Forestry Societies, Institute of Chartered Foresters, Association of Professional Foresters and the like.
- 3.2.7 Research is undertaken by various bodies and individuals, for example by the FC (e.g. on methods for achieving natural regeneration, squirrel control, deer management etc.), by the conservation agencies (e.g. work change in minimum intervention stands), by university departments (e.g. the regeneration dynamics of ash and sycamore), by NGOs and by other groups (eg British Hardwood Improvement programme looking at quality of timber trees).

4. Action plan objectives and proposed targets

- 4.1 The targets established in this plan are based on the objective of maintaining the current extent of lowland mixed deciduous woodland and improving its condition through encouraging a balance of appropriate management regimes (for example minimum intervention, coppice, managed high forest) within regions and across the distribution of the type. The restoration targets are based on the desirability of restoring some of the former areas of ancient sites for lowland mixed deciduous woodland (around 10%) that have been substantially planted with conifers in the last 50 years or that are currently dominated by other non-native species. Creation targets aim to encourage the expansion of lowland mixed deciduous woodland by encouraging natural colonisation and by planting using species mixtures of site-native and local genetic provenance.

- 4.2 The targets will require review and adjustment during the course of the plan. As an early step in plan implementation more precise estimates of extent, and distribution of lowland mixed deciduous woodland are being determined. Criteria for assessing the appropriate balance of different management regimes and suitable areas for woodland expansion and restoration also need to be developed. More work is underway to refine these targets in terms of where the emphasis should be on restoration rather than creation in terms of geographic distribution and ecological variation within the type.
 - 4.2.1 Maintain the current extent of semi-natural woodland of this type (considered to be 250,000 ha).
 - 4.2.2 Maintain the overall distribution of the type.
 - 4.2.3 Maintain area of ancient semi-natural woods of this type.
 - 4.2.4 Achieve favourable condition (or unfavourable-recovering condition if that is the best that can be achieved in the short term) over 80% of the woodland type by 2025.
 - 4.2.4.1 Initiate measures intended to achieve favourable condition (or unfavourable-recovering condition if that is the best that can be achieved in the short term) in 50% of lowland mixed deciduous woodland within the SSSI/ASSIs and Special Areas of Conservation, by 2004.
 - 4.2.4.2 Achieve favourable condition (or unfavourable-recovering condition if that is the best that can be achieved in the short term) over 95% of the designated sites by 2010.
 - 4.2.4.3 Initiate measures intended to achieve favourable condition (or unfavourable-recovering condition if that is the best that can be achieved in the short term) in 40% of lowland mixed deciduous woodland outwith designated sites by 2004.
 - 4.2.4.4 Achieve favourable condition (or unfavourable-recovering condition if that is the best that can be achieved in the short term) over 50% of the resource by 2010.
 - 4.2.5 Restore c15000 ha of replanted ancient woodland to native broadleaves by 2025.
 - 4.2.5.1 Initiate restoration to lowland mixed deciduous woodland cover over at least 10,000 ha by 2004
 - 4.2.5.2 Initiate restoration of remaining areas (to give total of 15,000 ha eventually restored) by 2015.
 - 4.2.5.3 Achieve restoration to site-native species over the equivalent of half this area by 2010 and all of it by 2025 (albeit achieving favourable condition in these restored woods may take longer).
 - 4.2.6 Establish by colonisation or planting of 25,000 ha of lowland mixed deciduous woodland on unwooded sites or in recent conifer plantations by 2015.
 - 4.2.6.1 Initiate 50% of this establishment by 2010 and all of it by 2015.

- 4.3 The UK Woodland HAP Steering Group has effectively been working as though this plan had been approved for some time, and this has also been reflected in the work of various agencies and voluntary bodies – ie some progress towards the targets has already been made. It is therefore proposed that woodland creation/restoration that has taken place since 1998 (the starting point for the other plans) should be counted as contributing to delivering the HAP targets.

5. Proposed action with lead agencies

(The layout of this section differs from that in other plans because the actions have been harmonised with the combined work plan drawn up for the other woodland HAPs. In the process some of the sub-headings have been changed.)

5.1 *Policy, legislation, targets and strategic planning*

- 5.1.1 Check/revise Definitions paper to incorporate lowland mixed broadleaves targets etc (UKWHAP group).
- 5.1.2 Allocate targets by country and regionally within countries (Country Woodland Groups).
- 5.1.3 Develop methods for assessing the condition of lowland mixed deciduous woodland suitable for use on both designated and non-designated sites by 2002. (Action: CCW, EN, FC, SNH)
- 5.1.4 Initiate sample surveys of woodland condition by 2003
- 5.1.5 By 2002 develop an an indicative framework by countries for improving the condition of lowland mixed broadleaved woodland and agree criteria for identifying appropriate areas (including avoiding other priority habitats) for restoration and expansion of lowland mixed deciduous woodland, for example around small sites, to connect sites, to restore zonation of woodland across soil types. (Action: CA, CCW, EN, FC, DEFRA, SNH, Scottish Executive, Welsh Assembly).

5.2 *Best practice, guidance and advice*

- 5.2.1 Produce management handbooks (eg Restoration Guide, reprinting and re-issuing of Forestry Practice guide series) by 2004. (Action: CCW, EN, FC,SNH).
- 5.2.2 Promote native woodland management through country workshops, effective distribution of existing advisory material to woodland managers and if gaps are identified production and dissemination of appropriate material to fill these. (Action: CCW, EN, FC, LA, SNH).
- 5.2.3 Develop training courses on management of lowland mixed broadleaves, including the provision of advice on the marketing and sustainable use of products. (Action: CA, CCW, EN, FC, NPA, SNH).
- 5.2.4 Develop an indicative framework, by countries, improvement of condition for management indicating an appropriate balance of minimum intervention, coppice and high forest across the range of variation within lowland mixed deciduous woodland by 2004. (Action: CCW, EN, FC, SNH)

- 5.2.5 Provide advice to land managers on management regimes, including grazing regimes, appropriate to the geographical distribution and ecological variation found in this habitat (Action: CCW, EN, SNH,FC).
- 5.2.6 Promote the management of deer, squirrels and rabbits in areas where they are (or might become) major limitations on the regeneration and spread of lowland mixed deciduous woodland. (Action: CCW, EN, FC, DEFRA, SNH, Scottish Executive, Welsh Assembly)
- 5.2.7 Encourage the development of forestry/landscape strategies to provide a context for and to promote expansion and positive management of lowland mixed deciduous woodland. (Action: CA, CCW, DEFRA, EN, FC, LAs (including NPAs), SNH, Scottish Executive, Welsh Assembly).
- 5.3 *Promoting management on the ground*
- 5.3.1 Develop management planning in each country through the use of native woodland plans, long-term forest plans and Forest Design Plans (in state-owned and private woods) that lead to improved management, restoration or creation of lowland mixed broadleaves alongside other management objectives (Action: CCW, EN, SNH, FC).
- 5.3.2 Review the ability of incentives such as the woodland grant scheme and other funding mechanisms to deliver the desired management and expansion targets in these woods and amend as necessary. (Action: CA, CCW, EN, FC, DEFRA, SNH, Scottish Executive, Welsh Assembly).
- 5.3.3 Support successful existing woodland initiatives and where appropriate develop new ones in areas not covered by existing schemes. (Action: CCW, EN, FC, SNH)
- 5.3.4 Investigate ways of assisting woodland development as an alternative to current agricultural regimes through changes to CAP, via the RDP interim review 2002 and full review in 2006. (Action: CA, CCW, EN, FC, MAFF, SNH, Scottish Executive, Welsh Assembly)
- 5.3.5 Secure long-term resources from other sources, such as HLF, LIFE, structural funds, land-fill tax, for lowland mixed broadleaves (CCW, EN, FC, SNH).
- 5.4 *Monitoring and research*
- 5.4.1 Develop and implement systems for recording the occurrence, distribution, management and composition of lowland mixed deciduous woodland, based on the National Inventory of Woodland and Trees by 2002, and make this information widely available, eg through the National Biodiversity Network initiative. (Action: CCW, EN, FC, JNCC, SNH).
- 5.4.2 Identify losses of ancient woodland and evolve procedures to minimise loss (FC, CCW, EN, SNH)
- 5.4.3 Investigate the relationships and dynamics of this habitat in relation to other priority habitats and species (SAPS) with which it commonly occurs, including the issue of deforestation for biodiversity (Action: CCW, EN, FC, SNH)

- 5.4.4 Develop by 2005 a small suite of lowland mixed deciduous woodland sites, including minimum intervention areas where detailed structure, process and species monitoring is carried out to complement the simpler, condition assessments that will be adopted more widely (Action: CCW, EN, FC, SNH).
- 5.4.5 Monitor restoration of lowland mixed ash woodland so that restoration efforts can be focused on sites most likely to show a positive response. (Action: CCW, EN, FC, SNH).
- 5.5 *Site safeguard*
- 5.5.1 By 2004 designate those lowland mixed deciduous woodland approved by the EC as SACs under the Habitats Directive and ensure that SSSI/ASSI coverage of important lowland mixed deciduous woodland sites is adequate through periodic review of the series. (Action: CCW, EN, SNH, DEFRA, Welsh Assembly, Scottish Executive).
- 5.6 *International*
- 5.6.1 Develop links with European organisations and programmes, such as the European Forestry Institute, the European Environment Agency and the European Centre for Nature Conservation to obtain estimates of the extent and distribution of comparable and related woodland, and exchange experience on research and management by 2004. (Action: CCW, EN, FC, JNCC, SNH)

6. Costings

- 6.1 The successful implementation of the habitat action plans will have resource implications for both the private and public sectors.

7. Key references

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Appendix 3

Discriminating between ‘upland’ and ‘lowland’ priority habitat types

Unfortunately there is an inevitable overlap between the NVC types that can occur within Upland Oakwood, Upland Mixed Ashwoods and Lowland Mixed Deciduous Woodland. W8a and W10a are not confined to Lowland Mixed Deciduous; W8e, W10e are not confined to Upland ash and Upland Oak types respectively. The same is true for every other classification system and reflects the fact that woodland communities are a continuum.

To provide a consistent method for separating the types out in this overlap zone, Keith Kirby proposes an approach based on Natural Areas. Where there is doubt over the allocation of a wood to a type because its composition could fit into either, he suggests that the following rules apply:

- a) Default to *Lowland Mixed Deciduous* for oak and ash/mixed deciduous stands (*sensu lato*) in the following Natural Areas

1, 3, 5, 6, 7, 9, 11, 13, 16, 18-24, 26, 27, 28, 32-40, 44-56, 59, 63-83, 85, 86, 88-91, 96, 97.

- b) Default to *Upland Oak* or *Upland Ash* (according to composition of stand) in the following Natural Areas

2, 4, 8, 10, 12, 14, 15, 17, 25, 29, 30, 31, 41, 42, 57, 58, 60, 61, 84, 86, 87, 92-95

- c) For 31 and 62 allocation may need to be on a site by site basis.

Note that this is to some degree arbitrary and it is as much for the bureaucratic need to report on which set of HAP targets are being contributed to. From a practical management point of view it should not make a difference because the needs of the particular wood should determine what is done.

Natural Area Number	Natural Area name
1	North Northumberland Coastal Plain
2	Border Uplands
3	Solway Basin
4	North Pennines
5	Northumbrian Coal Measures
6	Durham Magnesian Limestone Plateau
7	Tees Lowlands
8	Yorkshire Dales
9	Eden Valley
10	Cumbria Fells & Dales
11	West Cumbria Coastal Plain
12	Forest of Bowland
13	Lancashire Plain and Valleys

14	Southern Pennines
15	Pennine Dales Fringe
16	Vale of York and Mowbray
17	North York Moors and Hills
18	Vale of Pickering
19	Yorkshire Wolds
20	Holderness
21	Humber Estuary
22	Humberhead Levels
23	Southern Magnesian Limestone
24	Coal Measures
25	Dark Peak
26	Urban Mersey Basin
27	Meres and Mosses
28	Potteries and Churnet Valley
29	South West Peak
30	White Peak
31	Derbyshire Peak Fringe and Lower Derwent
32	Sherwood
33	Trent Valley and Rises
34	North Lincolnshire Coversands and Clay Vales
35	Lincolnshire Wolds
36	Lincolnshire Coast and Marshes
37	The Fens
38	Lincolnshire and Rutland Limestone
39	Charnwood
40	Needwood and South Derbyshire Claylands
41	Oswestry Uplands
42	Shropshire Hills
43	Midlands Plateau
44	Midland Clay Pastures
45	Rockingham Forest
46	Breckland
47	North Norfolk
48	The Broads
49	Suffolk Coast and Heaths
50	East Anglian Plain
51	East Anglian Chalk
52	West Anglian Plain
53	Bedfordshire Greensand Ridge
54	Yardley-Whittlewood Ridge
55	Cotswolds
56	Severn and Avon Vales

57	Malvern Hills and Teme Valley
58	Clun and North West Herefordshire Hills
59	Central Herefordshire
60	Black Mountains and Golden Valley
61	Dean Plateau and Wye Valley
62	Bristol, Avon Valleys and Ridges
63	Thames and Avon Vales
64	Midvale Ridge
65	Chilterns
66	London Basin
67	Greater Thames Estuary
68	North Kent Plain
69	North Downs
70	Wealden Greensand
71	Romney Marshes
72	High Weald
73	Low Weald and Pevensey
74	South Downs
75	South Coast Plain and Hampshire Lowlands
76	Isle of Wight
77	New Forest
78	Hampshire Downs
79	Berkshire and Marlborough Downs
80	South Wessex Downs
81	Dorset Heaths
82	Isles of Portland and Purbeck
83	Wessex Vales
84	Mendip Hills
85	Somerset Levels and Moors
86	Mid Somerset Hills
87	Exmoor and the Quantocks
88	Vale of Taunton and Quantock Fringes
89	Blackdowns
90	Devon Redlands
91	South Devon
92	Dartmoor
93	The Culm
94	Bodmin Moor
95	Cornish Killas and Granites
96	West Penwith
97	The Lizard
98	Northumberland Coast
99	Tyne to Tees Coast

100	Saltburn to Bridlington
101	Bridlington to Skegness
102	The Wash
103	Old Hunstanton to Sheringham
104	Sheringham to Lowestoft
105	Suffolk Coast
106	North Kent Coast
107	East Kent Coast
108	Folkestone to Selsey Bill
109	Solent and Poole Bay
110	South Dorset Coast
111	Lyme Bay
112	Start Point to Land's End
113	Isles of Scilly
114	Land's End to Minehead
115	Bridgwater Bay
116	Severn Estuary
117	Liverpool Bay
118	Morecambe Bay
119	Cumbrian Coast
120	Solway Firth

Appendix 4

BAP priority species associated with lowland mixed deciduous woodland (From "Biodiversity - Making the Links" ³ - 28 June 2000 version)

The presence of these species does not indicate that the habitat is definitely lowland mixed deciduous woodland. This list is included as additional information only.

Scientific name	Common name	Taxon	Priority list	Importance of habitat to the species *
<i>Triturus cristatus</i>	Great crested newt	Amphibian	SAP	x
<i>Formica aquilonia</i>	Scottish wood ant	Ant	SAP	S
<i>Formica lugubris</i>	Hairy wood ant (Northern)	Ant	SS	x
<i>Formica rufa</i>	Southern wood ant	Ant	SS	x
<i>Formicoxenus nitidulus</i>	Shining guest ant	Ant	SS	x
<i>Andrena ferox</i>	a mining bee	Bee	SAP	x
<i>Nomada ferruginata</i>	a cuckoo bee	Bee	SS	x
<i>Byctiscus populi</i>	a leaf-rolling weevil	Beetle	SAP	P
<i>Cryptocephalus nitidulus</i>	a leaf beetle	Beetle	SAP	P
<i>Cryptocephalus sexpunctatus</i>	a leaf beetle	Beetle	SAP	P
<i>Dromius quadrisignatus</i>	a ground beetle	Beetle	SS	P
<i>Ernoporus tiliae</i>	a bark beetle	Beetle	SAP	P
<i>Lucanus cervus</i>	Stag beetle	Beetle	SAP	P
<i>Procas granulicollis</i>	a weevil	Beetle	SAP	?P
<i>Cryptocephalus coryli</i>	a leaf beetle	Beetle	SAP	S
<i>Malachius aeneus</i>	a false soldier beetle	Beetle	SAP	S
<i>Cryptocephalus decemmaculatus</i>	a leaf beetle	Beetle	SS	x
<i>Gnorimus nobilis</i>	a chafer	Beetle	SAP	?
<i>Jynx torquilla</i>	Wryneck	Bird	SAP	P
<i>Lanius collurio</i>	Red-backed shrike	Bird	SAP	P
<i>Muscicapa striata</i>	Spotted flycatcher	Bird	SAP	P
<i>Passer montanus</i>	Tree sparrow	Bird	SAP	P
<i>Pyrrhula pyrrhula</i>	Bullfinch	Bird	SAP	P
<i>Streptopelia turtur</i>	Turtle dove	Bird	SAP	P
<i>Tetrao tetrix</i>	Black grouse	Bird	SAP	P
<i>Turdus philomelos</i>	Song thrush	Bird	SAP	P
<i>Caprimulgus europaeus</i>	Nightjar	Bird	SAP	S
<i>Carduelis cannabina</i>	Linnet	Bird	SAP	S
<i>Argynnis adippe</i>	High brown fritillary	Butterfly	SAP	x
<i>Boloria euphrosyne</i>	Pearl-bordered fritillary	Butterfly	SAP	x
<i>Carterocephalus palaemon</i>	Checkered skipper	Butterfly	SAP	x
<i>Mellicta athalia</i>	Heath fritillary	Butterfly	SAP	x
<i>Hammerschmidtia ferruginea</i>	a hoverfly	Fly	SAP	P
<i>Myolepta potens</i>	a hoverfly	Fly	SS	P
<i>Bombylius discolor</i>	Dotted bee-fly	Fly	SAP	S
<i>Doros profuges/conopseus</i>	a hoverfly	Fly	SAP	S
<i>Lipsothrix ecucullata</i>	a crane-fly	Fly	SAP	S
<i>Lipsothrix errans</i>	a crane-fly	Fly	SS	S
<i>Lipsothrix nervosa</i>	a crane-fly	Fly	SAP	S
<i>Hypocreopsis rhododendri</i>	an ascomycete	Fungi	SAP	P
<i>Hydnoid fungi (14 spp)</i>	tooth fungi	Fungi	SAP	S
<i>Microglossum olivaceum</i>	an earth-tongue	Fungi	SAP	S
<i>Arthothelium dictyosporum</i>	a lichen	Lichen	SAP	x

<i>Arthothelium reagens/macounii</i>	a lichen	Lichen	SAP	x
<i>Bacidia incompta</i>	a lichen	Lichen	SAP	x
<i>Biatoridium monasteriensis</i>	a lichen	Lichen	SAP	x
<i>Catapyrenium psoromoides</i>	Tree catapyrenium	Lichen	SAP	x
<i>Fossombronina crozalsii</i>	Crozal's fillwort	Liverwort	SS	x
<i>Barbastella barbastellus</i>	Barbastelle bat	Mammal	SAP	P
<i>Muscardinus avellanarius</i>	Dormouse	Mammal	SAP	P
<i>Myotis bechsteini</i>	Bechstein's bat	Mammal	SAP	P
<i>Myotis myotis</i>	Greater mouse-eared bat	Mammal	SAP	P
<i>Pipistrellus pipistrellus</i>	Pipistrelle bat	Mammal	SAP	P
<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat	Mammal	SAP	P
<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	Mammal	SAP	P
<i>Lepus europaeus</i>	Brown hare	Mammal	SAP	x
<i>Sciurus vulgaris</i>	Red squirrel	Mammal	SAP	x
<i>Seligeria calycina</i>	English rock-bristle	Moss	SS	P
<i>Weissia rostellata</i>	Beaked beardless-moss	Moss	SAP	S
<i>Weissia squarrosa</i>	Spreading-leaved beardless-moss	Moss	SS	S
<i>Atrichum angustatum</i>	Lesser smoothcap	Moss	SS	x
<i>Barbula glauca/ Didymodon glaucus</i>	Glaucus beard-moss	Moss	SAP	x
<i>Orthotrichum obtusifolium</i>	Blunt-leaved bristle-moss	Moss	SAP	x
<i>Orthotrichum pallens</i>	Pale bristle-moss	Moss	SAP	x
<i>Thamnobryum angustifolium</i>	Derbyshire feather-moss	Moss	SAP	x
<i>Weissia multicapsularis</i>	a moss	Moss	SAP	x
<i>Catocala promissa</i>	Light crimson underwing	Moth	SAP	P
<i>Catocala sponsa</i>	Dark crimson underwing	Moth	SAP	P
<i>Cosmia diffinis</i>	White-spotted pinion	Moth	SAP	P
<i>Dicycla oo</i>	Heart moth	Moth	SAP	P
<i>Hydrelia sylvata</i>	Waved carpet	Moth	SAP	P
<i>Jodia croceago</i>	Orange upperwing	Moth	SAP	P
<i>Minoa murinata</i>	Drap looper	Moth	SS	P
<i>Moma alpium</i>	Scarce Merveille du Jour	Moth	SAP	P
<i>Paracolax tristalis</i>	Clay fan-foot	Moth	SS	P
<i>Paradiarsia sobrina</i>	Cousin German	Moth	SS	P
<i>Pechipogo strigilata</i>	Common fan-foot	Moth	SAP	P
<i>Rheumaptera hastata</i>	Argent and sable	Moth	SAP	P
<i>Schrankia taenialis</i>	White-line snout	Moth	SS	P
<i>Trichopteryx polycommata</i>	Barred toothed stripe	Moth	SAP	P
<i>Trisateles emortualis</i>	Olive crescent	Moth	SS	P
<i>Xestia rhomboidea</i>	Square-spotted clay	Moth	SAP	P
<i>Eustroma reticulata</i>	Netted carpet	Moth	SAP	S
<i>Hemaris tityus</i>	Narrow-bordered hawk-moth	Moth	SAP	S
<i>Hypena rostralis</i>	Buttoned snout	Moth	SAP	S
<i>Mythimna turca</i>	Double line	Moth	SAP	S
<i>Noctua orbona</i>	Lunar yellow underwing	Moth	SAP	S
<i>Pareulype berberata</i>	Barberry carpet	Moth	SAP	S
<i>Phyllodesma ilicifolia</i>	Small lappet	Moth	SS	S
<i>Xylena exsoleta</i>	Sword-grass	Moth	SAP	S
<i>Cicadetta montana</i>	New Forest cicada	True bug	SAP	x
<i>Trichomanes speciosum</i>	Killarney fern	Vascular plant	SAP	P
<i>Carex muricata ssp. muricata</i>	Prickly sedge	Vascular plant	SAP	x
<i>Epipactis youngiana</i>	Young's helleborine	Vascular plant	SAP	x

* (P) primary, (S) secondary or (x) less