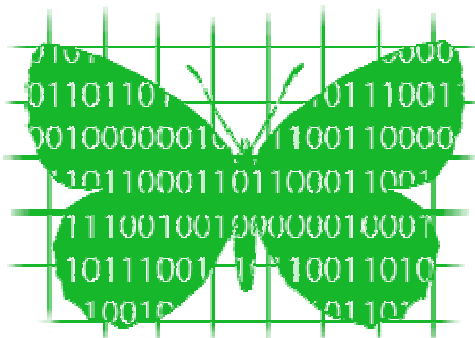
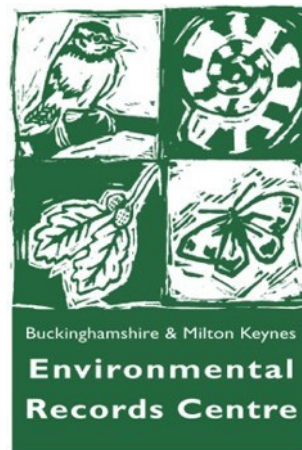


Criteria for the Selection of Local Wildlife Sites in Berkshire, Buckinghamshire and Oxfordshire



Thames Valley Environmental Records Centre



Version	Date	Authors	Notes
4.0	January 2009	MHa, MCH, PB, MD, AMcV	Edits and updates from wider consultation group
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1.0 Introduction

1.1 What is a Local Wildlife Site?

Local Wildlife Sites (LWS) are non-statutory sites of significant value for the conservation of wildlife. These sites represent local character and distinctiveness and have an important role to play in meeting local and national targets for biodiversity conservation. The purpose of their selection is to provide recognition of their value and to help conserve those features by affording a level of protection.

The overall objective of a Local Wildlife Sites system was defined by DETR (2000) as:

*"The series of non-statutory Local Sites seeks to ensure, in the public interest, the conservation, maintenance and enhancement of species, habitats, geological and geomorphological features of substantive nature conservation value. Local Site systems should select all areas of substantive value including both the most important and the most distinctive species, habitats, geological and geomorphological features within a national, regional and local context. Sites within the series may also have an important role in contributing to the public enjoyment of nature conservation."**

As the quotation above indicates, the LWS network is an inclusive and comprehensive set of sites. LWS may support habitats and species of national significance or they may be of more local importance. They should take account of geographical variations in habitat types and biological features at a county level. This is in contrast to statutory nature conservation sites such as SSSIs (Sites of Special Scientific Interest) which are a representative suite of sites that exemplify the nation's most important wildlife and geological features.

LWS may therefore hold as much biodiversity or geodiversity interest as the national SSSIs – or may be of more local importance.

The selection of LWS is based on evidence collected in the field and tested against a set of locally agreed criteria. DEFRA guidance on the identification, selection and management of Local Sites was published in February 2006**. The purpose of this guidance was to provide a transparent and consistent approach to the operation of Local Sites systems. It encouraged all Local Sites partnerships to reassess their position and this led to the joined-up review of the LWS Selection Criteria for Berkshire, Buckinghamshire and Oxfordshire as set out in this document.

Local Sites with a geological interest are often referred to as Regionally Important Geological/Geomorphological Sites (RIGS). These are covered by a separate set of criteria.

*Department of the Environment, Transport and the Regions (DETR) Local Sites Review Group, April 2000.

** 'Local Sites – Guidance on their Identification, Selection and Management', Department for Environment Food and Rural Affairs (2006)

1.2 Local Wildlife Sites and RIGS in Berkshire, Buckinghamshire and Oxfordshire.

1.2.1 Local Wildlife Sites

In common with many other counties in England, the LWS systems in Berkshire and Oxfordshire started in earnest in the early 1990s, whilst Buckinghamshire had started in the 1980s. The Wildlife Trust for the three Counties – Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) - was instrumental in providing the impetus and the manpower to get the LWS systems going, with the invaluable support of the County Ecologists, Nature Conservancy Council and Local Authority countryside / ecological staff, including those working in the County Local Environmental Records Centres.

The Local Wildlife Site systems in the three counties have developed independently, but all have the following:

- A rolling programme of field survey to keep site data up to date
- A panel of ecologists and others who select and de-select sites
- A set of written criteria to guide the selection of sites

In 2006, a three county review of the Local Wildlife Site systems was initiated by Local Authorities in order to share the best practice from each county, incorporate new guidance, standardise the selection criteria for the three counties and to make the systems more transparent and accountable. The review has been carried out by a group of ecologists and others from each of the counties.

The Local Wildlife Site review panel agreed that a key feature of any Local Wildlife Sites system is the criteria that are used to select and de-select sites. The development of a comprehensive and clear set of new criteria was commissioned by Local Authorities from the three counties and the work was carried out by Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) and the Thames Valley Environmental Records Centre (TVERC) with input from local naturalists. This document is the result of the 2006 commission from the review panel. A separate document describing the whole Local Wildlife Site system including field survey methodology, the make up of selection panels, the annual timetable for survey and selection, consultation with landowners, adoption of sites by Local Authorities, accompanies this document.

2.0 Selection Criteria for Local Wildlife Sites

2.1 National guidance

The DEFRA guidance about Local Site identification, selection and management recommends that criteria for the selection and de-selection of Local Wildlife Sites should:

- Be clear
- Be locally defined
- Have measurable thresholds (not necessarily for all the criteria)
- Provide a structured and systematic approach to the description and assessment of sites
- Be derived with reference to:
 - Naturalness
 - Size or extent
 - Diversity
 - Rare or exceptional feature(s)
 - Fragility
 - Typicalness
 - Connectivity within the landscape
 - Recorded history and cultural associations
 - Value for appreciation of nature
 - Value for learning

This framework is based on the 'Ratcliffe approach' which was drawn up in 1977¹ as a guide for the selection of biological SSSIs published by the Nature Conservancy Council (since succeeded as Natural England).

2.2 The new criteria within Berkshire, Buckinghamshire and Oxfordshire Local Wildlife Site Systems

The 'historic' criteria for Local Wildlife Sites in Berkshire, Buckinghamshire and Oxfordshire are broadly similar and are based mainly on the presence of particular habitats, plants and animals that are of importance for nature conservation.

The new criteria which have been established for use in the three counties take more account of the 'Ratcliffe approach' and describe the habitats and species of importance in far greater detail. They look more complex because the 'Ratcliffe approach' is applied to each habitat and species group in turn – in fact this is probably close to what the LWS selection panels have been 'considering' in their heads for the last fifteen years! These new criteria attempt to make the site designation decision-making process more transparent.

Note that the criteria developed by Ratcliffe have been adopted and modified through the three counties review to incorporate typicalness characteristics, to ensure that sites of local (not just national) importance will be selected.

¹ Ratcliffe, D.A., (ed.) (1977). 'A nature conservation review', Cambridge University Press, Cambridge.

The new criteria within the Berkshire, Buckinghamshire and Oxfordshire Local Wildlife Site Systems will be reviewed periodically, as, for example, changes occur in the lists of UK BAP Priority Species or Habitats or changes occur in the lists of indicator species for habitats, as determined within the three counties.

2.2.1 Criterion 1: Naturalness.

The 'naturalness' of a Local Wildlife Site is related to the degree to which the site has been or is being modified by human activity; the more modified the site, the less natural it is.

Human activity has had such an impact on the landscape in the south of England that no part of it can be described as 'natural' and ecologists refer to the least modified areas as 'semi-natural'. Most of what is defined as semi-natural habitat in the UK has also been designated as UK Biodiversity Action Plan (BAP) Priority Habitat.

The habitat descriptions presented in this document are based on nationally agreed ones that help determine whether a site supports UKBAP priority habitat. The local habitat indicator species lists which have been devised help to identify the degree of naturalness of a habitat in the three counties. This could be considered as a determination of the quality of the habitat. In general, the more indicators, the more 'natural' (and so the better quality) the habitat is.

A site with a large number of indicator species for a UKBAP habitat type will usually be considered for LWS status. The field evidence from the site surveyor should note abundance of indicators in all parts of the site as some sites will have a diverse flora throughout and others may only have small areas of high diversity and so be of lesser biodiversity value. Those sites containing habitats of good quality, based on the number of indicator species identified through survey, should be considered ahead of sites with a limited number of indicator species. LWS surveyors and local naturalists should be able to provide guidance on examples of good, standard and poor quality habitats in each county.

There are other factors to consider besides just the number of indicator species when determining naturalness. There are degrees of naturalness and LWS may include areas of an urban character, such as canals and disused railway lines, provided that they are not subject to intense human disturbance and have developed a recognisable habitat, e.g. maturing scrub along a linear feature providing a habitat for birds, mammals and invertebrates.

Overall, sites that have one or more of the UK BAP Priority Habitats of good quality should be selected under this criterion. In addition, sites with good quality, non-UK BAP Priority habitats in a more built environment setting can be selected under this criterion.

2.2.2 Criterion 2: Rare or exceptional features (including important populations and assemblages of species and local rarity)

This considers how common or uncommon the species or habitats on the site are. For example, the features of interest may be rare on an international, national, county or district scale. In highly developed or populated counties, many (semi-) natural habitats are considered rare or scarce, such as heathlands and chalk grasslands, and so this criterion is an important one for site selection. In general the rarer the habitat the larger the percentage of this habitat should be protected through the LWS system. However for the

three counties selection process, the presence of semi-natural habitat is reason to select a site under 2.2.1. This criterion should mainly be used to select sites based on the rare or exceptional species populations.

Sites which hold a large proportion of the district or county population of a species, or even nationally or internationally significant populations, should be selected on the basis of recent surveys (usually within the last 5 years). Selection may depend on the knowledge of county experts rather than just the LWS standard survey. (See the species criteria on page 69 for further definitions of rarity and specific selection guidance on what should be selected under this criterion).

Characteristic habitat and species assemblages of a region, county or locality, which are specific to an area (i.e. 'typicalness'), but possibly degraded or widely lost in the wider landscape, should also be taken into consideration within this criterion.

2.2.3 Criterion 3: Size or extent.

Larger sites will be looked on more favourably as they are usually richer in wildlife than smaller ones and are likely to accommodate more habitat and species diversity. Such sites may be necessary to support sustainable populations of some species which require a minimum foraging area or territory, or which operate successfully only within a meta-population (e.g. great crested newts, marsh fritillary butterflies).

For other animals and plants, the presence of individual blocks of a particular habitat type of a minimum size can be critical. For guidance on size relevance see the species chapters.

For the different UKBAP priority habitats an indicative size threshold, based on the existing known resource in each county, has been given in Appendix 1. Sites with habitats equal or greater than these thresholds will satisfy criterion 3 and should be considered for LWS selection. In most cases a single habitat that falls below the guidance size for that habitat will be considered to have failed to meet this criterion.

A large site with a variety of different habitats, although not all UKBAP habitats, can be selected. Large sites must still be selected on their substantive nature conservation interest and if a large site is mostly degraded or has poor species and/or habitat diversity it will not satisfy this criterion.

Small sites can be very important where species are using them as 'patches' of a larger habitat resource dispersed across the landscape (a characteristic related to criterion 5, "connectivity within the landscape"). Where this can be demonstrated, these sites should qualify under criterion 5. If the site is in a more urban setting and contributes to making the urban space more permeable to wildlife, the site will meet criterion 7, "recorded history and cultural associations".

2.2.4 Criterion 4: Diversity.

This refers to the range and diversity of species, habitats or other features (such as a well-developed canopy layer, shrub layer and ground flora layer in a wood) present on a site.

Some habitats have naturally low species diversity e.g. reedbeds, so this criterion should be used with care and comparisons should only be made between sites of the same plant

communities. The site surveyor will usually guide the selection panel on whether the species composition for that habitat type, in that area, has a high species-richness which equates to high quality habitat

A site which has county BAP or UKBAP species or habitats, or a site which supports an isolated population of a more frequent species near the edge of its range, should be considered positively and more highly than a site which simply adds to the stock of a common and widespread species or habitat.

This criterion should be distinguished from criterion 2, as it allows a site that has a number of habitat types - which individually may not see a site qualify as a LWS due to their small size or not being of national or county importance but collectively provide a number of ecological niches and add to the species richness (within and across taxon groups) - to be considered positively. See also section 3.1 on habitat mosaics and buffers.

The following criteria on their own cannot be used for the selection of sites but can provide supporting contextual information. Sites must still meet habitat and species criteria to qualify for Local Wildlife Site designation.

2.2.5 Criterion 5: Connectivity within the landscape and geographical position

The position of a site can enhance its value. For example, because of its location in or adjacent to a larger unit or to other habitats, the value of that site is enhanced. The degree to which a site links with other habitats, through proximity or as part of wildlife corridors, or has a buffering effect may be considered. Its geographical position may also increase the landscape permeability and enhance the county or wider biodiversity network.

The length, as well as the area, of a site should be taken into account when considering selection of a LWS. A long thin site may be small in area but have high importance for wildlife (e.g. a river corridor, green lane or species-rich hedgerow which links other sites of semi-natural habitats but is also important in its own right). Therefore, these features should be selected where they increase connectivity in the landscape.

2.2.6 Criterion 6: Fragility

Habitats and species populations are prone to change but some are at greater risk than others. Factors such as climate change, the presence of invasive species, direct and indirect impacts of human interference can affect these changes. When considering fragility, the ease with which a habitat can be restored is a useful barometer. Woodland can be restored from a position where management has been lacking, but re-creation is very hard. Some swamp or reedbed habitats can be more easily restored or re-created, assuming water levels have remained unchanged. Grasslands and true fens (including reed fens) and bogs have to be considered the most fragile. Restoration is very hard.

That said, the risk of loss by development or other large-scale land use change should not be included in considerations of this criterion. It should be a question of intrinsic sensitivity.

Sites that support fragile habitats and species are appropriate for selection as LWS.

2.2.7 Criterion 7: Recorded history and cultural associations

Some sites have been studied by amateurs or professionals for many years in a variety of fields, including wildlife, history, archaeology and landscape. In some cases, they may be the location where important discoveries were made. These discoveries can add to the conservation value of a site. They can also provide an insight into historic land use and management of the site. They may also help to explain the presence of certain plant communities or species and aid potential recovery if recent management has had an adverse impact.

2.2.8 Criterion 8: Value for appreciation of nature

Sites are often assessed in terms of their value to local people. This may relate to their quiet, natural appearance or to their links with community history, such as disused railway lines and old cemeteries.

Physical access to a site is important; a site that is freely accessed is of particular value. Public footpaths may cross a site or the landowner may allow public access.

It should be pointed out that the designation of a site as a LWS in no way affects current accessibility or the landowner's right to refuse access.

The visibility of sites to the public is an important consideration in urban areas. The appreciation of a site and enjoyment of its wildlife from outside the site boundary are possible. For example, prominent hillsides can be visible to a large population so increasing their value. The 'attractiveness' of a habitat, e.g. a colourful display of wildflowers or autumn leaves, adds to its value to the public.

As this criterion is somewhat subjective the threshold for inclusion of a site under this criterion should be that they are freely accessible or are visible from public rights of way and add to the natural aesthetic of the area.

2.2.9 Criterion 9: Value for learning

Some sites are of particular value by virtue of their proximity to educational establishments and/or by supporting a range of robust or successional habitats or features to aid study and interpretation.

A site would qualify under this criterion if there was current recorded use by schools, local groups, or if it is accessible to education centres.

2.3 How to use the criteria and site information

In order to evaluate a site, the following criteria matrix should be used in conjunction with the surveyor's interpretation of habitat classification, quality and structure, and any other expert knowledge of the site. The use of these habitat and species criteria should ensure a consistent approach to the determination of site status and minimise subjectivity.

For a site to be selected as a LWS it must:

- Qualify under one of core criteria 1 and 2,
AND
- EITHER Qualify under one or both of criteria 3 and 4
- OR Qualify under 2 or more of contextual criteria 5-9

The site selection form must detail the survey evidence to justify each of the core and contextual criteria which a site has met.

Exceptions that the selection panel may wish to consider are where the site, due to its geographical position, does not qualify under any of the core criteria e.g. an urban site of high local importance, which may also be part of a larger suite of sites that together forms a green corridor through an urban area.

Some sites may fail to meet adequate criteria to be designated a LWS. However, the site may reveal a more amenity- or education-based focus. It may be appropriate for it to be considered for Local Nature Reserve designation.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Core Criteria		
1. Naturalness (habitats)	Presence of UKBAP priority habitats	Qualifies under either core criteria 1 or 2 AND
2. Rare or exceptional features (principally for species)	Presence of substantial population or assemblage of species as defined by the species criteria. See the specific information for what would be considered under this criterion in the Species section.	
3. Size or extent of features (habitat or population)	Does the site hold a substantial amount ($\geq 3\%$) of the county resource of the habitat (or habitat mosaics) or species which it is being put forward for? OR is it a large site supporting a range of habitat types? AND Is the site ecologically viable? Are the minimum viable ecological units for the habitat(s) or the lifecycle requirements of the species present? NB. If the resource is less than the smallest viable unit for the BAP habitat it has been selected for, the site will not meet this criterion	EITHER one or both of criteria 3 or 4
4. Diversity (numbers of species or habitats)	Follow species guidelines and consider in context of the number of habitats the site supports.	

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Contextual Criteria		
5. Connectivity within the landscape	Presence of green links or in close proximity to other areas of semi-natural habitat. Part of wider area used by meta-population of a species	OR two or more of contextual criteria 5-9
6. Fragility	Sensitive species populations or habitats prone to loss from external influences such as climate change or land management change (does not include at risk from new development).	
7. Recorded history and cultural associations	Historic use of the site known and important to local community. Part of regular survey/monitoring programme	
8. Value for appreciation of nature	Good access/greatly increase the aesthetic of the area	
9. Value for learning	Current use by schools, local groups or proximity to education centres and access	
Does the site qualify for LWS selection?	YES/NO (qualifies by having: one of 1 OR 2 & at least one of 3 OR 4 alternatively one of 1 OR 2 & two or more contextual criteria)	

The following examples illustrate how the different criteria are used to make evidence-based decisions to select LWS. These examples also highlight which criteria are more relevant to particular sites and how survey and other collated evidence may be applied to them.

Case Study 1. Heathland

Site Overview/Abstract

The site supports approximately 15ha of open and semi-open (scrubby) humid heath of heather, cross-leaved heath, purple moor-grass and dwarf gorse (H2c). This is surrounded by species-poor acidic birch and pine woodland (over purple moor-grass – W4a) with areas of gorse scrub (W23 and gorse-encroached H2c). The site also includes small remnants of acid grassland. The site has several well-eroded footpaths and the 1877 OS map shows the boundaries to be the same as today.

Priority UK BAP Habitat(s): Lowland heathland, Lowland dry acid grassland

Nationally Scarce (NSC) & BAP Species Recorded: Silver-Studded Blue (2006) and Viviparous lizard (2006)

Selection Matrix

Criterion	Notes	Significance for LWS designation
1. Naturalness	Presence of substantial lowland heathland area and acid grassland	Satisfies habitat definitions 4.3 and 4.4.
2. Rare or exceptional features	One of last few populations of silver studded blue butterfly in the county	✓
3. Size or extent	15ha site of UKBAP habitat	✓ (>3% county resource)
4. Diversity	Species list recorded usual heathland plants for the area and has two habitat communities	✓
5. Connectivity within the landscape	Isolated habitat patch surrounded by plantation and roads	×
6. Fragility	Invertebrate population dependent on specific management regime	✓
7. Recorded history and cultural associations	Site boundary unchanged over time and site of Butterfly Conservation repeat transects	✓
8. Value for appreciation of nature	Common land, clearly used by local residents and naturalists	✓
9. Value for learning	Not currently used or in close proximity to schools etc	×
Does the site qualify for LWS selection?	YES (qualifies by having 1, 2, 3 & 4)	

Case Study 2. Calcareous grassland

Site Overview/Abstract

An interesting site that supports a high diversity of typical chalk grassland species and most closely resembles the NVC category CG3: Upright brome (*Bromus erectus*) grassland. It varies considerably in character across the site with localised dominance of certain species and differences in sward height. The ancient woodland blocks (3.1ha) included an old double-banked trackway, with numerous veteran trees and good quantities of deadwood. The ground flora was diverse, especially closer to the rides, with 16 ancient woodland indicators in total.

Priority UK BAP Habitat(s): Lowland calcareous grassland, Lowland mixed deciduous woodland

Other Designations: LNR

Nationally Scarce (NSC) & BAP Species Recorded: Chiltern gentian (2006), wood barley (2006), red kite (2006), striped lychnis (1998). Yellow meadow ant, horseshoe vetch, bluebell (all LBAP, 2006)

Criterion	Notes	Significance for LWS designation
1. Naturalness	Calcareous grassland and ancient woodland in good condition	✓
2. Rare or exceptional features	Two nationally scarce plant species recorded, both locally frequent in Chilterns	✓
3. Size or extent	6.3ha is a good size of chalk grassland for the area	✓
4. Diversity	Diverse flora in both grassland and woodland habitats and veteran trees and deadwood present	✓
5. Connectivity within the landscape	Adjoins existing LRN and other LWS in close proximity	✓
6. Fragility	This site is in secure management	✓
7. Recorded history and cultural associations	Unknown	✗
8. Value for appreciation of nature	LNR with good access, well used by locals	✓
9. Value for learning	Currently used for education activities, guided walks and conservation tasks	✓
Does the site qualify for LWS selection?	Yes (qualifies with 1, 2, 3 & 4)	

Case Study 3. Woodland site

Site Overview/Abstract

This lowland mixed deciduous woodland (UKBAP) is predominately a neglected, small coppice, which is bordered by recent tree planting, scrub and the motorway on the west, 1.5ha in size. The predominant species is hazel. Other scattered species include ash, alder, oak, with an area of wild cherry, sweet chestnut and field maple. The field layer is relatively species-poor, where towards the north it is made up of a carpet of bluebells with occasional Lords-and-Ladies, cleavers, meadow-grass and primrose. To the south, the field layer is patchy, with areas of bare ground and a grassy field layer made up of meadow-grass, dog's mercury, ground ivy and occasional nettle. Pheasant pen present. In the southern corner lies a relatively large pond in a slight basin with bulrush, reed sweet-grass and hard rush. The copse is in part surrounded by a ditch, lined by alder.

Priority UK BAP Habitat(s): Lowland Mixed Deciduous Woodland (10 Ancient woodland indicator plants)

Nationally Scarce (NSC) & BAP Species Recorded: None

Selection matrix

Criterion	Notes	Significance for LWS designation
1. Naturalness	Presence of ancient woodland with 10 indicators and pond habitat	Satisfies habitat definitions 4.12 and 4.7. ✓
2. Rare or exceptional features	None recorded in any previous survey either	x
3. Size or extent	1.5ha site <50% UKBAP habitat	x
4. Diversity	Only common plants and the more gregarious ancient woodland indicators, no notable species recorded	x
5. Connectivity within the landscape	Cut off by the motorway	x
6. Recorded history and cultural associations	None	x
7. Value for appreciation of nature	Privately owned – not accessible	x
8. Value for learning	Privately owned – not accessible	x
Does the site qualify for LWS selection?	No, presence of UKBAP habitat is not sufficient to qualify as LWS on its own.	

Case study 4. Woodland site

Site Overview/Abstract

The whole site varies in character and has been heavily influenced by planting and forestry practices. Only two small areas are classified as ancient replanted woodland (PAWS). There is a good range of ground flora along certain rides and where there is a more natural structure. Parts of the woodland complex retained older features such as woodbanks and older boundary trees.

Priority UK BAP Habitat(s): Lowland Mixed Deciduous Woodland (Ancient woodland Planted Ancient Woodland with 29 indicator plants)

Nationally Scarce (NSC) & BAP Species Recorded: Moschatel, bluebell, cowslip (all LBAP, 2006)

Selection matrix

Criterion	Notes	Significance for LWS designation
1. Naturalness	Part ancient with mature beech, part PAWS with deciduous planting (>50% native planting and qualifies as UKBAP) and part semi-natural woodland (planted late 1800s) with ancient ground flora species present, 29 Ancient Woodland indicators	Yes, All three types of woodland qualify as BAP habitat
2. Rare or exceptional features	A couple of uncommon plants but no county or regional rarities or UKBAP	x

Criterion	Notes	Significance for LWS designation
	species	
3. Size or extent	Total area is 75ha of woodland with good connectivity in the landscape	✓
4. Diversity	Good range of vascular plant species, relatively diverse woodland - part ancient, part new planting with several rides and woodbanks and older boundary trees	✓
5. Connectivity within the landscape	Large block of woodlands with links to further woodland areas	✓
6. Fragility	Robust, large woodland area under ongoing management.	×
7. Recorded history and cultural associations	Known site for firecrest	×
8. Value for appreciation of nature	Several footpaths cross the site, adds to the wooded character of the landscape	✓
9. Value for learning	Not currently used or in close proximity to schools	×
Does the site qualify for LWS selection?	Yes, qualifies under 1, 3 & 4	

2.4 De-selection and borderline sites

Re-surveyed LWS may show deterioration in the habitat and/or species diversity for which they were originally designated. In these circumstances, the assessment procedure should take into account evidence from any additional species surveys or local group information to determine whether a site still meets the selection criteria. If the re-surveyed site is shown to no longer meet the criteria AND restoration is not feasible, due to the existing state of deterioration, the loss of notable species, resource costs or unwilling landowners, then the site will be de-selected.

In some borderline cases it may be appropriate to defer the decision until sufficient information is available on which to base a decision (e.g. from specialist taxon recording groups or after the appropriate authority or organisation has assessed the suitability of restoration) and review the site at a later selection panel meeting.

3.0 Where does a Local Wildlife Site start and finish? Drawing the line

In general, boundaries must be along features recognisable on the ground and conforming to Ordnance Survey Master Map layers which usually conform to the boundary of a particular management type. This will mean whole field units, not part units, will be included in a site even where the survey has shown that only part of the field is of LWS standard.

As stated under the size criterion 2.2.3 there is a minimum size that can be digitally recorded. This varies for each habitat. If a site contains multiple patches of priority UK BAP habitat below these minimum sizes the whole site will be digitally mapped with a boundary including the buffering habitat(s) and digitally recorded as that buffer habitat with notes in the comment sections on BAP habitats they support.

3.1 Mosaics and buffers

Most of the habitat criteria require the comparison of botanical data for the site under consideration with a tabulated list of plants considered indicative of the habitat in question. Some sites will have a mosaic of habitats (particularly in the larger sites), which can increase species diversity being important for a large number of invertebrates and other fauna that require a range of different habitats within a limited distance. The quality of the individual habitats within a mosaic may be of limited intrinsic value and would fail to meet the criteria alone. However, the value of such a site is often greater than the sum of the component parts and so is of greater ecological value.

Additionally, habitats and features around recorded semi-natural habitats that reduce the vulnerability of the site may also be included. This might be relevant, for example, if the hydrological features associated with a fen are to be safeguarded. Other features might include hedgerows or arable field margins (UKBAP habitats in their own right) which might buffer or link other priority habitats and thus increase the permeability of the landscape to wildlife.

3.2 How the site selection process is adopted within local government planning guidance

The Local Wildlife Site Selection Panel for each county meets annually to assess and select/de-select sites based primarily on the botanical surveys and any additional species recording that has been undertaken. These panels are made up of representatives from statutory and voluntary nature conservation bodies, local authorities and the county Local Records Centre, as well as species experts. Discussions are underway with local authorities to develop policies or planning guidance to recognise LWS processes decisions in their Local Development Frameworks, in order to make informed planning decisions.

4.0 UKBAP habitat definitions

Habitats relevant to Berkshire, Buckinghamshire and Oxfordshire that will be considered for LWS selection under criterion 1 are described below. These descriptions are a guide, the opinion of the surveyor and other relevant experts should be sought to confirm habitat classification.

4.1 Lowland calcareous grassland

4.1.1 General description

Calcareous grassland develops on shallow, lime-rich, nutrient-poor soils, generally overlying limestone or chalk. These grasslands are defined by their species composition, which consists largely of calcicolous (lime-loving) plants. Calcareous grassland often supports a very rich flora with a high diversity (a large number of species per square metre). The main grasses are either the fine sheep's-fescue and yellow oat-grass, or the larger upright brome and tor-grass. False brome can also be predominant.

There is a high percentage of forbs (30-90%) typically common bird's-foot-trefoil, dwarf thistle, hoary plantain, field scabious, rough hawkbit, greater knapweed and salad burnet as well as the more restricted indicators, such as common rockrose and wild thyme. Many rare species may be represented, including gentians and orchids, and parasites are also present (bastard toadflax and common dodder). Open communities can also be rich in bryophytes, including *Ctenidium molluscum* and *Homalothecium lutescens*, and lichens, such as *Cladonia rangiformis*.

Calcareous grassland is thought to be an anthropogenic habitat in this area, i.e. it was originally created by human activity, and if unmanaged would revert to woodland. It has traditionally been grazed by sheep, cattle (typically towards the west), or, occasionally, horses. Rabbits took over this role in some areas in the early 20th century, but since the introduction of myxomatosis in the 1950s they have usually been unable to prevent scrub encroachment. If grazing is relaxed, grasses become dominant and dense, leading to a loss of small species and loss of diversity and, ultimately, scrub and / or woodland encroachment. This may become juniper scrub and yew woodland.

Geology

Calcareous grassland is limited by the geology of the under-lying rock. The major concentrations of calcareous grassland in Berkshire, Buckinghamshire and Oxfordshire are found on the Chilterns on the Cretaceous chalk, especially the scarp slopes. Other major areas are the North Wessex Downs, Berkshire Downs Escarpment, Blewbury Downs, the Cotswolds river valleys, and small areas in the Oxford Heights or Mid-vale ridge and associated with limestone outcrops along the Ouse valley. The gravel terraces are also composed of limestone and may carry calcareous grassland. Soils are characteristically shallow, free-draining and nutrient-poor.

Distribution

This habitat is usually found on steeper slopes (e.g. at the Goring Gap, or on the scarp slope as at Watlington Hill, Inkpen Hill and Ivinghoe Hills), valley sides (River Swere) and dry river valleys (Kingston Down and Buttler's Hangings). Man-made features are important for their calcareous grassland, e.g. ancient earthworks, trackways, road verges and quarries, railway cuttings (such as Chilton CWS and Ardley SSSI), and even airfields (Upper Heyford).

The cover of lowland calcareous grassland has suffered a sharp decline in extent over the last 50 years. Berkshire is thought to have approximately 210 ha of calcareous grassland

remaining, for Buckinghamshire the figure is 270ha (NE Lowland Grassland Inventory Review, 2007) and in Oxfordshire there is thought to be approximately 680 ha (TVERC habitat mapping 2006). The main factors resulting in the decline are agricultural improvement, inappropriate management (i.e. intensive grazing or neglect), fragmentation and development. There has been extensive loss of calcareous grassland on gentle slopes as a result of ploughing, and on steeper slopes by aerial spraying of fertilizer or herbicides. Many areas were ploughed during the Second World War years and are still floristically impoverished and species such as wild parsnip are often present in the resulting secondary grassland.

4.1.2 Associated Habitats

Lowland heathland

When calcareous and acidic soils are mixed, for instance the Corallian limestones intermixed with sandy deposits, they leach rapidly to give acid conditions. Heathland may be present in close association with calcareous grassland and a mixture called "chalk heath" can occur. This is significant around Frilford in the Oxford Heights West conservation target area, and also on the Chiltern plateau e.g. Bacombe & Coombe Hills SSSI, where thin sandy drift overlies chalk.

Lowland dry acid grassland

In north Oxfordshire, where there are limestones which are rich in iron and Lias sands and clays, some neutral to acid grassland can be found in close association with calcareous grassland. Generally it is easy to separate the habitat on species composition but in the U4 acid grassland community, localised base enrichment can lead to the presence of typical calcicoles, such as lady's bedstraw, quaking grass, salad burnet, wild thyme and common bird's-foot-trefoil, in the sward. For a full list refer to the lowland dry acid grassland indicators list in Appendix B.

Lowland meadow

On deeper soils the sward is more mesotrophic and neutral grassland species can be abundant. Generally there will always be a significant number of calcicoles still present to clearly distinguish the presence of calcareous grassland. Lowland meadow on alluvial soils can be highly calcareous and elements of calcareous grassland are more common in the sward. Some meadows may have abundant upright brome (e.g. Langleys Lane Meadow SSSI) and perhaps a small number of species usually associated with calcareous grassland. In East Berkshire salad burnet is often present and pyramidal orchid has been seen at Sutherland Grange. Such areas would still be classed as lowland meadow.

Scrub

When grazing is relaxed the sward may become very dense (especially if large species such as tor-grass were present originally) and scrub may invade. While a small amount of scrub is beneficial, especially for birds, it will eventually revert to woodland.

4.1.3 How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UKBAP Priority Habitat, Lowland calcareous grassland.

CG1 *Festuca ovina* - *Carlina vulgaris* grassland

This community is extremely rare in the area and occurs in Watlington Hill with a mixture of CG2.

CG2 *Festuca ovina* – *Avenula (Helictotrichon) pratensis* grassland

This community is a low, open sward dominated by sheep's-fescue (Crawley 2005) with abundant glaucous sedge, meadow oat-grass, crested hair-grass and many small chalk grassland wildflowers.

CG3 *Bromus erectus* grassland

This community is characterised by the virtual absence of tor-grass and downy oat-grass (Crawley 2005) and upright-brome is a constant.

CG4 *Brachypodium pinnatum* grassland

This community is characterised by the absence of the larger tussock forming grasses such as upright brome and downy oat-grass. Tor-grass is a constant species. Without management the sward becomes dense and less rich especially where tor-grass dominates.

CG5 *Bromus erectus* – *Brachypodium pinnatum* grassland

This community is characterised by the co-dominance of upright brome and tor-grass.

CG6 *Avenula (Helictotrichon) pubescens* grassland

CG6 is an uncommon type. It is dominated by red fescue and a mixture of meadow oat-grass species. It tends to be found on moister; more mesotrophic soils on flatter sites sometimes with a history of disturbance (ploughing) and limited grazing.

CG7 *Festuca ovina* – *Hieracium pilosella* – *Thymus* spp. grassland

CG7 has a very high abundance of mouse-ear-hawkweed and thyme. Grasses are similar to CG2 but there is generally less glaucous sedge. CG2/CG7 mixtures and mosaics are not uncommon. CG7 can be found on disturbed sites such as quarries and spoil heaps.

NB Most of these communities have more mesotrophic types which have a greater abundance of the more typical neutral grassland species such as Yorkshire fog, white clover and cock'sfoot. Red fescue may partially or completely replace sheep's-fescue.

Closely associated vegetation communities:

MG1

The calcareous type of MG1 is typical of calcareous soils, especially on road verges. These are characterised by the dominance of false oat-grass and an abundance of greater knapweed and field scabious. It is also found on unmanaged or little managed sites such as the edge of gallops. It is not unusual to have a mixture of CG3 and MG1 where there is some upright brome and some chalk or limestone indicators where management has largely ceased.

MG6

On deeper soils, towards the base of slopes and on land which has been improved, the grassland will be typically the more calcareous type of MG6. This can have calcareous grassland species such as burnet saxifrage, hoary plantain and occasionally salad burnet. The abundance or dominance of

perennial rye-grass and crested dog's-tail indicates MG6 but there may also be mixtures with CG grassland types.

MG5

The calcareous form of MG5, which is typical of drier hay meadows, is also found on banks in North Oxfordshire. This has an abundance of yellow oat-grass and species such as lady's bedstraw, salad burnet, hoary plantain, agrimony and the more usual red fescue may be partly replaced by sheep's-fescue. Glaucous sedge is also likely to be more abundant than in other MG5 types. The presence of true calcareous indicators such as common rock-rose, small scabious, thyme and clustered bellflower is probably the best way of separating them.

4.1.4 Other habitats

Areas of semi-natural or artificial habitat totally within an area of calcareous grassland should be included if they are less than 0.25 ha. Scattered scrub is often an integral part of the calcareous grassland environment. Stands of more than 0.25 ha of dense scrub (>20% cover) should be excluded and regarded as a separate habitat type. Areas of scrub that are surrounded by calcareous grassland and are <0.25 ha should be noted as part of the grassland and recorded as a feature.

The smallest unit of calcareous grassland that will usually be selected as a Local Wildlife Site is 0.25ha.

4.2 Lowland dry acid grassland

4.2.1 Description

Lowland dry acid grassland occurs on acidic, nutrient-poor, free-draining soils and is normally managed as pasture. The sward is characterised by the dominance of fine-leaved grasses such as common bent, sheep's-fescue, wavy hair-grass, sweet vernal-grass and heath grass. Forbs include tormentil, heath bedstraw, heath speedwell and sheep's sorrel. Dwarf shrubs such as heather and gorse can also occur but at less than 25% cover.

Acid grasslands can have a high cover of bryophytes and, when parched, can be rich in lichens of the genus *Cladonia*. They are very variable in terms of species richness and stands can range from relatively species-poor (less than 5 species per 4m²) to species-rich (in excess of 25 species per 4m²). However, generally they are not particularly species rich.

Dry acid grassland usually develops on suitable soils from clearance of woodland or bracken for pasture. Other sites are found on the heathland edge where grazing (and trampling) control heather growth, former arable sites and also as the ground layer in Wood pasture and parkland. It is usually present in enclosed pasture but may be found unenclosed within commons.

Dry acid grassland is usually grazed by sheep or cattle. However they may be cut in an absence of grazing such as on Peppard Common. Grazing is important in maintaining the grassland community as a lack of grazing leads to scrub or bracken encroachment.

Geology

Acid grassland is dependent on the solid and drift geology, where nutrient poor, free-draining soils with pH 4-5.5 are required. In Oxfordshire there are a few suitable areas, mostly on the Lower Greensand in the Oxford Heights and on glacial drift on the plateau of the Cotswolds and Chilterns. In Berkshire the Reading formation, Bagshot formation as well as glacial outwash sands carry suitable sandy soils. Buckinghamshire is also associated with the Lower Greensand on the border with Bedfordshire and the clay-with-flint occurring on the Chiltern plateau. Elsewhere the main concentration is found on the Glacial Gravels and London Clay in the south of the county.

Distribution

There has been a substantial decline in the resource over the last century, mainly due to agricultural intensification, but also as result of loss of grazing, especially on common land and afforestation. In our area it is currently most threatened by urban development and recreational use. In Berkshire there is thought to be approximately 100 ha with the main areas being at Greenham Common and Windsor Great Park. In Oxfordshire there are approximately 42 ha, and in the region of 30ha in Buckinghamshire, examples include Moorend Common and Langley Park. However these figures are probably under-estimated due to the difficulty in identifying this habitat and its close relationship with heathland where it can form part of a mosaic.

4.2.2 Associated habitats

Lowland meadow

Lowland meadow is distinguished from lowland dry acid grassland by the absence of acid indicator species (listed below). Sheep's sorrel, tormentil and heath bedstraw are particularly good indicators of dry acid grassland. Care should be taken with the more acidic lowland meadow habitat, especially in North Oxfordshire, where there might be some species which may be found in either habitat, specifically the U4 acid grassland community. These include bitter vetch, betony, tormentil, pignut and devil's-bit scabious. The presence of abundant heath bedstraw is a key obvious difference.

Lowland calcareous grassland

In north Oxfordshire, where there are limestones which are rich in iron and Lias sands and clays, some neutral to acid grassland can be found in close association with calcareous grassland. Generally it is easy to separate the habitat on species composition but in the U4 acid grassland community localised base enrichment can lead to the presence of typical calcicoles, such as lady's bedstraw, quaking grass, salad burnet, wild thyme and common bird's-foot trefoil, which may cause confusion. The presence of the U4 community in the region has not been confirmed.

Lowland heath

In many cases dry acid grasslands are an integral part of Lowland Heaths, and the grassland component may contribute significantly to the diversity and ecological interest of heathland sites. There will be much overlap with the species for acid grassland and heathland; however the defining factor for heathland is whether it has a greater than 25 % cover of ericaceous sub-shrubs such as heather, bilberry and dwarf gorse. If the acid grassland component of a heathland is estimated to be at least 0.25 ha in total, then it should be recorded as a separate habitat on a site with an estimate of the % of the grassland component recorded.

Lowland wood-pasture and parkland

Dry acid grassland may form the ground flora of wood-pasture.

4.2.3 How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UKBAP Priority Habitat, Lowland dry acid grassland.

U1 *Festuca ovina-Agrostis capillaris* – *Rumex acetosella* grassland

This is a variable but distinctive vegetation type, with an open sward of small tussocky grasses, mostly sheep's-fescue and common bent. Characteristic forbs include sheep's sorrel and heath bedstraw and also the less-restricted tormentil and heath speedwell.

This community develops on the freely drained ground on acid sandy soils of the Bagshot series. It often grades to acid variants of MG5 and MG7 in which sheep's-fescue is replaced with red fescue. U1 is the only Berkshire grassland with abundant lichens in the sward (Crawley 2005) and these can form lichen dominated patches known as lichen heath.

U2 *Deschampsia flexuosa* grassland

U1 and U2 have quite a lot of overlap. The defining factor is whether sheep's-fescue or wavy hair-grass is the dominant species. If it is wavy hair-grass it is more likely to be a U2 grassland.

U3 *Agrostis curtisii* grassland

The predominant species are bristle bent, heather, heath grass, sheep's-fescue, heath bedstraw and tormentil.

U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland

Characteristically dominated by grass mixtures with sheep's-fescue, common bent and sweet vernal-grass generally being the most abundant species. In lowland situations it is usually restricted to acid, water-retentive, clayey soils, which are not so poorly drained that wet acid grassland can develop. U4 has many species also typical of lowland meadow and some calcicoles. The presence of this community in the area has not been confirmed.

U20 *Pteridium aquilinum* – *Galium saxatile* community, *Anthoxanthum odoratum* sub-community.

Bracken is the sole dominant, with a cover of greater than 25%, and being overwhelmingly abundant in many stands. The constant species are heath bedstraw, tormentil and sheep's-fescue.

Plants which need slightly damp acid conditions include meadow thistle, common sedge, purple moor-grass, soft rush and compact rush. Shady acid conditions are required by wood-sorrel and slender St John's-wort. On the iron-rich Lias species such as lousewort, bitter vetch and devil's-bit scabious indicate a rather unusual neutral to acidic grassland type. Soft rush can also occur in neutral to calcareous conditions.

The smallest unit size of lowland dry acid grassland that will usually be selected as a Local Wildlife Site is 0.25ha

4.3 Lowland meadow

4.3.1 Description

Lowland meadow habitat is found on neutral soils on alluvium or clay mainly in low-lying areas in river and stream valleys. It is usually managed for hay with aftermath grazing. Some sites may be grazed in some years rather than being hay cut, and the habitat can be present in sites with very low grazing levels. There are some large sites adjacent to rivers, which are subject to flooding, such as Pixey and Yarnton Meads. In Buckinghamshire concentrations occur in the Upper Ray area, with other notable examples scattered across the north of the county e.g. Oxley Mead and Pilch Fields. The habitat is also associated with hay cut ridge-and-furrow meadows. Most remaining sites are found on the alluvium, with scattered sites on the clay, which tend to be less species rich. In north Oxfordshire it is also found on banks along the narrow valleys in the Ironstone area. Lowland meadow is characterised by a sward with a mixture of grasses such as red fescue, common bent, sweet vernal-grass, meadow foxtail, crested dog's-tail and rye-grass. A rich variety of wildflowers is present including oxeye daisy, lady's bedstraw, common bird's-foot-trefoil, cowslip and common knapweed along with species, including some grasses and sedges, that are indicative of a long period without disturbance. These include great burnet, pepper saxifrage, yellow rattle, quaking grass, glaucous sedge, carnation sedge, green-winged orchid, adder's-tongue fern and devil's-bit scabious. The more acidic, but still neutral, soils have species such as tormentil, lady's mantle, dropwort, heath grass, betony and lousewort. Wetter areas may have marsh marigold and ragged robin along with some rushes (*Juncus* spp. and *Eleocharis* spp.) and tubular water-dropwort.

Other neutral grasslands

These are described here in order to help distinguish between lowland meadow and other neutral grasslands. However there can be great deal of crossover in communities and these can be mixtures of lowland meadow communities and some of the types listed below. These communities tend to occur on a cline which depends on type of management, or the lack of it.

Wet grassland

This is dominated by tussocky grasses, especially tufted hair-grass, Yorkshire fog and creeping bent, as well as hard and soft rushes. Such sites are managed as pasture. Generally these are relatively species poor although a small number of lowland meadow indicator species may be found. With low level grazing there can be elements of the richer lowland meadow mixed with wet grassland. It is also typically found in furrows in ridge and furrow meadows with lowland meadow communities on the ridges. Wet grasslands can be important habitat for wading birds.

Inundation grassland

This habitat is typically dominated by one or two species, with a few other species in abundance. Typical species include marsh foxtail, creeping bent and silverweed. The habitat is found in areas regularly inundated with water. Generally they are species-poor but rich stands of one type (see box) do count as UKBAP habitat. Good examples of these richer stands are to be found in the regularly inundated parts of Port Meadow where creeping marshwort is found.

Improved grassland

This is permanent pasture dominated by rye-grass and crested dog's-tail. It lacks most of the indicator species of lowland meadow but may have some of the common species such as common knapweed, common bird's-foot-trefoil and lady's bedstraw. Depending on the management of the site, including grazing regime and the use of fertilizers, there can be a mixed sward with lowland meadow elements.

Rough grassland

Where management stops the sward becomes tall and dense with coarse grasses dominating. False oat-grass and cock's-foot become particularly prominent in the sward and the dense growth and build up of leaf litter leads to a loss of many indicator species. Some of the more common species may survive in the sward. This is commonly seen in East Berkshire, such as along the Thames near Eton. Depending on the length of time without management, a mixed lowland meadow/rough grassland sward may be present. Some hay meadows may be left ungrazed and although many of the typical lowland meadow species survive false oat-grass becomes very abundant in the sward. This would still be classed as lowland meadow habitat.

4.3.2 Relationship with other habitats

Fen

Some wet hay meadows, where peaty soils have formed, may have elements of fen communities. This is rare but can be seen at Alvescot Meadows SSSI, Fernham Meadows SSSI, Manor Farm Meadow at Crawley, Asham Meads and Wendlebury Meads.

Flushes are found in lowland meadow habitat on banks along the valleys in north Oxfordshire and in association with the River Ouse in Buckinghamshire. These have elements of fen and wet grassland communities.

Wood-pasture and parkland

Very occasionally lowland meadow habitat is found in parkland. Most parkland grassland on neutral soils has been improved but sites such as Crowsley Park have the more acidic form of lowland meadow habitat.

Lowland mixed deciduous woodland

Lowland meadow habitat may be found along wide rides within some woodlands. There is often a strong element of woodland species present. Examples are found at Bernwood and Whitecross Green.

Calcareous grassland

In north Oxfordshire and on the Corallian Ridge the complex geology along some valleys mean there can be intimate mixtures of calcareous and neutral grassland.

Acid grassland

The main problem is separating the more acidic neutral grassland from the U4 acid grassland community. Some north Oxfordshire grasslands are similar to U4 but it has not

been confirmed that this habitat is present in the area. A key difference is the abundance of heath bedstraw in U4.

Seeded grassland

Some sites have been seeded with a meadow seed mix and may have a good variety of the species associated with lowland meadow habitat. In early years the composition of the sward can change significantly. Such grasslands should not be classed as lowland meadow habitat until a stable and properly assessable community develops. A minimum length of time should be ten years before such sites can be considered.

4.3.4 How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UKBAP Priority Habitat, Lowland Meadows.

MG4 Great Burnet – Meadow Foxtail Floodplain Grassland

This is typical of regularly flooded or waterlogged, but freely draining, riverside meadows on alluvium.

Red fescue, meadow foxtail, Yorkshire fog and rye-grass are the most abundant grasses. It is characterised by the abundance of larger herbaceous wildflowers such as great burnet, devil's-bit scabious and meadowsweet and often an abundance of dandelion. Snake's-head fritillary is typically associated with this community.

MG5 Common Knapweed - Crested Dog's-Tail Meadows

This has a similar suite of species to MG4 but the large herbaceous wildflowers are not present or much reduced in abundance. Red fescue, crested dog's-tail and common bent are the most abundant grasses. More typical of drier sites which don't flood (although they may still be quite wet) including the ridges of ridge-and-furrow. It is found on clay and alluvium. The more acidic form is found on banks on Lias clay along north Oxfordshire valleys.

MG8 Crested Dog's-Tail - Marsh Marigold Grassland

This is typical of true water meadows. Mainly found in wetter pockets within other communities (e.g. old river channels at Pixey and Yarnton Meads). It is quite varied in composition. Grasses are more dominant in the sward than other lowland meadow communities. Wetland species are more prominent. Marsh marigold is always present. Ragged robin, greater bird's-foot trefoil, common marsh and fen bedstraw and wild angelica are typically present.

Also includes:

- Richer stands of MG13 red fescue-creeping bent-silverweed inundation grassland. Creeping bent and silverweed are particularly abundant.

The smallest unit size of lowland meadows that will usually be selected as a Local Wildlife Site is 0.25ha.

4.4 Lowland heathland

4.4.1 Definition

Lowland heathland is characteristically found on acidic nutrient-poor soils, commonly on free-draining sands and gravels and generally found below 300 metres in altitude. Lowland heathland is a vegetation type which is normally dominated by heather and ericaceous sub-shrubs such as bell heather, cross-leaved heath and bilberry, often with gorse species. To be classed as lowland heathland the site must have a presence of dwarf shrubs (e.g. heather, bilberry, dwarf gorse) at a cover of at least 25 %.

Grasses generally play a minor role and often include common bent, wavy hair-grass and purple moor-grass. Other species include tormentil, sheep's sorrel and heath bedstraw. Trees are scarce or absent, however many heathlands have been encroached by trees such as birch, oak and scots pine.

Lowland heathland is a dynamic habitat which undergoes significant changes in different successional stages, from bare ground (e.g. after burning or tree clearing) and grassy stages, to mature, dense heath. These different stages often co-occur on a site. It is often found with a varied height and structure, and with areas of bare ground. Although the habitat is in itself relatively species-poor, it is usually part of a mosaic of habitats, including mires, acidic grassland, scattered and clumped trees and scrub; bracken; areas of bare ground; areas of lichens; gorse, wet heaths, bogs and open water.

Lowland heathland can be sub-divided:

- dry heath - characterised by heather and bell heather;
- wet heath - cross-leaved heath replaces both heather and bell heather. Wet heath is found predominately in depressions and low lying places where water accumulates. Purple moor-grass and some Sphagnum species are also present.

Lowland heathland is generally considered to be anthropogenic in origin, a product of traditional pastoral activities and the exercising of commoner's rights such as bracken collecting, turf cutting, grazing and firewood collection etc. They are maintained by grazing, cutting or burning.

The presence and numbers of characteristic birds, reptiles, invertebrates, vascular plants, bryophytes and lichens are important indicators of habitat quality.

Geology

Heathland vegetation generally occurs on mineral soils and thin peats (0.5m deep). In Berkshire, heathlands are predominately found on the acid, sandy soils in the south of the county, particularly on the Lower Bagshot sand where the soils are freely drained and often highly acidic. Other soils include Bracklesham Sand and Barton Sand. Much is also formed on the drift geology of the sands and gravel such as Snelsmore Common.

In Oxfordshire, heathland survives on a few, relatively scarce geological strata mostly with sand or gravelly soils such as Middle Lias plateau, the Northampton sands, the narrow bands of gravel from Eynsham to Wychwood and Kingham, and of Kellaways beds from

Witney to Finmere, some sands within the Corallian, the few tetrads of Shotover sands and Lower Greensand and the Clay-with-flints and pebbly soils of the Chiltern dip slope. The remaining concentrations of heathland in Buckinghamshire are found on the Glacial Gravel and London Clay in the south of the county (Wooburn – Iver Heath), and on the boundary with Bedfordshire (Bragenham – Woburn Sands) on the Lower Greensand. A small number of relicts persist in the Chilterns on with the Clay-with-flints of the plateau.

Distribution/context

In the UK it is estimated that English lowland heathland has declined by more than 80% since 1800. Although information on Berkshire's historical heathlands is scant it is estimated that heathlands covered 14,933 ha in around 1761, occurring in two main areas, on plateau gravels in the west of the county and on the sandy Eocene Barton and Bracklesham Beds in the east. Across Berkshire alone, it is estimated that 98% of heathland has been lost since 1761, and today only approx. 440 ha remain in isolated fragments. Oxfordshire has previously had limited heathland, and what it had has mostly gone. Today there is thought to be only 3 ha of heathland within the County. Examples of the fragments of lowland heath that remain in Oxfordshire include Peppard Common, Tadmarton Heath and Ramsden Heath.

Although distribution is naturally restricted by geology within the county, heathland was formerly more widespread with recent work showing the coverage in South Buckinghamshire to be in the region of 2,000ha in c.1760. Today the remaining area is estimated at 87ha the majority of which is found at Black Park, Burnham Beeches and Stoke Common. The largest remaining heathland on the Greensand is at Rammamere Heath, which brings the total area for the county to approximately 97ha. Tiny parcels of ericaeous vegetation remain in the Chilterns including examples at Coombe Hill and Hawridge and Cholesbury Common; also of note is a relict Juniper population found at Naphill Common.

Heathland has been severely fragmented in the past due to a range of factors including: urbanisation, afforestation, agricultural improvements, mineral extraction and road building. One of the main threats today is the lack of management and consequently loss to scrub and woodland encroachment. Wet heaths are particularly vulnerable to drying out due to successional changes.

4.4.2 Associated habitats

Heathlands can form a complex of habitat types, mainly due to the lack of management. For example, heathland grades into grasslands as grazing pressure or burning frequency is increased, and into woodland as either or both of these processes is relaxed. In addition, heathlands can be affected by topography, for example a depression and increase in water can lead to a gradation towards valley mire.

Secondary woodland and scrub

Associated habitats include oak-birch-heath which is in effect an open immature W16 oak – birch - wavy hair-grass woodland but it retains considerable heathland species in the field layer. Heathland in good condition should have **less than 15% cover of scrub or secondary woodland**. In cases where ericoid/Ulex cover is greater than 25% and secondary woodland is greater than 15% then the area should be considered as 'close to' heathland.

Dry acid grassland

Lowland heathland is likely to occur in combination with lowland dry acid grassland. Many of the species will be similar and the defining factor is the amount of heather present (i.e. greater than 25% to be classed as lowland heath).

Fen/bog

Valley mire has not been included within the lowland heathland definition; instead it has been defined under the fen criteria. However it may be very difficult to distinguish between the two habitats. Berkshire contains very little valley mire. Valley mire usually forms part of the following NVC Communities: M21 *Narthecio-Sphagnetum* valley mire and M25 *Molinia caerulea-Potentilla erecta* mire. In Berkshire, M25 is thought to be a degraded wet heath M16.

4.4.3 How this habitat definition relates to the National Vegetation Classification Communities

Dry heath

Note several of the dry-heaths in Berkshire are species-poor and consist of a mono-culture of heather with few or none of the vascular associates that serve to distinguish other lowland heath types (Poorley 1993). This makes it difficult to distinguish between the NVC Communities H1 and H2. In the 1993 heathland survey this was just classed as *Callunetum*. In Buckinghamshire H1 and H2 are the dominant communities.

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UKBAP Priority Habitat, Lowland Heathlands

Dry heath

H1 *Calluna vulgaris-Festuca ovina* heath

Generally heather is the only sub shrub and associated flora is often very species-poor with scattered tussocks of sheep's-fescue and patches of *Hypnum cupressiforme* and *Dicranum scoparium*.

H2 *Calluna vulgaris-Ulex minor* heath

This is the dominant heath type in Berkshire. Wavy hair-grass is very common with occasional purple moor-grass and cross-leaved heath where the vegetation extends on to seasonally waterlogged ground. But bristle bent is very rare.

H3 *Ulex minor-Agrostis curtisii* heath

A small amount is found in Berkshire on Broadmoor to Bagshot Heaths SSSI (Porley 1993). The defining feature for this community is that dwarf gorse and bristle bent are present. However wavy hair-grass is sparse.

Wet heath

M16 *Erica tetralix-Sphagnum compactum* wet heath

This occurs where there is some seasonal fluctuation in the water-table and water levels come close to the surface. It is characteristically dominated by a mixture of heather, cross-leaved heath and purple moor-grass. *Sphagnum compactum* is also present.

The smallest unit size of lowland heathland that will usually be selected as a Local Wildlife Site is 0.25ha.

4.5 Eutrophic standing water

4.5.1 Description

Eutrophic standing waters are nutrient-rich water-bodies, greater than 2ha in size and characterised by having dense, long-term populations of algae in mid-summer, often making the water green. This definition covers natural and man-made still waters, such as lakes, reservoirs and disused gravel pits, but it excludes small pools, field ponds, brackish waters and canals. The habitat is found throughout much of England but particularly in lowland areas.

They are highly productive because plant nutrients are plentiful, either naturally or as a result of artificial enrichment. Their beds are usually covered by dark anaerobic mud, rich in organic matter. Many lowland water bodies in the UK are now heavily polluted, with nutrient concentrations far in excess of natural levels (dystrophic water-bodies), although there is some geographical variation in the extent of the enrichment. The determination of whether a site contains this priority habitat is dependent on its Trophic Ranking Score (Palmer & Roy, 2001).

Geology/hydrology

Eutrophic waters are most typical of hard water areas of the lowlands of southern and eastern Britain, but they also occur in the north and west, especially near the coast.

Depending on whether the water bodies are natural or man-made, their linings can be anything from clay to concrete. Their beds are usually covered by dark anaerobic mud, rich in organic matter. Local geology and soils may have an influence on local drainage, and therefore the input of nutrients that may dictate trophic status within the water body.

There is a strong association between this habitat and sand and gravel extraction operations. In these circumstances, eutrophic standing water can often be found in areas where this type of superficial geology is found.

Abundance/threat

The data on the location of the habitat are reasonably well-established in Scotland but more patchy for England and Wales, and therefore there is a large capacity for error in the estimates. This habitat also has considerable overlap with other standing water habitats (Palmer & Roy, 2001). The Environment Agency has data concerning threshold values for identifying eutrophic standing waters.

Distribution

Generally, eutrophic standing water occurs in lowland areas i.e. below 300m. At present the extent of standing water in the UK is not accurately known, and figures on distribution are estimates. It has been estimated that the total surface area of standing freshwater in Great Britain is 2400km². About 518km² of the 674km² of those freshwater habitats found in England are eutrophic (77%), whilst in Scotland and Wales most standing freshwater habitats are oligotrophic (80% and 47% respectively). Of the remaining eutrophic standing freshwater in Great Britain, 121km² is found in Scotland and 40km² in Wales (32%) (Palmer & Roy, 2001).

In Berkshire, Buckinghamshire and Oxfordshire, eutrophic standing water is most likely to be found in disused gravel pits. In Oxfordshire, a number of sites along the Thames at Caversham, Dorchester and Cassington support large open water bodies, and, perhaps most notably, the Lower Windrush Valley from Witney to the river Thames contains a complex of man-made lakes. In Berkshire, similar sites are found in the Theale and Thatcham area. The Colne and Ouse Valleys in Buckinghamshire have been extensively worked for mineral extraction providing large open areas of water, some of which are noted for their avian interest. Other water bodies include reservoirs e.g. Foxcote and Weston Turville SSSI and former chalk quarries at College Lake near Pitstone.

There are two raw water supply storage reservoirs in Oxfordshire, one at Farmoor and the other at Grimsbury, both of which are concrete-lined. There is also a naturally banked reservoir at Clattercote which services the Oxford Canal. It is likely that these will be eutrophic standing water.

Some of these sites have had trophic level determinations carried out but by no means all. It is, therefore, difficult to categorically state that all of these sites are eutrophic standing water bodies.

4.5.2. Associated Habitats

Other open water habitats

Standing water bodies are not easy to confuse with other habitats due to their open nature. However, there are at least three other types of standing fresh water habitats (dystrophic, oligotrophic, and mesotrophic) that occur in this country. Looking at the nutrient levels within the bodies of water as well as comparing the floral and faunal communities in and around them can differentiate these from one another.

Ponds

Ponds are distinguished from other standing water bodies by their smaller size, <2ha would be considered as a pond and so potentially a BAP priority habitat.

Reedbeds

Post sand and gravel extraction habitat creation may see networks of open water and riparian habitats established. Reedbeds are often a feature of this form of after use.

Woodlands

Secondary woodland may also develop in association with open water bodies, and may take the form of either lowland mixed deciduous woodland or wet woodland, both priorities for conservation in the UK.

4.5.3. Species Lists

4.5.3.1 Characteristic species

- Plankton: In their natural state, eutrophic waters have high biodiversity. Planktonic algae and zooplankton are abundant in the water column.
- Vascular plants: Plant assemblages differ accordingly to geographical area and nutrient concentration but fennel pondweed *Potamogeton pectinatus* and spiked water-milfoil *Myriophyllum spicatum* are characteristic throughout the UK. Common floating-leaved plants include yellow water-lily *Nuphar lutea*, and

there is often a marginal fringe of reed swamp, which is an important component of the aquatic ecosystems.

- Cyanobacteria: Periodic 'blooms' of blue green cyanobacteria, which may be natural phenomena, can occur.
- Invertebrates: Bottom-dwelling invertebrates, such as snails, dragonfly larvae and water beetles, are abundant and calcareous sites may support large populations of the native freshwater crayfish *Austropotamobius pallipes*. Coarse fish such as roach *Rutilus rutilus*, tench *Tinca tinca* and pike *Esox lucius* are typical of standing eutrophic waters, but salmonids also occur naturally in some.
- Amphibians & other vertebrates: Species such as great crested newts are often present. The abundance of food can support internationally important bird populations and significant populations of wintering waterfowl.

4.5.3.2 Negative indicators

In water bodies that are heavily enriched as a result of human activity, biodiversity is depressed because planktonic and filamentous algae (blanket-weed) increase rapidly at the expense of other aquatic organisms. Sensitive organisms, such as many of the pondweed *Potamogeton spp.* and stoneworts *Chara spp.*, then disappear and water bodies may reach a relatively stable but biologically impoverished state.

4.5.4 Management

These water bodies are often used for recreational and sporting purposes and as a source of water for potable supply, industry or irrigation. Trophic status is more likely to be affected by management.

4.5.5 Key issues associated with discriminating from other habitats

- See other definitions for distinctions between other standing water habitats.

4.6 Mesotrophic lakes

4.6.1 Description

Mesotrophic lakes are bodies of standing water greater than 2ha in size, characterised by having a narrow range of nutrients and are in the middle of the trophic range (with a pH usually around or slightly below neutral). Planktonic algae sometimes discolour the water. They may be natural lakes or artificial water bodies, such as gravel pits and reservoirs, but not canals or ditches.

Standing waters are usually classified according to their nutrient status. There are three main types of standing waters: oligotrophic (nutrient-poor), eutrophic (nutrient-rich) and mesotrophic (intermediate). Other types of standing water include dystrophic (highly acidic, peat-stained water), guantrophic, marl lakes, brackish water lakes, turloughs and other temporary water bodies.

Mesotrophic lakes are relatively infrequent in the UK and are largely confined to the margins of upland areas in the north and west.

The main indicative nutrients in mesotrophic standing waters are nitrogen (N) and total phosphorus (P). Typically these water bodies have nutrient levels of $0.3 - 0.65 \text{ mgNI}^{-1}$ and $0.01 - 0.03 \text{ mgPI}^{-1}$, however, virtually all available nutrients are 'locked up' in algae during the growing season. The pH in these water bodies is usually around or slightly below 7 (neutral) although it can be higher. The determination of whether a site contains this priority habitat is dependent on its Trophic Ranking Score (Palmer & Roy, 2001).

Geology/hydrology

Mesotrophic lakes may have a relationship with acidic soils, that is, free draining mineral soils, acid brown earths and peat bogs. Not all sites are natural lakes, some may be artificial waters and so may have no relationship with geology and soil structure.

Although the habitat is not commonly found in the south of England, there may be an association between it and sand and gravel extraction operations. As a result, mesotrophic lakes may be found in areas where this type of superficial geology is found.

Abundance/threat

The data on the location of the habitat are reasonably well-established in Scotland but patchier for England and Wales, and therefore there is a large capacity for error in the estimates. This habitat also has considerable overlap with other standing water habitats (Palmer & Roy, 2001). The Environment Agency has data concerning threshold values for identifying eutrophic standing waters.

Distribution

This habitat occurs relatively infrequently in the UK, and is largely confined to upland areas (above 300m), eg Scotland and the Lake District. At present the extent of mesotrophic standing water in the UK is not widely known, and figures on distribution are estimates. In Great Britain as a whole, of the 2400km^2 of standing freshwater, 1445km^2 (+/-80) is oligotrophic (mostly in Scotland), 679km^2 is eutrophic, 267km^2 (+/-27) is mesotrophic (11% and mostly in Scotland) and 11km^2 is dystrophic. Trophic status'

mentioned above were all categorised using Trophic Ranking Scores rather than nutrient levels.

It is estimated that there is 26,727 ha of mesotrophic standing water in Great Britain with the majority of it being in Scotland (approx. 17,983 ha). If mesotrophic lakes are to be found in Berkshire, Buckinghamshire and Oxfordshire, they will occur in areas which have been the subject of gravel extraction over recent years. In Oxfordshire, a number of sites along the Thames at Caversham, Dorchester and Cassington support large open water bodies, and then, perhaps most notably, the Lower Windrush Valley from Witney to the river Thames contains a complex of man-made lakes. In Berkshire, similar sites are found in the Theale and Thatcham area.

There is a possibility that reservoirs may also support this priority habitat. There are two raw water supply storage reservoirs in Oxfordshire, one at Farmoor near Oxford and the other at Grimsbury near Banbury. There is also a naturally banked reservoir at Clattercote which services the Oxford Canal. Some of these sites have had trophic level determinations carried out but by no means all. It is, therefore, difficult to categorically state which of these sites are mesotrophic lakes or eutrophic standing water bodies. That said, where nutrient levels have been studied (in the Lower Windrush Valley by Pond Conservation) a site supporting the mesotrophic lake habitat has been identified.

4.6.2. Associated Habitats

Eutrophic standing water

Mesotrophic standing water is separated from eutrophic standing waters by its water chemistry and/or aquatic plant communities such as alternate water-milfoil, more than one species of *Chara* present.

Reedbeds

Post-sand and gravel extraction habitat creation may see networks of open water and riparian habitats established. Reedbeds (and possible fen) are often a feature of this form of after use.

Wet woodland

Secondary woodland may also develop in association with open water bodies, and may take the form of either lowland mixed deciduous woodland or wet woodland, both priorities for conservation in the UK.

4.6.3 Characteristic species

Mesotrophic lakes have the highest macrophyte diversity of any lake type, and relative to other lake types, they contain a higher proportion of nationally scarce and rare aquatic plants, e.g. Blunt-leaved pondweed *Potamogeton obtusifolius*, Perfoliate pondweed *Potamogeton perfoliatus* and White water-lily *Nymphaea alba*.

Macroinvertebrates are well represented in this habitat, important groups including dragonfly larvae, water beetles, stoneflies and mayflies. In general, fish communities in mesotrophic lakes are a mix of coarse and salmonid species, but there are now few truly natural assemblages because of the introduction of other species. Amphibians, including the protected great crested newt *Triturus cristatus*, are often present. Mesotrophic lakes can support important bird populations such as wintering waterfowl.

4.6.4 Management

Management of mesotrophic lakes is largely in the form of action to rehabilitate nutrient-enriched lakes as a result of pollution and to monitor water quality. They are used widely for recreational purposes and some for water extraction.

4.6.5 Key issues associated with discriminating from other habitats

- See other definitions for distinctions between other standing water habitats.

The smallest unit size of Mesotrophic lakes that will usually be selected as a Local Wildlife Site and by definition is 2ha.

4.7 Ponds

4.7.1 Description

Ponds are defined as permanent and seasonal standing water bodies up to 2ha in extent which meet one or more of the following criteria:

- *Habitats of international importance.* Ponds that meet criteria under Annex I of the Habitats Directive (see Appendix 2).
- *Species of high conservation importance.* Ponds supporting Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a nationally scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.
- *Exceptional assemblages of key biotic groups.* Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥ 30 wetland plant species or ≥ 50 aquatic macroinvertebrate species).
- *Ponds of high ecological quality:* Ponds classified in the top PSYM category (“high”) for ecological quality (i.e. having a PSYM score $\geq 75\%$). [PSYM (the Predictive System for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales; plant species and / or invertebrate families are surveyed using a standard method; the PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset; comparison of the prediction and observed data gives a % score for ponds quality]
- *Other important ponds:* Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context. Important areas for ponds can exist where ponds that meet the criteria have smaller or less species richness, but improve the overall habitat quality and quantity to enhance the protected and priority species associated with the habitat (see table A4.7 in Appendix 2).

Distribution

Ponds are widespread throughout the UK, but high-quality examples are now highly localised, especially in the lowlands. Recent evidence shows that many high value ponds are seriously at risk from the spread of alien invasive species of plants and animals. With increased emphasis on access to the countryside, this risk is likely to increase.

4.7.2. Associated habitats

Open water bodies

Distinction needs to be made between ponds and other open water bodies such as eutrophic standing water and mesotrophic lakes. Ponds are water bodies less than 2ha in size.

Reedbeds

Post-extraction habitat and new large-scale developments habitat creation may see networks of open water and riparian habitats established. Reedbeds (and possible fen) are often a feature of this form of land use.

Open mosaic habitats on previously developed land

As a habitat often found on the urban fringe open mosaic habitats may frequently support ponds as part of the mosaic. Gardens ponds are not typically included in this category

4.7.3 Characteristic species

At the landscape level, ponds typically support more invertebrate and plant species than other water body types (i.e. lakes, rivers, streams and ditches). Ponds support considerable numbers of key species. Species with statutory protection include:

- at least 65 UK BAP priority species (e.g. water vole, tadpole shrimp, lesser silver water and spangled water beetles, starfruit, pennyroyal, three-lobed crowfoot),
- at least 28 animal and plant species listed under the Wildlife & Countryside Act Schedules 5 and 8,
- Six Habitats Directive Annex II species including: great crested newt, white-clawed crayfish and otter (in larger ponds).

Ponds have additionally been shown to support at least 80 aquatic Red Data Book species. The number using the damp margins and drawdown zones of ponds (e.g. Diptera, ground beetles) has never been estimated but is likely to be considerable. There is increasing evidence that ponds are an important feeding resource for bats and farmland birds, including species such as Tree Sparrow and Yellow Wagtail.

Ponds will usually be selected as part of a mixed habitat Local Wildlife Site or that are individually >0.1ha and <2ha.

4.8 Lowland fens

4.8.1 Description

The UKBAP fen habitat includes:

- Swamp communities found at the margins of open water and in some floodplain sites. Reedbed is a type of swamp that is listed as a separate UKBAP priority habitat but is treated as a subset of UKBAP Fen.
- Tall fen vegetation on similar spring fed sites such as Chilswell Valley and Harcourt Hill and in association with fen meadow habitat and also the meadowsweet-wild angelica mire found in ditches and very wet areas in the floodplain.
- Short calcareous rich fen meadow habitat fed by lateral movements of spring water.
- Acidic mire found on heathland sites. However the national description states that the types found in this region, which are also very rare, should be treated as heathland.

Swamp/Reedbed

This habitat is found at the margins of open water, sometime forming extensive stands especially in the case of reedbed, but this is treated as a separate habitat (see section 4.10). In addition, very wet riverside fields can support extensive stands of swamp habitat. Swamp communities could be classified as any one of a range of National Vegetation Classification communities (see 4.8.3).

The habitat is reliant on a high water table and regular inundation by water. Where it dries out tall herbs such as nettle and great willowherb become increasingly dominant. Short swamp vegetation with species such as water-cress, fool's watercress, brooklime and lesser water-parsnip is also included here. In eutrophic conditions some swamp communities can become widespread on spring fed fen sites, especially reed-sweet grass dominated stands. These habitats are widespread in the region but most sites are small. Some riverside sites have extensive stands of sedge dominated swamp. Examples are found along the Rivers Windrush, Glyme, Cherwell, Thames, Ouse, Coln and on Otmoor.

Tall fen vegetation

This is found on spring-fed sites with peaty soils, often in association with fen meadow and also on other wet sites on mineral soils. Tall fen vegetation is also known as tall-herb fen and is approximately one to two metres tall.

Tall fen vegetation are common reed-dominated communities that are richer in species than typical reedbed, but are not considered to be botanically rich. Hemp agrimony is typically abundant, whilst other typical species include marsh thistle, meadowsweet, wild angelica, purple loosestrife, great willowherb, common marsh-bedstraw, water mint, marsh marigold and ragged robin. Sprawlers such as tufted vetch, hedge bindweed and bittersweet are also typical. Some fen meadow species may be present. The common reed – common nettle type, found in eutrophic conditions, is not included as UKBAP habitat.

The meadowsweet - wild angelica mire is also included as UKBAP priority habitat. This is more widespread and also found in very wet areas and ditches in the floodplain. It is mainly restricted to mineral sites.

Fen meadow

These are described as soligenous fens due to them being fed by lateral movement of water. The water is base-rich and they are associated with peaty soils. They comprise the M13, M22 and M24 NVC communities (see below).

The typical dominant species of fen meadow habitat are blunt-flowered rush, black bog rush and purple moor-grass. The sward is generally quite rich with species such as marsh valerian, devil's-bit scabious, fragrant orchid, bog pimpernel, sundew, common butterwort, marsh helleborine, meadow thistle, fen pondweed, marsh lousewort and marsh pennywort. The richest community, where black bog-rush and blunt-flowered rush dominate, is only known from a few local SSSIs and is not likely to be seen elsewhere. In some cases hard and soft rush replace blunt-flowered rush in these communities. Tall wetland species are prominent in some communities especially later in the season. These include marsh thistle, meadowsweet, hemp agrimony, wild angelica, water figwort, common meadow-rue and common valerian.

This habitat is largely restricted to North Buckinghamshire and Oxfordshire. The main concentration is along the Sandford Brook at Lashford Lane, Cothill, Gozards Ford and Barrow Farm. Other sites include Lye Valley, Sydlings Copse, Middle Barton Fen, Weston Fen, Taynton Fen, Spartum Fen, Combe Fen and Easington Fen. In North Buckinghamshire they occur widely, ranging from base-poor examples (the mostly wooded mires on Lower Greensand) to base-rich sites mostly associated with calcareous tills (Wheeler, 1997). The sites are often small and include Clack Fen, Drayton Parslow Fen, Valley Farm Fen, Nash Fen, Pilch Fields, Tingewick, Bledlow Fen and Longwick Fen.

Flushes

Flushes are excluded by the national guidelines for the fen definition but often have elements of fen and wet grassland communities. The rushes are usually hard, jointed and soft rush. Some flushes may support stands of giant horsetail.

4.8.2 Associated Habitats

Reedbeds

Reedbed forms the most extensive stand of swamp, usually at the edges of open and running water sites. Common reed is dominant and other vascular plant species are rare. Reedbeds are again scattered in Berkshire, Buckinghamshire and Oxfordshire but there are a few more extensive stands, the largest of which are part of habitat creation schemes, such as at Otmoor and Farmoor.

Open water

Swamp stands are often found at the edge of lakes and ponds.

Rivers and streams

Small stands of marginal swamp vegetation are typically found along rivers.

Lowland meadow and other neutral grassland

Stands of swamp vegetation are found in ditches in meadow sites. Some wet hay meadows, where some peaty soils have formed, may have elements of fen meadow communities. This is rare but can be seen at Alvescot Meadows SSSI, Fernham Meadows SSSI Manor Farm Meadow at Crawley, Asham Meads and Wendlebury Meads.

Wet woodland

Typically, this habitat is found fringing fen and floodplain swamps. Without management these habitats can succeed to wet woodland.

Purple moor-grass and rush pasture

This habitat supports certain types of fen meadow community (NVC types M22 and M24) that are also found in the soligenous fens in this region. The habitat is largely found in Western Britain. There is very little such habitat in this region and the key separator is location. It is found on a few very wet sites with a high water table. A good example is the rifle range at Otmoor and meadows along the Blackwater Valley.

It could be argued that the fen meadow community types included here, especially NVC type M22, should be described as this habitat instead. However this means that many of the soligenous fens in the region would not be classed as supporting fen habitat.

4.8.3 How this habitat definition relates to the National Vegetation Classification Communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the UKBAP priority habitat definition of Lowland Fen:

Swamp

S3 *Carex paniculata* sedge-swamp (Greater tussock-sedge swamp)

S5 *Glyceria maxima* swamp (Reed sweet-grass swamp)

S6 *Carex riparia* swamp (Greater pond-sedge swamp)

S7 *Carex acutiformis* swamp (Lesser pond-sedge swamp)

S8 *Scirpus lacustris* swamp (Open reed swamp)

S12 *Typha latifolia* swamp (Reedmace swamp)

S13 *Typha angustifolia* swamp (Lesser bulrush swamp)

S14 *Sparganium erectum* swamp (Branched Bur-reed swamp)

S19 *Eleocharis palustris* swamp (Common spike rush swamp)

S22 *Glyceria fluitans* water margin vegetation (Floating sweet-grass water margin vegetation)

S23 Other water margin vegetation

S28 *Phalaris arundinacea* tall-herb fen (Reed canary-grass tall-herb fen)

Tall-herb fen

S25 *Phragmites australis* – *Eupatorium cannabinum* tall-herb fen (Common reed-hemp agrimony tall herb fen)

Fen Meadow Communities

M13 Black bog rush – blunt-flowered rush mire

M22 Blunt-flowered rush – marsh thistle fen meadow

M24 Purple moor-grass – meadow thistle fen meadow

- M22 and M24 have both purple moor-grass and blunt-flowered rush and a similar suite of species so can be hard to separate.

Additional information

The smallest unit of this habitat to usually be selected as Local Wildlife Site is 0.1ha. Smaller stands/patches within another habitat type can be summed and if greater than 0.1ha can be considered for selection.

4.9 Purple moor-grass and rush pasture

4.9.1 Description

Purple moor-grass and rush pastures occur on poorly drained, usually acidic soils in lowland areas of high rainfall. It is a mixture of wet acid grassland, wet heath fen and mire communities. The habitat is defined by the dominant species which are purple moor-grass and tall rushes (*Juncus subnodulosus*, *J. articulatus* and *J. effusus*). There are four NVC communities associated with this habitat in this area – M22 and M23, which are rush pastures and M24 and M25 which are dominated by purple moor-grass (see below for further details). It is important to recognise that M22 and M24 are also associated with fen habitat. It is also important to understand that it is not just wet pasture with rushes which is a more common habitat in the region and which is a wet neutral grassland community. However this habitat though is closely related to one of the rush pasture communities. (see associated habitats below).

Distribution

The habitat is largely found in Western Britain and its presence in Berkshire, Buckinghamshire and Oxfordshire is not readily recognized. It is though rare in this region. It is found in floodplain sites such as the more acidic wet riverside meadows of south-east Berkshire (Blackwater Valley) and at Otmoor in Oxfordshire, in heathland sites, such as Snelsmore Common, and at the periphery of fens (though see associated habitats/fens section below).

Geology

It occurs on alluvium with more acidic soils.

4.9.2 Associated habitats

Fen

One of the communities (M24) is nationally recognised as also being found on fen sites, specifically soligenous fens where the water rises from springs and flushes and moves laterally through the fen. In this area M22 is also found on the same fen sites, although in the national descriptions this community is always classed as purple moor-grass and Rush Pasture. Location, however, is key and therefore where these conditions are found they should always be classed as fen. If this is not done many fen sites would not have fen habitat. If the area is wet simply because it is low lying and has a high water table, as is seen on Otmoor, then the habitat should be classified as purple moor-grass and rush pasture.

Wet grassland

The neutral grassland community M10 is called *Holcus lanatus*-*Juncus effusus* (Yorkshire fog-soft rush) rush pasture but it is not rush pasture in the context of this priority habitat. This has tussocks of soft rush amongst shorter grassland dominated by Yorkshire fog and creeping bent. Sedges are rare except for hairy sedge and generally the sward is species poor. It is closely related to M23 *Juncus effusus/acuteiflorus* – *Galium palustre* (Soft/sharp-flowered rush – common marsh bedstraw) rush pasture which also has abundant soft rush and Yorkshire fog which is included here. M23 is a richer community with abundant

common marsh bedstraw, greater bird's-foot-trefoil and has species such as meadowsweet, tormentil, carnation sedge, marsh horsetail, sneezewort and meadow buttercup along with a range of other grassland and fen species. Marsh thistle, lesser spearwort and water mint are also frequent and purple moor-grass is usually present.

4.9.3 How this habitat definition relates to the National Vegetation Classification Communities

The NVC community types covered here are listed in the mires section of British Plant Communities. It includes three communities where purple moor-grass dominates but only two occur in this region:

- M24 *Molinia caerulea* – *Cirsium dissectum* (Purple moor-grass – meadow thistle) fen meadow.
- Typical constant species are tormentil, devil's-bit scabious, meadow thistle, greater bird's-foot-trefoil and carnation sedge. Other species include fen bedstraw, marsh valerian, blunt-flowered rush, common knapweed, meadowsweet and marsh horsetail.
- M25 *Molinia caerulea* – *Potentilla erecta* (Purple moor-grass – tormentil) mire.
- This is associated with heathland sites. Purple moor-grass dominates and the only other constant species is tormentil. Cross-leaved heath can be prominent in one sub community. Another sub community has a more established grass element with Yorkshire fog, common bent and sweet vernal-grass while a third sub-community has a greater prominence of species such as marsh thistle, soft rush and common marsh bedstraw.

And two communities where rushes are a major component:

- M22 *Juncus subnodulosus* – *Cirsium palustre* (Blunt flowered rush – marsh thistle) fen meadow.
- This is often associated with fen sites. This is certainly true in Oxfordshire and Buckinghamshire and in most cases should be classed as fen habitat. It has an abundance of blunt-flowered rush, sometimes with hard rush and jointed rush. Lesser pond-sedge and brown sedge are the most typical sedges. There are a variety of tall wetland species such as marsh thistle, meadowsweet, wild angelica, devil-bit scabious, hemp agrimony and water figwort. Other species include purple loosestrife, yellow loosestrife, common valerian, common meadow-rue and comfrey. Purple moor-grass can be abundant in this community.
- M23 *Juncus effusus/acutiflorus* – *Galium palustre* (Soft/sharp-flowered rush – common marsh bedstraw) rush pasture.
- Dominated by soft rush or jointed rush with abundant Yorkshire fog, common marsh bedstraw, greater bird's-foot-trefoil and has species such as meadowsweet, tormentil, carnation sedge, marsh horsetail, sneezewort and meadow buttercup along with a range of grassland and fen species. Marsh thistle, lesser spearwort and water mint are also frequent and purple moor-grass is usually present.

The smallest unit of this habitat to usually be selected as Local Wildlife Site is 0.25ha.

4.10 Coastal and floodplain grazing marsh

4.10.1 Description

This is not a specific habitat but is a landscape type which supports a variety of habitats; the defining features being hydrological and topographical rather than botanical.

The habitat is characterised by periodically inundated pasture or meadow, usually by mesotrophic water, and a network of drainage ditches (containing standing fresh water) or banks designed to retain water. The drainage ditches will usually be man-made and, as such, are liable to create a landscape of flat, low-lying fields with straight watercourses which may act as field boundaries and/or drinking points for stock. The habitat will therefore tend to occur on land that is liable to flooding. The ditches are especially rich in plants and invertebrates.

The Floodplain Grazing Marsh element of this habitat is of interest in Berkshire, Buckinghamshire and Oxfordshire. Grazing marshes are particularly important for the number of breeding waders such as snipe, lapwing and curlew, which they support. Internationally important populations of wintering wildfowl also occur, including Bewick and whooper swans. Other UKBAP habitats may in some cases occur within areas of grazing marsh, and where this happens, land parcels may be recorded as belonging to both habitats. This habitat definition may include semi-natural floodplain grassland, active water meadows and areas of wet grassland with intensive water level management, such as at Otmoor. It is important to stress that this "habitat" does not include wet, perhaps rushy, pasture that may flood but where there is no control of water level.

There is the potential for confusion with several other habitats. The habitat is most usefully considered as a complex that will have many structural components including wet woodland, water, swamp, fen-meadow and tall-herb fen communities, lowland wet grassland showing varying degrees of agricultural improvement, including improved grassland, and ruderal communities.

Geology

Floodplain grazing marsh is usually associated with surface water gley, groundwater gley and peat soils with a low to moderate fertility, often underlain by clays and loams of mildly acidic to neutral reaction.

Hydrology

The habitat only occurs in areas that are periodically flooded and where water levels are managed with ditches that augment the natural flooding regime, and the water table is close enough to the surface to create damp soil conditions for some period of most years.

Abundance

The UK BAP gives an estimate of 300,000 ha of this habitat in the UK. The majority of this is in England with a 1994 estimate of 200,000 ha.

Threat

- The results of ecologically insensitive flood defence structures
- Agricultural intensification
- Decline in traditional water level management
- Eutrophication of the water courses/ditches (and its impact on characteristic species).

4.10.2. Characteristic species

Species associated with the grassland component

- Grazing marsh grasslands are typically dominated by the more common grasses of neutral soils, for example meadow foxtail *Alopecurus pratensis*, crested dog's-tail *Cynosurus cristatus*, rye-grass *Lolium perenne*, and Yorkshire fog *Holcus lanatus*.
- Grazing marshes are particularly important for the number of breeding waders they support, such as snipe, lapwing and curlew, and wintering wildfowl such as whooper swans.

Species associated with the ditch component

- Ditches have a wide variety of species but may be marked by the occurrence of common reed *Phragmites australis*, as well as species more typically associated with freshwater swamps and fens, such as greater pond-sedge *Carex riparia* and reed sweet-grass *Glyceria maxima*.
- The dominant freshwater aquatic macro-invertebrates of drainage ditches are beetles (Coleoptera), bugs (Heteroptera), snails (Mollusca-Gastropoda) and fly larva (Diptera). Grazing marshes are also undoubtedly important habitats for dragonflies.

4.10.3. Associated habitats

Ancient and /or species rich hedgerows

Hedges can be considered as part of the floodplain grazing marsh as well as habitat in its own right.

Fen

In general, grazing marshes will have a dominant grassland component, and this will help to provide separation from fen. Fen is not usually grazed to the same extent and is in general subject to less intensive management. Small areas of fen may occur within floodplain grazing marsh habitat. However, if these areas are larger than 0.25 hectares, they should be recorded as fen and NOT as floodplain grazing marsh.

Reedbed

Any reedbed occurring within coastal and floodplain grazing marsh which is greater than 0.25ha in size should be recorded as reedbed and NOT coastal and floodplain grazing marsh. Smaller areas of reedbed however may be included within coastal and floodplain grazing marsh.

Lowland meadow

Lowland meadows may occur as features within coastal and floodplain grazing marsh. If they meet the definitions for both habitats then they should be recorded as such.

Lowland mixed deciduous woodland

Lowland mixed deciduous woodland occurring in coastal and floodplain grazing marsh should be considered as units of lowland mixed deciduous woodland if their area is greater than 0.25ha. Smaller areas of lowland mixed deciduous woodland (that is less than 0.25ha in area) may be included within the overall extent of the site supporting coastal and floodplain grazing marsh.

Wet woodland

Wet woodland occurring in coastal and floodplain grazing marsh should be considered separately from coastal and floodplain grazing marsh if it is 0.25 ha in area or larger. Smaller areas of wet woodland (less than 0.25ha) should be considered as elements within coastal and floodplain grazing marsh.

Mesotrophic / Eutrophic standing water

Any standing waters occurring within coastal and floodplain grazing marsh that are greater in area than 2 hectares should be recorded as standing waters and NOT coastal and floodplain grazing marsh. Smaller areas of standing waters though may be included in the grazing marsh habitat or recorded as BAP ponds if they meet the definition.

Purple moor-grass and rush pasture

Purple moor-grass and rush pastures may occur as features within coastal and floodplain grazing marsh. If they meet the criteria for both definitions then they may be recorded as separate habitats.

4.10.4. Management

The habitat is characterised by the control of water levels through the use of pumps and /or sluices. There will normally be some grazing or occasionally mowing for hay/silage at some time of most years.

4.10.5. Key issues associated with discriminating from other habitats

The habitat associations are described above in section 4.10.3, with issues surrounding identification of other individual habitats within coastal and floodplain grazing marsh with the references to size thresholds. In general, where habitats are greater than or equal to 0.25ha for most habitats (between 0.1ha and 2ha for ponds and >2ha for standing waters) then they should be considered as that specific habitat.

The smallest unit of this habitat to usually be selected as Local Wildlife Site is 0.25ha.

4.11 Reedbeds

4.11.1 Description

Reedbeds are wetlands dominated by stands of the common reed *Phragmites australis*. Only one NVC community is included (S4) and care must be taken to distinguish this from other communities where common reed is dominant or abundant (see Lowland Fens, 4.8). It is also important to note that reedbeds are a subset of fen habitat and so when considering the total area of fen, reedbed should be included.

Reedbeds often incorporate areas of open water and ditches, and can incorporate small areas of wet grassland and carr woodland. The habitat is reliant on a high water table and regular inundation by water. Where reedbeds dry out, tall herbs, such as nettle and great willowherb, become increasingly dominant.

Nationally reedbeds support a distinctive breeding bird assemblage including 6 nationally rare Red Data Birds the bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus*, crane *Grus grus*, Cetti's warbler *Cettia cetti*, Savi's warbler *Locustella luscinioides* and bearded tit *Panurus biarmicus* provide roosting and feeding sites for migratory species (including the globally threatened aquatic warbler *Acrocephalus paludicola*) and several raptor species in winter. Five GB Red Data Book invertebrates are also closely associated with reedbeds including red leopard moth *Phragmataecia castanaea* and a rove beetle *Lathrobium rufipenne*.

Distribution

There are about 5000 ha of reedbeds in the UK, but of the 900 or so sites contributing to this total, only about 50 are greater than 20 ha, and these make a large contribution to the total area. Reedbeds are amongst the most important habitats for birds in the UK.

This habitat is widespread in the region but most sites are small and associated with riverside sites and post sand and gravel extraction sites where this habitat has been created. Reedbeds are scattered but there are a few more extensive stands, the largest of which are part of habitat creation schemes, such as at Otmoor and Farmoor. In Buckinghamshire the largest stands are associated with water-bodies in and around Milton Keynes.

4.11.2 Associated habitats

Fens and Swamps

Reedbeds are a component of fens. Associated with base-rich soil, fens and swamp habitats often have areas of reedbeds where there is more constant inundation of surface water. Where the percentage of *Phragmites* is >60% the habitat is classed as reedbed.

Open water

Reedbed forms the most extensive stands at the edge of lakes and ponds.

Rivers and streams

Small stands of marginal reedbeds are typically found along rivers.

Wet woodland

Typically wet woodland is found fringing fen and floodplain swamps. Without management these habitats can succeed to wet woodland.

4.11.3 How this habitat definition relates to the National Vegetation Classification Communities

NVC S4 – *Phragmites australis* swamp and reedbeds, typically the stand is dominated by this single species, making up 60% or more cover.

The smallest unit of this habitat to usually be selected as Local Wildlife Site is 0.1ha.

4.12 Rivers

4.12.1 Description

This habitat type includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems).

Numerous factors influence the ecological characteristics of a watercourse, for example geology, topography, substrate, gradient, flow rate, altitude, channel profile, climate, catchment features (soil, landuse, vegetation etc). Human activities add to this complexity. In addition, most river systems change greatly in character as they flow from source to sea or lake.

This broad priority habitat is made up of (but not exclusively) an existing UK BAP priority habitat and three broad features or components present in some or all rivers of particular national priority for conservation. These are:

- Chalk rivers;
- Rivers with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation;
- Headwaters;
- Exposed riverine sediments, a feature of active shingle rivers and other rivers with predominantly sandy sediments (probably not relevant to Berks, Bucks and Oxon).
- Rivers designated for other features (e.g. surrounding wetlands)

As a minimum the Rivers priority habitat would be defined as extending to the top of the adjacent banks, recognising that (a) it may be desirable to restore a river to a previous course, and (b) a river's floodplain (present or historical) may be essential to its ecological functioning. Significant areas of adjoining priority habitats (such as fen, woodland, grassland and heathland types) may form an integral component of river systems for the purposes of conservation and management, but would be excluded from the formal definition of the Rivers priority habitat.

Exclusions

Adjacent ponds would be included within the river habitat if they have been formed as a result of river dynamics (e.g. oxbows), but not if they are artificial or formed by an unrelated process (e.g. pingos). The following reaches that are heavily degraded with limited scope for improvement are also excluded from this priority habitat:

- Canals;
- Ditches;
- Heavily modified rivers and streams or reaches.

4.12.2 Habitat types within the overall UK BAP Priority Habitat

A. Chalk rivers

Description

There are approximately 35 chalk rivers and major tributaries ranging from 20 to 90 kilometres in length. They are located in south and east England - from the Frome in Dorset to the Hull in Humberside. Chalk rivers have a characteristic plant community, often dominated in mid-channel by river water crowfoot *Ranunculus penicillatus* var *pseudofluitans* and starworts *Callitriche obtusangula* and *C. platycarpa*, and along the

edges by watercress *Rorippa nasturtium-aquaticum* and lesser water-parsnip *Berula erecta*. They have low banks which support a range of water-loving plants.

All chalk rivers are fed from groundwater aquifers, producing clear waters and a generally stable flow and temperature regime. These are conditions which support a rich diversity of invertebrate life and important game fisheries, notably for brown trout *Salmo trutta*, brook lamprey *Lampetra planeri*, salmon *Salmo salar*, crayfish *Austropotamobius pallipes* and otter *Lutra lutra* are among the species listed on Annex II of the EC Habitats Directive which chalk rivers support.

Most chalk rivers have 'winterbourne' stretches in their headwaters. These often run dry, or partially dry, in late summer because of a lack of rainfall recharging the aquifer. A characteristic range of invertebrates has adapted to these conditions, as has the brook water crowfoot *Ranunculus peltatus*.

Where the river corridor (approximately 50m either side of the river) is not affected by intensive agriculture, fisheries or urban development, rich fen vegetation has developed. This is maintained by extensive cattle grazing or naturally progresses to carr woodland. These areas are particularly rich in insect life and breeding birds.

The habitat is (or has been) susceptible to threats associated with water abstraction, physical modification (particularly dredging or modification for the creation of lakes for ornamental or fishery purposes), diffuse and acute pollution (including nutrient enrichment and fisheries management).

B. Rivers with *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation

Description

This habitat type is characterised by the abundance of water-crowfoots *Ranunculus* spp., sub-genus *Batrachium* (*Ranunculus fluitans*, *R. penicillatus* ssp. *penicillatus*, *R. penicillatus* ssp. *pseudofluitans*, and *R. peltatus* and its hybrids). Floating mats of these white-flowered species are characteristic of river channels in early to mid-summer. They may modify water flow, promote fine sediment deposition, and provide shelter and food for fish and invertebrate animals.

There are several variants of this habitat in the UK, depending on geology and river type. In each, *Ranunculus* species are associated with a different assemblage of other aquatic plants [but see sub-type 3], such as water-cress *Rorippa nasturtium-aquaticum*, water-starworts *Callitriche* spp., water-parsnips *Sium latifolium* and *Berula erecta*, water-milfoils *Myriophyllum* spp. and water forget-me-not *Myosotis scorpioides*. In some rivers, the cover of these species may exceed that of *Ranunculus* species. Three main sub-types are defined by substrate and the dominant species within the *Ranunculus* community.

- Sub-type 1: This variant is found on rivers on chalk substrates. The community is characterised by pond water-crowfoot *Ranunculus peltatus* in spring-fed headwater streams (winterbournes), stream water-crowfoot *R. penicillatus* ssp. *pseudofluitans* in the middle reaches, and river water-crowfoot *R. fluitans* in the downstream sections. *Ranunculus* is typically associated in the upper and middle reaches with *Callitriche obtusangula* and *C. platycarpa*.

- Sub-type 2: This variant is found on other substrates, ranging from lime-rich substrates such as oolite, through soft sandstone and clay to more mesotrophic and oligotrophic rocks. There is considerable geographic and ecological variation in this sub-type. Sub-type 2 rivers contain a mixture of species, and often hybrids, but rarely support *R. penicillatus* ssp. *penicillatus* or *R. fluitans*. Associated species which may be present include lesser water-parsnip *Berula erecta*, bluntfruited water-starwort *Callitriche obtusangula*, and, in more polluted rivers, curled pondweed *Potamogeton crispus*, fennel pondweed *P. pectinatus* and horned pondweed *Zannichellia palustris*. Flowering-rush *Butomus umbellatus* is an occasional bank-side associate.
- Sub-type 3: This variant is a mesotrophic to oligotrophic community found on hard rocks in the north and west.

Distribution

The habitat type is widespread in rivers in the UK, especially on softer and more mineral-rich substrates. It is largely absent from areas underlain by acid rock types (principally in the north and west). It has been adversely affected by nutrient enrichment, mainly from sewage inputs and agriculture, and where agriculture has caused serious siltation. It is also vulnerable to artificial reductions in river flows and to unsympathetic channel engineering works. Consequently, the habitat has been reduced or has disappeared from parts of its range in Britain.

Sub-type 1 has a limited to southern and eastern England. Sub-types 2 and 3 are widespread in those parts of the UK where the substrate is suitable. In general, sub-type 2 is commoner in the south and east, whereas sub-type 3 is largely restricted to southwest England, Wales, northern England, Northern Ireland, and parts of Scotland. A few southern rivers show a transition from one substrate to another, as geology changes from chalk to clay. There are no comprehensive data available for the extent of this habitat type in the UK. However, it has been estimated that there are about 2,500 km length of river which have *Ranunculus* cover in England and Wales.

C. Headwaters

A 'headwater' is 'a watercourse within 2.5km of its furthest source as marked with a blue line on Ordnance Survey (OS) Landranger maps with a scale of 1:50,000' (Furse, 1995). In Britain, headwaters probably represent >70% of the total length of flowing waters. This implies a total length >146,000 km.

Physical and chemical characteristics of headwaters vary greatly according to their location, altitude, geology, and surrounding land-use. By definition, headwaters form the uppermost segments of rivers, and as such play an important role in the overall functioning of river ecosystems downstream.

Headwater habitats are exposed to a wide range of environmental threats, ranging from poor water quality (e.g. pollution from silage or slurry, or as a result of nutrient enrichment from fertilisers) through to channelisation. Headwaters are also known to be used extensively by water vole, sometimes comprising refuge areas in catchments where populations are under threat.

4.12.3 Characteristic species

Biological features (e.g. dominant life forms/species, notable species)

The plant and animal assemblages of rivers and streams vary according to their geographical area, underlying geology and water quality. Lowland nutrient-rich systems are dominated by higher plants, and coarse fish such as chub *Leuciscus cephalus*, dace *Leuciscus leuciscus* and roach *Rutilus rutilus*. Exposed sediments such as shingle beds and sand bars are important for a range of invertebrates, notably ground beetles, spiders and craneflies. Marginal and bankside vegetation is an integral part of a river, supporting a range of river processes, as well as acting as habitat in its own right for a diverse flora and fauna, and as a migration corridor.

Characteristic species of headwaters

A study by the Institute of Freshwater Ecology in the early 1990s found that an average of 45 invertebrate taxa per river system were exclusively found in headwater samples, suggesting that headwaters may contribute about 20% of the total aquatic macro-invertebrate richness of complete river systems. Many of the taxa exclusively or predominantly found in headwaters are sufficiently rare to have national conservation status.

Headwaters are critically important habitats for other taxa as well as invertebrates. For example, they form important spawning grounds for species such as Atlantic salmon.

Associated key species

Rivers support a wide range of key species of vertebrates, invertebrates and plants, including an exceptional 13 species on Annex II of the Habitats Directive: otter, Atlantic salmon, river, brook and sea lampreys, spined loach, bullhead, allis shad, twaite shad, white-clawed crayfish, freshwater pearl mussel, Southern damselfly and floating water-plantain. They also support numerous UK BAP priority species, including some of the above and a long list of invertebrates (notably beetles, flies and molluscs) vertebrates (e.g. water vole, bat spp) plants and lichens (e.g. river jelly lichen).

4.12.4 Links with other species and habitats

Rivers also have strong functional importance in various respects e.g. as linear networks or habitat corridors, linking for example the uplands, lowlands and coast, essential for migratory species such as salmon, lampreys and otter. They are also of vital functional importance for standing waters and many other wetlands.

4.13 Woodland

Woodlands must fit into one of the following categories to qualify as UKBAP priority habitat.

- Ancient semi-natural woods.
- Other semi-natural woods.
- Planted woods on ancient woodland sites where the composition is mainly site native species (over 50% canopy).

4.13.1 Description

Three main woodland categories are covered here. These are:

- A. Lowland mixed deciduous woodland.
- B. Beech and yew woodland.
- C. Wet woodland.

A. Lowland mixed deciduous woodland

This habitat includes most semi-natural woodland and also some recent native broadleaved plantations. Mixed deciduous woodland is found growing on most geological formations and the full range of soils, from very acidic to base-rich. There are concentrations in the old forest areas of Wychwood, Windsor, Bernwood, Shotover and in the Mid Vale ridge west of Oxford. Other concentrations of woodland include scattered, small copses across the Berkshire Downs, in the Chilterns amongst beech woodland, the Kennet Valley with its alder woodlands and Windsor Great Park, south Buckinghamshire and the Bucklebury area, where the more acidic woodlands can be found. Woodland sites may have well-defined boundaries such as woodbanks or be associated with parks. There is a large number of small woods, less than 20 ha in size.

Ancient woods (woods more than 400 years old) are of particular value for biodiversity as their continuity enables a range of drought sensitive and relatively immobile invertebrates and bryophytes to survive. Most ancient woodlands were traditionally managed as coppice with standards, except on the most acidic soils.

There is a great range of species composition in lowland mixed deciduous woodland. Oak and ash are the usual dominants. On basic and nutrient-rich soils the most abundant are ash and field maple with wych elm, wild cherry and suckering English elms. On damp soil willows, poplars and alder may occur and may form stands of wet woodland (see wet woodland description). More acid and nutrient-poor soils have silver birch, oak rowan and hornbeam, and downy birch where the ground is damp. This includes woodland that has developed on old heathland sites. Pedunculate oak is much the commonest oak and may occur in virtually all combinations with other tree species. Sessile oak occurs in south Buckinghamshire in association with heath / wood pasture mosaics e.g. Burnham Beeches and Littleworth Common, it is very rare in Oxfordshire and only forms one pure stand (in Bagley Wood, probably planted) and in Berkshire is usually planted and not regenerating. Small-leaved lime is very rare in Bucks and north Oxon. Wild crab-apple and wild service-

tree are ancient woodland indicators which occur sparingly. Hornbeam has been promoted in the past for its hard wood.

Non-native trees may be frequent in lowland mixed deciduous woodland, most common is sycamore which self seeds readily, while sweet chestnut, horse chestnut and others have been planted and are naturalized in many woods. Within woods there is considerable variation in stand composition.

The commonest underwood species is hazel, which was usually coppiced, but it is sometimes absent from recent woods if it has not been planted. Hawthorn and blackthorn are common in the understorey especially where scrub has recently developed into woodland. Buckthorn, spindle and other shrubs are frequent, with dogwood and privet on the basic soils. Midland hawthorn is an ancient woodland indicator. Elder is typical on nitrogen rich soils and is often associated with rabbits. Climbers include honeysuckle on neutral to acid soils, while traveller's joy and black bryony are frequent on basic soils.

Dog's mercury and bluebell are the typical field layer dominants on neutral to basic well-drained soils. Bramble is also often dominant. Enchanter's-nightshade, bramble, yellow archangel, primrose, wood anemone and many unusual species such as early-purple orchids will be present. Early colonizers of woodland are ground ivy, wood avens and herb Robert, with enchanter's-nightshade, wood dock and giant fescue. On more acidic soil the ground flora is poorer, with bluebell, wood-sorrel, bramble, honeysuckle and bracken often dominating, with some foxglove and red campion. Common nettle is an indicator of high phosphate levels (particularly on old settlement sites) while cleavers is common on damper nitrogen-rich soils.

On very acid soils the ground vegetation is relatively poor and sparse, and may include bracken, tormentil, creeping soft-grass, wood sage, foxglove, wavy hair-grass, and buckler-ferns (*Dryopteris* spp.).

How this habitat definition relates to the National Vegetation Classification

NVC habitat codes in this section are followed by a short description of what type of habitat the code refers to. Each of the NVC habitat types listed here falls within the definition of the UKBAP Priority Habitat, Lowland Mixed Deciduous Woodland

W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland

This community is typically found on the heavier, base-rich soils where the main characteristics of this community are ash, field maple and hazel. However this community encompasses a wide range of floristic variation. Dog's mercury is the most distinctive field layer species and lord's-and-ladies, Enchanter's-nightshade, wood avens, bluebell and violet species are often frequent.

W10 *Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland

This is a more acidic community, on base-poor soils and forms the bulk of Berkshire oak woods. Oak is the predominant tree species and silver birch is abundant, especially in younger stands. The field layer lacks base-rich species such as dog's mercury. Bluebell and

wood anemone are often spring dominants, but bramble, bracken and honeysuckle are the most common species.

W16 *Quercus* spp. – *Betula* spp. – *Deschampsia flexuosa* woodland

This community is typically found on the most acidic, nutrient-poor soils and the field layer is more 'heathy' in character. Soils are typically very free-draining, usually sandy and podzolic. Long established woodlands occur as high forest oak-coppice or in wood pasture, but many stands are recent developments on heathland. Oak is predominant and birch can be very abundant, and may dominate, especially in recently formed stands on old heathland, where self sown pine may also be abundant. Rowan and holly may be present in the shrub layer. Hazel is rare (which helps separate it from W10). The field layer is generally species-poor with wavy hair-grass and bracken. Heathland species may also be present.

B. Lowland beech and yew woodland

The largest concentration of this woodland in the three counties is in the Chilterns. This habitat is separated from lowland mixed deciduous woodland, where beech is predominant in the canopy, but often with oak. However, mixed deciduous woodland may merge with beechwoods on base-rich soils, for example where there is a low percentage of invading beech, or where regeneration in a beech woodland is predominantly of ash. In stands with much planted beech, in areas where its status is uncertain, the assignment to beech or Lowland Mixed Deciduous Woodland should be made on the basis of the proposed future management of the beech. Beech is native on the southern limestone and chalk outcrops. Yew occurs on the chalk in this area as a native. Both species are widely planted outside their native areas.

Beech can grow on both acidic and calcareous soils, while yew is confined to calcareous sites. Usually beech develops on slightly richer soils while yew is more likely to dominate on the steeper drier slopes. Yew woodland is largely confined to a few sites on the Chilterns escarpment.

Beech may be mixed with other species such as wild cherry, limes, oak, sycamore and whitebeam. The underwood, especially if the soil is deeper, may be diverse with privet, holly, guelder rose and other shrubs. Beech casts a very deep shade, and where pure the understorey and ground flora are very sparse, where sometimes reduced to little more than tufts of *Leucobryum* and other mosses scattered amongst persistent drift leaves. The ground flora may be spectacular sheets of bluebell, while on deeper calcareous soil dog's mercury is frequent. On thinner soils sanicle, Lordies-and-Ladies, woodruff and wood avens are present. On moister soils a greater range of species is present with primrose, yellow archangel, wood anemone, deadly nightshade and spurge laurel. On more acidic soils wavy hair-grass, bracken or bilberry, butcher's broom, hard fern and Buckler-ferns are common.

On acidic soil oak (including sessile oak) is usually present with beech. Holly is the main understorey species, notably in woods which have been heavily grazed. Rowan and silver birch are also characteristic while hazel and hawthorn tend to be rare, and alder buckthorn and downy birch are found in damper areas. At a few sites in Berkshire box occurs in the understorey. These woods are mostly found on the leached clay-with-flints of the Chilterns

plateau. The ground flora includes bluebell, wood-sorrel, male-fern, tufted hair-grass, creeping soft-grass and wood spurge. The rare violet helleborine grows in this community.

Yew has even fewer associated species with only a few hazel, whitebeam or ash, and the ground flora reduced to a thin scatter of dog's mercury, Lords-and-Ladies, violets and wild strawberry. Where the soil is slightly nutrient-enriched (perhaps by rabbits) elder, dog's mercury and common nettle can occur as associates.

How this habitat definition relates to the National Vegetation Classification

Beech Woodland NVC Communities – information from Crawley (2005).

Beech occurs as both natural and plantations, but the structure of the woodland is strongly affected by the soil type (Crawley 2005).

W12 *Fagus sylvatica*-*Mercurialis perennis* woodland

Found on freely drained calcareous soils, on the steep scarp slopes of the chalk downs.

W14 *Fagus sylvatica*-*Rubus fruticosus* woodland

Found on brown earths, on the dip slope of the downs.

W15 *Fagus sylvatica*-*Deschampsia flexuosa* woodland

Found on more acidic soils and often planted beech woodlands.

W13 *Taxus baccata* woodland

Pockets of yew can be found in beech woodland on the chalk and often fall into this NVC Community.

C. Wet woodland

Wet woodland typically occurs on valley bottoms, hollows or along stream lines, but can also occur on plateau where drainage is impeded and on flushed slopes. Narrow gully woodlands are a typical on the slopes at the edge the acid plateaus of Berkshire where gullies are formed by streams. The largest stands of wet woodland are found in the Kennet Valley west of Newbury. Wet woodland is separated from other woodland habitats by having more than 50 % of willow and alder. It is generally associated with poorly drained or seasonally wet soils, but can occur on a wide range of soil types, including nutrient-rich mineral and acid and nutrient-poor organic ones.

Alder, birch and willows are usually the predominant tree species, but sometimes ash, oak, pine and beech occur on the drier riparian areas. In willow woodlands, birch and alder are usually present and occasionally oak, hawthorn, hazel and guelder rose. The wet ground flora includes species which are characteristic of fens and marshes such as marsh marigold, wild angelica, meadowsweet, water mint, yellow iris, marsh horsetail and purple loosestrife. Tall bulky sedges such as the pond-sedges and reed canary-grass are often present. On the drier areas bramble and dog rose can be present. Nettles may be common on the richer soils.

In alder woodlands, alder is often completely dominant in wetter ground, but on drier sites other species including downy birch, ash, pedunculate oak and hawthorn may occur.

Shrubs and small trees are generally infrequent. Ground conditions can vary from very wet to almost dry. In alder-dominated woodlands, marsh plants include yellow iris, marsh valerian, marsh pennywort, yellow pimpernel, several large sedges and marsh violet, a declining species in Berkshire. In the wetter ground several species of fern may be present. On the more fertile areas, common nettle is likely to be dominant. On the less fertile, drier sites a great variety of woodland plants are found and include ground ivy, common marsh-bedstraw, remote sedge, enchanter's-nightshade and dog's mercury.

For wet woodland it is the presence of typical fen and swamp species which indicates the quality of the wet woodland.

In birch dominated, acidic conditions the canopy is usually open and purple moor-grass is usually present with *Sphagnum* species.

How this habitat definition relates to the National Vegetation Classification

NVC Communities

W1 *Salix cinerea*-*Galium palustre* woodland

Willow carr woodland is characteristic of mineral soils on the margins of lakes or slow-moving streams and rivers that are waterlogged in winter. This community is characterised by grey willow and occasionally downy birch. The field layer is often varied, but common marsh bedstraw and water mint are often frequent.

W5 *Alnus glutinosa*-*Carex paniculata* woodland

This is an alder carr woodland, derived by succession from swamp fen (particularly along the Kennet Valley). In this community alder is predominant and the field layer includes greater tussock-sedge, or occasionally wood club-rush.

W6 *Alnus glutinosa* – *Urtica dioica* woodland

This is a species-poor community, where common nettle is predominant in the field layer. There is a lack of tall swamp and fen species. Alder is usually the predominant tree species.

W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland

Usually found along small flushes on slopes, or along young river systems. Alder woodland is predominant with often some ash. The field layer often includes wetland species such as yellow pimpernel, opposite-leaved golden-saxifrage, meadowsweet and lady-fern.

4.13.2 Associated habitats

Lowland wood-pasture and parkland

This habitat is distinguished by <20% woodland cover. Some lowland wood pasture may have developed into woodland.

Hedgerows

Hedgerows are especially important for butterflies and moths, farmland birds (including game birds), bats and dormice. Indeed, hedgerows are the most significant wildlife habitat over large stretches of lowland UK and are essential refuge for a great many woodland and farmland plants and animals. They are distinguished by their linear nature and being less than 5m in width.

4.13.3 Additional Comments

Traditional management of lowland mixed deciduous woodland was usually coppice with standards. Many of the ancient woodlands were coppiced, particularly those on moderately acid to base-rich soils, usually as coppice with standards. For most woods coppicing ceased during the 20th century and is now difficult due to the high density of deer which browse the new growth. Consequently many woods now appear as high forest. In addition high forest develops where densely stocked oaks have grown to closed canopy, or where suckered elm has grown up. Some mixed woodlands have a history as wood-pasture, for instance Wychwood, where some former wood-pasture has been ungrazed for many years and is now wooded over.

Many woods are now managed for pheasant rearing. This can cause damage to the ground flora and invertebrates if young birds are released at a high density. Lack of management can mean that rides close over with loss of nectaring places for woodland butterflies.

The minimum unit of this habitat that would usually be selected as a Local Wildlife Site is 0.25ha.

4.14 Lowland wood-pasture and parkland

4.14.1 Description

Lowland wood-pasture and parkland represents a vegetation structure resulting from management, rather than being a particular plant community. It includes areas that have been managed by a long-established tradition of grazing among trees. Multiple generations of trees have survived (where the site is in good condition) characteristically with some old, veteran trees. The tree component may have been exploited in the past, for instance by pollarding, and can occur as scattered individuals, small groups, or as more or less complete canopy cover. Depending on the degree of canopy cover, so other semi-natural habitats, including grassland, heath and scrub may occur in mosaic with woodland communities. While oak and beech are the most common trees of wood-pasture and parkland, a wide range of native trees such as ash and field maple and non-native species may have been planted or have regenerated naturally, e.g. beech and sweet chestnut outside their native range, and the introduced horse chestnut and larch.

Wood-pasture is characterized by a series of features that, taken together, separate current and past wood-pastures from woods where the predominant treatment is or has been coppice or high forest. Sites in reasonable condition are likely to have most features:

1. Trees show a significant impact on their structure from past grazing by large herbivores, i.e. open-grown trees, that is trees with widely spreading branches relatively low down the trunk (as opposed to trees which have grown up in closed forest where the major branches arise higher up the trunk, and are more upward pointing). Also trees show a browse line.
2. Old trees, preferably including some veterans.
3. The vegetation is a mixture of woodland and open grassland and/or heath communities, sometimes with scrub.
4. Archaeological features indicative of sustained management as wood-pasture. For example, wood-pasture commons have a typical "straggling" shape with concave outlines, funnelling out where they are crossed by roads i.e. the shape of a piece of land that it is no one person's duty to fence, and with boundary houses. All that now exists of many early parks is the remains of an outline, rectangular with rounded corners, subdivided by later field boundaries. A bank with an internal ditch may mark the perimeter of a park. Some parks may show the remains of internal coppice-banks, which were originally established to form compartments. Old wood-pastures may include built structures such as hunting lodges, as at Ashbury, earthworks and ruins, and walls or woodland protection dykes (to protect areas of coppice or to enclose deer for hunting).
5. Wood-pastures and parklands derived from medieval forests and emparkments, wooded Commons, parks and pastures with trees in them. Some have subsequently had a designed landscape superimposed in the 16th to 19th centuries.
6. Parks with their origins in the 19th century or later where they contain old trees derived from an earlier landscape, or where they are close to areas with very old

trees. There should be a realistic prospect that appropriate management would create conditions allowing specialist species (mostly invertebrates and fungi) to colonise in the long-term (50-250 years).

7. Under-managed and unmanaged wood-pastures with veteran trees, in a matrix of secondary woodland or scrub which has developed by regeneration and/or planting.

8. Parkland or wood-pasture that has been converted to other land uses such as arable fields, forestry or amenity land, but where surviving veteran trees are of nature conservation value as some of the characteristic species may have survived this change.

9. Parklands with 19th century origins or later with none of the above characteristics.

Geographical distribution

Britain holds a significant proportion of this habitat world wide, and it is most common in the south, though scattered examples occur throughout the country. Buckinghamshire, Oxfordshire and Berkshire carry an important series of parks especially in the Cotswolds, Blenheim (part SSSI), Swerford Park (part SSSI), Chilterns e.g. Watlington, Stonor, and the clay vale Eynsham, Kirtlington, but also on the Midvale ridge e.g. at Marcham, Beckley and Shotover, and in Berkshire notably at Windsor Great Park and south Buckinghamshire e.g. Burnham Beeches and Langley Park.

There were two major medieval forests in Oxfordshire – Wychwood and Shotover. Fragments of these remain some as very important woodland blocks e.g. Wychwood NNR in Cornbury Park and Bernwood SSSI. The former ancient forest of Bernwood extends to Buckinghamshire where it also contains several woodlands including Sheephouse Wood and Finemere Wood. These have slowly dwindled in size over the years but parts have become parkland for instance large areas at Blenheim, Waddesdon and Wooton Underwood. In Wychwood areas of wood-pasture have ceased to be grazed and have become continuous woodland. Generally, the main grazing animals are cattle, e.g. at Crowsley Park or Ditchley Park. Sheep are grazed, as at Blenheim, and in one case deer, at Stonor.

4.14.2 Associated habitats and boundaries

By its nature this habitat includes a range of other habitats both wooded and non-wooded, some of which are UKBAP habitats independently.

Boundaries may be clearly defined, or it may be difficult to set limits. For example, the presence of old trees is a determining factor but density can be variable, and if they are at less than one per hectare there could be problems using them to define the site boundary. Other features should also be used. It is not possible to set a minimum canopy cover. A density of three trees per hectare can be given as a common level of tree density but is not a threshold.

Certain sources are of particular use for identifying parkland, as is not the case for other woodland priority habitats:

- Old maps and historical records indicative of wood-pasture management
- Oral evidence of a tradition of wood-pasture management
- Archaeological features, e.g. scalloped outline, wood-banks.

Other BAP habitat types that may overlap or form part of a boundary should be recorded as that UKBAP habitat if over their respective minimum size. These include:

Ancient and/or species rich hedgerows
 Beech and yew woodland
 Lowland calcareous grassland
 Lowland dry acid grassland
 Lowland heathland
 Lowland meadows
 Lowland mixed deciduous woodland
 Wet woodland

4.14.3 Characteristic species

The floral and faunal composition of wood-pasture and parkland varies depending on the levels of grazing and canopy cover, and the habitat types present. The most common native trees are pedunculate oak, beech and ash, with occasional wych elm, yew, hornbeam and whitebeam. English elm was formerly important but is now lost. Non-native trees include sycamore, horse chestnut, European lime, larch, pine and others.

The older and veteran trees and decaying timber support extremely rich assemblages of epiphytic lichens, fungi, mosses, in particular the knothole moss (*Zygodon forsteri*) which occurs on 10-20 beech trees at Burnham Beeches in Buckinghamshire, and ferns (particularly polypody *Polypodium vulgare*). They also provide habitats for many very rare saproxylic (eating rotting wood) invertebrates, notably beetles.

4.14.4 Management

In wood-pasture the grassland or heathland is grazed by deer or domestic livestock. This results in open-grown trees with low branching or other signs of having grown in open conditions. The canopy may be relatively open, or show signs of having been so over the last 100-200 years (old trees interspersed by dense in-fill). Grazing may have been discontinued allowing scrub and continuous woodland to develop. Conversely coppice woods that have recently acquired a high density of deer are not to be included in this BAP priority habitat.

The grassland may have been "improved" or converted to arable.

The trees often, but not always, show signs of management – pollarding or coppicing. The density of the old trees can be very variable. Some wood-pastures may have lost their old trees relatively recently, leaving evidence such as stumps, or their presence on old maps or historic records.

Often the open mosaic structure has been lost in recent years by natural regeneration of trees following cessation of grazing and the deliberate planting of trees in the gaps. Old maps or records may indicate the original extent and nature of this open mosaic.

The minimum size of this habitat that will usually be considered for Local Wildlife Site selection is 0.25ha.

4.15 Traditional orchards

4.15.1 Description

A traditional orchard is a dense arrangement of standard fruit trees (usually of a smaller stature than semi-natural or plantation trees) grown on permanent grassland. It is a habitat complex (similar to wood pasture and parkland) that is defined by habitat structure rather than vegetation type, topography or soils. Generally, orchards are distributed in small-scale individual habitat patches. They are readily recognisable across society and can also have a particular set of cultural associations. An orchard is a plot consisting of 5 or more trees which are no more than 20m apart from crown edge to crown edge (People's Trust for Endangered Species, 2007)

Orchards can be the traditional standard (or dual purpose orchard managed in a low intensity way) or the more commercial bush orchards. The species composition of trees is primarily from the family Rosaceae, but orchards may also have been planted for walnuts and hazelnuts. A traditional orchard can also be composed of young trees which are being managed in a traditional manner.

Traditional orchards can be hotspots for biodiversity in the countryside, supporting a wide range of wildlife; they can contain BAP priority habitats and species, as well as an array of nationally rare and scarce species. The wildlife of orchard sites depends on the mosaic of habitats associated with them, including fruit trees, scrub, hedgerows, hedgerow trees, non-fruit trees within the orchard, the orchard floor habitats, fallen dead wood and associated features, such as walls, ponds and streams.

Factors affecting the biodiversity of orchards operate from the national scale (for example, dry deposition of atmospheric pollutants), through the landscape scale (an orchard's place within the matrix of surrounding habitats) to the site specific (such as the grazing management regime within the orchard).

By virtue of the low intensity management of the habitat (spacing of trees can vary from approx. 3 metres in some plum orchards to over 20 metres in some large perry pear and cherry orchards), orchards can support a variety of wildlife, including lichens, fungi, bryophytes and invertebrates. Saproxyllic (wood-decaying) invertebrates, for example, are associated with the long continuity of tree cover, and are species either of low known or supposed mobility. These species are aided by traditional orchards' place within a network of habitats including hedgerow trees, wood pasture and ancient woodland.

Hedgerows and non-fruit tree species on boundaries or in orchards contribute to the species of interest, and provide shelter and food supplies, such as pollen and nectar, for invertebrate species.

Geology/hydrology

No specific or identifiable associations. Traditional orchards can occur on a wide range of soil types, from slightly acid (and relatively infertile) through to fertile river floodplain and lime-rich. They can be found on slopes ranging from steep to level, and with any aspect.

Abundance/threat

Traditional orchards are often small parcels of land situated within villages and on village edges. As they have no protection within the planning system they are susceptible to residential development or loss to, for example, pony paddock conversion. The decreasing profitability of fruit production in the last 50 years has led to a significant decline in the area of orchards.

Distribution

Historically, the main concentrations of orchards in the United Kingdom have been in Kent, Devon and the three counties of Gloucestershire, Herefordshire and Worcestershire. Orchards are now associated with a belt of western English counties from Cornwall to Cheshire, in Hampshire, Kent, Sussex, Hertfordshire, Norfolk, and as far north as Yorkshire, Cumbria and Fife.

In Oxfordshire, orchards can be found at Sulgrave near Banbury, Frilford, Upton (near Didcot), and Wolvercote, whilst in Berkshire, there are orchards in Mapledurham and Colnbrook. Cherry and plum orchards were the speciality in Buckinghamshire and were grown extensively across the Chilterns the south of Aylesbury Vale; other species also included nut (cob), pear and apple. Surviving examples are situated near Ivinghoe, Pitstone and Cheddington. A number of orchards remain in and around Hazlemere, and further to the south near Langley.

4.15.2. Associated habitats

Wood-pasture and Parkland (a debate has been taking place as to whether orchards should be considered as part of this BAP habitat), hedgerows, lowland meadow, ponds and rivers. The grassland component, if it is particularly species-rich, can be a UKBAP priority habitat in itself. This is usually neutral grassland but can also be lowland calcareous grassland in some cases.

4.15.3. Characteristic species

The priority BAP species noble chafer (*Gnorimus nobilis*) is almost confined to traditional orchards. Other priority BAP species associated with orchards are a waxcap grassland fungus (*Hygrocybe calyptriformis*) and the stag beetle (*Lucanus cervus*). The BOCC red-listed lesser spotted woodpecker is particularly associated with traditional orchard habitats, as are birds such as tree sparrow and spotted flycatcher which are otherwise declining sharply in the countryside as a whole. Old orchards form part of the landscape of habitats that are the essential foraging range of species such as greater horseshoe bat. Various fungi are likely to be found within traditional orchards, either associated with dead and living wood, or with orchard floor grassland.

4.15.4. Management

Fruit tree management is based distinctively around regular pruning, rather than pollarding or felling. Grazing (usually by sheep, cattle or occasionally pigs) and/or mowing can also be a feature of habitat management. In parts of the UK, some orchards were once underplanted with soft fruits and cut flowers, and the livestock element was geese and chickens.

4.15.5 Key issues associated with discriminating from other habitats

There is an association with lowland wood pasture and parkland, but mapping issues will be more closely linked with distinguishing between orchard and broadleaved plantation.

The minimum size for a traditional orchard is officially 5 trees therefore the area will depend on this constraint but usually the minimum area that will be considered for selection as a Local Wildlife Site will be >0.1ha.

4.16 Open mosaic habitats on previously developed land

4.16.1 Description

The habitat is best defined in terms of structure and growth forms, rather than through specific vegetation communities. It comprises mosaics of bare ground with, typically, very early pioneer communities on skeletal substrates; more established open grasslands, usually dominated by fine-leaved grasses with many herbs; and areas of bare ground, scrub and patches of other habitats such as heathland, swamp, ephemeral pools and inundation grasslands. High quality examples may be characterised as "unmanaged flower-rich grasslands with sparsely-vegetated areas developed over many years on poor substrates".

These are generally primary successions, and as such unusual in the British landscape, especially the lowlands. The vegetation can have similarities to early/pioneer communities (particularly grasslands) on more 'natural' substrates but, due to the soil conditions, the habitat can often persist (remaining relatively stable) for decades without active management (intervention). Stands of vegetation commonly comprise small patches and may vary over relatively small areas, reflecting small-scale variation in substrate and topography.

Other features

The heterogeneity within the habitat mosaic reflects chemical and physical modification by former development or previous industrial processes, including the exposure of underlying substrates and the tipping of wastes and spoils. Features such as ditches, other exposures, spoil mounds and even the relicts of built structures provide topographical heterogeneity at the macro and micro scale. Sealed surfaces and compaction add further variation and contribute to the modified hydrology of such habitats resulting in areas of impeded and accelerated drainage.

Soil conditions for this habitat are severely limiting on plant growth. Examples are substrates with extreme pH, whether alkaline (e.g., chemical wastes) or acid (e.g., colliery spoils); deficiency of nitrogen (e.g. Pulverised Fuel Ash (PFA)), or available phosphate (highly calcareous Leblanc waste, blast furnace slag and calcareous quarry spoil); or water-deficient (dry gravel and sand pits). Other typical situations where such conditions arise include disused quarries, former railway sidings, extraction pits and landfill sites.

Abundance/threat

The habitat is concentrated in urban, urban fringe and large-scale former industrial landscapes. Generally these sites are at risk from re-development, landfill, industrial and commercial use, or housing (where this has been targeted at brownfield sites)

4.16.2 Characteristic species

- Plant assemblages are unusual, selected by propagule supply as well as site conditions. The habitat supports a range of notable vascular plant, moss and lichen species. These often include species declining in the wider countryside such as:
 - bee orchid *Ophrys apifera*,
 - fragrant orchid *Gymnadenia conopsea* (alkaline wastes),

- Royal fern *Osmunda regalis* (acid sandstone quarries),
- tower mustard (*Arabis glabra*),
- the lichen *Peltigera rufescens* (lime waste, PFA),
- *Cladonia pocillum* (calcareous wastes),
- *Diploschistes muscorum* (PFA)
- a UK BAP priority liverwort, *Petalophyllum ralfsii* (PFA).

Alien plant species, which are well adapted to the prevailing environmental conditions, are a characteristic component of associated plant assemblages. Invertebrate faunas can be species-rich and include many uncommon species. Between 12 and 15% of all nationally-rare and nationally-scarce insects are recorded from brownfield sites, including many post-industrial examples.

Alien plants provide for an extended flowering season and, with the floristic and structural diversity of the habitat mosaic, contribute to the value of the habitat for invertebrates. Some areas are important for birds that are primarily associated with previously developed or brownfield land such as little ringed plover (in 1984 97% of LRP nests in England were in 'man-made' habitats), as well as more widespread, but UK BAP priority species, including skylark, house sparrow and grey partridge. The habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

The minimum size of this habitat that will usually be considered for Local Wildlife Site Selection will be 0.25ha.

Hedgerows, arable field margins and veteran trees

Both hedgerows and arable field margins are UKBAP habitats in their own right, however, for the purposes of selecting local wildlife sites these habitats will be considered as only supporting and enhancing other sites but not a basis for selection under criteria 1 – naturalness. Both are usually subjected to much disturbance and maintenance (from physical cutting and use of agri-chemicals - arable field margins are ephemeral habitats) and can be relatively very small in size.

Veteran trees can greatly improve the value of semi-natural habitats. Where these habitats are species-rich veteran trees can greatly enhance a site selected for other habitats or habitat mosaics.

4.17 Hedgerows

Hedgerows do not qualify in their own right as Local Wildlife Sites but as a priority UK BAP habitat the presence of a hedgerow on a site will add to the diversity of habitats and species.

4.17.1 Description

Hedgerows have been defined as any boundary of trees or shrubs over 20 metres long where this woody growth forms a band less than 5 metres wide, and where any gaps between the trees or shrubs are less than 20 metres wide. Hedges which consist only of an earth or stone bank or wall are not included. However, where such features occur in association with a line of trees or shrubs, they are considered to form part of a hedgerow. Any bank, wall, ditch or tree within 2 metres of the centre of the hedgerow is considered to be part of the hedgerow habitat, as is the herbaceous vegetation within 2 metres of the centre of the hedgerow

The definition takes in all hedgerows consisting predominantly (ie. 80% or more cover) of at least one woody UK native species.

Hedgerows are a primary habitat for at least 47 extant species of conservation concern in the UK, including 13 globally threatened or rapidly declining ones, more than for most other key habitats. Over 600 plant species, 1500 insects, 65 birds and 20 mammals have been recorded at some time living or feeding in hedgerows.

Hedgerows are especially important for butterflies and moths, farmland birds (including game birds), bats and dormice. Indeed, hedgerows are the most significant wildlife habitat over large stretches of lowland UK and are essential refuge for a great many woodland and farmland plants and animals. They may also act as wildlife corridors for many species, including reptiles and amphibians, allowing dispersal and movement between other habitats.

Hedgerows also play an important pest control role – predatory insects over-winter in them and will move into crops in springs when aphid numbers start to increase, whilst hedgerows can also act as barriers to windborne pests.

Geology

Geology and/or soil types will not determine the presence or absence of hedgerows, although species content may vary depending on types.

Abundance

It was estimated that 84% of countryside hedgerows in Britain will fall within this definition. Of the 411,000 km of hedgerow remaining in United Kingdom, 154,000km are ancient and/or species rich.

Threats

- Deliberate removal in response to changing farming practices or development
- Grazing pressure
- Inappropriate management (inc. neglect and spray drift).

4.17.2 Associated habitats

Grassland habitats

Hedgerows have an association with a number of grassland habitats, by virtue of their inter-relationship on a landscape level. These habitats are:

- Coastal and floodplain grazing marsh
- Lowland meadow,
- Lowland calcareous grassland,
- Lowland dry acid grassland,
- Lowland heathland,
- Purple moor-grass and rush pastures.

There is an allowable overlap between these habitats and hedgerows; they can be considered as part of these habitats, as well as entities in their own right.

Woodland habitats

Hedgerows can often be relics of ancient woodlands or features within other types of woodlands. There is likely therefore to be an association between the habitat and woodland habitats. However, a distinction can be made in our approach to these:

- a. Hedgerows as discreet habitats – hedgerows associated with lowland mixed deciduous woodland, lowland beech and yew woodland, and wet woodland are viewed separately when less than 5m wide and more than 15m long.
- b. Allowable overlap – hedgerows can be considered to be part of lowland wood pasture and parkland, as well as entities in its own right. They should not be viewed as artificially sub-dividing the wood pasture and parkland priority habitat.

Fen

There is an allowable overlap between the two habitats so that hedgerows are considered as part of fens and not viewed as artificially sub-dividing this priority habitat. Again, where they do feature, they should be considered as that UKBAP habitat in their own right is over the minimum size threshold.

Arable field margins

There is a close association between the two priority habitats, but the two should be considered separately.

4.17.3 Management

Annual or alternate year trimming, periodic laying or coppicing (depending on adjacent land use).

14.18 Arable field margins

14.18.1 Description

For the purposes of Local Wildlife Site selection this UKBAP habitat is too ephemeral to be considered for the main qualifying feature for a site, but the presence at the edge of other habitat types will enhance the biodiversity value.

Arable field margins refer to strips of land at the field margins that are cultivated periodically, usually annually or biennially, but are not sprayed with insecticides or herbicides (except for targeted or spot treatment). These can extend for a limited distance into the crop, but have to be deliberately managed for the benefit of key farmland species. They can take a variety of forms and include

- A wildlife strip (6m wide margin that is not cropped)
- Conservation headlands (6m – 12 m wide outer margin of a crop that has reduced inputs of pesticides to enhance the arable wildflowers and invertebrates)
- Game crops, stubble of grassland fallow lying between annually cropped land and the field boundary.

The type of arable fields can be regularly cultivated fields drilled with cereals, linseed, rape, potatoes, maize, root crops, horticultural crops; and less regularly cultivated field edges and fallows (set-aside).

Only sites that contain non-casual arable populations of naturally occurring species should be considered. For the purposes of nature conservation, casuals of garden origin or introductions from wild flower mixes are not valuable.

14.18.2 Associated habitats

Hedgerows

There is a close association between the two priority habitats, but the two should be considered separately.

14.18.3 How this habitat definition relates to the National Vegetation Classification

NVC habitat codes in this section are followed by a short description of what type of habitat the code refers to. Each of the NVC habitat types listed here fall within the definition of the UKBAP Priority Habitat, Arable Field Margins.

NVC types for sandy soils:

OV1 *Viola arvensis*-*Aphanes microcarpa* community (Field pansy - Slender parsley piert community)

OV3 *Papaver rhoeas*-*Viola arvensis* community (Common poppy - Field pansy community)

OV4 *Chrysanthemum segetum*-*Spergula arvensis* community (Corn marigold – Corn spurrey community)

OV14 *Urtica urens*-*Lamium amplexicaule* community (Small nettle – Henbit dead-nettle community)

NVC types for clay soils:

OV7 *Veronica persica-Veronica polita* community (Common field-speedwell – Grey field-speedwell community)

OV8 *Veronica persica-Alopecurus myosuroides* community (Common field-speedwell – Black grass community)

OV9 *Matricaria perforate-Stellaria media* community (Pineapple weed - Common chickweed community)

NVC types for chalky soils:

OV15 *Anagallis arvensis-Veronica persica* community (Scarlett pimpernel - Common field-speedwell community)

OV16 *Papaver rhoeas-Silene noctiflora* community (Common poppy – Night flowering catchfly community) (NB Crawley states that *Silene noctiflora* itself is local and rare)

14.18.4 Additional comments

Arable flora occur sporadically so a single survey may provide only a partial picture of the floristic diversity in an arable field. Seeds can remain viable but dormant for decades so if conditions are unfavourable they may be absent one year, reappearing when conditions improve.

The following information can be useful in understanding the relative importance of the habitat:-

- Soil type
- Current crop
- Past cropping
- Number of years that the land has been arable/ley
- Whether the land has been ploughed or disc-harrowed

Communities arising from disturbance associated with building and other construction work should not be included.

4.19 Veteran trees

4.19.1 Description

Veteran trees are ones which are usually in a mature stage of life and have important wildlife and habitat features. These will generally be old trees, but also younger, middle-aged trees where premature ageing characteristics are apparent. Veteran trees can be defined as:

- Trees of interest biologically, aesthetically or culturally because of their age, size and condition
- Trees in the ancient stage of their lives
- Trees that are old relative to others of the same species

Veteran trees and ancient trees

Veteran trees differ from ancient trees – all ancient trees will be veteran trees, but not all veteran trees will be ancient trees. An ancient tree is one which is very old, in the declining stages of life and in most cases, larger in girth in relation to other trees of its species, depending on how it has grown and where in the country it is growing. Ancient trees are not normally tall but stand out visually as being very special. They will be marked by a 'wow!' factor.

Detailed description

Many veteran trees started life as working trees, being regularly lopped or pollarded to provide fuel and wood. Those which survive in the landscape today are usually found in places with a long history of human activity, such as ancient deer parks, wood-pastures, wooded commons, village greens, hedgerows, riversides, and, in the case of ancient yews, churchyards.

That said, veteran trees can be standards or maiden trees. These are trees that have never been cut and thus have a single main stem. Depending on the species and habitat, these trees can have tall stems and high crowns (e.g. trees in a woodland setting) or can have relatively short stems with large, wide crowns (e.g. in a parkland).

For the purposes of Local Wildlife Site selection, the presence of veteran trees will be considered important and will enhance the diversity of a potential site as they can support many species that cannot live anywhere else.

Important features of veteran trees that help identify their value as a separate habitat include:

- Hollow areas on trunks or main branches (>150mm)
- Holes - small holes in trunks or branches (<150mm)
- Water pools - water-filled pockets on the tree or the roots
- Rot (red, brown or white)
- Deadwood - large amounts of deadwood in the crown or on the ground
- Bark - loose old thick bark
- Broken branch stubs - live branches which have broken with shattered ends
- Splits in the trunk or branch wood fibre separation

- Runs or sap/other stains, wet exudations from the surface of the bark, wounds or holes
- Bore exit holes from insect tunneling with dry powdery residues
- Large girth for the tree species concerned
- Epiphytic plants
- Unnatural growth forms – all stems grow from the base of the tree, all branches arise from the same point in the stem, etc.

In addition to this, as veterans can be of interest culturally and historically certain features associated with woodland management such as ancient pollards, ancient coppice stools and medieval wood banks as well as significant archaeological features such as old moats, earthworks and presence on old parish boundaries increase their importance.

As a guide, if there are 5 or more veteran trees in a site it should be considered for selection provided it meets the other criteria.

4.19.2. Associated species

Many of the species which may be associated with veteran trees are included in the species lists of other wooded UKBAP habitats and as rare and scarce species in the species section. The main groups include:

- Fungi - bracket fungi, toadstools with cap and stalk, skin-like covering
- Invertebrates - beetles, hoverflies, spiders, millipedes etc
- Birds - large birds occupying cavities, or nesting birds
- Mammals - bats, rodents
- Reptiles - snakes or lizards under loose bark
- Plants and epiphytic lichens, ferns, ivy, moss etc

4.19.3 Associated habitats

Veteran trees can be unique habitats. Though not themselves considered as UKBAP priority they are often associated within UKBAP priority habitats, including lowland mixed deciduous woodland, particularly ancient woodland, wood pasture and parkland, traditional orchards and hedgerows, as well as other field boundaries and as individuals within a habitat

4.19.4 Additional information

In addition, the veteran trees can qualify under the criterion “recorded history and cultural associations” (2.2.7) where one or more of the following applies:

- There are historical records dating back, for example, to World War II or before
- There are historical records from the start of the 20th century or before the 1st edition Ordnance Survey Map
- The tree is associated with archaeologically important features e.g. woodbank or earthworks
- The tree shows evidence of historic management e.g. pollarding

“Value for the appreciation of nature” (2.2.8) will be considered an important criterion where one or more of the following applies:

- The tree contributes to local landscape character or is dominant in the local landscape.

- The tree supports specific interest e.g. mammal interest, lichens, ferns, moss or invertebrate interest.
- The tree has specific links with community history or folklore.

5.0 Species criteria for identifying Local Wildlife Sites

5.1 Introduction

Local Wildlife Sites have generally taken both habitats and species into consideration, and current DEFRA (2006) guidance places species conservation on an equal footing with the conservation of habitat and geological features:

“The series of non-statutory Local Sites seek to ensure, in the public interest, the conservation, maintenance and enhancement of species, habitats, geological and geomorphological features of substantive nature conservation value.”

Conservation of habitats and geological features will of course result in the conservation of many species; for instance, many UK BAP Priority species have been shown to be associated with UK BAP Priority habitats (Simonson and Thomas 1999), and if such habitats are well-managed they will support many notable species as well as more widespread ones.

However, there are good reasons for giving direct attention to species within the Wildlife Sites system.

- Some species, including UK BAP and other notable species, depend on habitats that are not in themselves priorities, e.g. over a third of UK BAP Priority species were found by Simonson and Thomas (1999) not to be directly associated with BAP Priority habitat types.
- Species are important and sensitive indicators of the health of habitats and the effectiveness of their management, and ultimately of the state of the wider environment. Ongoing declines are evident for species in many groups, and Wildlife Sites have a role to play in conserving species.
- For many people, species conservation is easier to relate to than habitat conservation, and it is their concern for, and empathy with, species that drives their commitment to conserving the environment.

The following selection criteria are designed to identify sites where selection may be considered, but eventual notification as a Local Wildlife Site will depend on further considerations. These include the viability of the habitat available to support the species or the potential to bring surrounding land into a favourable condition (in which case that land should be included within the Local Wildlife Site). It will also be necessary to consider whether or not a potentially stable breeding colony may exist (rather than just the transient occurrence of the species on a site), as well as the context of the population within its known range, both nationally and in the county.

In all cases selection should be subject to the condition that the site boundary encompasses a significant area of known habitat requirements. For example, nesting sites and food/prey foraging conditions are present in viable quantities. Thus, for a species such as the national BAP Four-spotted moth it would not be sufficient just to find a specimen on a site. There would need to be appropriate foodplants (Field Bindweed in this example) and habitat conditions (hot, well-drained sites with thin soil and sparse vegetation in this example) that would provide evidence of the likelihood of a sustainable population being present on the site.

The selection of Local Wildlife Sites will be strongly guided by the criteria given here, but this is not a simplistic process of comparison between the species recorded from a site and a list of notable species or threshold values. Wild species can be subject to great variation in the population sizes and distribution, and individual records of species need to be interpreted carefully to assess their relationship to the site on which they have been found. There will always be a need for best professional judgement in site selection, e.g. when assessing a "sustainable" population of a species.

It follows from this that the presence of one or more notable species on a site does not mean that the site will 'automatically' qualify for Wildlife Site status; expert guidance will be taken into account in assessing the importance of the site and any species population that it may support.

General guidance

- Species that are not native to the UK will not be considered unless a clear case can be made for their conservation importance. (For vascular plants, archaeophytes are considered as equivalent to natives; neophytes are excluded unless a clear case can be made for their conservation importance.)
- Sites will only be selected if it can be shown that the site contains resources necessary to support a population.
- Sites may be selected either for **notable species** or for **notable assemblages**:
 - Sites may be selected because they support one or more 'notable' species; usually these will be species that are considered notable under one or more international or national categories, but for some groups there is sufficient data to define locally notable categories
 - For most notable species, any population can be considered if it can be shown that the site holds sufficient resources to sustain the population; however, for birds there is an additional listing of species for which sites would only be selected if the population size reaches a particular threshold (in order to safeguard the most important populations of species that occur more widely)
 - Sites may be selected because they support breeding populations, wintering populations, or critical resources for any part of a population's life-cycle (e.g. important feeding areas for migratory birds)
 - Sites may be selected if they support a notable assemblage of species, as defined below. This criterion has not been used for all species groups, due to insufficient information on species assemblages.

The expectation is that sites put forward for consideration as LWS under these criteria will be based on recent records (usually within the previous five years) and that a case will be put forward for the significance of the records in the local context, and their relation to the habitats present on the site.

Where an LWS is selected on the basis of its importance for species, it may be deselected if that species interest is lost in the future. However, before any deselection it is expected that appropriate surveys will have taken place to establish the likelihood of the species still being present.

Throughout this document, the word "notable" refers to those species that defined in this document as being "notable", and does not refer to any external list of "notable" species. It should be noted that the lists are based on those species for which we currently have

records in the three counties – it may be that additional species will be recorded that are listed in one or more of the national priority species lists, and such species would also be eligible for consideration as notable species in the LWS context. For example, if a site was found to support a population of a Red Data Book species not previously recorded in the three counties, then it would be eligible for *consideration* as an LWS, even if the species was not explicitly included in the lists below.

These criteria should be reviewed periodically (at least once every five years) to take on board any changes to the species considered notable (e.g. changes in local status, updates to national lists).

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5.1. Vascular plants

Any site that has evidence (within the previous five years) of a sustainable population of any Notable plant species can be considered for LWS status. We would not expect to designate all sites for all species in the Notable list; some species might be considered significant enough in their own right to warrant site selection on the basis of their presence alone (e.g. species for which there are only a few sites in the UK); however, other species are more widespread and might only be considered if their populations are especially significant, or as part of an assemblage of plants, other species and habitats at the site, following expert advice and supporting evidence.

In most cases sites would only be designated for native populations, although species that have been introduced to a site as part of a habitat or species restoration project may also be considered.

A species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated. There may be exceptions to this rule for certain species (e.g. ghost orchid). Where the surveyor has reason to believe a species is still likely to be present this should be documented and a time set for resurvey to confirm whether it is extinct.

Species in Table 1 are those that

- Are listed as County Rare or County Scarce in the relevant county rare plant register list; it should be noted that these lists are subject to review. [Tables 1a and 1b show the species included in the draft Rare Plant Register lists for Bucks and Oxon as at February 2008; Berkshire rare and scarce plants are listed in the Berkshire Rare Plant Register (Crawley 2005), which is not available in a compatible electronic format and thus has not been incorporated into a table.]

In addition, many of these species fall into one or more of the following categories:

- threatened in Europe (ET); i.e. protected under the European Habitats Directive
- legally protected (WCA); i.e. protected under Schedule 8 of the Wildlife & Countryside Act (excluding those species that are protected from commercial exploitation only)
- Priority species in the UK Biodiversity Action Plan (UKBAP), as revised in 2007
- Listed in the current plant Red Data List (Cheffings and Farrell 2005)
- Nationally Rare or Scarce according to the Botanical Society of the British Isles

Notable species assemblages are not defined for vascular plants, as these would overlap with the assemblages of indicator species that form part of the habitat definitions.

Note that these lists may be incomplete, e.g. for rarities not yet discovered in the three counties, and new additions should be considered accordingly.

Table 1a: County rare and scarce plants in Bucks

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Adonis annua</i>	Pheasant's-eye			Y	Endangered	Rare
<i>Agrimonia procera</i>	Fragrant agrimony					
<i>Aira caryophyllaea</i>	Silver hair-grass					
<i>Alchemilla xanthochlora</i>	Intermediate Lady's-mantle					
<i>Alopecurus aequalis</i>	Orange foxtail					
<i>Anagallis arvensis subsp. foemina</i>	Blue pimpernel					Scarce
<i>Anagallis tenella</i>	Bog pimpernel					
<i>Anthriscus caucalis</i>	Bur chervil					
<i>Apera spica-venti</i>	Loose silky-bent				Near Threatened	
<i>Aphanes australis</i>	Slender parsley-piert					
<i>Apium graveolens</i>	Wild celery					
<i>Apium inundatum</i>	Lesser marshwort					
<i>Arabis glabra</i>	Tower mustard			Y	Endangered	Rare
<i>Artemisia absinthium</i>	Wormwood					
<i>Blysmus compressus</i>	Flat-sedge			Y	Vulnerable	
<i>Botrychium lunaria</i>	Moonwort					
<i>Brassica rapa subsp. campestris</i>	Wild turnip					
<i>Bromopsis benekenii</i>	Lesser hairy-brome					Scarce
<i>Bromus secalinus</i>	Rye brome				Vulnerable	Scarce
<i>Bromus x pseudothominei</i>	Lesser soft-brome / Hybrid soft brome					
<i>Bunium bulbocastanum</i>	Great pignut					Rare
<i>Calamagrostis canescens</i>	Purple small-reed					
<i>Callitriche hamulata</i>	Intermediate water-starwort					
<i>Carex binervis</i>	Green-ribbed sedge					
<i>Carex curta</i>	White sedge					
<i>Carex diandra</i>	Lesser tussock-sedge				Near Threatened	
<i>Carex dioica</i>	Dioecious sedge					
<i>Carex distans</i>	Distant sedge					
<i>Carex echinata</i>	Star sedge					
<i>Carex laevigata</i>	Smooth-stalked sedge					
<i>Carex muricata subsp. lamprocarpa</i>	Prickly sedge					
<i>Carex muricata subsp. muricata</i>	Large-fruited prickly-sedge				Near Threatened	Rare
<i>Carex pulicaris</i>	Flea sedge					
<i>Carex rostrata</i>	Bottle sedge					
<i>Carex vesicaria</i>	Bladder-sedge					
<i>Carex viridula subsp. brachyrrhyncha</i>	Long-stalked yellow-sedge					
<i>Carex viridula subsp. viridula</i>	Small-fruited yellow-sedge					
<i>Carex vulpina</i>	True fox-sedge			Y	Vulnerable	Rare
<i>Carex x pseudoaxillaris</i>	Axillary sedge (C. otrubae x remota)					
<i>Centaurea cyanus</i>	Cornflower			Y		
<i>Cephalanthera rubra</i>	Red helleborine		Y	Y	Critically Endangered	Rare
<i>Cerastium diffusum</i>	Sea mouse-ear					
<i>Cerastium fontanum subsp. holosteoides</i>	Common mouse-ear					
<i>Cerastium semidecandrum</i>	Little mouse-ear					
<i>Clinopodium calamintha</i>	Lesser calamint				Vulnerable	Scarce
<i>Coeloglossum viride</i>	Frog orchid			Y	Vulnerable	
<i>Cuscuta epithymum</i>	Dodder				Vulnerable	
<i>Cynoglossum officinale</i>	Hound's-tongue				Near Threatened	
<i>Cyperus fuscus</i>	Brown galingale		Y	Y	Vulnerable	Rare
<i>Cystopteris fragilis</i>	Brittle bladder-fern					
<i>Dactylorhiza maculata subsp. ericetorum</i>	Heath Spotted orchid					
<i>Damasonium alisma</i>	Starfruit		Y	Y	Critically Endangered	Rare
<i>Daphne mezereum</i>	Mezereon				Vulnerable	Scarce
<i>Dianthus deltoides</i>	Maiden pink				Near Threatened	Scarce
<i>Diploxys tenuifolia</i>	Perennial wall-rocket					
<i>Dipsacus pilosus</i>	Small teasel					
<i>Draba muralis</i>	Wall whitlowgrass					Scarce
<i>Drosera intermedia</i>	Oblong-leaved sundew					
<i>Dryopteris affinis subsp. affinis</i>	G-scaled male-fern					
<i>Dryopteris x deweveri</i>	D. carthusiana x dilatata					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Eleocharis multicaulis</i>	Many-stalked spike-rush					
<i>Eleogiton fluitans</i>	Floating club-rush					
<i>Epilobium lanceolatum</i>	Spear-leaved willowherb					
<i>Epipactis palustris</i>	Marsh helleborine					
<i>Epipactis phyllanthes</i>	Green-flowered helleborine					Scarce
<i>Epipogium aphyllum</i>	Ghost orchid		Y		Extinct	Rare
<i>Equisetum sylvaticum</i>	Wood horsetail					
<i>Equisetum x litorale</i>	Shore horsetail (E. arvense x fluviatile)					
<i>Erica cinerea</i>	Bell heather					
<i>Erica tetralix</i>	Cross-leaved heath					
<i>Eriophorum angustifolium</i>	Common cottongrass					
<i>Erophila glabrescens</i>	Glabrous whitlowgrass					
<i>Erophila majuscula</i>	Hairy whitlowgrass					
<i>Festuca filiformis</i>	Fine-leaved sheep's-fescue					
<i>Filago minima</i>	Small cudweed					
<i>Fritillaria meleagris</i>	Fritillary				Vulnerable	Scarce
<i>Fumaria muralis subsp. boraiei</i>	Common ramping-fumitory					
<i>Fumaria officinalis subsp. wirtgenii</i>	Common fumitory					
<i>Fumaria parviflora</i>	Fine-leaved fumitory				Vulnerable	Scarce
<i>Fumaria vaillantii</i>	Few-flowered fumitory				Vulnerable	Scarce
<i>Galeopsis angustifolia</i>	Red hemp-nettle			Y	Critically Endangered	Scarce
<i>Galium palustre subsp. elongatum</i>	Great marsh-bedstraw					
<i>Galium pumilum</i>	Slender bedstraw			Y	Endangered	Rare
<i>Genista anglica</i>	Petty whin				Near Threatened	
<i>Gentianella anglica</i>	Early gentian	Y	Y	Y		Scarce
<i>Gentianella ciliata</i>	Fringed gentian		Y	Y	Critically Endangered	Rare
<i>Gentianella x pamplinii</i>	G. amarella x germanica					
<i>Glyceria fluitans x declinata</i>						
<i>Gnaphalium sylvaticum</i>	Heath cudweed				Endangered	
<i>Groenlandia densa</i>	Opposite-leaved pondweed				Vulnerable	
<i>Gymnocarpium robertianum</i>	Limestone fern					Scarce
<i>Herminium monorchis</i>	Musk orchid			Y	Vulnerable	Scarce
<i>Hottonia palustris</i>	Water-violet					
<i>Hydrocharis morsus-ranae</i>	Frogbit				Vulnerable	
<i>Hypericum elodes</i>	Marsh St John's-wort					
<i>Hypericum x desetangsii</i>	H. maculatum x perforatum					
<i>Inula helenium</i>	Elecampane					
<i>Jasione montana</i>	Sheep's-bit					
<i>Juncus squarrosus</i>	Heath rush					
<i>Lathraea squamaria</i>	Toothwort					
<i>Lathyrus aphaca</i>	Yellow vetchling				Vulnerable	Scarce
<i>Lathyrus linifolius</i>	Bitter-vetch					
<i>Lepidium heterophyllum</i>	Smith's pepperwort					
<i>Lepidium latifolium</i>	Dittander					Scarce
<i>Limosella aquatica</i>	Mudwort					Scarce
<i>Lithospermum officinale</i>	Common gromwell					
<i>Littorella uniflora</i>	Shoreweed					
<i>Lythrum hyssopifolium</i>	Grass-poly		Y	Y	Endangered	Rare
<i>Lythrum portula</i>	Water-purslane					
<i>Mentha pulegium</i>	Pennyroyal		Y	Y	Endangered	Rare
<i>Minuartia hybrida</i>	Fine-leaved sandwort			Y	Endangered	Scarce
<i>Misopates orontium</i>	Weasel's-snout				Vulnerable	
<i>Moenchia erecta</i>	Upright chickweed					
<i>Molinia caerulea subsp. arundinacea</i>	Purple moor-grass					
<i>Montia fontana</i>	Blinks					
<i>Myosotis secunda</i>	Creeping forget-me-not					
<i>Myosurus minimus</i>	Mousetail				Vulnerable	
<i>Myriophyllum alterniflorum</i>	Alternate water-milfoil					
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil				Vulnerable	
<i>Nardus stricta</i>	Mat-grass					
<i>Nepeta cataria</i>	Cat-mint				Vulnerable	
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort					
<i>Oenanthe pimpinelloides</i>	Corky-fruited water-dropwort					
<i>Oenanthe silaifolia</i>	Narrow-leaved water-dropwort				Near Threatened	Scarce
<i>Orchis militaris</i>	Military orchid		Y		Vulnerable	Rare

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Orobanche elatior</i>	Knapweed broomrape					
<i>Osmunda regalis</i>	Royal fern					
<i>Pedicularis palustris</i>	Marsh lousewort					
<i>Persicaria minor</i>	Small water-pepper				Vulnerable	
<i>Physospermum cornubiense</i>	Bladderseed					Rare
<i>Platanthera bifolia</i>	Lesser butterfly-orchid			Y	Vulnerable	
<i>Polygala calcarea</i>	Chalk milkwort					
<i>Polygala serpyllifolia</i>	Heath milkwort					
<i>Polygala vulgaris x calcarea</i>						
<i>Polygonum rurivagum</i>	Cornfield knotgrass					
<i>Polypodium x mantoniae</i>	P. interjectum x vulgare					
<i>Polystichum aculeatum</i>	Hard shield-fern					
<i>Potamogeton berchtoldii</i>	Small pondweed					
<i>Potamogeton compressus</i>	Grass-wrack pondweed			Y	Endangered	Scarce
<i>Potamogeton friesii</i>	Flat-stalked pondweed				Near Threatened	Scarce
<i>Potamogeton nodosus</i>	Loddon pondweed				Vulnerable	Rare
<i>Potamogeton obtusifolius</i>	Blunt-leaved pondweed					
<i>Potamogeton polygonifolius</i>	Bog pondweed					
<i>Potamogeton praelongus</i>	Long-stalked pondweed				Near Threatened	
<i>Potamogeton trichoides</i>	Hairlike pondweed					
<i>Potentilla x italica</i>	P. erecta x reptans					
<i>Potentilla x mixta</i>	P. anglica x reptans					
<i>Primula elatior</i>	Oxlip				Near Threatened	Scarce
<i>Primula x digenea</i>	P. elatior x vulgaris					
<i>Pulsatilla vulgaris</i>	Pasqueflower			Y	Vulnerable	Scarce
<i>Pyrola minor</i>	Common wintergreen					
<i>Ranunculus circinatus</i>	Fan-leaved water-crowfoot					
<i>Ranunculus hederaceus</i>	Ivy-leaved crowfoot					
<i>Ranunculus parviflorus</i>	Small-flowered buttercup					
<i>Ranunculus sardous</i>	Hairy buttercup					
<i>Rosa agrestis</i>	Small-leaved sweet-briar				Near Threatened	Scarce
<i>Rosa rubiginosa</i>	Sweet-briar					
<i>Rosa tomentosa</i>	Harsh downy-rose					
<i>Rumex maritimus</i>	Golden dock					
<i>Rumex palustris</i>	Marsh dock					
<i>Salix aurita</i>	Eared willow					
<i>Salix repens</i>	Creeping willow					
<i>Salvia pratensis</i>	Meadow clary		Y		Near Threatened	Scarce
<i>Salvia verbenaca</i>	Wild clary					
<i>Sambucus ebulus</i>	Dwarf elder					
<i>Samolus valerandi</i>	Brookweed					
<i>Scandix pecten-veneris</i>	Shepherd's-needle			Y	Critically Endangered	
<i>Schoenoplectus tabernaemontani</i>	Grey club-rush					
<i>Scirpus sylvaticus</i>	Wood club-rush					
<i>Scleranthus annuus</i>	Annual knawel			Y	Endangered	
<i>Scutellaria minor</i>	Lesser skullcap					
<i>Senecio x subnebrodensis</i>	S. squalidus x viscosus					
<i>Silene gallica</i>	Small-flowered catchfly			Y	Endangered	Scarce
<i>Silene noctiflora</i>	Night-flowering catchfly				Vulnerable	
<i>Sium latifolium</i>	Greater water-parsnip			Y	Endangered	Scarce
<i>Sorbus x thuringiaca</i>	S. aria x aucuparia					
<i>Spergularia marina</i>	Lesser sea-spurrey					
<i>Spergularia rubra</i>	Sand spurrey					
<i>Spiranthes spiralis</i>	Autumn Lady's-tresses				Near Threatened	
<i>Stellaria pallida</i>	Lesser chickweed					
<i>Teesdalia nudicaulis</i>	Shepherd's cress				Near Threatened	
<i>Tephrosieris integrifolia subsp. integrifolia</i>				Y	Endangered	Scarce
<i>Thelypteris palustris</i>	Marsh fern					Scarce
<i>Torilis arvensis</i>	Spreading hedge-parsley			Y	Endangered	Scarce
<i>Trifolium striatum</i>	Knotted clover					
<i>Typha x glauca</i>	T. angustifolia x latifolia					
<i>Ulmus plotii</i>	Plot's elm					
<i>Utricularia australis</i>	Bladderwort					
<i>Utricularia vulgaris sens. str.</i>	Greater bladderwort					
<i>Vaccinium myrtillus</i>	Bilberry					
<i>Valerianella rimosa</i>	Broad-fruited cornsalad			Y	Endangered	Rare
<i>Veronica scutellata</i>	Marsh speedwell					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Vicia lathyroides</i>	Spring vetch					
<i>Vicia sylvatica</i>	Wood vetch					
<i>Viola canina</i>	Heath dog-violet				Near Threatened	
<i>Viola palustris</i>	Marsh violet					
<i>Vulpia ciliata subsp. ambigua</i>	Purple fescue					Scarce

Table 1b: County rare and scarce plants in Oxon

This is a working list of plants which may have as few as 10 localities in the county, some are already known to have more.

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Aceras anthropophorum</i>	Man orchid			Y	Endangered	Scarce
<i>Adonis annua</i>	Pheasant's-eye			Y	Endangered	Rare
<i>Agrostemma githago</i>	Corncockle					
<i>Agrostis canina</i>	Velvet bent					
<i>Agrostis vinealis</i>	Brown bent					
<i>Aira caryophyllea</i>	Silver hair-grass					
<i>Aira praecox</i>	Early hair-grass					
<i>Alchemilla filicaulis subsp. vestita</i>	Common Lady's mantle					
<i>Alchemilla glabra</i>	Smooth Lady's-mantle					
<i>Alchemilla xanthochlora</i>	Intermediate lady's-mantle					
<i>Alisma lanceolatum</i>	Narrow-leaved water-plantain					
<i>Alopecurus aequalis</i>	Orange foxtail					
<i>Anagallis arvensis subsp. foemina</i>	Blue pimpernel					Scarce
<i>Anagallis minima</i>	Chaffweed				Near Threatened	
<i>Anagallis tenella</i>	Bog pimpernel					
<i>Anthemis arvensis</i>	Corn chamomile				Endangered	
<i>Anthriscus caucalis</i>	Bur chervil					
<i>Apera interrupta</i>	Dense silky-bent					
<i>Apera spica-venti</i>	Loose silky-bent				Near Threatened	
<i>Aphanes australis</i>	Slender parsley-piert					
<i>Apium inundatum</i>	Lesser marshwort					
<i>Apium repens</i>	Creeping marshwort	Y	Y	Y	Vulnerable	Rare
<i>Aquilegia vulgaris</i>	Columbine					
<i>Arabis glabra</i>	Tower mustard			Y	Endangered	Rare
<i>Arabis hirsuta</i>	Hairy rock-cress					
<i>Aristolochia clematitis</i>	Birthwort					
<i>Arnoseris minima</i>	Lamb's succory			Y	Extinct	
<i>Artemisia absinthium</i>	Wormwood					
<i>Asparagus officinalis</i>	Asparagus					
<i>Asperula cynanchica</i>	Squinancywort					
<i>Astragalus danicus</i>	Purple milk-vetch			Y	Endangered	
<i>Baldellia ranunculoides</i>	Lesser water-plantain				Near Threatened	
<i>Bidens cernua</i>	Nodding bur-marigold					
<i>Blechnum spicant</i>	Hard-fern					
<i>Blysmus compressus</i>	Flat-sedge			Y	Vulnerable	
<i>Bolboschoenus maritimus</i>	Sea club-rush					
<i>Bromopsis benekenii</i>	Lesser hairy-brome					Scarce
<i>Bromus interruptus</i>	Interrupted brome			Y	Extinct in the wild	
<i>Bromus racemosus</i>	Smooth brome					
<i>Bromus secalinus</i>	Rye brome				Vulnerable	Scarce
<i>Bupleurum rotundifolium</i>	Thorow-wax			Y	Critically Endangered	Rare
<i>Butomus umbellatus</i>	Flowering-rush					
<i>Calamagrostis epigejos</i>	Wood small-reed					
<i>Callitriche hamulata</i>	Intermediate water-starwort					
<i>Callitriche hamulata sens. lat.</i>	Narrow-leaved water-starwort					
<i>Callitriche obtusangula</i>	Blunt-fruited sater-starwort					
<i>Calluna vulgaris</i>	Heather					
<i>Campanula latifolia</i>	Giant bellflower					
<i>Campanula rapunculus</i>	Rampion bellflower			Y	Endangered	Rare
<i>Cardamine amara</i>	Large bitter-cress					
<i>Cardamine impatiens</i>	Narrow-leaved bitter-cress				Near Threatened	Scarce

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Carduus tenuiflorus</i>	Slender thistle					
<i>Carex binervis</i>	Green-ribbed sedge					
<i>Carex caryophyllea</i>	Spring-sedge					
<i>Carex diandra</i>	Lesser tussock-sedge				Near Threatened	
<i>Carex dioica</i>	Dioecious sedge					
<i>Carex distans</i>	Distant sedge					
<i>Carex divulsa subsp. divulsa</i>	Grey sedge					
<i>Carex divulsa subsp. leersii</i>	Many-leaved sedge					
<i>Carex echinata</i>	Star sedge					
<i>Carex elata</i>	Tufted-sedge					
<i>Carex filiformis</i>	Downy-fruited sedge					Rare
<i>Carex hostiana</i>	Tawny sedge					
<i>Carex muricata</i>	Prickly sedge					
<i>Carex muricata subsp. muricata</i>	Large-fruited prickly-sedge				Near Threatened	Rare
<i>Carex ovalis</i>	Oval sedge					
<i>Carex pallescens</i>	Pale sedge					
<i>Carex paniculata</i>	Greater tussock-sedge					
<i>Carex pilulifera</i>	Pill sedge					
<i>Carex pseudocyperus</i>	Cyperus sedge					
<i>Carex pulicaris</i>	Flea sedge					
<i>Carex rostrata</i>	Bottle sedge					
<i>Carex strigosa</i>	Thin-spiked wood-sedge					
<i>Carex vesicaria</i>	Bladder-sedge					
<i>Carex viridula subsp. brachyrrhyncha</i>	Long-stalked yellow-sedge					
<i>Carex viridula subsp. oedocarpa</i>	Common yellow-sedge					
<i>Carex vulpina</i>	True fox-sedge			Y	Vulnerable	Rare
<i>Catabrosa aquatica</i>	Whorl-grass					
<i>Centaurea cyanus</i>	Cornflower			Y		
<i>Centaureum pulchellum</i>	Lesser centaury					
<i>Cephalanthera longifolia</i>	Narrow-leaved helleborine			Y	Vulnerable	Scarce
<i>Cerastium pumilum</i>	Dwarf mouse-ear				Near Threatened	Scarce
<i>Cerastium semidecandrum</i>	Little mouse-ear					
<i>Ceratocarpus claviculata</i>	Climbing corydalis					
<i>Ceratophyllum demersum</i>	Rigid hornwort					
<i>Chamaemelum nobile</i>	Chamomile			Y	Vulnerable	
<i>Chenopodium ficifolium</i>	Fig-leaved goosefoot					
<i>Chenopodium hybridum</i>	Maple-leaved goosefoot					
<i>Chenopodium murale</i>	Nettle-leaved goosefoot				Vulnerable	
<i>Chenopodium urbicum</i>	Upright goosefoot			Y	Critically Endangered	Rare
<i>Chrysanthemum segetum</i>	Corn marigold				Vulnerable	
<i>Chrysosplenium alternifolium</i>	Alternate-leaved golden-saxifrage					
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved golden-saxifrage					
<i>Cirsium dissectum</i>	Meadow thistle					
<i>Cladium mariscus</i>	Great fen-sedge					
<i>Clinopodium acinos</i>	Basil thyme			Y	Vulnerable	
<i>Clinopodium ascendens</i>	Common calamint					
<i>Clinopodium calamintha</i>	Lesser calamint				Vulnerable	Scarce
<i>Coeloglossum viride</i>	Frog orchid			Y	Vulnerable	
<i>Colchicum autumnale</i>	Meadow saffron				Near Threatened	
<i>Convallaria majalis</i>	Lily-of-the-valley					
<i>Cuscuta epithymum</i>	Dodder				Vulnerable	
<i>Cuscuta europaea</i>	Greater dodder					Scarce
<i>Cynoglossum germanicum</i>	Green hound's-tongue		Y	Y	Critically Endangered	Rare
<i>Cynoglossum officinale</i>	Hound's-tongue				Near Threatened	
<i>Cystopteris fragilis</i>	Brittle bladder-fern					
<i>Dactylorhiza incarnata</i>	Early marsh-orchid					
<i>Dactylorhiza maculata</i>	Heath spotted-orchid					
<i>Dactylorhiza purpurella</i>	Northern marsh-orchid					
<i>Danthonia decumbens</i>	Heath-grass					
<i>Daphne mezereum</i>	Mezereon				Vulnerable	Scarce
<i>Datura stramonium</i>	Thorn-apple					
<i>Descurainia sophia</i>	Flixweed					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Dianthus armeria</i>	Deptford pink		Y	Y	Endangered	Rare
<i>Dianthus deltoides</i>	Maiden pink				Near Threatened	Scarce
<i>Diplotaxis tenuifolia</i>	Perennial wall-rocket					
<i>Dipsacus pilosus</i>	Small teasel					
<i>Dryopteris carthusiana</i>	Narrow buckler-fern					
<i>Eleocharis acicularis</i>	Needle spike-rush					
<i>Eleocharis multicaulis</i>	Many-stalked spike-rush					
<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush					
<i>Eleocharis uniglumis</i>	Slender spike-rush					
<i>Eleogiton fluitans</i>	Floating club-rush					
<i>Epilobium lanceolatum</i>	Spear-leaved willowherb					
<i>Epilobium palustre</i>	Marsh willowherb					
<i>Epilobium roseum</i>	Pale willowherb					
<i>Epipactis muelleri</i>	Narrow-lipped helleborine				Data Deficient	Scarce
<i>Epipactis palustris</i>	Marsh helleborine					
<i>Epipactis phyllanthes</i>	Green-flowered helleborine					Scarce
<i>Epipactis purpurata</i>	Violet helleborine					
<i>Epipogium aphyllum</i>	Ghost orchid		Y		Extinct	Rare
<i>Equisetum sylvaticum</i>	Wood horsetail					
<i>Erica cinerea</i>	Bell heather					
<i>Erica tetralix</i>	Cross-leaved heath					
<i>Eriophorum angustifolium</i>	Common cottongrass					
<i>Eriophorum latifolium</i>	Broad-leaved cottongrass					
<i>Euphorbia platyphyllos</i>	Broad-leaved spurge					
<i>Euphrasia tetraquetra</i>					Data Deficient	
<i>Fallopia dumetorum</i>	Copse-bindweed			Y	Vulnerable	Scarce
<i>Festuca filiformis</i>	Fine-leaved sheep's-fescue					
<i>Filago minima</i>	Small cudweed					
<i>Filago pyramidata</i>	Broad-leaved cudweed		Y	Y	Endangered	Rare
<i>Filago vulgaris</i>	Common cudweed				Near Threatened	
<i>Frangula alnus</i>	Alder buckthorn					
<i>Fritillaria meleagris</i>	Fritillary				Vulnerable	Scarce
<i>Fumaria bastardii</i>	Tall ramping-fumitory					
<i>Fumaria capreolata</i>	White ramping-fumitory					
<i>Fumaria densiflora</i>	Dense-flowered fumitory					
<i>Fumaria muralis</i>	Common ramping-fumitory					
<i>Fumaria parviflora</i>	Fine-leaved fumitory				Vulnerable	Scarce
<i>Fumaria purpurea</i>	Purple Ramping-fumitory			Y		Scarce
<i>Fumaria vaillantii</i>	Few-flowered fumitory				Vulnerable	Scarce
<i>Gagea lutea</i>	Yellow Star-of-Bethlehem					
<i>Galeopsis angustifolia</i>	Red hemp-nettle			Y	Critically Endangered	Scarce
<i>Galeopsis bifida</i>	Bifid hemp-nettle					
<i>Galeopsis speciosa</i>	Large-flowered hemp-nettle				Vulnerable	
<i>Galium pumilum</i>	Slender bedstraw			Y	Endangered	Rare
<i>Galium tricornutum</i>	Corn cleavers			Y	Critically Endangered	Rare
<i>Genista tinctoria</i>	Dyer's greenweed					
<i>Gentianella anglica</i>	Early gentian	Y	Y	Y		Scarce
<i>Gentianella germanica</i>	Chiltern gentian					Scarce
<i>Geranium columbinum</i>	Long-stalked crane's-bill					
<i>Geum rivale</i>	Water avens					
<i>Glyceria declinata</i>	Small sweet-grass					
<i>Gnaphalium sylvaticum</i>	Heath cudweed				Endangered	
<i>Groenlandia densa</i>	Opposite-leaved pondweed				Vulnerable	
<i>Gymnadenia conopsea</i>	Fragrant orchid					
<i>Gymnocarpium robertianum</i>	Limestone fern					Scarce
<i>Helleborus foetidus</i>	Stinking hellebore					Scarce
<i>Helleborus viridis</i>	Green hellebore					
<i>Herminium monorchis</i>	Musk orchid			Y	Vulnerable	Scarce
<i>Himantoglossum hircinum</i>	Lizard orchid		Y		Near Threatened	Rare
<i>Hippocrepis comosa</i>	Horseshoe vetch					
<i>Hippuris vulgaris</i>	Mare's-tail					
<i>Hordelymus europaeus</i>	Wood barley					Scarce
<i>Hottonia palustris</i>	Water-violet					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Hydrocharis morsus-ranae</i>	Frogbit				Vulnerable	
<i>Hydrocotyle vulgaris</i>	Marsh pennywort					
<i>Hyoscyamus niger</i>	Henbane				Vulnerable	
<i>Hypericum androsaemum</i>	Tutsan					
<i>Hypericum humifusum</i>	Trailing St John's-wort					
<i>Hypericum maculatum</i>	Imperforate St John's-wort					
<i>Hypericum montanum</i>	Pale St John's-wort				Near Threatened	
<i>Hypochaeris maculata</i>	Spotted Cat's-ear				Near Threatened	Rare
<i>Iberis amara</i>	Wild candytuft			Y	Vulnerable	Scarce
<i>Inula helenium</i>	Elecampane					
<i>Isolepis setacea</i>	Bristle club-rush					
<i>Jasione montana</i>	Sheep's-bit					
<i>Juncus bulbosus</i>	Bulbous rush					
<i>Juncus compressus</i>	Round-fruited rush				Near Threatened	
<i>Juncus subnodulosus</i>	Blunt-flowered rush					
<i>Juniperus communis</i>	Juniper			Y		
<i>Lathraea squamaria</i>	Toothwort					
<i>Lathyrus linifolius</i>	Bitter-vetch					
<i>Lathyrus nissolia</i>	Grass vetchling					
<i>Lathyrus sylvestris</i>	Narrow-leaved everlasting-pea					
<i>Lemna gibba</i>	Fat duckweed					
<i>Lemna trisulca</i>	Ivy-leaved duckweed					
<i>Lepidium heterophyllum</i>	Smith's pepperwort					
<i>Lepidium ruderale</i>	Narrow-leaved pepperwort					
<i>Leucojum aestivum</i>	Summer snowflake					
<i>Limosella aquatica</i>	Mudwort					Scarce
<i>Lithospermum arvense</i>	Field gromwell				Endangered	
<i>Littorella uniflora</i>	Shoreweed					Extinct – not seen since C19 th
<i>Lolium temulentum</i>	Darnel			Y	Critically Endangered	Rare
<i>Lotus glaber</i>	Narrow-leaved Bird's-foot-trefoil / Slender Birdsfoot Trefoil					
<i>Luzula multiflora</i>	Heath wood-rush					
<i>Luzula sylvatica</i>	Great wood-rush					
<i>Lycopodium clavatum</i>	Stag's-horn clubmoss					
<i>Lythrum hyssopifolium</i>	Grass-poly		Y	Y	Endangered	Rare
<i>Lythrum portula</i>	Water-purslane					
<i>Marrubium vulgare</i>	White horehound					Scarce
<i>Medicago sativa subsp. falcata</i>	Sickle medick					Scarce
<i>Medicago sativa subsp. varia</i>	Sand lucerne					
<i>Melampyrum pratense</i>	Common cow-wheat					
<i>Mentha pulegium</i>	Pennyroyal		Y	Y	Endangered	Rare
<i>Menyanthes trifoliata</i>	Bogbean					
<i>Mespilus germanica</i>	Medlar					Scarce
<i>Minuartia hybrida</i>	Fine-leaved sandwort			Y	Endangered	Scarce
<i>Misopates orontium</i>	Weasel's-snout				Vulnerable	
<i>Moenchia erecta</i>	Upright chickweed					
<i>Molinia caerulea</i>	Purple moor-grass					
<i>Monotropa hypopitys</i>	Yellow bird's-nest			Y	Endangered	
<i>Montia fontana</i>	Blinks					
<i>Muscari neglectum</i>	Grape-hyacinth			Y	Vulnerable	Rare
<i>Myosotis secunda</i>	Creeping forget-me-not					
<i>Myosurus minimus</i>	Mousetail				Vulnerable	
<i>Myriophyllum alterniflorum</i>	Alternate water-milfoil					
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil				Vulnerable	
<i>Narcissus pseudonarcissus subsp. pseudonarcissus</i>	Daffodil					
<i>Nardus stricta</i>	Mat-grass					
<i>Neottia nidus-avis</i>	Bird's-nest orchid				Near Threatened	
<i>Nepeta cataria</i>	Cat-mint				Vulnerable	
<i>Nymphoides peltata</i>	Fringed water-lily					Scarce
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort					
<i>Oenanthe crocata</i>	Hemlock water-dropwort					
<i>Oenanthe fistulosa</i>	Tubular water-dropwort			Y	Vulnerable	
<i>Oenanthe fluviatilis</i>	River water-dropwort					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Oenanthe lachenalii</i>	Parsley water-dropwort					
<i>Oenanthe silaifolia</i>	Narrow-leaved water-dropwort				Near Threatened	Scarce
<i>Ononis spinosa</i>	Spiny restharrow					
<i>Ophrys insectifera</i>	Fly orchid			Y	Vulnerable	
<i>Ophrys sphegodes</i>	Early spider-orchid		Y			Scarce
<i>Orchis militaris</i>	Military orchid		Y		Vulnerable	Rare
<i>Orchis morio</i>	Green-winged orchid				Near Threatened	
<i>Orchis purpurea</i>	Lady orchid				Endangered	Scarce
<i>Orchis simia</i>	Monkey orchid		Y	Y	Vulnerable	Rare
<i>Orchis ustulata</i>	Burnt orchid			Y	Endangered	Scarce
<i>Oreopteris limbosperma</i>	Lemon-scented fern					
<i>Ornithopus perpusillus</i>	Bird's-foot					
<i>Orobanche elatior</i>	Knapweed broomrape					
<i>Papaver argemone</i>	Prickly poppy				Vulnerable	
<i>Papaver hybridum</i>	Rough poppy					
<i>Paris quadrifolia</i>	Herb-paris					
<i>Parnassia palustris</i>	Grass-of-Parnassus					
<i>Pedicularis palustris</i>	Marsh lousewort					
<i>Pedicularis sylvatica</i>	Lousewort					
<i>Persicaria bistorta</i>	Common bistort					
<i>Persicaria laxiflora</i>	Tasteless water pepper					
<i>Persicaria minor</i>	Small water-pepper				Vulnerable	
<i>Petroselinum segetum</i>	Corn parsley					
<i>Pilularia globulifera</i>	Pillwort			Y	Near Threatened	Scarce
<i>Pinguicula vulgaris</i>	Common butterwort					
<i>Plantago coronopus</i>	Buck's-horn plantain					
<i>Platanthera bifolia</i>	Lesser butterfly-orchid			Y	Vulnerable	
<i>Platanthera chlorantha</i>	Greater butterfly-orchid				Near Threatened	
<i>Poa angustifolia</i>	Narrow-leaved meadow-grass					
<i>Poa humilis</i>	Spreading meadow-grass					
<i>Polygala calcarea</i>	Chalk milkwort					
<i>Polygala serpyllifolia</i>	Heath milkwort					
<i>Polygonatum multiflorum</i>	Solomon's-seal					
<i>Polygonum rurivagum</i>	Cornfield knotgrass					
<i>Polypodium interjectum</i>	Intermediate polypody					
<i>Polystichum aculeatum</i>	Hard shield-fern					
<i>Potamogeton coloratus</i>	Fen pondweed					Scarce
<i>Potamogeton compressus</i>	Grass-wrack pondweed			Y	Endangered	Scarce
<i>Potamogeton friesii</i>	Flat-stalked pondweed				Near Threatened	Scarce
<i>Potamogeton lucens</i>	Shining pondweed					
<i>Potamogeton obtusifolius</i>	Blunt-leaved pondweed					
<i>Potamogeton perfoliatus</i>	Perfoliate pondweed					
<i>Potamogeton polygonifolius</i>	Bog pondweed					
<i>Potamogeton praelongus</i>	Long-stalked pondweed				Near Threatened	
<i>Potamogeton pusillus</i>	Lesser pondweed					
<i>Potamogeton trichoides</i>	Hairlike pondweed					
<i>Potentilla anglica</i>	Trailing tormentil					
<i>Potentilla argentea</i>	Hoary cinquefoil				Near Threatened	
<i>Potentilla palustris</i>	Marsh cinquefoil					
<i>Prunella laciniata</i>	Cut-leaved selfheal					
<i>Prunus cerasus</i>	Dwarf cherry					
<i>Pulicaria vulgaris</i>	Small fleabane		Y	Y	Critically Endangered	Rare
<i>Pyrola minor</i>	Common wintergreen					
<i>Pyrus pyraeaster</i>	Wild pear					
<i>Radiola linoides</i>	Allseed				Near Threatened	
<i>Ranunculus arvensis</i>	Corn buttercup			Y	Critically Endangered	
<i>Ranunculus circinatus</i>	Fan-leaved Water-crowfoot					
<i>Ranunculus fluitans</i>	River Water-crowfoot					
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot					
<i>Ranunculus lingua</i>	Greater spearwort					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Ranunculus omiophyllus</i>	Round-leaved Crowfoot					
<i>Ranunculus parviflorus</i>	Small-flowered Buttercup					
<i>Ranunculus peltatus</i>	Pond Water-crowfoot					
<i>Ranunculus trichophyllus</i>	Thread-leaved Water-crowfoot					
<i>Rosa agrestis</i>	Small-leaved Sweet-briar				Near Threatened	Scarce
<i>Rosa obtusifolia</i>	Round-leaved Dog-rose					
<i>Rosa sherardii</i>	Sherard's Downy-rose					
<i>Rosa stylosa</i>	Short-styled Field-rose					
<i>Rosa tomentosa</i>	Harsh Downy-rose					
<i>Rumex maritimus</i>	Golden dock					
<i>Rumex pulcher</i>	Fiddle dock					
<i>Sagina nodosa</i>	Knotted pearlwort					
<i>Salix aurita</i>	Eared willow					
<i>Salix repens</i>	Creeping willow					
<i>Salvia pratensis</i>	Meadow clary		Y		Near Threatened	Scarce
<i>Salvia verbenaca</i>	Wild clary					
<i>Sambucus ebulus</i>	Dwarf elder					
<i>Samolus valerandi</i>	Brookweed					
<i>Saxifraga granulata</i>	Meadow saxifrage					
<i>Scandix pecten-veneris</i>	Shepherd's-needle			Y	Critically Endangered	
<i>Schoenoplectus tabernaemontani</i>	Grey Club-rush					
<i>Schoenus nigricans</i>	Black Bog-rush					
<i>Scirpus sylvaticus</i>	Wood Club-rush					
<i>Scleranthus annuus</i>	Annual knawel			Y	Endangered	
<i>Sedum telephium</i>	Orpine					
<i>Senecio fluviatilis</i>	Broad-leaved ragwort					
<i>Senecio sylvaticus</i>	Heath groundsel					
<i>Serratula tinctoria</i>	Saw-wort					
<i>Silene conica</i>	Sand catchfly				Vulnerable	Scarce
<i>Silene gallica</i>	Small-flowered Catchfly			Y	Endangered	Scarce
<i>Silene noctiflora</i>	Night-flowering Catchfly				Vulnerable	
<i>Sium latifolium</i>	Greater Water-parsnip			Y	Endangered	Scarce
<i>Smyrnium olusatrum</i>	Alexanders					
<i>Solidago virgaurea</i>	Goldenrod					
<i>Sorbus torminalis</i>	Wild Service-tree					
<i>Spergula arvensis</i>	Corn Spurrey				Vulnerable	
<i>Spergularia rubra</i>	Sand Spurrey					
<i>Spiranthes spiralis</i>	Autumn Lady's-tresses				Near Threatened	
<i>Spirodela polyrhiza</i>	Greater duckweed					
<i>Stachys arvensis</i>	Field woundwort				Near Threatened	
<i>Stachys germanica</i>	Downy woundwort		Y		Vulnerable	Rare
<i>Stellaria pallida</i>	Lesser chickweed					
<i>Stellaria palustris</i>	Marsh stitchwort			Y	Vulnerable	
<i>Tephrosia integrifolia</i>	Field fleawort					
<i>Thelypteris palustris</i>	Marsh fern					Scarce
<i>Thesium humifusum</i>	Bastard-toadflax					Scarce
<i>Thlaspi perfoliatum</i>	Perfoliate Penny-cress		Y	Y	Vulnerable	Rare
<i>Thymus pulegioides</i>	Large Garden					
<i>Tilia cordata</i>	Small-leaved Lime					
<i>Torilis arvensis</i>	Spreading Hedge-parsley			Y	Endangered	Scarce
<i>Torilis nodosa</i>	Knotted Hedge-parsley					
<i>Trifolium arvense</i>	Hare's-foot clover					
<i>Trifolium fragiferum</i>	Strawberry clover					
<i>Trifolium scabrum</i>	Rough clover					
<i>Trifolium striatum</i>	Knotted clover					
<i>Trifolium subterraneum</i>	Subterranean clover					
<i>Triglochin palustre</i>	Marsh arrowgrass					
<i>Tulipa sylvestris</i>	Wild tulip					
<i>Typha angustifolia</i>	Lesser bulrush					
<i>Ulex gallii</i>	Western gorse					
<i>Ulex minor</i>	Dwarf gorse					
<i>Ulmus plotii</i>	Plot's elm					
<i>Umbilicus rupestris</i>	Navelwort					
<i>Utricularia australis</i>	Bladderwort					

Species	English name	ET	WCA	UKBAP	Red Data	UK Rare / Scarce
<i>Utricularia vulgaris sens. lat.</i>	Greater bladderwort					
<i>Valeriana dioica</i>	Marsh valerian					
<i>Valerianella carinata</i>	Keeled-fruited cornsalad					
<i>Valerianella dentata</i>	Narrow-fruited cornsalad				Endangered	
<i>Valerianella rimosa</i>	Broad-fruited cornsalad			Y	Endangered	Rare
<i>Veronica praecox</i>	Breckland speedwell					
<i>Veronica scutellata</i>	Marsh speedwell					
<i>Veronica triphyllos</i>	Fingered speedwell		Y	Y	Endangered	Rare
<i>Vicia lathyroides</i>	Spring vetch					
<i>Vicia parviflora</i>	Slender tare				Vulnerable	Scarce
<i>Vicia sylvatica</i>	Wood vetch					
<i>Viola canina</i>	Heath dog-violet				Near Threatened	
<i>Viola palustris</i>	Marsh violet					
<i>Viola persicifolia</i>	Fen violet		Y	Y	Endangered	Rare
<i>Viola tricolor</i>	Wild pansy				Near Threatened	
<i>Vulpia myuros</i>	Rat's-tail fescue					
<i>Vulpia unilateralis</i>	Mat-grass fescue					Scarce
<i>Zannichellia palustris</i>	Horned pondweed					

5.2. Bryophytes

Any site supporting sustainable populations of one or more Notable species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable bryophyte species can be considered for LWS status. Red Data Book and Nationally Rare species carry a greater weight than Nationally Scarce species, but sites may be selected for Nationally Scarce species alone if sufficient evidence can be given to support this.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable bryophyte species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories), or Nationally Rare or Nationally Scarce (national rarity categories), in the current version of the JNCC "spreadsheet of conservation designations for UK taxa", see:

<http://www.jncc.gov.uk/page-3409>

The JNCC listing (version 20071217) is in turn based on:

- British Bryological Society. 2005. *Bryophyte Red List*
- Preston, C.D. 2006. A revised list of nationally scarce bryophytes. *Field Bryology* 90: 22-30.

Notable assemblages have not been defined for bryophytes.

5.3. Stoneworts

Any site supporting sustainable populations of one or more Notable species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable stonewort species can be considered for LWS status.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable stonewort species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Endangered, Vulnerable or Near Threatened (Red Data Book categories) in the current version of the JNCC "spreadsheet of conservation designations for UK taxa", see:

<http://www.jncc.gov.uk/page-3409>

The JNCC listing (version 20071217) is in turn based on:

- Stewart, N. Review of the status of charophytes (stoneworts). Unpublished.

Notable assemblages have not been defined for stoneworts.

5.4. Lichens

Any site supporting sustainable populations of one or more Notable species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable lichen species can be considered for LWS status. Red Data Book and Nationally Rare species carry a greater weight than Nationally Scarce species, but sites may be selected for Nationally Scarce species alone if sufficient evidence can be given to support this.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable lichen species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories), or Nationally Rare or Nationally Scarce (national rarity categories), in the current version of the JNCC "spreadsheet of conservation designations for UK taxa", see:

<http://www.jncc.gov.uk/page-3409>

The JNCC listing (version 20071217) is in turn based on:

- Woods, R.G., and Coppins, B.J. 2003. A conservation evaluation of British lichens, British Lichen Society, London.

Notable assemblages have not been defined for lichens.

5.5. Fungi

Any site supporting sustainable populations of one or more Notable species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable fungus species can be considered for LWS status.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least two surveys, in separate years and at the relevant time of year, should be undertaken before de-selection of any LWS on the grounds of loss of the notable fungi for which it was designated.

Notable fungus species are those that are native to Berkshire, Buckinghamshire and Oxfordshire and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories) in:
 - Evans, S. [undated, circulated in 2007] The Red Data list of threatened British fungi.

Notable assemblages have not been defined for fungi.

5.6. Mammals

Any site supporting sustainable populations of one or more Notable mammal species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable mammal species can be considered for LWS status. In most cases this would be of a native population, although species that have been introduced to a site as part of a habitat restoration project may also be considered.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Sites for notable mammal species are those that:

- Contain a proven breeding holt for Otter (the inclusion of feeding territory of the breeding females should be considered)
- Regularly support a sustainable population of Hazel Dormouse or of Water Vole
- Regularly support a significant population of any bat species. Inclusion of some key feeding areas and habitat links or commuting routes should be considered. Significance should be measured by reference to the conservation status of the roost. Please refer to *Bat Mitigation Guidelines (A Mitchell Jones, January 2004) p.39*.
- Regularly support an assemblage of twelve or more mammal species in sustainable populations. Inclusion of feeding ground, hibernation areas and shelter areas should be considered.
- Consideration for LWS selection should be given to sites that regularly support large and significant populations of any species of mammal e.g. the largest population of water shrews in a county, the most extensive and long-recorded badger sett, highest density of brown hares over a large area. Not all sites that hold large populations of mammals will be selected but the presence of a good population of say, a UKBAP Priority Mammal species should be a consideration in selecting a site which has other (habitat) interest.

5.7. Birds

In the criteria outlined below, “supports breeding” will be taken to mean confirmed or probable breeding at the site, on more than one occasion in the previous five years. Any of the following activities are regarded as evidence for a site supporting confirmed or probable breeding of a bird species (as per the methodology for the BTO Bird Atlas 2007-2011):

Probable breeding:	
P	Pair observed in suitable nesting habitat in breeding season
T	Permanent Territory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more part at the same place
D	Courtship and Display (judged to be in or near potential breeding habitat; be cautious with wildfowl)
N	Visiting probable Nest site
A	Agitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
I	Brood patch on adult examined in the hand, suggesting Incubation
B	Nest Building or excavating nest-hole
Confirmed breeding :	
DD	Distraction-Display or injury feigning
UN	Used Nest or eggshells found (occupied or laid within period of survey)
FL	Recently Fledged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.
ON	Adults entering or leaving nest-site in circumstances indicating Occupied Nest (including high nests or nest holes, the contents of which can not be seen) or adults seen incubating
FF	Adult carrying Faecal sac or Food for young
NE	Nest containing Eggs
NY	Nest with Young seen or heard

A species would be regarded as no longer breeding at a site if a 3-year period elapsed without breeding activities of the species being recorded. However, to ensure this is not simply due to lack of survey at the appropriate time, at least one new survey should be undertaken (in appropriate weather at the relevant time of year and time of day) before removal of any previously designated Criterion A LWS on the basis of “Birds no longer breeding at a site”.

Criterion A: Sites which support one or more ‘notable’ species.

5.7.Ai. Notable birds – breeding

Any site that supports the breeding of any Notable Species listed in Table 5.7.Ai may be considered for Wildlife Site status under species criterion 5.7.Ai.

Birds in Table 5.7.Ai are species that are rare in the area, and are colonial or faithful to particular breeding sites over long periods. They are also listed under one or more of these headings:

- threatened in Europe (ET); defined as those birds listed in Annex 1 of the European Birds Directive
- national Conservation Concern (CC); defined as those birds having Red-listed status in Birds of Conservation Concern
- legally protected (WCA); defined as those birds listed in Schedule 1 of the Wildlife & Countryside Act
- County Rare or County Scarce (CR, CS); defined as:
 - County Rare = breeds in 5 tetrads or fewer
 - County Scarce = breeds in between 6 and 15 tetrads

Table 5.7.Ai

Species	ET	CC	WCA	CR	CS	Threshold
Little Egret	Y			Y		2 nests
Grey Heron					Y	2 nests
Honey Buzzard	Y		Y	Y		1 pair
Common Tern	Y				Y	5 pairs
Sand Martin					Y	5 pairs
Nightjar	Y	Y		Y		5 pairs
Lesser spotted woodpecker		Y				1 pair
Woodlark	Y	Y	Y		Y	5 pairs

5.7.Aii. Notable birds – non-breeding

Any site that frequently supports significant non-breeding numbers of any of the Notable Species listed in Table 5.7.Aii, may be considered for Wildlife Site status under species criterion 5.7.Aii.

“Supporting” may be by way of providing any one or more of feeding, resting, or roosting provision. “Significant numbers” are numbers that are equal to or exceed the threshold numbers given for each species in Table 5.7.Aii. “Frequently” will be taken to mean that at least the threshold numbers have been recorded on several occasions, and in more than two seasons, in the last five years.

A species would be regarded as no longer being supported at a site in significant numbers, if a 3-year period elapsed without such numbers of the species being recorded. However, to ensure this not simply due to lack of survey at appropriate time, before removal of any previously designated LWS on the basis of “Birds no longer supported at a site”, at least one new survey should be undertaken in appropriate weather at the relevant time of year and time of day.

Birds in Table 5.7.Aii are species that:

- occur in Berkshire, Buckinghamshire or Oxfordshire outside the breeding season
- and which are any one or more of:
 - threatened in Europe (ET); defined as those birds listed in Annex 1 of the European Birds Directive or classed as migratory waterfowl under the Directive.
 - having significant national non-breeding population (SNPn) (defined as >20% of the European wintering population occurring in Great Britain, as listed on the Amber-list of BOCC)
 - having significant county non-breeding population (SCPn)
 - considered to be County Scarce as non-breeding birds (CSn)

Table 5.7.Aii

Species	Minimum number.	ET	SNPn	SCPn	CSn	Comments
Little grebe		Y				
Great crested grebe		Y				
Cormorant		Y	Y			
Bittern	1	Y	Y		Y	
Bewick's Swan	2	Y	Y		Y	
Whooper Swan	2	Y	Y		Y	
Wigeon		Y	Y			
Gadwall	100	Y	Y	Y		
Teal	200	Y	Y	Y		
Pintail		Y	Y			

Species	Minimum number.	ET	SNPn	SCPn	CSn	Comments
Shoveler	100	Y	Y	Y		
Pochard		Y	Y			
Tufted duck		Y				
Goldeneye		Y				
Goosander		Y				
Smew	2	Y			Y	
Red kite		Y				Site to include known roost site
Marsh harrier		Y			Y	Site to include known roost site
Hen Harrier	1	Y	Y		Y	Site to include known roost site
Merlin	1	Y			Y	Site to include known roost site
Peregrine	2	Y			Y	Site to include known roost site
Water Rail	2				Y	
Snipe		Y				
Long-eared Owl	1				Y	
Short-eared Owl	2	Y				
Lesser Spotted Woodpecker	1		Y			
Woodlark	2	Y	Y		Y	
Cetti's Warbler	1				Y	
Dartford Warbler	2	Y			Y	

Criterion 5.7.B: sites which support a significant assemblage of birds associated with a habitat present on the site.

A site which normally supports a range of **breeding birds** with a value equal to or exceeding the following indices (qualifying species and scores are listed in the tables below):

- Lowland damp grassland: index threshold 21
- Lowland fen (without open water): index threshold 18
- Lowland open waters and margins: index threshold 47
- Lowland heath: index threshold 20
- Lowland scrub: index threshold 16.5
- Lowland woodland: index threshold 52

Note: If a site has more than one habitat, the threshold index should be the sum of the habitats and a species should be double counted if it occurs.

The scoring system is based on that used in the SSSI selection guidelines (Anon. 1989-1998). The species for habitats have been taken from these guidelines; the scores for each species have been revised to reflect the latest available set of British bird population data (Baker *et al.* 2006). For each habitat, the theoretical "total possible score" is calculated by summing the scores of all species that score 4 or less; the qualifying score for a site to be considered as a LWS is 60% of the total possible score. Rarer species scoring 5 or 6 are not summed in the total possible score, but should still be added to the score calculated for any sites on which they do breed.

Note that all introduced species have been removed from the list as although they add to the diversity of a site it gives an inconsistent message to general conservation practice.

Table 5.7.Bi: Lowland damp grassland

Species	Score
Mute Swan	2
Shelduck	3
Gadwall	4
Teal	3
Shoveler	3.5
Lapwing	2
Curlew	2
Redshank	4
Barn Owl	3
Cuckoo	2
Yellow Wagtail	2
Grasshopper Warbler	3
Sedge Warbler	1
Reed Bunting	1

Total possible score = 35.5; threshold = 60%;
qualifying score = 21

Additional rarities to be added to site score

Quail	5
Garganey	5
Snipe	5

Table 5.7.Bii: Lowland fen (without open water)

Species	Score
Little Grebe	3
Gadwall	4
Teal	3
Shoveler	3.5
Pochard	4
Water Rail	4
Cuckoo	2
Grasshopper Warbler	2.5
Sedge Warbler	1
Reed Warbler	2
Reed Bunting	1

Total possible score = 30; threshold = 60%;
qualifying score = 18

Additional rarities to add to site score:

Garganey	5
Snipe	5

Table 5.7.Biii: Lowland open waters and margins

Species	Score
Little Egret	4
Little Grebe	3
Great Crested Grebe	3
Grey Heron	2
Mute Swan	2
Shelduck	3
Gadwall	4
Teal	3
Garganey	5
Shoveler	3.5
Pochard	4
Tufted Duck	3
Water Rail	4
Little Ringed Plover	3
Ringed Plover	4
Lapwing	2
Snipe	5
Redshank	3
Common Tern	2.5
Cuckoo	2
Kingfisher	3
Yellow Wagtail	2
Grey Wagtail	2
Grasshopper Warbler	2.5
Sedge Warbler	1
Reed Warbler	2
Reed Bunting	1

Total possible score = 78.5;
Qualifying score = 47 (threshold = 60%)

Or mean counts of >500 birds over winter

Table 5.7.Biv: Lowland heath

Species	Score
Hobby	3
Snipe	5
Curlew	1.5
Redshank	2
Cuckoo	2
Long-eared Owl	3
Nightjar	3
Wood Lark	3
Tree Pipit	2
Stonechat	2
Grasshopper Warbler	3
Dartford Warbler	3
Linnet	1

Total possible score = 33.5;

Qualifying score = 20 (threshold = 60%)

Additional rarity to add to site score:

Quail	5
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Table 5.7.Bv: Scrub

Species	Score
Turtle Dove	2
Cuckoo	2
Long-eared Owl	3
Nightjar	3
Tree Pipit	2
Nightingale	3
Stonechat	2
Grasshopper Warbler	2.5
Lesser Whitethroat	2
Whitethroat	2
Green woodpecker	1
Garden Warbler	1
Blackcap	1
Linnet	1

Total possible score = 27.5;

Qualifying score = 16.5 (threshold = 60%)

Table 5.7.Bvi: Woodland

Species	Score
Grey Heron	2
Red Kite	3
Goshawk	4
Sparrowhawk	2
Buzzard	2
Hobby	3
Woodcock	3
Stock Dove	1
Cuckoo	2
Tawny Owl	1
Long-eared Owl	3
Nightjar	3
Green Woodpecker	1
Great Spotted Woodpecker	1
Lesser Spotted Woodpecker	4
Tree Pipit	3
Nightingale	3
Garden Warbler	1
Blackcap	1
Wood Warbler	3.5
Chiffchaff	1
Goldcrest	1
Firecrest	4.5
Spotted Flycatcher	3
Long-tailed Tit	1
Marsh Tit	2
Willow Tit	4
Coal Tit	1
Nuthatch	1
Treecreeper	1
Jay	1
Raven	3.5
Siskin	3.5
Lesser Redpoll	3.5
Crossbill	3.5
Bullfinch	1
Hawfinch	4

Total possible score = 86;

Qualifying score = 52 (threshold = 60%)

5.8. Amphibians and reptiles

Any site supporting sustainable populations of one or more Notable amphibian or reptile species (as defined below), or any site supporting a significant assemblage of amphibians and reptiles (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable amphibian or reptile species can be considered for LWS status. This can be of a native population, or of a population introduced to a site as part of a conservation project. Garden ponds and swimming pools will not normally be considered for LWS status. Ponds should be considered in their context, and consideration should be given to including groups of ponds in a single designation where these are thought to have ecological connectivity, and/or to including suitable terrestrial habitat around the ponds where this is believed to be important to the sustainability of the species' populations.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey, in appropriate weather and at the relevant time of year and time of day, should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Sites for notable amphibian and reptile species are those that contain suitable habitat and:

- Support populations of Adder, Natterjack Toad or Sand Lizard
- Contain water bodies supporting Great Crested Newt, where a breeding-season night count shows 20 or more individuals to be present
- Support Common Toad populations of >1000

Sites may also be proposed for LWS status on the basis of supporting a good assemblage of amphibian or reptile species, as defined below

A good amphibian assemblage will consist of at least three species and achieve a score of 6 or more using Table 8A.

Table 8A.

<i>Species</i>	<i>Method</i>	<i>Small population</i>	<i>Medium population</i>	<i>Large population</i>
Great Crested Newt	Seen or netted during day	<10	10-100	>100
	Counted at night or trapped overnight	<10	10-100	>100
Smooth Newt	Netted during day or counted at night or trapped overnight	<10	10-100	>100
Palmate Newt	Netted during day or counted at night or trapped overnight	<10	10-100	>100
Common Toad	Estimated	<500	500-5,000	>5,000
	Counted	<100	100-1,000	>1,000
Common Frog	Spawn clumps counted	<50	50-500	>500
		SCORE 1	SCORE 2	SCORE 3

Scores must be for breeding sites observed during the breeding season. Daytime netting should be made during a 15-minute period for sites with less than 50m of water's edge, for 30 minutes with 50–100m, and so on. To compute the total score for a site, add the scores for individual species and add one additional point for four species present and two points for five species. (Scoring system based on Nature Conservancy Council, 1989)

A good reptile assemblage must meet at least one of the following criteria:

- Supports at least three reptile species
- Supports an assemblage of species scoring at least 4 in Table 8B.

Table 8B.

<i>Species</i>	<i>Low population</i>	<i>Good population</i>	<i>Exceptional population</i>
Adder	<5	5–10	>10
Grass Snake	<5	5–10	>10
Common Lizard	<5	5–20	>20
Slow-worm	<5	5–20	>20
	SCORE 1	SCORE 2	SCORE 3

Figures in the table refer to the maximum number of adults seen by observation and/or under tins (placed at a density of up to ten per hectare), by one person in one day. (Scoring system based on Froglife 1999).

5.9. Fish

Any site supporting sustainable populations of one or more Notable fish species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable fish species can be considered for LWS status. In most cases this would be of a native population, although species that have been introduced to a site as part of a habitat restoration project may also be considered.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Sites for notable fish species are those that:

- Provide breeding sites for UK BAP Priority species. BAP species known from Berks, Bucks and Oxon include:
 - European Eel *Anguilla anguilla*
 - Spined Loach *Cobitis taenia*
 - River Lamprey *Lampetra fluviatilis*
 - Atlantic Salmon *Salmo salar*
 - Brown Trout *Salmo trutta*

5.10. Invertebrates: butterflies

Any site supporting sustainable populations of one or more Notable butterfly species (listed in Table 10) may be considered for Wildlife Site status.

Any site that has confirmed or probable breeding populations, within the previous five years, of any of the Notable species listed in Table 10 can be considered for LWS status.

The following are regarded as evidence for confirmed or probable breeding of a Lepidoptera species:

- (a) Regular occurrence of the species at the site over successive years.
- (b) Confirmed mating, ova, larvae or pupae at the site.
- (c) Occurrence of several individuals of the particular species recorded at the site on a single visit.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS previously designated under Criterion A on the basis of Lepidoptera now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken for adults. Alternatively, egg, larval or pupa searches should be undertaken if they present a more appropriate technique.

Species in Table 10 are those that

- breed in Berkshire, Buckinghamshire or Oxfordshire
- are considered to be in need of site protection in the area
- and which are any one or more of:
 - threatened in Europe (ET); i.e. protected under the European Habitats Directive
 - legally protected (WCA); i.e. protected under Schedule 1 of the Wildlife & Countryside Act (excluding those species that are protected from commercial exploitation only)
 - Priority species in the UK Biodiversity Action Plan (UKBAP), as revised in 2007
 - Listed as High or Medium Regional Priority (RP) species in: Clarke, S.A., and Bourn, N. 2000. *Butterfly Conservation - Regional Action Plan - Thames Region*.

Notable assemblages have not been defined for butterflies.

Table 10: Notable butterfly species

Notable species	ET	WCA	UKBAP	RP	No. of tetrads 1987–1992 *	No. of tetrads 1995–2000 *	Trend *	Present in county:		
								Berks	Bucks	Oxon
Silver-spotted Skipper				High	11	26	increasing, rare	Yes	Yes	Yes
Dingy Skipper			Yes	Medium	106	90	decreasing, local	Yes	Yes	Yes
Grizzled Skipper			Yes	Medium	105	103	stable, local	Yes	Yes	Yes
Wood White			Yes	High	43	29	decreasing severely, rare	No	Yes	Yes
Black Hairstreak				High	37	39	stable, local	No	Yes	Yes
Brown Hairstreak			Yes	High	12	12	stable, local	No	Yes	Yes
Small Blue			Yes	Medium	94	73	decreasing, local	Yes	Yes	Yes
Silver-studded Blue		Yes	Yes	High	12	9	decreasing, rare	Yes	No	No
Adonis Blue				High	7	16	increasing, rare	Yes	Yes	Yes

Notable species	ET	WCA	UKBAP	RP	No. of tetrads 1987–1992 *	No. of tetrads 1995–2000 *	Trend *	Present in county:		
								Berks	Bucks	Oxon
Duke of Burgundy			Yes	Medium	29	26	decreasing, rare	Yes	Yes	Yes
Marsh Fritillary	Yes	Yes	Yes	High	8	5	decreasing severely, rare	Yes	No	Yes?
Wall Brown			Yes	Medium	332	103	decreasing severely, rare	Yes?	Yes	Yes
Grayling			Yes	Medium	21	24	stable, rare	Yes	No	No

5.11. Invertebrates: moths

Any site supporting sustainable populations of one or more Notable moth species (listed in Table 11) may be considered for Wildlife Site status.

Any site that has confirmed or probable post-2000 breeding populations of any of the Notable species listed in Table 11 can be considered for LWS status.

The following are regarded as evidence for confirmed or probable breeding of a Lepidoptera species:

- (d) Regular occurrence of the species at the site over successive years.
- (e) Confirmed mating, ova, larvae or pupae at the site.
- (f) Occurrence of several individuals (especially females) of the particular species recorded at the site on a single visit.

The species would be regarded as extinct from the site if a 20-year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS previously designated under Criterion A on the basis of Lepidoptera now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken for adults. Alternatively, egg, larval or pupa searches should be undertaken if they present a more appropriate technique.

Species in Table 11 are those that

- Are macro-moths, pyralid and plume moths* that breed in Berkshire, Buckinghamshire or Oxfordshire
- are considered to be in need of site protection in the area
- and which are any one or more of:
 - legally protected; i.e. protected under Schedule 1 of the Wildlife & Countryside Act (excluding those species that are protected from commercial exploitation only)
 - Priority species in the UK Biodiversity Action Plan (UKBAP), as revised in 2007
 - Red Data Book or Nationally Scarce
 - Listed as High or Medium Regional Priority (RP) species in: Clarke, S.A., and Bourn, N. 2000. *Butterfly Conservation - Regional Action Plan - Thames Region*.

Table 11: Notable moth species in Berks, Bucks and Oxon

Code	Taxon	Vernacular	Status	UK BAP	W&C Act	Thames RAP
0162	<i>Cossus cossus</i>	Goat Moth	Nationally Scarce/Nb	Priority		Medium Priority
0163	<i>Adscita staites</i>	Forester		Priority		
0164	<i>Adscita geryon</i>	Cistus Forester	Nationally Scarce/Nb			Medium Priority
0173	<i>Apoda limacodes</i>	Festoon	Nationally Scarce/Nb			Medium Priority
0174	<i>Heterogenea asella</i>	Triangle	RDB3: Rare			High Priority
0370	<i>Sesia apiformis</i>	Hornet Moth	Nationally Scarce/Nb			Medium Priority
0377	<i>Synanthedon flaviventris</i>	Sallow Clearwing	Nationally Scarce/Nb			Medium Priority
1321	<i>Thisanotia chrysonuchella</i>		Nationally Scarce/Nb			Medium Priority
1328	<i>Schoenobius gigantella</i>		Nationally Scarce/Nb			
1373	<i>Paratalanta pandalis</i>		Nationally Scarce/Na			
1374	<i>Paratalanta hyalinalis</i>		Nationally Scarce/Nb			Medium Priority

Code	Taxon	Vernacular	Status	UK BAP	W&C Act	Thames RAP
1381	<i>Anania funebris</i>		Nationally Scarce/Na			
1396	<i>Mecyna flavalis</i>		RDB2: Vulnerable			Medium Priority
1414	<i>Synaphe punctalis</i>		Nationally Scarce/Nb			Medium Priority
1463	<i>Pempeliella ornatella</i>		RDB3: Rare			
1467	<i>Ancylosis oblitella</i>		Nationally Scarce/Nb			
1480	<i>Homoeosoma nebulella</i>		Nationally Scarce/Nb			Medium Priority
1489	<i>Oxyptilus pilosellae</i>		RDB1: Endangered			
1503	<i>Platyptilia ochrodactyla</i>		Nationally Scarce/Nb			
1519	<i>Euleioptilus carphodactyla</i>		Nationally Scarce/Nb			Medium Priority
1633	<i>Eriogaster lanestris</i>	Small Eggar	Nationally Scarce/Nb			Medium Priority
1636	<i>Lasiocampa trifolii</i>	Grass Eggar	Nationally Scarce/Na			
1662	<i>Archiearis notha</i>	Light Orange Underwing	Nationally Scarce/Nb			Medium Priority
1670	<i>Chlorissa viridata</i>	Small Grass Emerald	Nationally Scarce/Na			
1675	<i>Cyclophora pendularia</i>	Dingy Mocha	Red Data Book 3: Rare	Priority		
1676	<i>Cyclophora annularia</i>	Mocha	Nationally Scarce/Nb			Medium Priority
1698	<i>Idaea muricata</i>	Purple-bordered Gold	Nationally Scarce/Nb			Medium Priority
1701	<i>Idaea sylvestriaria</i>	Dotted Border Wave	Nationally Scarce/Nb			Medium Priority
1718	<i>Phibalapteryx virgata</i>	Oblique Striped	Nationally Scarce/Nb			Medium Priority
1719	<i>Orthonama vittata</i>	Oblique Carpet		Priority		
1731	<i>Scotopteryx bipunctaria</i>	Chalk Carpet	Nationally Scarce/Nb	Priority		High Priority
1735	<i>Catarhoe rubidata</i>	Ruddy Carpet	Nationally Scarce/Nb			Medium Priority
1751	<i>Lampropteryx otregiata</i>	Devon Carpet	Nationally Scarce/Nb			
1785	<i>Pareulype berberata</i>	Barberry Carpet	RDB1: Endangered	Priority	Sch 5 (full)	High Priority
1787	<i>Rheumaptera hastata</i>	Argent & Sable	Nationally Scarce/Nb	Priority		High Priority
1793	<i>Euphyia biangulata</i>	Cloaked Carpet	Nationally Scarce/Nb			Medium Priority
1814	<i>Eupithecia plumbeolata</i>	Lead-coloured Pug	Nationally Scarce/Nb			Medium Priority
1818	<i>Eupithecia irriguata</i>	Marbled Pug	Nationally Scarce/Nb			Medium Priority
1820	<i>Eupithecia insigniata</i>	Pinion-spotted Pug	Nationally Scarce/Nb			Medium Priority
1821	<i>Eupithecia valerianata</i>	Valerian Pug	Nationally Scarce/Nb			
1824	<i>Eupithecia egenaria</i>	Pauper Pug	RDB3: Rare			
1833	<i>Eupithecia expallidata</i>	Bleached Pug	Nationally Scarce/Nb			Medium Priority
1836	<i>Eupithecia denotata</i>	Campanula Pug	Nationally Scarce/Na			Medium Priority
1841	<i>Eupithecia millefoliata</i>	Yarrow Pug	Nationally Scarce/Nb			
1843	<i>Eupithecia distinctaria</i>	Thyme Pug	Nationally Scarce/Nb			
1861	<i>Pasiphila debiliata</i>	Bilberry Pug	Nationally Scarce/Nb			
1863	<i>Anticollix sparsata</i>	Dentated Pug	Nationally Scarce/Na			Medium Priority
1865	<i>Chesias rufata</i>	Broom-tip	Nationally Scarce/Nb	Priority		Medium Priority
1872	<i>Discoloxia blomeri</i>	Blomer's Rivulet	Nationally Scarce/Nb			Medium Priority
1877	<i>Hydrelia sylvata</i>	Waved Carpet	Nationally Scarce/Nb			
1878	<i>Minoa murinata</i>	Drab Looper	Nationally Scarce/Nb	Priority		High Priority
1880	<i>Trichopteryx polycommata</i>	Barred Tooth-striped	Nationally Scarce/Na	Priority		High Priority
1897	<i>Macaria wauaria</i>	V-Moth		Priority		
1901	<i>Cepphis advenaria</i>	Little Thorn	Nationally Scarce/Nb			Medium Priority
1905	<i>Pachycnemis hippocastanaria</i>	Horse Chestnut	Nationally Scarce/Nb			Medium Priority
1939	<i>Cleora cinctaria</i>	Ringed Carpet	Nationally Scarce/Na			Medium Priority
1943	<i>Hypomecis roboraria</i>	Great Oak Beauty	Nationally Scarce/Nb			Medium Priority
1959	<i>Aleucis distinctata</i>	Sloe Carpet	Nationally Scarce/Nb	Priority		Medium Priority
1982	<i>Hemaris tityus</i>	Narrow-bordered Bee Hawk	Nationally Scarce/Na	Priority		
1983	<i>Hemaris fuciformis</i>	Broad-bordered Bee Hawk	Nationally Scarce/Nb			Medium Priority
2013	<i>Ptilophora plumigera</i>	Plumed Prominent	Nationally Scarce/Na			Medium Priority
2017	<i>Clostera pigra</i>	Small Chocolate-tip	Nationally Scarce/Nb			Medium Priority
2075	<i>Meganola strigula</i>	Small Black Arches	Nationally Scarce/Na			Medium Priority
2076	<i>Meganola albula</i>	Kent Black Arches	Nationally Scarce/Nb			Medium Priority
2084	<i>Agrotis cinerea</i>	Light Feathered Rustic	Nationally Scarce/Nb			Medium Priority
2108	<i>Noctua orbona</i>	Lunar Yellow Underwing	Nationally Scarce/Nb	Priority		High Priority
2131	<i>Xestia rhomboidea</i>	Square-spotted Clay	Nationally Scarce/Nb			High Priority
2148	<i>Polia bombycina</i>	Pale Shining Brown	Nationally Scarce/Nb	Priority		High Priority
2149	<i>Polia trimaculosa</i>	Silvery Arches	Nationally Scarce/Nb			Medium Priority
2153	<i>Heliophobus reticulata</i>	Bordered Gothic	Nationally Scarce/Na	Priority		High Priority
2191	<i>Mythimna turca</i>	Double Line	Nationally Scarce/Nb			High Priority

Code	Taxon	Vernacular	Status	UK BAP	W&C Act	Thames RAP
2211	<i>Cucullia absinthii</i>	Wormwood	Nationally Scarce/Nb			Medium Priority
2219	<i>Shargacucullia lychnitis</i>	Striped Lychnis	Nationally Scarce/Na	Priority		High Priority
2242	<i>Xylena exsoleta</i>	Sword-grass	Nationally Scarce/Nb	Priority		Medium Priority
2257	<i>Jodia croceago</i>	Orange Upperwing	RDB1: Endangered	Priority		High Priority
2275	<i>Xanthia gilvago</i>	Dusky-lemon Sallow		Priority		
2276	<i>Xanthia ocellaris</i>	Pale-lemon Sallow	Nationally Scarce/Na			Medium Priority
2313	<i>Enargia paleacea</i>	Angle-striped Sallow	Nationally Scarce/Nb			Medium Priority
2315	<i>Dicycla oo</i>	Heart Moth	RDB3: Rare	Priority		High Priority
2317	<i>Cosmia diffinis</i>	White-spotted Pinion	Nationally Scarce/Na	Priority		High Priority
2347	<i>Chortodes extrema</i>	Concolorous	RDB3: Rare	Priority		High Priority
2349	<i>Chortodes fluxa</i>	Mere Wainscot	Nationally Scarce/Nb			Medium Priority
2373	<i>Archanara sparganii</i>	Webb's Wainscot	Nationally Scarce/Nb			
2401	<i>Heliothis viriplaca</i>	Marbled Clover	RDB3: Rare			Medium Priority
2418	<i>Earias clorana</i>	Cream-bordered Green Pea	Nationally Scarce/Nb			Medium Priority
2435	<i>Diachrysia chryson</i>	Scarce Burnished Brass	Nationally Scarce/Na			Medium Priority
2454	<i>Catocala promissa</i>	Light Crimson Underwing	RDB3: Rare	Priority		High Priority
2465	<i>Tyta luctuosa</i>	Four-spotted	Nationally Scarce/Na	Priority		High Priority
2480	<i>Hypena rostralis</i>	Buttoned Snout	Nationally Scarce/Nb			High Priority
2482	<i>Schrankia taenialis</i>	White lined Snout	Nationally Scarce/Nb			High Priority
2485	<i>Hypenodes humidalis</i>	Marsh Oblique-barred	Nationally Scarce/Nb			Medium Priority
2488	<i>Pechipogo strigilata</i>	Common Fan-foot	Nationally Scarce/Na	Priority		High Priority
2495	<i>Trisateles emortualis</i>	Olive Crescent	RDB3: Rare	Priority		High Priority

* : other micro-moth families have not been listed as there is insufficient data on their status in the three counties; however, a case could still be made for sites to be considered on the basis of micro-moths, e.g. if a Red Data Book species is known to have a population on a suitable site.

5.12. Invertebrates: dragonflies and damselflies

The criteria used here are based on the “Key Site” criteria developed by the British Dragonfly Society, see Appendix 3 or: <http://www.dragonflysoc.org.uk/keysites.html>

For selection as a LWS, a site must qualify as a “Confirmed Key Site” under the BDS criteria. The BDS criteria also allow for the identification of “Possible” and “Probable” Key Sites – although these would not be selected as LWS without additional information, it is recommended that any such sites are kept under review to see whether they would qualify as “Confirmed” Key Sites in the future.

Sites which support one or more ‘notable’ species.

Any site that qualifies as a “Confirmed key site” under the BDS criteria for Species Importance may be considered for Wildlife Site status.

Any site with evidence of successful breeding of one or more important species (as listed in Table 11) that are either abundant or persistent at the site can be considered for LWS status.

Definitions of “successful breeding” and “abundant or persistent” are given in the BDS criteria, appended below.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS previously designated under Criterion A on the basis of Odonata now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken.

Species in Table 12 are those that are listed by BDS as being nationally or locally important in the Thames Valley and Buckinghamshire areas.

Table 12: Important Odonata in Berks, Bucks and Oxon

Species	English name	WCA	UKBAP	National status	Local status
<i>Aeshna juncea</i>	Common Hawker				Locally Important (Thames Valley)
<i>Brachytron pratense</i>	Hairy Dragonfly				Locally Important (Thames Valley)
<i>Ceriagrion tenellum</i>	Small Red Damselfly			Nationally Scarce	
<i>Coenagrion mercuriale</i>	Southern Damselfly	Sch 5 (full)	Priority	Endangered	
<i>Coenagrion pulchellum</i>	Variable Damselfly			Near Threatened	
<i>Cordulegaster boltonii</i>	Golden-ringed Dragonfly				Locally Important (Thames Valley)
<i>Cordulia aenea</i>	Downy Emerald				Locally Important (Thames Valley)
<i>Gomphus vulgatissimus</i>	Club-tailed Dragonfly			Near Threatened	
<i>Ischnura pumilio</i>	Scarce Blue-tailed Damselfly			Near Threatened	
<i>Libellula fulva</i>	Scarce Chaser			Near Threatened	
<i>Orthetrum coerulescens</i>	Keeled Skimmer				Locally Important (Thames Valley)

Species	English name	WCA	UKBAP	National status	Local status
<i>Somatochlora metallica</i>	Brilliant Emerald			Vulnerable	

Sites which support an outstanding assemblage of species.

Any site that qualifies as a "Confirmed key site" under the BDS criteria for Species Diversity may be considered for Wildlife Site status.

Any site with evidence, within the last ten years, of successful breeding of 14 or more species that are abundant at the site can be considered for LWS status.

Definitions of "successful breeding" and "abundant" are given in the BDS criteria, appended below.

5.13. Invertebrates: other groups

Any site supporting sustainable populations of one or more Notable species (as defined below) may be considered for Wildlife Site status.

Any site that has evidence (within previous five years) of a sustainable population of any Notable invertebrate species can be considered for LWS status. Given the large number of species under this category, it is not possible to provide explicit thresholds for site selection, but the following are guidelines against which sites should be judged:

- Presence of a single notable species could be enough to justify site selection, if a good case can be made for the particular significance of the species within a county and national context; this is more likely to be justifiable for Red Data Book species (rather than Nationally Scarce species), but would need to be considered on a case-by-case basis.
- Presence of an assemblage of species, e.g. one RDB and several Nationally Scarce, could justify site selection if a case can be made for the assemblage being of significance and being supported by the habitat resources within the site.
- Some species that currently receive RDB or Nationally Scarce status are known to have increased their range in recent years, and may not be suitable for site selection. Examples might include the spider *Argiope bruennichi*, the Box Bug *Gonocerus acuteangulatus* and the Bee Wolf *Philanthus triangulum*. Expert guidance is required to assess the status of species put forward for consideration.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least two surveys, in separate years and at the relevant time of year, should be undertaken before de-selection of any LWS on the grounds of loss of the notable invertebrates for which it was designated.

Notable invertebrate species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed in one of the following categories:
 - Protected under the Wildlife and Countryside Act;
 - Critically Endangered, Endangered, Vulnerable or Near Threatened (IUCN Red Data Book categories);
 - RDB 1 (Endangered), RDB 2 (Vulnerable), RDB 3 (Rare), RDB Indeterminate (pre-IUCN Red Data Book categories);
 - Nationally Scarce/Notable (national rarity categories),

In the current version of the JNCC "spreadsheet of conservation designations for UK taxa", see: <http://www.jncc.gov.uk/page-3409>

The JNCC listing (version 20071217) is in turn based on a number of publications, including:

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Notable assemblages have not been defined for invertebrates.

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Worcestershire Biodiversity Action Plan

Appendix 1

UKBAP Habitat resources in Berkshire, Buckinghamshire and Oxfordshire

The following table has been created through the habitat mapping exercises and LBAP projects to estimate the area (in hectares) of the UKBAP habitat resource for each of the three counties. With further survey and habitat inventory work this will get more accurate but can be used as a guide to give approximate values that represent the appropriate percentage of the county resource of each of the habitats to inform selection criterion 3 'Size or extent'. Thresholds reflect the current distribution and occurrence of the UKBAP habitats and presence in existing designated sites.

UKBAP Priority Habitat	Berks		Bucks		Oxon	
	Total	Threshold	Total	Threshold	Total	Threshold
Native woodland (>50ha)	9608	50	5098	50	4637	50
Wood-pasture and parkland (1.5%)	1128	16.9	1360	20.4	1449	21.7
Lowland calcareous grassland (1.5%)	209	3.1	235	3.5	694	10.4
Fens (1.5%)	108	1.6	69	1.0	132	2.0
Lowland meadows (3%)	229	6.9	275	8.3	993.7	29.8
Lowland dry acid grassland (3%)	108	3.2	31	0.9	42	1.3
Purple moor-grass and rush pasture (3%)	46	0.3	15	1.4	7	0.21
Lowland heathland (3%)	442	13.3	110	3.3	3	0.1
Eutrophic standing waters (3%)	1498	44.9		0.0	919	27.6
Mesotrophic lakes (3%)	27	0.8	0	0.0	0	0.0
Reedbeds (3%)	40	1.2	3	0.1	26	0.8
Coastal and floodplain grazing marsh (3%)	0	0.0	0	0.0	357	10.7

Appendix 2 Habitat Species Lists

Habitat species lists for classification

The selection panel will usually rely on the LWS surveyor's assessment of a site and the habitat types present, however, for transparency, below are the species lists (where available) that help make the decision on whether a site will qualify as a UKBAP priority habitat.

A4.1 Lowland Calcareous Grasslands

Table 1. Indicator species of calcareous grassland

Common Name	Scientific Name	Notes
Pyramidal orchid	<i>Anacamptis pyramidalis</i>	
Kidney vetch	<i>Anthyllis vulneraria</i>	
Squinancywort	<i>Asperula cynanchica</i>	
Purple milk-vetch	<i>Astragalus danicus</i>	Not in Bucks
Wild liquorice	<i>Astragalus glycyphyllos</i>	Uncommon in Bucks
Yellow-wort	<i>Blackstonia perfoliata</i>	
Tor-grass	<i>Brachypodium pinnatum</i>	
Quaking grass	<i>Briza media</i>	
Upright brome	<i>Bromopsis erecta</i>	
Clustered bellflower	<i>Campanula glomerata</i>	
Musk thistle	<i>Carduus nutans</i>	
Spring sedge	<i>Carex caryophyllea</i>	Uncommon in Bucks
Carline thistle	<i>Carlina vulgaris</i>	
Fern grass	<i>Catapodium rigidum</i>	
Greater knapweed	<i>Centaurea scabiosa</i>	
Common centaury	<i>Centaureum erythraea</i>	
Dwarf thistle	<i>Cirsium acaule</i>	
Woolly thistle	<i>Cirsium eriophorum</i>	
Basil thyme	<i>Clinopodium acinos</i>	
Common dodder	<i>Cuscuta epithymum</i>	Used to be more an acidic species, Very rare in Bucks
Blue fleabane	<i>Erigeron acer</i>	
Eyebright	<i>Euphrasia nemorosa</i>	
Sheep's-fescue	<i>Festuca ovina</i>	
Dropwort	<i>Filipendula vulgaris</i>	Also in damp meadows.
Autumn gentian	<i>Gentianella amarella</i>	
Fragrant orchid	<i>Gymnadenia conopsea</i>	
Common rock-rose	<i>Helianthemum nummularium</i>	
Meadow oat-grass	<i>Helictotrichon pratense</i>	
Downy oat-grass	<i>Helictotrichon pubescens</i>	

Common Name	Scientific Name	Notes
Horseshoe vetch	<i>Hippocrepis comosa</i>	
Candytuft	<i>Iberis amara</i>	
Ploughman's-spikenard	<i>Inula conyza</i>	
Field scabious	<i>Knautia arvensis</i>	
Crested hair-grass	<i>Koeleria macrantha</i>	
Pale toadflax	<i>Linaria repens</i>	
Fairy Flax	<i>Linum catharticum</i>	
Twayblade	<i>Listera ovata</i>	
Bee orchid	<i>Ophrys apifera</i>	
Sainfoin	<i>Onobrychis viciifolia</i>	Scarce in Bucks – found in Chilterns
Spiny restharrow	<i>Ononis spinosa</i>	
Common restharrow	<i>Ononis repens</i>	
Marjoram	<i>Origanum vulgare</i>	
Mouse-ear hawkweed	<i>Pilosella officinarum</i>	
Burnet saxifrage	<i>Pimpinella saxifraga</i>	
Hoary plantain	<i>Plantago media</i>	
Chalk milkwort	<i>Polygala calcarea</i>	Known from 1 site in Bucks
Common milkwort	<i>Polygala vulgaris</i>	
Cowslip	<i>Primula veris</i>	
Salad burnet	<i>Sanguisorba minor</i>	
Lesser scabious	<i>Scabiosa columbaria</i>	
Autumn lady's tresses	<i>Spiranthes spiralis</i>	Very rare in Bucks
Bastard toadflax	<i>Thesium humifusum</i>	Extinct in Bucks
Common thyme	<i>Thymus polytrichus</i>	
Large thyme	<i>Thymus pulegioides</i>	
Hairy violet	<i>Viola hirta</i>	

A4.2 Lowland Dry Acid Grassland Species Lists

Common Name	Scientific Name	Notes
Velvet bent	<i>Agrostis canina</i>	Rare in Oxfordshire & Bucks, frequent in Berks
Bristle bent	<i>Agrostis curtisii</i>	Rare in Berks, not in Oxon & Bucks
Slender parsley-piert	<i>Aphanes australis</i>	Rare in Bucks
Silver hair-grass	<i>Aira caryophyllea</i>	Very rare in Bucks
Early hair-grass	<i>Aira praecox</i>	Rare in Bucks
Heather	<i>Calluna vulgaris</i>	Indicator of heathland if >20%
Harebell	<i>Campanula rotundifolia</i>	Also in lime-rich grassland
Pill sedge	<i>Carex pilulifera</i>	
Common centuary	<i>Centaureum erythraea</i>	Also on lime-rich open sites
Field mouse-ear	<i>Cerastium arvense</i>	calcareous to slightly acid sites Rare in Bucks
Lichens	<i>Cladonia spp</i>	Some <i>Cladonia</i> are not typical of acid grassland
Pignut	<i>Conopodium majus</i>	Also ancient woodland indicator and lowland meadow
Broom	<i>Cytisus scoparius</i>	Shrub
Heath grass	<i>Danthonia decumbens</i>	
Wavy hair-grass	<i>Deschampsia flexuosa</i>	Often in woodlands on acid soils
Foxglove	<i>Digitalis purpurea</i>	Also in woodland on acid soils
Bugloss	<i>Echium vulgare</i>	Dry low nutrient soils, also sometimes lime rich
Stork's-bill	<i>Erodium cicutarium</i>	Also arable weed
Small cudweed	<i>Filago minima</i>	Very rare in Bucks
Heath bedstraw	<i>Galium saxatile</i>	
Mouse-ear hawkweed	<i>Pilosella officinarum</i>	Also in lime-rich, nitrogen-poor grassland
Crested hair-grass	<i>Koeleria macrantha</i>	Better known as a chalk and limestone species but a common component of some acid grassland types in this area.
Bitter vetch	<i>Lathyrus montanus</i>	In the U4 community as well as acidic lowland meadow
Lesser hawkbit	<i>Leontodon saxatile</i>	
Wood-sorrel	<i>Oxalis acetosella</i>	
Bird's-foot	<i>Ornithopus perpusillus</i>	Rare in Bucks
Buck's-horn plantain	<i>Plantago coronopus</i>	Also on road verges
Many-hair moss	<i>Polytrichum spp</i>	
Tormentil	<i>Potentilla erecta</i>	
Sheep's sorrel	<i>Rumex acetosella</i>	
Procumbent pearlwort	<i>Sagina procumbens</i>	
Betony	<i>Stacyhs officinalis</i>	Mostly in other grasslands but also in the U4 community
Devil's-bit scabious	<i>Succisa pratensis</i>	Mostly in other grasslands but also in the U4 community
Wood sage	<i>Teucrium scorodonia</i>	Often on woodland edges and in open woodland
Gorse	<i>Ulex europaeus</i>	Indicator of Heathland if over 25%
Heath speedwell	<i>Veronica officinalis</i>	
Common dog-violet	<i>Viola riviniana</i>	
Mat-grass	<i>Nardus stricta</i>	
Smooth Cat's-ear	<i>Hypochaeris glabra</i>	On sandy grassy heaths. Not in Bucks
Hoary cinquefoil	<i>Potentilla argentea</i>	Not in Bucks

A4.3 Lowland Meadow Species

Indicator species of Lowland Meadows BAP habitat

This list has been compiled to include those species that are particularly indicative of a long period without disturbance and the more typical wildflowers of neutral grassland. This allows proper consideration of sites where only remnants of this habitat are found such as East Berkshire, but which may still support many of the more common typical grassland species.

Common Name	Scientific name	Comments
Sneezewort	<i>Achillea ptarmica</i>	
Lady's mantle	<i>Alchemilla filicaulis</i>	In the more acidic neutral grassland. Rare in Bucks
Quaking grass	<i>Briza media</i>	Also in calcareous grassland
Meadow brome	<i>Bromus commutatus</i>	
Smooth brome	<i>Bromus racemosus</i>	
Marsh marigold	<i>Caltha palustris</i>	Also in fen
Harebell	<i>Campanula rotundifolia</i>	In the more acidic neutral grassland
Brown sedge	<i>Carex disticha</i>	Uncommon in Bucks
Glaucous sedge	<i>Carex flacca</i>	Also in calcareous grassland
Common sedge	<i>Carex nigra</i>	Rare in Bucks
Carnation sedge	<i>Carex panicea</i>	Scarce in Bucks
Cuckoo flower	<i>Cardamine pratensis</i>	
Common knapweed	<i>Centaurea nigra</i>	Rayed form is probably indicative of a long period without disturbance.
Meadow thistle	<i>Cirsium dissectum</i>	Very rare in Bucks
Pignut	<i>Conopodium majus</i>	Also in woodland and acid grassland
Common spotted orchid	<i>Dactylorhiza fuchsii</i>	
Southern marsh orchid	<i>Dactylorhiza praetermissa</i>	Also in fen, Very rare in Bucks
Heath grass	<i>Danthonia decumbens</i>	In the more acidic neutral grassland
Slender spike-rush	<i>Eleocharis uniglumis</i>	Not in Bucks
Meadowsweet	<i>Filipendula ulmaria</i>	
Dropwort	<i>Filipendula vulgaris</i>	
Snake's-head fritillary	<i>Fritillaria meleagris</i>	
Common marsh-bedstraw	<i>Galium palustre</i>	
Fen bedstraw	<i>Galium uliginosum</i>	Also in fen.
Lady's bedstraw	<i>Galium verum</i>	
Meadow crane's-bill	<i>Geranium pratense</i>	
Dyer's greenweed	<i>Genista tinctoria</i>	Very rare in Berks and Bucks
Water avens	<i>Geum rivale</i>	Also in wet ancient woodland. Not in Bucks
Bristle club-rush	<i>Scirpus setaceus</i>	Very rare in Bucks
Meadow vetchling	<i>Lathyrus pratensis</i>	
Autumn hawkbit	<i>Leontodon autumnalis</i>	
Rough hawkbit	<i>Leontodon hispidus</i>	Also in calcareous grassland
Oxeye daisy	<i>Leucanthemum vulgare</i>	
Fairy flax	<i>Linum catharticum</i>	Also in calcareous grassland
Common bird's-foot trefoil	<i>Lotus corniculatus</i>	
Greater birds-foot-trefoil	<i>Lotus pedunculatus</i>	
Ragged Robin	<i>Lychnis flos-cuculi</i>	
Creeping Jenny	<i>Lysimachia nummularia</i>	
Tubular water-dropwort	<i>Oenanthe fistulosa</i>	Rare in Bucks

Common Name	Scientific name	Comments
Adder's-tongue	<i>Ophioglossum vulgatum</i>	Rare in Bucks
Green-winged orchid	<i>Orchis morio</i>	Rare in Bucks
Lousewort	<i>Pedicularis sylvatica</i>	In the more acidic neutral grassland Very rare in Bucks
Common milkwort	<i>Polygala vulgaris</i>	
Tormentil	<i>Potentilla erecta</i>	Mainly in the more acidic neutral grassland. Also in acid grassland.
Cowslip	<i>Primula veris</i>	
Yellow-rattle	<i>Rhinanthus minor</i>	
Salad burnet	<i>Sanguisorba minor</i>	Mainly in calcareous grassland but also on strongly calcareous alluvium.
Great burnet	<i>Sanguisorba officinalis</i>	
Meadow saxifrage	<i>Saxifraga granulata</i>	
Saw-wort	<i>Serratula tinctoria</i>	Also in calcareous grassland
Pepper saxifrage	<i>Silaum silaus</i>	
Betony	<i>Stachys officinalis</i>	
Marsh stitchwort	<i>Stellaria paulstris</i>	
Devil's-bit scabious	<i>Succisa pratensis</i>	
Meadow rue	<i>Thalictrum flavum</i>	Also in fen.
Marsh arrowgrass	<i>Triglochin palustris</i>	Also in fen.
Marsh valerian	<i>Valeriana dioica</i>	Also in fen.

A4.4. Lowland Heathland Species lists

Indicator species of Lowland Heathland

Note that the species lists are based on the plant species in Berkshire as many of the following species will have a restricted distribution in Oxfordshire and Buckinghamshire.

Common Name	Scientific Name	Dry Heath	Wet Heath	Mire/Bog	Notes
Bristle bent	<i>Agrostis curtisii</i>	X			Mostly East Berks, not in Bucks
Silver hair-grass	<i>Aira caryophyllea</i>	X			Found on open ground
Early hair-grass	<i>Aira praecox</i>	X			
Bog pimpernel	<i>Anagallis tenella</i>		X	X	Known from 1 site in Bucks
Heather	<i>Calluna vulgaris</i>	X	X	X	
Harebell	<i>Campanula rotundifolia</i>	X			Various habitats
Green-ribbed sedge	<i>Carex binervis</i>	X	X		
Star sedge	<i>Carex echinata</i>			X	
Pill sedge	<i>Carex pilulifera</i>		X	X	Also in woodland rides
Broom	<i>Cytisus scoparius</i>	X			
Dodder	<i>Cuscuta epithymum</i>	X			Also calcareous grasslands
Heath spotted-orchid	<i>Dactylorhiza maculata</i>		X		
Heath grass	<i>Danthonia decumbens</i>	X			
Wavy-hair grass	<i>Dechampsia flexuosa</i>	X	X		
Common Sundew	<i>Drosera rotundifolia</i>		X	X	Extinct in Bucks
Narrow Buckler-fern	<i>Dryopteris carthusiana</i>		X		Also in acid wooded areas
Many-Stemmed Spike-rush	<i>Eleocharis multicaulis</i>		X	X	Known from 1 site in Bucks
Bell heather	<i>Erica cinerea</i>	X			Rare in Bucks
Cross-leaved heather	<i>Erica tetralix</i>		X		Rare in Bucks
Common cotton-grass	<i>Eriophorum angustifolium</i>		X	X	In lowland meadows in Bucks
Eyebright	<i>Euphrasia anglica</i>	x	X	X	Not recorded recently in Bucks
Small Cudweed	<i>Filago minima</i>	x			Very rare in Bucks
Common cudweed	<i>Filago vulgaris</i>	X			Very rare in Bucks
Alder buckthorn	<i>Frangula alnus</i>		X	X	Sometimes planted
Heath bedstraw	<i>Galium saxatile</i>	X			Also in acid woodlands
Petty Whin	<i>Genista anglica</i>	X			
Heath Cudweed	<i>Gnaphalium sylvaticum</i>	x			Not recorded recently in Bucks
Marsh pennywort	<i>Hydrocotyle vulgaris</i>			X	Also lake side, lawns and damp woodland rides
Marsh St. John's-Wort	<i>Hypericum elodes</i>			X	
Trailing St. John's-Wort	<i>Hypericum humifusum</i>	X			
Elegant St. John's Wort	<i>Hypericum pulchrum</i>	X			
Bulbous Rush	<i>Juncus bulbosus</i>		X	X	
Heath Rush	<i>Juncus squarrosus</i>		X		
Heath wood-rush	<i>Luzula multiflora</i>		X		
Common Cow-Wheat	<i>Melampyrum pratense</i>	X	X		Also in acid woods
Upright chickweed	<i>Moenchia erecta</i>	X			Not recorded recently in Bucks
Purple moor-grass	<i>Molinia caerulea</i>		X		
Early Forget-Me-Not	<i>Myosotis ramosissima</i>	X			Dry open places

Common Name	Scientific Name	Dry Heath	Wet Heath	Mire/Bog	Notes
Mat-grass	<i>Nardus stricta</i>		X		
Bog asphodel	<i>Narthecium ossifragum</i>			X	Extinct in Bucks
Bird's-Foot	<i>Ornithopus perpusillus</i>	X			Rare in Bucks
Marsh lousewort	<i>Pedicularis palustris</i>			X	Not in Bucks
Lousewort	<i>Pedicularis sylvatica</i>		X		Very rare in Bucks
Heath milkwort	<i>Polygala serpyllifolia</i>	X	X		Very rare in Bucks
Bog pondweed	<i>Potamogeton polygonifolius</i>			X	
Tormentil	<i>Potentilla erecta</i>	X	X		
Sheep's sorrel	<i>Rumex acetosella</i>	X			
Creeping willow	<i>Salix repens</i>		X		Known from 1 site in Bucks
Lesser skullcap	<i>Scutellaria minor</i>	X			Rare in Bucks
Heath groundsel	<i>Senecio sylvaticus</i>	X			Rare in Bucks
Knotted clover	<i>Trifolium striatum</i>	X			Sandy ground
Gorse	<i>Ulex europaeus</i>	X			
Dwarf gorse	<i>Ulex minor</i>	X			Rare in Bucks
Bilberry	<i>Vaccinium myrtillus</i>	X			
Heath speedwell	<i>Veronica officinalis</i>	X			
Marsh speedwell	<i>Veronica scutellata</i>			X	Peaty and marshy places. Very rare in Bucks
Marsh violet	<i>Viola palustris</i>		X	X	Also found in alder swamps. Very rare in Bucks

Key bird species of note strongly associated with lowland heathlands are nightjar, woodlark and Dartford warbler

A4.5 Eutrophic Standing Waters Associated Species Lists

Priority species associated with Eutrophic Standing Waters

Please note this is not an exhaustive list and is subject to review, many of the other species listed in the species criteria will also be strongly associated with this habitat.

Scientific name	Common name	Taxon	Priority list	Importance of habitat to the species
<i>Triturus cristatus</i>	Great crested newt	Amphibian	SAP	P
<i>Badister peltatus</i>	a ground beetle	Beetle	SS	S
<i>Bidessus unistriatus</i>	a diving beetle	Beetle	SAP	P
<i>Donacia aquatica</i>	a reed beetle	Beetle	SAP	x
<i>Donacia bicolora</i>	a reed beetle	Beetle	SAP	x
<i>Stenus palposus</i>	a ground beetle	Beetle	SAP	P
<i>Botaurus stellaris</i>	Bittern	Bird	SAP	S
<i>Emberiza schoeniclus</i>	Reed bunting	Bird	SAP	S
<i>Melanitta nigra</i>	Common scoter	Bird	SAP	S
<i>Austropotamobius pallipes</i>	White-clawed crayfish	Crustacean	SAP	S
<i>Triops cancriformis</i>	Tadpole shrimp	Crustacean	SAP	P
<i>Coregonus autumnalis</i>	Pollan	Fish	SAP	P
<i>Arvicola terrestris</i>	Water vole	Mammal	SAP	x
<i>Barbastella barbastellus</i>	Barbastelle bat	Mammal	SAP	x
<i>Lutra lutra</i>	Otter	Mammal	SAP	x
<i>Pipistrellus pipistrellus</i>	Pipistrelle bat	Mammal	SAP	x
<i>Myxas glutinosa</i>	Glutinous snail	Mollusc	SAP	P?
<i>Pisidium tenuilineatum</i>	Freshwater pea mussel	Mollusc	SAP	S
<i>Ephemerum cohaerens</i>	Clustered earth-moss	Moss	SS	P
<i>Dolomedes plantarius</i>	Fen raft spider	Spider	SAP	x
<i>Chara canescens</i>	Bearded stonewort	Stonewort	SS	x
<i>Chara connivens</i>	Convergent stonewort	Stonewort	SAP	
<i>Nitellopsis obtusa</i>	Starry stonewort	Stonewort	SAP	
<i>Tolypella prolifera</i>	Great tassel stonewort	Stonewort	SAP	x
<i>Alisma gramineum</i>	Ribbon-leaved water-plantain	Vascular plant	SAP	P
<i>Najas flexilis</i>	Slender naiad	Vascular plant	SAP	P
<i>Najas marina</i>	Holly-leaved naiad	Vascular plant	SAP	P
<i>Potamogeton rutilus</i>	Shetland pondweed	Vascular plant	SAP	P
<i>Hirudo medicinalis</i>	Medicinal leech	Worm	SAP	P
<i>Prostoma jenningsi</i>	a freshwater nemertean	Worm	SS	?

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

Please see the bird criteria for details of the bird assemblages for Lowland open waters and marsh land.

A4.6 Mesotrophic Lakes associated BAP Species List

Scientific name	Common name	Taxon	Priority list	Importance of habitat to the species
<i>Bufo calamita</i>	Natterjack toad	Amphibian	SAP	P
<i>Triturus cristatus</i>	Great crested newt	Amphibian	SAP	P
<i>Badister peltatus</i>	a ground beetle	Beetle	SS	S
<i>Bidessus unistriatus</i>	a diving beetle	Beetle	SAP	P
<i>Donacia aquatica</i>	a reed beetle	Beetle	SAP	x
<i>Donacia bicolora</i>	a reed beetle	Beetle	SAP	x
<i>Melanitta nigra</i>	Common scoter	Bird	SAP	S
<i>Botaurus stellaris</i>	Bittern	Bird	SAP	S
<i>Emberiza schoeniclus</i>	Reed bunting	Bird	SAP	S
<i>Lophopus crystallinus</i>	a freshwater bryozoan	Bryozoa	SAP	x
<i>Coregonus albula</i>	Vendace	Fish	SAP	P
<i>Collema dichotomum</i>	River jelly lichen	Lichen	SAP	x
<i>Arvicola terrestris</i>	Water vole	Mammal	SAP	x
<i>Barbastella barbastellus</i>	Barbastelle bat	Mammal	SAP	x
<i>Lutra lutra</i>	Otter	Mammal	SAP	x
<i>Pipistrellus pipistrellus</i>	Pipistrelle bat	Mammal	SAP	x
<i>Myxas glutinosa</i>	Glutinous snail	Mollusc	SAP	P?
<i>Segmentina nitida</i>	Shining ram's-horn snail	Mollusc	SAP	S
<i>Micromitrium tenerum</i>	Millimetre moss	Moss	SS	S
<i>Weissia rostellata</i>	Beaked beardless-moss	Moss	SAP	S
<i>Weissia squarrosa</i>	Spreading-leaved beardless-moss	Moss	SS	S
<i>Chara baltica</i>	Baltic stonewort	Stonewort	SS	S
<i>Chara connivens</i>	Convergent stonewort	Stonewort	SAP	P
<i>Chara curta</i>	Lesser bearded stonewort	Stonewort	SAP	P
<i>Chara muscosa</i>	Mossy stonewort	Stonewort	SAP	P
<i>Nitella tenuissima</i>	Dwarf stonewort	Stonewort	SAP	S
<i>Nitelopsis obtusa</i>	Starry stonewort	Stonewort	SAP	P
<i>Tolypella intricata</i>	Tassel stonewort	Stonewort	SAP	P
<i>Tolypella prolifera</i>	Great tassel stonewort	Stonewort	SAP	x
<i>Luronium natans</i>	Floating water-plantain	Vascular plant	SAP	P
<i>Najas flexilis</i>	Slender naiad	Vascular plant	SAP	P
<i>Pilularia globulifera</i>	Pillwort	Vascular plant	SAP	P
<i>Potamogeton compressus</i>	Grass-wrack pondweed	Vascular plant	SAP	S
<i>Potamogeton rutilus</i>	Shetland pondweed	Vascular plant	SAP	P
<i>Hirudo medicinalis</i>	Medicinal leech	Worm	SAP	P

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

A4.7 Pond associated Biodiversity Action Plan Species

Common name	Species name	Taxon Group	National status
Grass-wrack Pondweed	Potamogeton compressus	Plant	BAP priority species, RDB
Pennyroyal	Mentha pulegium	Plant	BAP priority species, RDB
Pillwort	Pilularia globulifera	Plant	BAP priority species, RDB
Fine-lined pea mussel	Pisidium tenuilineatum	Invert	BAP priority species, RDB
Mud pond snail	Omphiscola glabra	Invert	BAP priority species, RDB
White-clawed Crayfish	Austropotamobius pallipes	Invert	BAP priority species, RDB
Fairy shrimp	Chirocephalus diaphanus	Invert	BAP priority species, RDB
Great crested newt	Triturus cristatus	Herp	BAP priority species
Natterjack toad	Bufo calamita	Herp	BAP priority species
Otter	Lutra lutra	Mammal	BAP priority species
Water vole	Arvicola terrestris	Mammal	BAP priority species
Barbastelle Bat	Barbastella barbastellus	Mammal	BAP priority species, RDB
Bechstein's Bat	Myotis bechsteinii	Mammal	BAP priority species, RDB
Greater Horseshoe Bat	Rhinolophus ferrumequinum	Mammal	BAP priority species, RDB
Lesser Horseshoe Bat	Rhinolophus hipposideros	Mammal	BAP priority species, RDB
Pipistrelle Bat	Pipistrellus pipistrellus	Mammal	BAP priority species

A4.8 Lowland Fens

Indicator species of Lowland Fens

Scientific name

Swamp communities

Rorippa nasturtium-aquaticum
Apium nodiflorum
Veronica beccabunga
Berula erecta
Carex paniculata
Glyceria maxima
Carex riparia
Carex acutiformis
Schoenoplectus lacustris
Typha latifolia
Typha angustifolia
Sparganium erectum
Eleocharis palustris
Glyceria fluitans
Phalaris arundinacea

Common name

Water-cress
Fools watercress
Brooklime
Lesser water parsnip
Greater tussock sedge
Reed Sweet-grass
Greater Pond-sedge
Lesser Pond-sedge
Common club-rush
Reedmace
Lesser bulrush
Branched Bur-reed
Common spike rush
Floating Sweet-grass
Reed Canary-Grass

Tall-herb fen communities

Eupatorium cannabinum
Cirsium palustre
Filipendula ulmaria
Angelica sylvestris
Lythrum salicaria
Epilobium hirsutum
Galium palustre
Mentha aquatica
Caltha palustris
Lychnis flos-cuculi
Vicia sativa
Calystegia sepium
Solanum dulcamara

Hemp agrimony
Marsh thistle
Meadowsweet
Wild angelica
Purple loosestrife
Great willowherb
Common marsh-bedstraw
Water mint
Marsh marigold
Ragged Robin
Common vetch
Hedge bindweed
Bittersweet

Fen meadow communities

Anagallis tenella
Carex viridula subsp. oedocarpa
Carex viridula subsp. brachyrrhyncha
Carex panicea
Carex pulicaris
Carex rostrata
Cirsium dissectum
Dactylorhiza traunsteineri
Dactylorhiza incarnata
Dactylorhiza praetermissa
Drosera rotundifolia
Eleocharis quinqueflora

Bog pimpernel (Known from 1 site in Bucks)
Common yellow-sedge
Long-stalked yellow-sedge
Carnation sedge
Flea sedge (Known from 1 site in Bucks)
Bottle sedge
Meadow thistle
Narrow-leaved marsh-orchid
Early marsh-orchid
Southern marsh-orchid
Round-leaved sundew (Extinct in Bucks)
Few-flowered spike-rush (Not in Bucks)

<i>Epipactis palustris</i>	Marsh helleborine
<i>Eriophorum latifolium</i>	Broad-leaved cottongrass (Not in Bucks)
<i>Galium uliginosum</i>	Fen bedstraw
<i>Gymnadenia conopsea</i>	Fragrant orchid
<i>Hydrocotyle vulgaris</i>	Marsh pennywort
<i>Juncus subnodulosus</i>	Blunt-flowered rush
<i>Lotus pedunculatus</i>	Great bird's-foot-trefoil
<i>Luzula multiflora</i>	Heath wood-rush
<i>Menyanthes trifoliata</i>	Bogbean
<i>Molinia caerulea</i>	Purple moor-grass
<i>Oenanthe lachenalii</i>	Parsley water-dropwort (Not in Bucks)
<i>Parnassia palustris</i>	Grass of Parnassus (Not in Bucks)
<i>Pedicularis palustris</i>	Marsh lousewort (Not in Bucks)
<i>Pinguicula vulgaris</i>	Common butterwort (Not in Bucks)
<i>Potentilla erecta</i>	Tormentil
<i>Potamogeton coloratus</i>	Fen pondweed (Not in Bucks)
<i>Schoenus nigricans</i>	Black bog-rush (Not in Bucks)
<i>Serratula tinctoria</i>	Saw-wort
<i>Succisa pratensis</i>	Devil's-bit scabious
<i>Triglochin palustris</i>	Marsh arrowgrass (Very rare in Bucks)
<i>Utricularia vulgaris</i>	Common bladderwort (Very rare in Bucks)
<i>Valeriana dioica</i>	Marsh valerian

A4.11 Reedbed Species list

There is only one species that can be used to identify reedbeds with any confidence, common reed *Phragmites australis*.

In addition to this reedbeds may support a large diversity of species. Below is the list of UK BAP priority species associated with reedbeds.

Scientific name	Common name	Taxon	Priority list	Importance of habitat to the species *
<i>Acrocephalus paludicola</i>	Aquatic warbler	Bird	Y	P
<i>Botaurus stellaris</i>	Bittern	Bird	Y	P
<i>Dromius sigma</i>	a ground beetle	Beetle	Y	P
<i>Emberiza schoeniclus</i>	Reed bunting	Bird	Y	P
<i>Acrocephalus palustris</i>	Marsh warbler	Bird	Y	S
<i>Hydraecia osseola hucherardi</i>	Marsh mallow moth	Moth	Y	S
<i>Arvicola terrestris</i>	Water vole	Mammal	Y	x
	Harvest Mouse	mammal	Y	
<i>Lutra lutra</i>	Otter	Mammal	Y	x
<i>Miliaria calandra</i>	Corn bunting	Bird	Y	x
<i>Pilularia globulifera</i>	Pillwort	Vascular plant	Y	x
<i>Pterostichus aterrimus</i>	a ground beetle	Beetle	Y	x
<i>Donacia aquatica</i>	a reed beetle	Beetle	Y	?

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

A4.13 Woodland indicator species list

L = longevity indicator presence suggests the woodland is particularly old.

* = often planted, e.g. for pheasant cover, timber or ornamental.

Note three species listed in the Wilson and Reid 1995 English Nature SE region list are considered too widespread to be included – field maple, giant fescue and black bryony.

For wet woodland, a range of wetland species may be present which have not been included within the list and include species such as marsh bedstraw, yellow iris, wild angelica and meadowsweet. Please refer to the fens and swamps list for a full list of these species.

Common Name	Scientific Name	Comments
Moschatel	<i>Adoxa moschatellina</i>	L
Ramsons	<i>Allium ursinum</i>	L
Wood anemone	<i>Anemone nemorosa</i>	L
Columbine *	<i>Aquilegia vulgaris</i>	*
Hard fern	<i>Blechnum spicant</i>	L
Hairy-brome	<i>Bromopsis ramosa</i>	
Wood small-reed	<i>Calamagrostis epigejos</i>	
Nettle-leaved bellflower	<i>Campanula trachelium</i>	
Large bitter-cress	<i>Cardamine amara</i>	Mainly wet woodland
Smooth-stalked sedge	<i>Carex laevigata</i>	
Pale sedge	<i>Carex pallescens</i>	
Pendulous sedge *	<i>Carex pendula</i>	*
Remote sedge	<i>Carex remota</i>	
Thin-spiked Wood-sedge	<i>Carex strigosa</i>	L
Wood-sedge	<i>Carex sylvatica</i>	
Hornbeam *	<i>Carpinus betulus</i>	*
Narrow-leaved helleborine	<i>Cephalanthera longifolium</i>	
Climbing corydalis	<i>Ceratocarpus claviculata</i>	
Opposite-leaved golden saxifrage	<i>Chrysosplenium oppositifolium</i>	Wet woodland
Meadow saffron	<i>Colchicum autumnale</i>	
Pignut	<i>Conopodium majus</i>	L
Lily-of-the-valley *	<i>Convallaria majalis</i>	L
Midland hawthorn	<i>Crataegus laevigata</i>	
Spurge laurel	<i>Daphne laureola</i>	L
Small teasel	<i>Dipsacus pilosus</i>	
Scaly male-fern	<i>Dryopteris affinis</i>	L
Narrow buckler-fern	<i>Dryopteris carthusiana</i>	L
Bearded couch	<i>Elymus caninus</i>	
Broad-leaved helleborine	<i>Epipactis helleborine</i>	
Narrow-lipped helleborine	<i>Epipactis leptochila</i>	
Violet helleborine	<i>Epipactis purpurata</i>	L
Wood horsetail	<i>Equisetum sylvaticum</i>	
Wood spurge	<i>Euphorbia amygdaloides</i>	L
Alder buckthorn	<i>Frangula alnus</i>	

Common Name	Scientific Name	Comments
Woodruff	<i>Galium odoratum</i>	L
Water avens	<i>Geum rivale</i>	Wet woodland.
Green hellebore	<i>Helleborus viridis</i>	
Creeping soft-grass	<i>Holcus mollis</i>	
Wood barley	<i>Hordelymus europaeus</i>	
Bluebell	<i>Hyacinthoides non-scripta</i>	
Tutsan *	<i>Hypericum androsaemum</i>	L
Slender St. John's-wort	<i>Hypericum pulchrum</i>	
Holly	<i>Ilex aquifolium</i>	
Stinking iris	<i>Iris foetidissima</i>	
Yellow archangel	<i>Lamiastrum galeobdolon</i>	
Toothwort	<i>Lathraea squamaria</i>	L
Bitter vetch	<i>Lathyrus linifolius</i>	
Narrow-leaved everlasting pea	<i>Lathyrus sylvestris</i>	
Southern wood-rush	<i>Luzula forsteri</i>	L
Hairy wood-rush	<i>Luzula pilosa</i>	
Great wood-rush	<i>Luzula sylvatica</i>	L
Yellow pimpernel	<i>Lysimachia nemorum</i>	
Crab apple	<i>Malus sylvestris</i>	
Common cow-wheat	<i>Melampyrum pratense</i>	L
Wood melick	<i>Melica uniflora</i>	
Wood millet	<i>Milium effusum</i>	
Three-nerved sandwort	<i>Moehringia trinervia</i>	L
Wild daffodil *	<i>Narcissus pseudonarcissus</i> subsp. <i>pseudonarcissus</i>	*
Bird's nest orchid	<i>Neottia nidus-avis</i>	
Early-purple orchid	<i>Orchis mascula</i>	
Lemon-scented fern	<i>Oreopteris limbosperma</i>	
Wood-sorrel	<i>Oxalis acetosella</i>	L
Herb-Paris	<i>Paris quadrifolia</i>	L
Hart's-tongue	<i>Phyllitis scolopendrium</i>	
Greater butterfly orchid	<i>Platanthera chlorantha</i>	
Wood meadow-grass	<i>Poa nemoralis</i>	
Solomon's-seal	<i>Polygonatum multiflorum</i>	L
Polypody	<i>Polypodium vulgare</i>	
Hard shield-fern	<i>Polystichum aculeatum</i>	
Aspen	<i>Populus tremula</i>	Wet woodland
Barren strawberry	<i>Potentilla sterilis</i>	
Primrose	<i>Primula vulgaris</i>	Sometimes planted.
Wild cherry	<i>Prunus avium</i>	
Narrow-leaved lungwort	<i>Pulmonaria longifolia</i>	Garden escape?
Sessile oak *	<i>Quercus petraea</i>	L
Goldilocks buttercup	<i>Ranunculus auricomus</i>	
Black currant	<i>Ribes nigrum</i>	
Red currant *	<i>Ribes rubrum</i>	L
Field rose	<i>Rosa arvensis</i>	
Butcher's broom *	<i>Ruscus aculeatus</i>	Beech woodland
Sanicle	<i>Sanicula europaea</i>	
Wood club-rush	<i>Scirpus sylvaticus</i>	Wet woodland
Orpine	<i>Sedum telephium</i>	

Common Name	Scientific Name	Comments
Saw-wort	<i>Serratula tinctoria</i>	
Goldenrod	<i>Solidago virgaurea</i>	
Wild service-tree	<i>Sorbus torminalis</i>	
Betony	<i>Stachys officinalis</i>	
Small-leaved lime	<i>Tilia cordata</i>	Mostly planted
Bilberry	<i>Vaccinium myrtillus</i>	In Berks and Bucks
Wood speedwell	<i>Veronica montana</i>	
Guelder rose *	<i>Viburnum opulus</i>	
Bush vetch	<i>Vicia sepium</i>	
Wood vetch	<i>Vicia sylvatica</i>	
Marsh violet	<i>Viola palustris</i>	In Berks
Early dog-violet	<i>Viola reichenbachiana</i>	

A4.14 Lowland wood-pasture and parkland species

Last column – importance of the habitat to that species P = primary, S = secondary, x = less.

Scientific name	Common name	Taxon	Priority	
<i>Passer montanus</i>	Tree sparrow	Bird	SAP	P
<i>Muscicapa striata</i>	Spotted flycatcher	Bird	SAP	P
<i>Turdus philomelos</i>	Song thrush	Bird	SAP	S
<i>Jynx torquilla</i>	Wryneck	Bird	SAP	
<i>Formica lugubris</i>	Hairy wood ant	Ant	SS	X
<i>Formica rufa</i>	Southern wood ant	Ant	SS	X
<i>Formicoxenus nitidulus</i>	Shining guest ant	Ant	SS	
<i>Ampedus nigerrimus</i>	a saproxylic beetle	Beetle	SS	P
<i>Ampedus ruficeps</i>	a saproxylic beetle	Beetle	SS	P
<i>Ampedus rufipennis</i>	a saproxylic beetle	Beetle	SS	P
<i>Dromius quadrisignatus</i>	a ground beetle	Beetle	SS	P
<i>Dryophthorus corticalis</i>	a saproxylic beetle	Beetle	SS	P
<i>Elater ferrugineus</i>	a saproxylic beetle	Beetle	SS	P
<i>Eucnemis capucina</i>	a saproxylic beetle	Beetle	SS	P
<i>Gastrallus immarginatus</i>	a wood-boring beetle	Beetle	SAP	P
<i>Gnorimus nobilis</i>	a chafer	Beetle	SAP	
<i>Gnorimus variabilis</i>	a chafer	Beetle	SS	
<i>Hypebaeus flavipes</i>	a saproxylic beetle	Beetle	SS	P
<i>Lacon Quercus</i>	a saproxylic beetle	Beetle	SS	P
<i>Limoniscus violaceus</i>	Violet click beetle	Beetle	SAP	P
<i>Lucanus cervus</i>	Stag beetle	Beetle	SAP	P
<i>Megapenthes lugens</i>	a saproxylic beetle	Beetle	SS	P
<i>Ernoporus tiliae</i>	a bark beetle	Beetle	SAP	?P
<i>Jodia croceago</i>	Orange upperwing	Moth	SAP	x
<i>Mythimna turca</i>	Double line	Moth	SAP	S
<i>Dicycla oo</i>	Heart moth	Moth	SAP	P
<i>Paracolax tristalis</i>	Clay fan-foot	Moth	SS	S
<i>Cosmia diffinis</i>	White-spotted pinion	Moth	SAP	x
<i>Argynnis adippe</i>	High brown fritillary	Butterfly	SAP	P
<i>Dicycla oo</i>	Heart moth	Moth	SAP	P
<i>Mythimna turca</i>	Double line	Moth	SAP	S
<i>Paracolax tristalis</i>	Clay fan-foot	Moth	SS	S
<i>Cosmia diffinis</i>	White-spotted pinion	Moth	SAP	x
<i>Jodia croceago</i>	Orange upperwing	Moth	SAP	x
<i>Pechipogo strigilata</i>	Common fan-foot	Moth	SAP	x
<i>Callicera spinolae</i>	a hoverfly	Fly	SAP	P
<i>Myolepta potens</i>	a hoverfly	Fly	SS	?
<i>Boletus regius</i>	Royal bolete	Fungi	SAP	P
<i>Boletus satanas</i>	Devil's bolete	Fungi	SAP	P
<i>Buglossoporus pulvinus/ quercinus</i>	Oak polypore	Fungi	SAP	P
<i>Hericeum erinaceum</i>	A hedgehog fungus	Fungi	SAP	P
<i>Hydnoid fungi (14 spp)</i>	Tooth fungi	Fungi	SAP	P

Scientific name	Common name	Taxon	Priority	
<i>Battarraea phalloides</i>	Sandy stilt puffball	Fungi	SAP	x
<i>Bacidia incompta</i>	A lichen	Lichen	SAP	P
<i>Caloplaca luteoalba</i>	Orange-fruited elm-lichen	Lichen	SAP	x
<i>Chaenotheca phaeocephala</i>	A lichen	Lichen	SAP	x
<i>Enterographa elaborata</i>	A lichen	Lichen	SAP	x
<i>Enterographa soresiate</i>	A lichen	Lichen	SAP	x
<i>Gyalecta ulmi</i>	Elm's gyalecta	Lichen	SAP	x
<i>Schismatomma graphidioides</i>	A lichen	Lichen	SAP	x
<i>Thelenella modesta</i>	Warty wax-lichen	Lichen	SAP	x
<i>Orthotrichum obtusifolium</i>	Blunt-leaved bristle-moss	Moss	SAP	x
<i>Orthotrichum pallens</i>	Pale bristle-moss	Moss	SAP	x
<i>Zygodon forsteri</i>	Knothole moss	Moss	SAP	x

A4.15 Traditional Orchards Associated Species Lists

Fruit tree species include apple, cherry, pear, plum, gages and damsons.

Table 1. Species associated with Traditional Orchards

Species	Taxon Group	National status
Orchard Tooth Crust Fungus (<i>Sarcodontia crocea</i>)	Fungi	UK BAP priority species
Pink waxcap (<i>Hygrocybe calyptriformis</i>)	Fungi	UK BAP priority species
Mistletoe	Vascular Plant	
Noble chafer	Coleoptera	UK BAP priority species
Stag beetle	Coleoptera	Nationally scarce (Notable b)
Figure of eight moth	Lepidoptera	UK BAP priority species
Red-belted clearwing	Lepidoptera	Nationally scarce (Notable b)
V-moth	Lepidoptera	UK BAP priority species
Brown hairstreak	Lepidoptera	Nationally scarce (Notable b)
Turtle dove	Bird	UK BAP priority species
Spotted flycatcher	Bird	UK BAP priority species
Song thrush	Bird	UK BAP priority species
Bullfinch	Bird	UK BAP priority species
Grass snake	Reptile	UK BAP priority species
Slow-worm	Reptile	UK BAP priority species
Bat spp.	Mammal	

Table 2. Orchard saproxylic invertebrates

Species	Taxon Group	National status
<i>Aderus oculatus</i>	Coleoptera	NSB
<i>Anitya rubens</i>	Coleoptera	NSB
<i>Anobium inexpectatum</i>	Coleoptera	NSB
<i>Dorcatoma dresdensis</i>	Coleoptera	NSA
<i>Dorcatoma flavicornis</i>	Coleoptera	NSB
<i>Gastrallus immarginatus</i>	Coleoptera	RDB1, BAP
<i>Hadrobregmus denticollis</i>	Coleoptera	NSB
<i>Hedobia (Ptinomorphus) imperialis</i>	Coleoptera	NSB
<i>Choragus sheppardi</i>	Coleoptera	NSA
<i>Platyrhinus resinosus</i>	Coleoptera	NSB
<i>Agrilus biguttatus</i>	Coleoptera	NSA
<i>Agrilus sinuatus</i>	Coleoptera	NSA
<i>Malthinus balteatus</i>	Coleoptera	NSB
<i>Malthinus frontalis</i>	Coleoptera	NSB
<i>Anaglyptus mysticus</i>	Coleoptera	NSB
<i>Gracilia minuta</i>	Coleoptera	RDB2
<i>Grammoptera variegata</i>	Coleoptera	NSA
<i>Molorchus umbellatarum</i>	Coleoptera	NSA
<i>Clambus pallidulus</i>	Coleoptera	RDBK
<i>Opilo mollis</i>	Coleoptera	NSB
<i>Tillus elongatus</i>	Coleoptera	NSB
<i>Orthoperus nigrescens</i>	Coleoptera	NSB
<i>Cossonus parallelepipedus</i>	Coleoptera	NSB
<i>Magdalis barbicornis</i>	Coleoptera	NSA
<i>Magdalis cerasi</i>	Coleoptera	NSB
<i>Ctesias serra</i>	Coleoptera	[NSB]

Species	Taxon Group	National status
<i>Globicornis rufitarsis</i>	Coleoptera	RDB1
<i>Megatoma undata</i>	Coleoptera	NSB
<i>Ampedus cinnabarinus</i>	Coleoptera	RDB3
<i>Ampedus rufipennis</i>	Coleoptera	RDB2, BAP
<i>Ischnodes sanguinicollis</i>	Coleoptera	NSA
<i>Prokraerus tibialis</i>	Coleoptera	RDB3
<i>Triplax russica</i>	Coleoptera	NSB
<i>Melasis buprestoides</i>	Coleoptera	NSB
<i>Microrhagus pygmaeus</i>	Coleoptera	RDB3
<i>Plegaderus dissectus</i>	Coleoptera	NSB
<i>Lucanus cervus</i>	Coleoptera	NSB, BAP
<i>Abdera biflexuosa</i>	Coleoptera	NSB
<i>Abdera flexuosa</i>	Coleoptera	NSB
<i>Abdera quadrifasciata</i>	Coleoptera	NSA
<i>Anisoxya fuscula</i>	Coleoptera	NSA
<i>Conopalpus testaceus</i>	Coleoptera	NSB
<i>Hallomenus binotatus</i>	Coleoptera	NSB
<i>Melandrya caraboides</i>	Coleoptera	NSB
<i>Orchesia micans</i>	Coleoptera	NSB
<i>Orchesia minor</i>	Coleoptera	NSB
<i>Aplocnemus impressus</i>	Coleoptera	NSB
<i>Mordellistena neuwaldeggiana</i>	Coleoptera	RDBK
<i>Tomoxia bucephala</i>	Coleoptera	NSA
<i>Ischnomera cyanea</i>	Coleoptera	NSB
<i>Platypus cylindrus</i>	Coleoptera	NSB
<i>Nossidium pilosellum</i>	Coleoptera	NS
<i>Lissodema denticolle</i>	Coleoptera	NSB
<i>Anaspis thoracica</i>	Coleoptera	NSA
<i>Gnorimus nobilis</i>	Coleoptera	RDB2, BAP
<i>Scolytus mali</i>	Coleoptera	NSB
<i>Xyleborus dispar</i>	Coleoptera	NSB
<i>Dexiogyia corticina</i>	Coleoptera	NS
<i>Euryusa sinuata</i>	Coleoptera	RDB1
<i>Gyrophaena angustata</i>	Coleoptera	NS
<i>Gyrophaena joyi</i>	Coleoptera	NS
<i>Placusa tachyporoides</i>	Coleoptera	NS
<i>Scaphisoma boleti</i>	Coleoptera	NSB
<i>Quedius assimilis</i>	Coleoptera	NSB
<i>Quedius truncicola</i>	Coleoptera	NSB
<i>Xantholinus angularis</i>	Coleoptera	NSA
<i>Sepedophilus bipunctatus</i>	Coleoptera	NSB
<i>Sepedophilus testaceus</i>	Coleoptera	NS
<i>Eledona agricola</i>	Coleoptera	NSB
<i>Mycetochara humeralis</i>	Coleoptera	NSA
<i>Prionychus ater</i>	Coleoptera	NSB
<i>Prionychus melanarius</i>	Coleoptera	RDB2
<i>Pseudocistela ceramboides</i>	Coleoptera	NSB
<i>Cylindroiulus parisiorum</i>	Diplopoda	NS
<i>Choerades marginatus</i>	Diptera	NS
<i>Stegana coleoptrata</i>	Diptera	NS
<i>Fannia gotlandica</i>	Diptera	NS
<i>Euthyneura halidayi</i>	Diptera	NS
<i>Oedalea apicalis</i>	Diptera	NS

Species	Taxon Group	National status
<i>Keroplatus testaceus</i>	Diptera	NS
<i>Gnophomyia viridipennis</i>	Diptera	NS
<i>Phaonia exoleta</i>	Diptera	RDB3
<i>Gregorzekia collaris</i>	Diptera	RDB3 [NS]
<i>Sciophila geniculata</i>	Diptera	NS
<i>Sciophila ochracea</i>	Diptera	RDB1
<i>Odinia pomona</i>	Diptera	RDB1
<i>Scenopinus niger</i>	Diptera	NS
<i>Chorisops nagatomii</i>	Diptera	NS
<i>Tanyptera atrata</i>	Diptera	NS
<i>Tanyptera nigricornis</i>	Diptera	RDB3
<i>Tipula (Lunatipula) peliostigma</i>	Diptera	NS
<i>Xylocoridea brevipennis</i>	Hemiptera	NS
<i>Omalus violaceus</i>	Hymenoptera: Aculeata	NSB
<i>Lasius brunneus</i>	Hymenoptera: Aculeata	NSA
<i>Dipogon bifasciatus</i>	Hymenoptera: Aculeata	RDB3
<i>Sapyga clavicornis</i>	Hymenoptera: Aculeata	NSB
<i>Nitela borealis</i>	Hymenoptera: Aculeata	RDBK
<i>Pemphredon morio</i>	Hymenoptera: Aculeata	NSB
<i>Cossus cossus</i>	Lepidoptera	NSB
<i>Parascotia fuliginaria</i>	Lepidoptera	NSB
<i>Dafa formosella</i>	Lepidoptera	pRDB1
<i>Synanthedon myopaeformis</i>	Lepidoptera	NSA

A.16 Open Mosaic Habitats on Previously Developed Land Table Associated Species List

Characteristic of Open Mosaic Habitats on Previously Developed Land

Common name	Species name	Taxon Group	National status
A lichen	<i>Peltigera rufescens</i>	Plant	
A lichen	<i>Cladonia pocillum</i>	Plant	
A lichen	<i>Diplochistes muscorum</i>	Plant	
Petalwort	<i>Petalophyllum ralfsii</i>	Plant	
Bee orchid	<i>Ophrys apifera</i>	Vascular Plant	
Fragrant orchid	<i>Gymnadenia conopsea</i>	Vascular Plant	
Royal fern	<i>Osmunda regalis</i>	Vascular Plant	
Tower mustard	<i>Arabis glabra</i>	Vascular Plant	UK BAP priority species
Ground beetle	<i>Harpalus obscurus</i>	Coleoptera	
Adonis ladybird	<i>Adonia variegata</i>	Coleoptera	
Cuckoo bee	<i>Nomad ferruginata</i>	Hymenoptera	
Knapweed carder bee	<i>Bombus sylvarum</i>	Hymenoptera	
Brown-banded Carder bumblebee	<i>Bombus humilis</i>	Hymenoptera	
Bee wolf	<i>Philanthus triangulum</i>	Hymenoptera	
5-banded weevil wasp	<i>Cerceris quinquefasciata</i>	Hymenoptera	
Picture winged fly	<i>Dorycera graminum</i>	Diptera	
Great crested newt	<i>Triturus cristatus</i>	Amphibian	

4.17 A Hedgerow Species Lists

- Table 1 provides a list of native woody species, as given in Schedule 3 of the Hedgerows Regulations (1997).
- Table 2 provides a list of the ground floral species associated with this habitat.

Table 1

Native woody hedgerow species (Schedule 3 of the Hedgerows Regulations, 1997)

Alder (*Alnus glutinosa*)
Apple, crab (*Malus sylvestris*)
Ash (*Fraxinus excelsior*)
Aspen (*Populus tremula*)
Beech (*Fagus sylvatica*)
Birch, downy (*Betula pubescens*)
Birch, silver (*Betula pendula*)
Black-poplar (*Populus nigra* sub-species *betulifolia*)
Blackthorn (*Prunus spinosa*)
Box (*Buxus sempervirens*)
Broom (*Cytisus scoparius*)
Buckthorn (*Rhamnus cathartica*)
Buckthorn, alder (*Frangula alnus*)
Butcher's-broom (*Ruscus aculeatus*)
Cherry, bird (*Prunus padus*)
Cherry, wild (*Prunus avium*)
Cotoneaster, wild (*Cotoneaster cambricus*)
Currant, downy (*Ribes spicatum*)
Currant, mountain (*Ribes alpinum*)
Dogwood (*Cornus sanguinea*)
Elder (*Sambucus nigra*)
Elm (*Ulmus species*)
Gooseberry (*Ribes uva-crispa*)
Gorse (*Ulex europaeus*)
Gorse, dwarf (*Ulex minor*)
Gorse, western (*Ulex gallii*)
Guelder rose (*Viburnum opulus*)
Hawthorn (*Crataegus monogyna*)
Hawthorn, midland (*Crataegus laevigata*)
Hazel (*Corylus avellana*)
Holly (*Ilex aquifolium*)
Hornbeam (*Carpinus betulus*)
Juniper, common (*Juniperus communis*)
Lime, large-leaved (*Tilia platyphyllos*)
Lime, small-leaved (*Tilia cordata*)
Maple, field (*Acer campestre*)
Mezereon (*Daphne mezereum*)
Oak, pedunculate (*Quercus robur*)
Oak, sessile (*Quercus petraea*)
Osier (*Salix viminalis*)
Pear, Plymouth (*Pyrus cordata*)
Pear, wild (*Pyrus communis sens. str.*)
Poplar, grey (*Populus x canescens*)
Poplar, white (*Populus alba*)
Privet, wild (*Ligustrum vulgare*)
Rose (*Rosa species*)
Rowan (*Sorbus aucuparia*)
Sea-buckthorn (*Hippophae rhamnoides*)
Spindle (*Euonymus europaeus*)
Spurge-laurel (*Daphne laureola*)
Walnut (*Juglans regia*)

Wayfaring-tree (*Viburnum lantana*)
Whitebeam (*Sorbus species*)
Wild Service-tree (*Sorbus torminalis*)
Willow (*Salix species*)
Yew (*Taxus baccata*)

Table 2

**Ground flora associated with hedgerows
(taken from Schedule 2 of the Hedgerows Regulations, 1997)**

Barren strawberry (*Potentilla sterilis*)
Bluebell (*Hyacinthoides non-scripta*)
Broad buckler-fern (*Dryopteris dilatata*)
Broad-leaved helleborine (*Epipactis helleborine*)
Bugle (*Ajuga reptans*)
Common cow-wheat (*Melampyrum pratense*)
Common dog-violet (*Viola riviniana*)
Polypody (*Polypodium vulgare*)
Dog's mercury (*Mercurialis perennis*)
Early dog-violet (*Viola reichenbachiana*)
Early-purple orchid (*Orchis mascula*)
Enchanter's-nightshade (*Circaea lutetiana*)
Giant fescue (*Festuca gigantea*)
Goldilocks buttercup (*Ranunculus auricomus*)
Giant bellflower (*Campanula latifolia*)
Greater wood-rush (*Luzula sylvatica*)
Hairy-brome (*Bromopsis ramosa*)
Hairy wood-rush (*Luzula pilosa*)
Hard fern (*Blechnum spicant*)
Hard shield-fern (*Polystichum aculeatum*)
Hart's-tongue (*Phyllitis scolopendrium*)
Heath bedstraw (*Galium saxatile*)
Herb-paris (*Paris quadrifolia*)
Herb-robert (*Geranium robertianum*)
Lady-fern (*Athyrium filix-femina*)
Lords-and-ladies (*Arum maculatum*)
Male-fern (*Dryopteris filix-mas*)
Moschatel (*Adoxa moschatellina*)
Narrow buckler-fern (*Dryopteris carthusiana*)
Nettle-leaved bellflower (*Campanula trachelium*)
Oxlip (*Primula elatior*)
Pignut (*Conopodium majus*)
Primrose (*Primula vulgaris*)
Ramsons (*Allium ursinum*)
Sanicle (*Sanicula europaea*)
Scaly male-fern (*Dryopteris affinis*)
Small cow-wheat (*Melampyrum sylvaticum*)
Soft shield-fern (*Polystichum setiferum*)
Sweet violet (*Viola odorata*)
Toothwort (*Lathraea squamaria*)
Tormentil (*Potentilla erecta*)
Wild strawberry (*Fragaria vesca*)
Wood anemone (*Anemone nemorosa*)
Wood avens/Herb bennet (*Geum urbanum*)
False-brome (*Brachypodium sylvaticum*)
Wood horsetail (*Equisetum sylvaticum*)
Wood meadow-grass (*Poa nemoralis*)
Wood melick (*Melica uniflora*)
Wood millet (*Millium effusum*)
Wood sage (*Teucrium scorodonia*)
Wood-sedge (*Carex sylvatica*)

Wood-sorrel (*Oxalis acetosella*)

Wood speedwell (*Veronica montana*)

Wood spurge (*Euphorbia amygdaloides*)

Woodruff (*Galium odoratum*)

4.18 Arable Field Margins Characteristic species

These lists of characteristic species have been taken from Crawley (2005). The arable weed flora differs primarily with soil type (chalk, clay or sand) and soil moisture. There is variation in the relative abundance of different species between places and across different years in the same place. The timing of cultivation also influences the community.

Species included on Plantlife's list of rare arable plants are indicated with an asterisk.

Sandy soils

There is considerable overlap in the characteristic species found in the different NVC communities found on sandy soils.

Forbs	Grasses	Bryophytes
<i>Achillea millefolium</i>	<i>Agrostis capillaris</i>	<i>Brachythecium rutabulum</i>
<i>Aethusa cynapium</i>	<i>Agrostis gigantea</i>	<i>Bryum erythrocarpum</i>
<i>Anagallis arvensis</i>	<i>Agrostis stolonifera</i>	<i>Bryum rubens</i>
<i>Anchusa arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Ceratodon purpureus</i>
<i>Aphanes arvensis</i>	<i>Anisantha sterilis</i>	<i>Dicranella staphylina</i>
<i>Aphanes australis</i>	<i>Anthoxanthum odoratum</i>	<i>Phascum cuspidatum</i>
<i>Arabisdopsis thaliana</i>	<i>Apera spica-venti</i> *	<i>Pleuridium subulatum</i>
<i>Arenaria serpyllifolia</i>	<i>Avena fatua</i>	<i>Riccia sorocarpa</i>
<i>Capsella bursa-pastoris</i>	<i>Bromus hordeaceus</i>	
<i>Cerastium glomeratum</i>	<i>Elytrigia repens</i>	
<i>Chenopodium album</i>	<i>Holcus lanatus</i>	
<i>Chenopodium polyspermum</i>	<i>Holcus mollis</i>	
<i>Chrysanthemum segetum</i>	<i>Poa annua</i>	
<i>Cirsium arvense</i>	<i>Poa trivialis</i>	
<i>Conyza canadensis</i>		
<i>Coronopus didymus</i>		
<i>Crepis capillaris</i>		
<i>Equisetum arvense</i>		
<i>Erodium cicutarium</i>		
<i>Fallopia convolvulus</i>		
<i>Fumaria officinalis</i>		
<i>Galeopsis bifida</i>		
<i>Galeopsis tetrahit</i>		
<i>Galinsoga parviflora</i>		
<i>Geranium dissectum</i>		
<i>Geranium molle</i>		
<i>Gnaphalium uliginosa</i>		
<i>Juncus bufonius</i>		
<i>Lamium amplexicaule</i>		
<i>Lamium purpureum</i>		
<i>Matricaria discoidea</i>		
<i>Matricaria recutita</i>		
<i>Medicago lupulina</i>		
<i>Myosotis arvensis</i>		
<i>Myosotis discolor</i>		
<i>Ornithopus perpusillus</i>		
<i>Papaver argemone</i> *		
<i>Papaver dubium</i>		
<i>Papaver rhoeas</i>		
<i>Persicaria lapathifolium</i>		

Forbs	Grasses	Bryophytes
<i>Persicaria maculosa</i>		
<i>Polygonum aviculare</i>		
<i>Raphanus raphanistrum</i>		
<i>Rumex acetosella</i>		
<i>Rumex crispus</i>		
<i>Senecio vulgaris</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Solanum nigrum</i>		
<i>Sonchus asper</i>		
<i>Spergula arvensis</i>		
<i>Stachys arvensis</i>		
<i>Stellaria media</i>		
<i>Trifolium arvense</i>		
<i>Trifolium dubium</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Urtica urens</i>		
<i>Veronica arvensis</i>		
<i>Veronica persica</i>		
<i>Viola arvensis</i>		
<i>Viola tricolor</i>		

Clay soils

As with sandy soils, there is overlap between the lists of characteristic species.

Forbs	Grasses	Bryophytes
<i>Aethusa cynapium</i>	<i>Agrostis stolonifera</i>	<i>Barbuda unguiculata</i>
<i>Anagallis arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Bryum rubens</i>
<i>Anchusa arvensis</i>	<i>Anisantha sterilis</i>	<i>Dicranella staphylina</i>
<i>Anthemis cotula</i>	<i>Avena fatua</i>	<i>Eurhynchium praelongum</i>
<i>Aphanes arvensis</i>	<i>Avena sterilis ssp. ludoviciana</i>	<i>Phascum cuspidatum</i>
<i>Artemisia vulgaris</i>	<i>Elytrigia repens</i>	<i>Portia intermedia</i>
<i>Atriplex patula</i>	<i>Holcus lanatus</i>	<i>Riccia sorocarpa</i>
<i>Atriplex prostrata</i>	<i>Holcus mollis</i>	
<i>Capsella bursa-pastoris</i>	<i>Poa annua</i>	
<i>Cerastium fontanum</i>	<i>Poa trivialis</i>	
<i>Chenopodium album</i>		
<i>Chrysanthemum segetum</i>		
<i>Cirsium arvense</i>		
<i>Conyza canadensis</i>		
<i>Coronopus squamatus</i>		
<i>Diplotaxis muralis</i>		
<i>Equisetum aparine</i>		
<i>Geranium dissectum</i>		
<i>Gnaphalium uliginosum</i>		
<i>Juncus bufonius</i>		
<i>Lamium amplexicaule</i>		
<i>Lamium hybridum</i>		
<i>Lamium purpureum</i>		
<i>Lapsana communis</i>		
<i>Legousia hybrida</i>		
<i>Matricaria discoidea</i>		
<i>Matricaria recutita</i>		
<i>Mercurialis annua</i>		

Forbs	Grasses	Bryophytes
<i>Misopates orontium</i>		
<i>Myosotis arvensis</i>		
<i>Papaver dubium</i>		
<i>Papaver rhoeas</i>		
<i>Persicaria lapathifolium</i>		
<i>Persicaria maculosa</i>		
<i>Plantago lanceolata</i>		
<i>Plantago major</i>		
<i>Polygonum arenastrum</i>		
<i>Polygonum aviculare</i>		
<i>Potentilla anserina</i>		
<i>Ranunculus arvensis</i> *		
<i>Ranunculus repens</i>		
<i>Raphanus raphanistrum</i>		
<i>Rumex crispus</i>		
<i>Scandix pecten-veneris</i> *		
<i>Senecio vulgaris</i>		
<i>Sherardia arvensis</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Solanum nigrum</i>		
<i>Sonchus arvensis</i>		
<i>Sonchus asper</i>		
<i>Sonchus oleraceus</i>		
<i>Stellaria media</i>		
<i>Thlaspi arvensis</i> *		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Tussilago farfara</i>		
<i>Urtica urens</i>		
<i>Veronica arvensis</i>		
<i>Veronica persica</i>		
<i>Veronica polita</i>		
<i>Vicia sativa ssp. sativa</i>		
<i>Viola arvensis</i>		

Chalky soils

The distinctive feature of the arable weed flora of chalky soils is the absence of *Capsella* and *Senecio vulgaris* and the presence of *Kickxia* spp.

Forbs	Grasses	Bryophytes
<i>Aethusa cynapium</i>	<i>Agrostis stolonifera</i>	<i>Barbula convoluta</i>
<i>Anagallis arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Barbula fallax</i>
<i>Anthemis cotula</i>	<i>Anisantha sterilis</i>	<i>Barbula unguiculata</i>
<i>Arenaria serpyllifolia ssp. leptoclados</i>	<i>Avena fatua</i>	<i>Bryum klinggraeffii</i>
<i>Atriplex patula</i>	<i>Dactylis glomerata</i>	<i>Bryum microerythrocarpum</i>
<i>Cerastium fontanum</i>	<i>Elytrigia repens</i>	<i>Bryum rubens</i>
<i>Chaenorhinum minus</i>	<i>Lolium perenne</i>	<i>Dicranella schreberana</i>
<i>Chenopodium album</i>	<i>Poa annua</i>	<i>Dicranella staphylina</i>
<i>Cirsium arvense</i>	<i>Poa trivialis</i>	<i>Dicranella varia</i>
<i>Cirsium vulgare</i>		<i>Ephemerum recurvifolium</i>
<i>Convolvulus arvensis</i>		<i>Eurhynchium praelongum</i>
<i>Euphorbia exigua</i>		<i>Phascum curvicolium</i>
<i>Euphorbia helioscopia</i>		<i>Phascum cuspidatum</i>
<i>Fallopia convolvulus</i>		<i>Phascum floerkeanum</i>

Forbs	Grasses	Bryophytes
<i>Filago pyramidata</i> *		<i>Pottia recta</i>
<i>Fumaria densiflora</i> *		<i>Pottia starkeana</i>
<i>Fumaria officinalis</i>		<i>Pottia truncata</i>
<i>Fumaria parviflora</i> *		<i>Weissia crispa</i>
<i>Fumaria vaillantii</i> *		
<i>Galeopsis angustifolia</i> *		
<i>Galium aparine</i>		
<i>Geranium dissectum</i>		
<i>Iberis amara</i> *		
<i>Kickxia elatine</i>		
<i>Kickxia spuria</i>		
<i>Lapsana communis</i>		
<i>Legousia hybrida</i>		
<i>Linaria vulgaris</i>		
<i>Lithospermum arvense</i>		
<i>Malva sylvestris</i>		
<i>Matricaria discoidea</i>		
<i>Medicago lupulina</i>		
<i>Mentha arvensis</i>		
<i>Myosotis arvensis</i>		
<i>Odontites vernus</i> ssp. <i>serotinus</i>		
<i>Papaver rhoeas</i>		
<i>Petroselinum segetum</i>		
<i>Plantago major</i>		
<i>Polygonum aviculare</i>		
<i>Ranunculus repens</i>		
<i>Reseda lutea</i>		
<i>Scandix pecten-veneris</i> *		
<i>Sherardia arvensis</i>		
<i>Silene latifolia</i>		
<i>Silene noctiflora</i> *		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Sonchus asper</i>		
<i>Stellaria media</i>		
<i>Trifolium pratense</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Urtica dioica</i>		
<i>Valerianella carinata</i>		
<i>Valerianella dentata</i> *		
<i>Valerianella ramosa</i>		
<i>Veronica persica</i>		
<i>Veronica polita</i>		
<i>Viola arvensis</i>		

Arable Field Margin Indicator Species in the three counties

The following vascular arable species have been recorded in Berkshire, Buckinghamshire or Oxfordshire since 1970. Some species have been defined as rare using three classifications.

- Rare (P) is based on the species' classification as 'Threatened'. These species have a Plantlife individual species score of 7, 8 or 9, based on their occurrence within 10-km squares and/or their recent decline (Byfield & Wilson, 2005).
- Rare (C) is based on the species' listing in fewer than three 1-km squares in the Vice-County of Berkshire by Crawley (2005).
- Rare (M) is based on the Buckinghamshire Rare Plant list by R. Maycock and BMERC (2008)

The preferred soil type is also shown.

Species	Rarity	Sandy soils	Clay soils	Chalky soils	In Berks, Bucks or Oxon since 1970?
<i>Adonis annua</i>	Rare (P)			√	Oxon
<i>Althaea hirsuta</i>	Rare (P)			√	Berks + Oxon
<i>Apera interrupta</i>		√		√	Berks + Oxon
<i>Apera spica-venti</i>		√			Berks, Bucks & Oxon
<i>Centaurea cyanus</i>	Rare (P)	√	√		Berks + Oxon
<i>Erodium moschatum</i>	Rare (C)	√			Oxon
<i>Euphorbia platyphyllos</i>	Rare (C)		√		Berks, Bucks & Oxon
<i>Filago pyramidata</i>	Rare (P)			√	Oxon
<i>Fumaria bastardii</i>		√			Berks + Oxon
<i>Fumaria capreolata</i>	Rare (C)				Oxon
<i>Fumaria densiflora</i>				√	Berks, Bucks & Oxon
<i>Fumaria parviflora</i>	Rare (P) (C)			√	Bucks & Oxon
<i>Fumaria purpurea</i>		√			Oxon
<i>Fumaria vaillantii</i>	Rare (P)			√	Berks, Bucks & Oxon
<i>Galeopsis angustifolia</i>	Rare (P) (C)			√	Berks, Bucks & Oxon
<i>Galium tricornutum</i>	Rare (P) (C)		√		Bucks & Oxon
<i>Hyoscyamus niger</i>	Rare (P)	√		√	Berks, Bucks & Oxon
<i>Hypochaeris glabra</i>	Rare (P) (C)	√			Oxon
<i>Iberis amara</i>	Rare (P)			√	Berks, Bucks & Oxon
<i>Lathyrus aphaca</i>	Rare (P) (M)		√	√	Bucks & Oxon
<i>Myosurus minimus</i>	Rare (P) (M)		√		Berks, Bucks & Oxon
<i>Papaver argemone</i>	Rare (P)	√	√	√	Berks, Bucks & Oxon
<i>Papaver hybridum</i>				√	Berks, Bucks & Oxon
<i>Polygonum rurivagum</i>			√	√	Berks & Bucks
<i>Ranunculus arvensis</i>	Rare (P)		√		Berks, Bucks & Oxon
<i>Ranunculus parviflorus</i>	Rare (C)	√	√	√	Berks, Bucks & Oxon
<i>Scandix pecten-veneris</i>	Rare (P)		√	√	Berks, Bucks & Oxon
<i>Silene gallica</i>	Rare (P)	√			Bucks & Oxon
<i>Silene noctiflora</i>	Rare (P) (M)			√	Berks, Bucks & Oxon
<i>Thlaspi perfoliatum</i>	Rare (P)		√	√	Oxon
<i>Torilis arvensis</i>	Rare (P)		√	√	Berks, Bucks & Oxon
<i>Valerianella dentata</i>	Rare (P)			√	Berks, Bucks & Oxon
<i>Vicia parviflora</i>	Rare (P)		√		Berks, Bucks & Oxon

Appendix 3

Criteria for identifying Local Wildlife Sites based on species information: dragonflies/damselflies (Odonata)

Version	Date	Author	Notes
1.0	January 2008	MCH	Initial draft

General guidance

- Species that are not native to the UK will not be considered unless a clear case can be made for their conservation importance
- Sites will only be selected if it can be shown that the site contains resources necessary to support a population.
- There are three criteria under which sites can qualify:
 - A. Sites which support one or more 'notable' species.
 - B. Sites which support a significant population of a species that has a restricted distribution or has substantially declined in population or range. For Odonata this criterion has not been used.
 - C. Sites which support an outstanding assemblage of species (assemblages to be defined locally).

The criteria used here are based on the "Key Site" criteria developed by the British Dragonfly Society, see: <http://www.dragonflysoc.org.uk/keysites.html>

For selection as a LWS, a site must qualify as a "Confirmed Key Site" under the BDS criteria. The BDS criteria also allow for the identification of "Possible" and "Probable" Key Sites – although these would not be selected as LWS without additional information, it is recommended that any such sites are kept under review to see whether they would qualify as "Confirmed" Key Sites in the future.

Criterion A: Sites which support one or more 'notable' species.

Any site that qualifies as a "Confirmed key site" under the BDS criteria for Species Importance may be considered under Criterion A.

Any site with evidence of successful breeding of one or more important species (as listed in Table A) that are either abundant or persistent at the site can be considered for LWS status under Criterion A.

Definitions of "successful breeding" and "abundant or persistent" are given in the BDS criteria, appended below.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS previously designated under Criterion A on the basis of Odonata now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken.

Species in Table A are those that are listed by BDS as being nationally or locally important in the Thames Valley and Buckinghamshire.

Table A

Species	English name	WCA	UKBAP	National status	Local status
<i>Aeshna juncea</i>	Common Hawker				Locally Important (Thames Valley)
<i>Brachytron pratense</i>	Hairy Dragonfly				Locally Important (Thames Valley)
<i>Ceriagrion tenellum</i>	Small Red Damselfly			Nationally Scarce	
<i>Coenagrion mercuriale</i>	Southern Damselfly	Sch 5 (full)	Priority	Endangered	
<i>Coenagrion pulchellum</i>	Variable Damselfly			Near Threatened	
<i>Cordulegaster boltonii</i>	Golden-ringed Dragonfly				Locally Important (Thames Valley)
<i>Cordulia aenea</i>	Downy Emerald				Locally Important (Thames Valley)
<i>Gomphus vulgatissimus</i>	Club-tailed Dragonfly			Near Threatened	
<i>Ischnura pumilio</i>	Scarce Blue-tailed Damselfly			Near Threatened	
<i>Libellula fulva</i>	Scarce Chaser			Near Threatened	
<i>Orthetrum coerulescens</i>	Keeled Skimmer				Locally Important (Thames Valley)
<i>Somatochlora metallica</i>	Brilliant Emerald			Vulnerable	

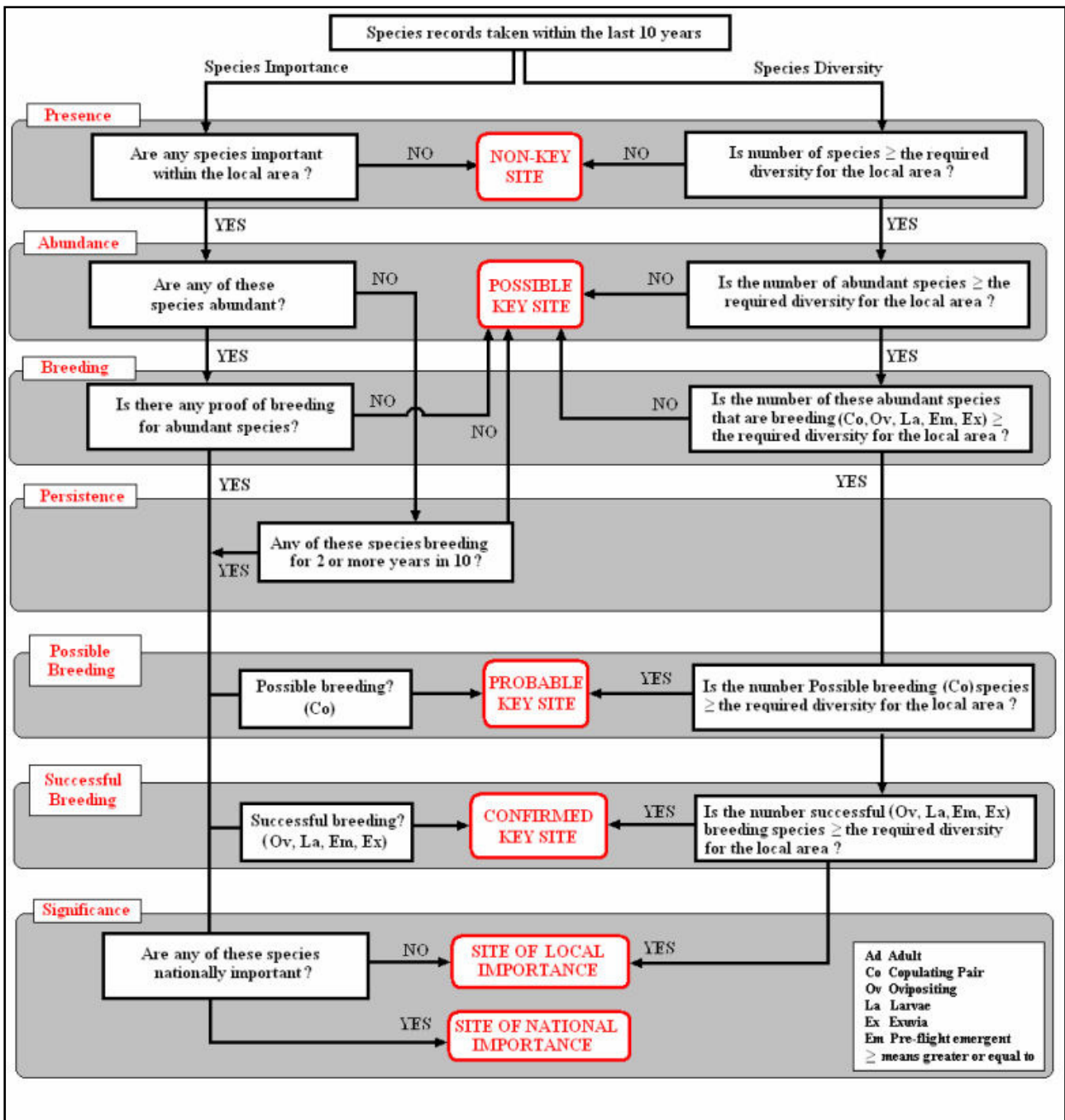
Criterion C: Sites which support an outstanding assemblage of species.

Any site that qualifies as a “Confirmed key site” under the BDS criteria for Species Diversity may be considered under Criterion C.

Any site with evidence, within the last ten years, of successful breeding of 14 or more species that are abundant at the site can be considered for LWS status under Criterion C.

Definitions of “successful breeding” and “abundant” are given in the BDS criteria, appended below.

British Dragonfly Society - Key Sites Criteria



Explanation of each of the seven steps

1. Presence

Recording the **presence of species** found at the site indicates important species or a high diversity of species at that site. It does not however indicate whether these species form viable populations, able to regularly breed.

Presence only records therefore means that a site can only be determined as a **Possible Key Site**.

To confirm the site as a key site, additional recording of abundance and evidence of breeding of these important or diverse species is required.

2. Abundance

Recording the **abundance of species** gives a better indication of a viable population at the site. As shown on the RA83 recording card, population numbers are estimated within ranges, each given a letter A to F. This estimation may be from any lifestage.

For **damselfly species**, recording over 21 individuals (estimated number "D") can be regarded as indicating an abundant population. For the two rarer damselfly species, listed below, fewer individuals are often seen. For these species recording 6 or more individuals (estimated number "C") may indicate an abundant population.

- Scarce Emerald Damselfly (*Lestes dryas*)
- Scarce Blue-tailed Damselfly (*Ischnura pumilio*)

For **dragonfly species**, recording 6 or more individuals (estimated number "C") can be regarded as indicating an abundant population. A number of species are commonly seen at larger numbers. For these species listed below recording over 21 individuals (estimated number "D") is required to indicate an abundant population.

- Migrant Hawker (*Aeshna mixta*)
- Four-spotted Chaser (*Libellula quadrimaculata*)
- Keeled Skimmer (*Orthetrum coerulescens*)
- Black-tailed Skimmer (*Orthetrum cancellatum*)
- Common Darter (*Sympetrum striolatum*)
- Ruddy Darter (*Sympetrum sanguineum*)
- Black Darter (*Sympetrum danae*)

Recording abundance does not provide actual evidence of a breeding population at a site. Therefore sites with important or diverse species can only be determined as a **Possible Key Site**.

To confirm the site as a key site, additional evidence of breeding of these important or diverse species is required.

3. Breeding

Criteria for proof of breeding were defined by the Dragonfly Conservation Group, in March 2004. For the key site criteria evidence of breeding consists of recording one of the following.

- possible breeding (observation of **copulating pair**)
- probable successful breeding (observation of **ovipositing, larvae, or emergence**)
- confirmed successful breeding (presence of **exuviae**)

4. Persistence

In some sites finding the numbers required to determine abundance for important species may be difficult.

Difficulty with access, site conditions, weather conditions or behaviour of particular species may mean that these species fail to meet the abundance criteria, despite the presence of a good viable population at the site.

In these cases, the alternative of recording evidence of breeding on 2 or more occasions in the 10 year period can be taken as evidence of a persistent breeding population at the site.

5. Possible Breeding

Recording copulating pairs indicates possible breeding of species at the site.

Combined with recording of abundance or persistence of important or diverse species at a site, this indicates that the site is a key site

However, as copulating pairs are not evidence of successful breeding, then the site can only be determined as a **Probable Key Site**.

To confirm the site as a key site, additional evidence of successful breeding of these important or diverse species is required.

6. Successful Breeding

Recording successful breeding for an important or diverse species, either probable successful breeding (observation of **ovipositing, larvae, or emergence**) or confirmed successful breeding (presence of **exuviae**), on top of abundance or persistence, confirms the presence of a viable breeding population at the site.

This site is therefore a **Confirmed Key Site**.

7. Significance

At a national level key sites may be regarded as either of national or local significance.

Sites that have been determined as being a Probable or Confirmed Key Site, as a result of containing at least one viable breeding population of a nationally important species, are regarded as a **Site of National Importance**.

Alternatively, if the criteria have been met by recording species of local importance or a diverse number of species then the site is regarded as one of **Local importance**.