

## Part 2: Criteria for selection of Key Wildlife Sites

Gloucestershire's Key Wildlife Sites are selected according to the general criteria and principles listed below, used in conjunction with minimum thresholds for selection of particular habitat types and species populations.

### 2.1 Checklist of General Key Wildlife Site Criteria

#### 1 Size or extent

- a. the site is an exceptionally large area of an important natural or semi-natural habitat e.g. the largest in the county, or the largest within a distinct region of the county
- b. the site supports an exceptionally large and/or thriving population of an important species (as defined in the Species Criteria)
- c. the site supports a high proportion of the total area of an important habitat or the total numbers of an important species in the county and/or in a wider national or international context

#### **Principles for selection on the grounds of size or extent**

Each KWS should be large enough to provide adequate site-based protection for the feature(s) for which it has been designated. In general, the larger the site, the better potential for conserving the biodiversity associated with it.

#### *Rationale*

A larger site provides a wider range of opportunities for biodiversity and more chance to contain all the elements of a particular habitat. It also reduces the proportion of the site which is exposed to "edge effects" such as damage from adjacent human activities (a common problem with fragmented and linear sites). The larger species populations in a bigger site benefit from a greater resilience to fluctuating natural conditions, either because of their more diverse range of habitat opportunities or because they have a sufficiently large population to benefit from increased genetic diversity.

## 2 Diversity

- a. the site contains many of the typical species and assemblages – including stages of succession, subtypes and variations – for which a habitat type is considered important
- b. the site contains the majority of species typical of the habitat as it is found in the county in its most favourable condition
- c. the site contains a range of semi-natural habitats in close proximity
- d. a range of successional stages of habitat development are present on the site
- e. the habitats present exhibit a wide range of natural structural diversity

### **Principles for selection on the grounds of diversity**

Where a site is selected on the grounds of diversity, special consideration should be given to the future management of the site, so as to ensure that management of one element of the habitat does not disadvantage another element, which can result in a reduction in overall diversity. Guidelines for judging the importance of assemblages for some species groups, such as birds, are included in the Species Criteria.

#### *Rationale*

A site with a diversity of habitats is more likely to support a greater biodiversity, and gives species more opportunities to survive adverse circumstances. An interface between two habitat types may be used by more species than exist in either of the individual habitats on either side of the transition zone. Diverse sites also benefit those species whose life cycle requires a wide range of situations – e.g. semi-aquatic invertebrates. Diversity has other potential advantages: it is often aesthetically pleasing to visitors, and can provide good educational opportunities. It may therefore be linked with the criteria for Value for appreciation of nature, and Value for learning. Diversity is also closely related to size of site, site history, and connectivity within the landscape.

Where one element of habitat on a diverse site requires a particular management, there is a danger that other elements can be reduced (e.g. removal of scrub in favour of grassland, loss of invertebrates in rough grassland due to yearly mowing or heavy grazing). It is therefore important to note in a KWS Assessment whether the diversity of the site is in itself an important feature that should be preserved for the benefit of biodiversity, or whether some elements appear to be undesirable (e.g. burnt or littered areas) or invasive.



*A management annotation for wet grassland, showing desired structural diversity of the habitat. Sketches can help with management recommendations for diverse sites.*

### 3 Naturalness and typicalness

- a. compared with other examples in the county, the habitat present is notable for its lack of human disturbance, introduced plant or animal species, mechanical damage, litter, agricultural spray drift or other factors which could adversely affect the vegetation structure and/or species composition of the community
- b. the site is an excellent representative of a habitat or species population that forms a distinctive element of Gloucestershire's biodiversity
- c. the site represents an excellent example of a mosaic of associated habitats typical of Gloucestershire, e.g. floodplain grazing marsh, traditional orchards, species-rich hedgerows

#### **Principles for selection on the grounds of naturalness and/or typicalness**

The KWS criteria are designed to take into account the fact that much of the county's native biodiversity exists within semi-natural habitats that have been shaped by human activities. As is the practice nationally, site protection is more likely to be considered a priority if the habitats involved are considered to be:

- unusually pristine examples;
- exceptionally diverse;
- a recognised locally distinctive type, or
- impossible to restore once degraded or lost.

#### *Rationale*

There has been much discussion amongst conservationists about the relative importance of natural, semi-natural and recently-established habitats for biodiversity. A high proportion of native British Isles species have survived through colonising man-made environments during and following the removal of their original ecological niches. Such communities are known as semi-natural.

Semi-natural habitats are important both for the communities they support, and for the individual rare species that may occur there. Longstanding semi-natural habitats that have resulted from traditional land management practices tend to be more diverse and contain more rare species than farmland where regular rotations and modern fertilising systems are practiced. However, some more recent activities, such as quarrying, may also result in important areas of wildlife value. In the interests of biodiversity conservation, such sites will not be ruled out of the selection process just because they are not strictly “natural”.

The KWS selection process should reflect the prevailing scientific opinion that **all** habitats with a high complement of native species, in communities which form an interdependent ecosystem, should be valued for their contribution to biodiversity conservation, whether technically natural or semi-natural. This is of particular importance in the light of climate change, which may necessitate an adaptation in habitat or species distribution if biodiversity is to survive.

#### **4 Rare or Exceptional feature**

- a. the habitats and/or species present are rare, either in an international, national or county context
- b. the site is the only example of a particular habitat sub-type or variation that cannot be protected elsewhere in the county
- c. the scientific interest of the site is dependent on a rare or unique combination of site-related factors such as geology, aspect, soil type, microclimate, hydrology or altitude. Consequently, if the site was damaged or destroyed, the habitat and species communities present would be irreplaceable to the county
- d. the site supports habitats or species which are on the very edge of their natural range

#### **Principles for selection on the grounds of rarity or exceptional feature**

Sites will be assessed using the most recent species and habitat data available. A potential KWS will not be disqualified from selection on the grounds of deficient data; however, in such cases efforts will be made to confirm the importance of the site prior to designation as a matter of priority.

The presence of nationally important species will be a prime consideration when assessing potential KWS; however, simple presence of rare or protected species will not necessarily warrant KWS selection.

### *Rationale*

In the case of rare species, simple presence on the site might not necessarily imply that the site has a colony or is depended on in some other way by that species. Suitability of the site's habitat for such purposes should also be taken into account.

The acceptable dates for species records which are used in order to assess sites will vary with the species or group. In general, invertebrate and lower plant surveys are less frequent than bird and vascular plant surveys, therefore older records sometimes have to be accepted for use with invertebrate or lower plant-based criteria. Rarity evaluations will make use of the best species distribution information available at the time. If new information comes to light indicating that a species is significantly more common or more rare than previously thought, a site proposed for designation may require a re-evaluation.

It is recognised that for some significant species – e.g. bats in domestic roof-spaces – Local Site designation is not a suitable approach to conservation, which is better met by legal protection and provision of suitable advice. Such features should not, however, be ruled out of the KWS system completely, as management of associated habitats may benefit these species.

## **5 Fragility**

- a. the habitats and/or species present are fragile or vulnerable to loss, damage or exploitation, either in an international, national or county context

### **Principles for selection on the grounds of fragility**

Some sites may consist of scattered features, especially where the features in question are known to be fragile or vulnerable to “edge effects” due to fragmentation.

Where a KWS has vulnerable features, special care will be taken when visiting the site for survey and monitoring, and any management recommendations will be designed to minimised potential disturbance or damage.

KWS with fragile features are likely to include “buffering” or linking habitats. Reasons for the inclusion of such apparently-less-important areas will be made clear at the time of designation.

### *Rationale*

The designation of KWS with non-contiguous features is rare, but may be appropriate for such habitats as closely-related groups of ponds, or clusters of veteran trees, in otherwise-improved farmland. This is particularly the case where they, as a group, contribute jointly to the survival of more mobile species in the area. It is recognised that these fragments can be more vulnerable than larger sites, and that linking “corridors” may form an important part of their conservation. Because of this, fragile features are likely to require some less-important fringing and/or linking habitats within a KWS boundary.

The degree of fragility of some KWS features may not immediately be apparent. For example, rough grassland may look resilient to grazing or mowing, but support invertebrate populations which are highly vulnerable to damage or destruction (including through well-meaning conservation management aimed at optimising botanical features). Thus the invertebrate diversity of a site may be fragile and vulnerable, and management recommendations should reflect this.

Whilst it is important to conserve the county’s most fragile habitats and vulnerable species, there is always a danger of causing damage simply by visiting the site. It is therefore appropriate to include a full assessment of site vulnerability, including susceptibility to visitor pressure, in the management section of the KWS Assessment Sheet.



*“Nest” site of an oystercatcher, shortly after hatching.*

*Populations of ground-nesting birds are often very vulnerable to damage and disturbance, requiring careful timing of survey, monitoring and management activities.*

## 6 Recorded history and cultural associations

- a. the nature conservation interest of the site is dependent on a rare or unique combination of historical factors such as long-term land use and management patterns
- b. the habitats and species present have become established over a very long period of time and consequently represent a limited resource in the county, as they could not be replaced or substituted
- c. The site is a particularly good example of the positive influence of long-established cultural practice on biodiversity
- d. the site in question has exceptional potential for education and/or public appreciation of nature due to its longstanding recorded history

### **Principles for selection on the grounds of recorded history and cultural associations**

When considering whether to select a KWS on the basis of its recorded history and cultural associations, particular consideration will be given to the typicalness of the site as a Gloucestershire habitat, eg. Flood meadows, traditional orchards.

#### *Rationale*

Habitats with a long history of association with the county are particularly likely to benefit from recorded history and cultural associations, as they provide a direct link to the factors which made those habitats distinctive in a local context.

## 7 Wildlife corridors and other connected habitats

- a. the site forms part of an important, larger ecological unit which would be reduced in value as a whole if the site was damaged or destroyed
- b. the site forms a vital part of a sequence of habitats all of which are required in order to conserve a key population of an important species (e.g. semi-aquatic invertebrates)
- c. The site contributes significantly to a landscape-scale "corridor" of habitat(s) to enable species to adapt/move in response to climate change

### **Principles for selection on the grounds of wildlife corridors and connected habitats**

Special consideration will be given to situations where a collection of habitats forms part of a landscape-scale corridor or progression of habitats typical of the county. This includes sites that link fragmented habitats, and sites in areas such as floodplains where species tend to rely on movement and adaptation for their long-term survival.

When considering the importance of a site for landscape connectivity, Gloucestershire's Strategic Nature Areas (Nature Map), Landscape Character Areas (where applicable), Natural Areas and National Character Areas will all be taken into consideration.

### *Rationale*

Whilst KWS can be selected on the basis of one important feature, they can also contain several different important habitats and features. This is vital for the conservation of species which are dependent on the presence of several interrelated habitat types, e.g. invertebrates which have both aquatic and terrestrial life stages, and species using marginal habitats. It is also important in the Gloucestershire context, where large, homogeneous sites are rare, and the majority of semi-natural vegetation consists of a mix of different but interrelated habitats. Therefore, although most habitat types have special-case selection criteria which are enough to justify selection in their own right (eg. large areas of limestone grassland), each habitat will also be considered in the light of other, complementary site features.

Where there are "gaps" in habitat cover associated with a particular Strategic Nature Area, a site may be of special usefulness for the species typical of that area, even if it does not itself contain much that is rare or vulnerable. It would be a mistake to leave such sites out of the KWS system, due to their importance for the adaptability and survival of species. This is especially important in the context of climate change, which may force some species further along their natural range in order to survive the changing suitability of the environment.

## **8 Value for appreciation of nature**

- a. Three or more of the following factors apply:
  - The site is adjacent to, or overlooked by, a residential area
  - There are well-used footpaths/cycleways/bridleways providing access to the site (official or permissive)
  - The site and its features of interest are accessible to people who are physically disabled
  - There is space to park at, or within easy walking distance of, the site
  - There is a local 'friends' type group concerned with beneficial conservation management on the site
  - The site is used by community groups
- b. There is a well-established history of community involvement with positive nature conservation management of the site



### **Principles for selection on the grounds of value for appreciation of nature**

A KWS may be selected purely because it is an excellent example of a place which is highly valued for its natural appeal, leading to greater appreciation of biodiversity and a high level of support for its conservation and enhancement.

Such sites will not be selected purely on “accessibility” grounds where there is an unavoidable likelihood of human activities damaging the biodiversity on the site.

A site which is otherwise a good candidate for KWS selection may be **less** suitable as a KWS due to very heavy use by members of the public who value the site for very different reasons. In such cases, the site may benefit from designation as a KWS, but should be designated only where there is a way of addressing problems in a positive manner. All such factors should be detailed on the site Assessment Sheet for the Selection Panel to consider.



*Accessible Key Wildlife Sites – such as this public footpath through a woodland carpeted with wild daffodils – are often the only places where members of the public can encounter wildlife, throughout the seasons, within easy reach of where they live*

### *Rationale*

People value wildlife sites for reasons other than their scientific importance for biodiversity conservation. It may be an attractive area to walk, or for a picnic, or it may provide a view from a window, or it could have a local historical association. These activities all provide opportunities for appreciation of nature whilst they are carried out on a diverse site with thriving, attractive habitats and species. The appeal of such sites increases public advocacy for wildlife, and contributes to the quality of life of those living nearby. If such a site is damaged, whilst the dismay of users may be on aesthetic rather than biodiversity grounds, the fact that the site is known and valued still serves to further the cause of mending the damage, spreading the word about the nature conservation interest on the site, and taking protective measures in future.

## **9 Value for learning**

- a. the site provides the best or only Gloucestershire example of a situation where a threatened or declining habitat or species of high nature conservation interest for which there is a research need may effectively be studied
- b. the site has one or more features of nature conservation importance that would not ordinarily qualify for KWS or SSSI selection, but which are known to be declining or having to adapt due to factors which cannot be prevented, and for which research over the medium or long term is crucial for the success of conservation efforts elsewhere
- c. the site is exceptionally well-placed to offer educational opportunities either by its proximity to a school or other place of learning, or its easy accessibility for study of the species and habitats present without causing unacceptable damage or disturbance

### **Principles for selection on the grounds of value for learning**

KWS may be selected purely on the grounds of excellence for the understanding of biodiversity, even where other criteria are not met.

Where there is a potential for disturbance to wildlife but also a high potential for educational value, an effort should be made to designate the site as a KWS in conjunction with site users, so that risks to biodiversity can be reduced whilst keeping the educational benefits.

### *Rationale*

Since the publication of the Ratcliffe criteria, which did not include educational value as a criterion for selection of protected sites (see Part 1), the importance of education for the benefit and enjoyment of biodiversity has been given greater recognition. DEFRA guidelines for selection of Local Sites make a point of including value for learning, on the understanding that awareness of biodiversity is highly beneficial for the future of local habitats and species in both the short and long term.

## **2.2 Using the Criteria**

The checklist of general site criteria is applicable to each site under consideration. Sites which fulfil at least one of these criteria will be selected as KWS. The detailed, minimum thresholds for selection on the grounds of a particular habitat or species should be used as a guide to whether one or more of the general criteria have been met; note that sites will not necessarily be selected just because they meet the minimum habitat or species requirement (see 2.5, below).

In order to meet criteria which require “exceptional” or “excellent” quality, the features in question should be recognised by the selection panel as outstanding within the county context. As a broad guide, an excellent site is likely to be in at least the top ten percent of its class. Exceptional sites should be unanimously agreed upon as a best example in the county context.

## **2.3 Choosing KWS boundaries**

Well-defined boundaries are crucial to the success of any network of protected sites. In defining KWS boundaries there are two potentially conflicting considerations:

1. The boundary should be the minimum necessary –
  - a) to avoid unnecessary restrictions on land owners;
  - b) to maintain the site integrity and high standards of the Key Wildlife Site system;
  
2. At the same time the boundary must be large enough to protect the site adequately, by ensuring that all the important features are included and that an appropriate conservation management regime can be maintained.

In defining boundaries it should be possible to explain to individual landowners why their land is included in the site while other lands are not. The KWS selection panel should therefore be able to agree that, on balance, a consistent, logical and methodical approach to defining site boundaries has been employed. Boundaries must be clearly indicated on a map, showing any hedges, streams or other linear features which are considered to be part of the designation. Other semi-natural habitats will be also be included where they are considered vital for the survival of the key ecological features for which the site has been selected. This might include:

- crucial feeding areas for a rare species;
- linking habitats, without which the site would be threatened by fragmentation;
- hydrological features on which the habitat depends, or
- other less-diverse habitats without which the most important habitats and species on a KWS could not be adequately conserved.

**Whatever the site includes, the position of the boundaries should be clear both on the map and in the field, with existing recognisable field and management boundaries used wherever possible.**

## **2.4 Making the assessment**

In order to evaluate a site based on the standard survey information, and incorporating the criteria above, an Assessment Sheet should be filled in, showing the surveyors' interpretation of habitat classification, quality and structure, and how the site fits the Criteria. This is to ensure a consistent approach of appraisal for each site, minimising subjectivity. Completed Assessment Sheets should be presented to the Site Selection Panel.

**A fully-worked example of a KWS Assessment Sheet is shown in Appendix 1<sup>1</sup>.**

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<sup>1</sup> With acknowledgements to Berks, Bucks & Oxon Wildlife Trust: *Local Wildlife Sites Criteria* (BBOWT, 2008)

## 2.5 Minimum habitat selection thresholds

All sites should fulfil at least one of the criteria in the Checklist of General Key Wildlife Site Criteria in Section 2.1. The following minimum habitat selection thresholds should be used as a guide to whether a site fulfils the general criteria or not, and as a guide to site assessment. In the case of manmade or complicated habitats, extra guidance is included such as checklists of features and indicator species. Habitats which are crucially associated with a particular key species are given their own section, as these categories may override the usual minimum thresholds.

This section is arranged into common habitat types for ease of reference. However, the selection process takes into account the importance of mosaic habitat communities, including examples of natural zonation of successional stages in vegetation development, and valuable mixed habitat corridors, as well as good examples of individual habitats.

Some habitat selection thresholds depend on lists of **indicator plant species**. Where these occur on **Table S1a of Appendix 3** (i.e. they are vascular plants of high conservation concern in Gloucestershire) they are marked with an **asterisk\***. Species on **Table S1b** (e.g. vascular plants with 10% or more of their English hectads in Gloucestershire) they are marked with **two asterisks\*\***. Some may be on both lists.

### Important note:

A site will be selected if the Selection Panel deems that it fulfils at least one of the general criteria for site selection in Section 2.1, **not** just because it fulfils the minimum threshold. **Sites which only support habitats with features that do not meet the minimum thresholds below will not normally be selected as KWS unless other factors – such as value for learning or nature appreciation – are particularly well-represented.**

## H1 Woodland and scrub

### Related Priority Habitats:

Lowland mixed deciduous woodland  
Lowland beech and yew woodland  
Wet woodland  
Scrub (Local Priority)  
Veteran trees (Local Priority)  
Green infrastructure (Local Priority)

## **H1.1 – All semi-natural broad-leaved woodland sites larger than 2ha which support 15 or more species from Table H1**

### *Rationale*

Semi-natural woodlands are one of the most species-rich habitat types in Britain owing to their structure and, in the case of ancient woodlands, longevity.

Whilst all woods are of local value it is not possible to argue county significance of very small woods in the absence of other factors. The size limit of 2 hectares coincides with that used by English Nature in their inventories of ancient woodlands; however, this includes some sites with very limited taxonomic and structural diversity. Only the best examples which fit the checklist of criteria in Section 2.1 should be designated as KWS.

**Table H1** should be used as a guide to whether a site over 2ha in extent is worth selecting. Note that it includes distinctive woodland ride species as well as trees, shrubs and groundflora; Table H1 also includes wet ride and woodland species.

As woodland coverage of the county is complicated by large tracts of woodland such as the central area of the Forest of Dean, often consisting of many smaller compartments, the following guidelines for implementation should be applied:

- Survey information should be present to back up the Ancient Woodland Inventory, sites should not be identified on AWI alone;
- The woodland area for which survey information is available must be 2 ha or more;
- For discrete woodlands where there is both broadleaf and coniferous cover, the whole woodland should be identified, provided the area of broadleaves is greater than 2 ha.

## **H1.2 – All wet woodlands (to include NVC categories W1, W5, W6 and W7) which support 10 or more species from Table H1**

### *Rationale*

Many species are unique to wet woodland. This habitat type is intrinsically fragile and may be altered by natural and man made processes. It is a rare habitat in the county and all good examples which fit at least one of the general KWS criteria should be conserved, even where they are smaller than the usual minimum size threshold for broadleaved semi-natural woodland.

H1.3 – Areas of scrub which are semi-natural in origin, greater than 2ha in extent, and support 15 or more species from Table H1, at least four of which are native, woody species.

Special consideration will be given to areas of scrub which fit Criterion 7 (re. Connectivity with the landscape) in addition to one or more of the other general KWS criteria.

*Rationale*

Semi-natural scrub is a common habitat, and, where isolated from other habitats, can offer little to support a diverse bird or invertebrate community. However, when it occurs in conjunction with other habitats it is valuable to a range of native species, both as a food source and as an element of more open habitat<sup>2</sup>. For example, grassland birds and butterflies may depend on the presence of scrub in order to take full advantage of the available grassland habitat. Scrub also offers a valuable transition habitat where woodland grades into grassland, and can support woodland groundflora. If left, semi-natural scrub is a precursor to semi-natural woodland, and the source of all new semi-natural woodland.

**Table H1 – Species in woodlands of high conservation concern in Gloucestershire**

<i>Acer campestre</i>	Field maple
<i>Adoxa moschatellina</i>	Moschatel
<i>Alliaria petiolata</i>	Garlic mustard
<i>Allium ursinum</i>	Ramsons
<i>Alnus glutinosus</i>	Alder
<i>Anemone nemorosa</i>	Wood anemone
<i>Aquilegia vulgaris</i>	Columbine
<i>Arum maculatum</i>	Lords-and-ladies
<i>Asplenium adiantum-nigrum</i>	Black spleenwort
<i>Asplenium scolopendrium</i>	Hart's tongue
<i>Athyrium filix-femina</i>	Lady fern
<i>Betula pendula</i>	Silver birch
	Downy birch
<i>Betula pubescens</i>	(& intermediates with <i>B. pendula</i> )
<i>Blechnum spicant</i>	Hard fern

<sup>2</sup> See Mortimer, S.R., Turner, A.J., Brown, V.K., Fuller, R.J., Good, J.E.G., Bell, S.A. Stevens, P.A., Norris, D., Bayfield, N. and Ward, L.K.: *Report 308: The nature conservation value of scrub in Britain* (JNCC, 2000)

<i>Brachypodium sylvaticum</i>	Wood false-brome
<i>Bromopsis ramosa</i>	Hairy brome
<i>Buxus sempervirens</i>	Box
<i>Calamagrostis epigejos</i>	Wood small-reed
<i>Campanula trachelium</i>	Nettle-leaved bellflower
<i>Cardamine amara</i>	Large bitter-cress
<i>Cardamine impatiens</i>	Narrow-leaved bittercress
<i>Cardamine pratensis</i>	Lady's smock
<i>Carex digitata</i> *	Fingered sedge
<i>Carex laevigata</i>	Smooth-stalked sedge
<i>Carex montana</i> *	Soft-leaved sedge
<i>Carex pallescens</i>	Pale sedge
<i>Carex pendula</i>	Pendulous sedge
<i>Carex remota</i>	Remote sedge
<i>Carex strigosa</i>	Thin-spiked wood sedge
<i>Carex sylvatica</i>	Wood sedge
<i>Carpinus betulus</i>	Hornbeam
<i>Castanea sativa</i>	Sweet chestnut
<i>Cephalanthera damasonium</i> *	White helleborine
<i>Cephalanthera longifolia</i> *	Narrow-leaved helleborine
<i>Cephalanthera rubra</i> *	Red helleborine
<i>Ceratocarpus claviculata</i>	Climbing corydalis
<i>Chrysosplenium alternifolium</i>	Alternate-leaved golden saxifrage
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved golden saxifrage
<i>Circaea lutetiana</i>	Enchanter's nightshade
<i>Cirsium eriophorum</i> **	Woolly thistle
<i>Colchicum autumnale</i> **	Meadow saffron / Autumn crocus
<i>Conopodium majus</i>	Pignut
<i>Convallaria majalis</i>	Lily-of-the-valley
<i>Cornus sanguineum</i>	Dogwood
<i>Corylus avellana</i>	Hazel
<i>Crataegus laevigata</i>	Midland hawthorn
<i>Crataegus monogyna</i>	Hawthorn
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid
<i>Daphne laureola</i>	Spurge laurel
<i>Daphne mezereum</i>	Mezereon
<i>Deschampsia cespitosa</i>	Tufted hair-grass
<i>Deschampsia flexuosa</i>	Wavy hair-grass



<i>Digitalis purpurea</i>	Foxglove
<i>Dipsacus pilosus</i> **	Small teasel
<i>Dryopteris affinis</i> agg.	Scaly male-fern
<i>Dryopteris carthusiana</i>	Narrow buckler-fern
<i>Dryopteris dilatata</i>	Broad buckler-fern
<i>Dryopteris filix-mas</i>	Male fern
<i>Elymus caninus</i>	Bearded couch
<i>Epilobium roseum</i>	Pale willowherb
<i>Epipactis helleborine</i>	Broad-leaved helleborine
<i>Epipactis leptochila</i> *	Narrow-lipped helleborine
<i>Epipactis purpurata</i>	Violet helleborine
<i>Equisetum sylvaticum</i>	Wood horsetail
<i>Euonymus europaeus</i>	Spindle
<i>Euphorbia amygdaloides</i>	Wood spurge
<i>Euphorbia serrulata</i> **	Upright spurge
<i>Festuca altissima</i>	Wood fescue
<i>Ficaria verna</i>	Lesser celandine
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fragaria vesca</i>	Wild strawberry
<i>Frangula alnus</i>	Alder buckthorn
<i>Fraxinum excelsior</i>	Ash
<i>Gagea lutea</i>	Yellow star-of-Bethlehem
<i>Galium odoratum</i>	Sweet woodruff
<i>Geranium sanguineum</i>	Bloody cranesbill
<i>Geum rivale</i>	Water avens
<i>Gymnocarpium dryopteris</i>	Oak fern
<i>Gymnocarpium robertianum</i> *	Limestone fern
<i>Helleborus foetidus</i> *	Stinking hellebore
<i>Helleborus viridis</i>	Green hellebore
<i>Hordelymus europaeus</i> *	Wood barley
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypericum montanum</i>	Pale St John's wort
<i>Hypericum pulchrum</i>	Slender St John's wort
<i>Hypopitys monotropa</i> *	Yellow bird's-nest
<i>Ilex aquifolium</i>	Holly
<i>Iris foetidissima</i>	Stinking iris
<i>Lamium galeobdolon</i>	Yellow archangel

<i>Lathraea squamaria</i>	Toothwort
<i>Lathyrus linifolius</i>	Bitter vetch
<i>Ligustrum vulgare</i>	Wild privet
<i>Lilium martagon</i>	Martagon lily
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Luzula forsteri</i>	Southern wood-rush
<i>Luzula pilosa</i>	Hairy wood-rush
<i>Luzula sylvatica</i>	Great wood-rush
<i>Lysimachia nemorum</i>	Yellow pimpernel
<i>Lysimachia nummularia</i>	Creeping Jenny
<i>Malus sylvestris</i>	Crab apple
<i>Melampyrum pratense</i>	Common cow-wheat
<i>Melica nutans</i>	Mountain melick
<i>Melica uniflora</i>	Wood melick
<i>Mercurialis perennis</i>	Dog's-mercury
<i>Milium effusum</i>	Wood millet
<i>Moehringia trinervia</i>	Three-veined sandwort
<i>Mycelis muralis</i>	Wall-lettuce
<i>Myosotis sylvatica</i>	Wood forget-me-not
<i>Narcissus pseudonarcissus</i>	Wild daffodil
<i>Neottia nidus-avis</i>	Bird's-nest orchid
<i>Neottia ovata</i>	Twayblade
<i>Ophioglossum vulgatum</i>	Adder's-tongue
<i>Ophrys insectifera</i>	Fly orchid
<i>Orchis mascula</i>	Early purple orchid
<i>Oreopteris limbosperma</i>	Lemon-scented fern
<i>Oxalis acetosella</i>	Wood sorrel
<i>Paris quadrifolia</i>	Herb Paris
<i>Platanthera chlorantha</i>	Greater butterfly orchid
<i>Poa nemoralis</i>	Wood meadow-grass
<i>Polygonatum multiflorum</i>	Solomon's-seal
<i>Polygonatum odorata*</i>	Angular Solomon's-seal
<i>Polypodium interjectum</i>	Intermediate polypody
<i>Polypodium vulgare</i>	Polypody
<i>Polystichum aculeatum</i>	Hard shield-fern
<i>Polystichum setiferum</i>	Soft shield-fern
<i>Populus tremula</i>	Aspen
<i>Potentilla sterilis</i>	Barren strawberry

<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i>	Primrose
<i>Prunus avium</i>	Wild cherry
<i>Prunus spinosa</i>	Blackthorn
<i>Pyrola minor**</i>	Common wintergreen
<i>Quercus petraea</i>	Sessile oak
<i>Quercus robur</i>	Pedunculate oak
<i>Ranunculus auricomus</i>	Goldilocks buttercup
<i>Ribes nigrum</i>	Black currant
<i>Ribes rubrum</i>	Red currant
<i>Ribes uva-crispa</i>	Gooseberry
<i>Rosa arvensis</i>	Field rose
<i>Rosa canina</i>	Dog-rose
<i>Rubia peregrina</i>	Wild madder
<i>Rubus idaeus</i>	Raspberry
<i>Rumex sanguineus</i>	Wood dock
<i>Salix capraea</i>	Goat willow
<i>Salix cinerea</i>	Grey willow
<i>Sambucus nigra</i>	Elder
<i>Sanicula europaea</i>	Sanicle
<i>Schedonorus giganteus</i>	Giant fescue
<i>Scirpus sylvaticus</i>	Wood club-rush
<i>Sedum telephium</i>	Orpine
<i>Silene dioica</i>	Red campion
<i>Solanum dulcamara</i>	Woody nightshade
	Common whitebeam
<i>Sorbus aria**</i>	AND any other native whitebeams
<i>Sorbus aucuparia</i>	Rowan
<i>Sorbus torminalis</i>	Wild service-tree
<i>Stellaria holostea</i>	Greater stitchwort
<i>Stellaria nemorum</i>	Wood stitchwort
<i>Taxus baccata</i>	Yew
<i>Teucrium scorodonia</i>	Wood sage
<i>Tilia cordata</i>	Small-leaved lime
<i>Tilia platyphyllos*</i>	Large-leaved lime
<i>Ulmus glabra</i>	Wych elm
	English elm
<i>Ulmus procera</i>	AND other native elms

<i>Vaccinium myrtillus</i>	Bilberry
<i>Veronica montana</i>	Wood speedwell
<i>Viburnum lantana</i>	Wayfaring tree
<i>Viburnum opulus</i>	Guelder rose
<i>Vicia sepium</i>	Bush vetch
<i>Vicia sylvatica</i>	Wood vetch
<i>Viola hirta</i>	Hairy violet
<i>Viola palustris</i>	Marsh violet
<i>Viola reichenbachiana</i>	Early dog-violet
<i>Viola riviniana</i>	Common dog-violet
<i>Viscum album</i>	Mistletoe
<i>Wahlenbergia hederacea</i>	Ivy-leaved bellflower

**H12.6 – special habitat for dormice – and H12.7 – special habitat for White-letter hairstreaks – may apply to woodland and scrub habitats. See below.**

**S3 – woodland bird assemblage – may also apply. See below.**

## **H2 Pasture Woodland and Mature Timber habitat**

### **Related Priority Habitats:**

Wood-pasture and parkland

Veteran trees (Local Priority)

Urban green space (parks) (Local Priority)

**H2.1 – All sites with 10 or more over-mature trees**

**H2.2 – All sites with an Alexander Index of saproxylic beetles of 10 or more<sup>3</sup>**

**H2.3 – All parkland sites**

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<sup>3</sup> Alexander, K.N.A., 2004. *Revision of the Index of Ecological Continuity as used for Saproxylic Beetles*

Note: Each species of saproxylic beetle is given a score from 0 to 3. The Index uses the sum of the scores of the species found at a site to arrive at a total score for the whole site. Sites with larger scores have been continuously wooded for longer than those with smaller scores. Sites scoring at least 80 are deemed to be of international importance, 25 or more for national importance and 15 or more for regional importance.

**S3 – woodland bird assemblage – may also apply. See below.**

**H12.7 – special habitat for White-letter hairstreaks – might also apply.**

Note: An over-mature tree is here defined as one which has significant decaying timber within the canopy or which has developed heart rot and or rot holes. Sap runs are an additional feature of importance.

### *Rationale*

Over-mature trees support a wide range of flora and fauna which are unique to them, particularly where the site has had a long and unbroken continuity of over mature trees and decaying timber.

Britain is unique in Western Europe for the extent of this habitat and so has an international responsibility for its conservation.

The most widespread type of site in Gloucestershire is pasture woodland, including wooded commons, historic parklands and the Cotswolds rough pastures with ash pollards etc. Also included may be areas with long-established orchards, concentrations of old hedgerow trees (especially in the Severn vale) and river and stream sections lined by old trees, including willow pollards. Ancient woodland sites which have had a history of traditional timber management may also be important.

## **H3 Hedgerows**

### **Related Priority Habitats:**

Hedgerows

Green infrastructure (Local Priority)

**H3.1 – Lengths of native hedgerow which satisfy the Hedgerows Regulations 1997 definition of an Important Hedgerow (see Appendix 2) will not qualify in their own right, but should be included in KWS boundaries if they are adjacent to qualifying sites;**

**H3.2 – Groups of Important Hedgerows as defined by the Hedgerows Regulations 1997 will qualify in their own right where they are continuous for at least three field boundaries, with a minimum of two connections of lengths (e.g. corners, junctions) and/or links to adjacent sites of interest e.g. SSSIs, KWS. Such groups will be selected as KWS where they fit at least one of the general KWS Criteria.**

**H12.6 – special habitat for dormice – and H12.7 – special habitat for White-letter**

hairstreaks – may apply to hedgerow habitats. See below.

*Rationale*

Species-rich hedgerows are now recognised as a UK Priority Habitat. Gloucestershire has a rich resource of well-established hedgerows, often forming the most diverse semi-natural habitat available in some parts of the countryside. They are a distinctive part of the landscape in all parts of the county, and form valuable connections between otherwise-isolated habitats, in addition to being a valuable habitat in their own right.

The relevant extracts from the Hedgerows Regulations 1997 are shown in **Appendix 2**.

**H4 Traditional Orchards**

**Related Priority Habitats:**

- Traditional Orchards
- Veteran trees (Local Priority)
- Green infrastructure (Local Priority)

**H4 any traditional orchard with 5 or more mature or overmature fruit or nut trees from Table H4**

**Table H4:** Tree fruit and nut species found in traditional orchards in Gloucestershire

<i>Corylus avellana</i> , <i>Corylus maxima</i> and relevant <i>Corylus</i> hybrids	hazelnut – encompassing all varieties of hazel, filbert, cob and hybrids thereof.
<i>Cydonia oblonga</i>	quince
<i>Juglans regia</i> , including those on <i>Juglans hindsii</i> or related rootstock	walnut
<i>Malus spp.</i>	encompassing all varieties of apple
<i>Mespilus germanica</i>	medlar
<i>Morus alba</i>	White mulberry
<i>Morus nigra</i>	Black mulberry
<i>Prunus spp.</i>	encompassing all varieties of edible, cultivated <i>Prunus</i> species: plum, gage, quetsche, damson, myrobalan, peach, apricot, cherries and hybrids thereof.
<i>Pyrus spp.</i>	encompassing all varieties of pear

### Additional guidance on using the KWS criteria with orchards

Although not a semi-natural habitat as such, traditional orchards which meet the minimum threshold may be deemed to fit the Criteria for points including, but not limited to, the following:

<b>Orchard features</b>	<b>Relevant KWS Criteria</b>
The orchard contains or is adjacent to the following habitats: ancient woodland, parkland/wood pasture, species-rich hedgerows, unimproved grassland, ponds;	7. Connectivity in the landscape
There are fruit or nut trees present of a suitable age and condition for noble chafer and other saproxylic invertebrates, with a minimum girth size at breast height of 0.90m (apple/pear/cherry) or 0.60m (plum/damson/gage) <sup>4</sup> ;	2. Diversity 3. Naturalness and typicalness 4. Rarity 5. Fragility 7. Connectivity in the landscape
The orchard supports a population of noble chafer	4. Rarity, fragility and vulnerability
The following tree features <sup>5</sup> are present:	
• >25% deadwood in canopy	2. Diversity
• Deadwood limbs attached	2. Diversity
• Bark condition – patches dead, loose, missing	2. Diversity
• Bark sap runs	2. Diversity
• Tears, scars & lightning strikes	2. Diversity
• Hollow trunks & major limbs	2. Diversity
• Rot holes	2. Diversity
• Whole dead trees	2. Diversity
• Particular educational value – eg Wolds End, Chipping Campden	2. Diversity
• Rare and/or local varieties are present e.g. rare Gloucestershire perry pear varieties	4. Rarity, fragility and vulnerability 7. History
• There is a history of traditional orchard management practices eg ridge-and-furrow	7. History

<sup>4</sup> These are the minimum girth of trees in which signs of noble chafer have been found

<sup>5</sup> These features are used in grades 1 & 2 of Keith Alexander's Orchard Grading System, as used in the Peoples' Trust for Endangered Species Orchard Inventory ground-truthing exercise

planting	
<ul style="list-style-type: none"> <li>• There are established trees of varying ages to provide 'succession' habitats</li> </ul>	2. Diversity

In addition to the above, Traditional orchards may well qualify for KWS selection under veteran tree or species criteria, or on the grounds of value for appreciation of nature.

*Rationale*

Despite anecdotal evidence of the high levels of biodiversity associated with traditional orchards, they were not officially included on the list of Priority Habitats until the UK Biodiversity Action Plan Review of 2005. A research report<sup>6</sup> at the time identified traditional orchards as biodiversity hotspots, often containing examples of other priority habitats such as hedgerows and species-rich grassland, in addition to supporting rare and scarce species associated with the old fruit trees present. These include lichens, saproxylic invertebrates and other species associated with hedgerows and woodland.

In addition to forming biodiversity hotspots in their own right, traditional orchards were identified as forming part of a series or network of habitats at a landscape scale, which are able sustain scarce lichens and beetles, and perhaps other taxa, that require continuity of habitat through time. This network is made up of orchards, hedgerow trees, wood pasture and ancient woodland, all of which are also Priority Habitats.



*The appeal and accessibility of traditional orchards makes Criterion 8: Value for appreciation of nature particularly relevant*

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<sup>6</sup> M. Lush, H. J. Robertson, K. N. A. Alexander, V. Giavarini, E. Hewins, J. Mellings, C. R. Stevenson and M. Storey. *English Nature Research Report No. XXX: The extent, distribution, biodiversity and management of traditional orchards in England*. EN, Peterborough, 2005



In view of the Report findings, Traditional orchards were added to the list of Priority Habitats. This is particularly significant for Gloucestershire, which has a large number of traditional orchards associated with its cultural history and locally distinctive landscape as well as biodiversity.

Where an orchard is surrounded by a hedge, H12.7 – special habitat for White-letter hairstreaks – may also apply.

## H5 Grassland

### Related Priority Habitats:

Lowland Dry Acid Grassland  
 Lowland Calcareous Grassland  
 Lowland Meadows  
 Coastal and Floodplain Grazing Marsh  
 Purple moor-grass and rush pastures  
 Marsh (Local Priority)  
 Road verges (Local Priority)  
 Urban green space (parks) (Local Priority)  
 Green infrastructure (Local Priority)  
 Open mosaic habitats on previously-developed land

**H5.1 – All grasslands larger than 0.5 ha which are identified as one or more of the NVC types in Table H5a and which support 15 or more species from Table H5c**

**Table H5a – High priority grassland types**

<b>NVC code</b>	<b>Characteristic species</b>
CG3	<i>Bromus erectus</i>
CG4	<i>Brachypodium pinnatum/rupestre</i>
CG5	<i>Bromus erectus – Brachypodium pinnatum/rupestre</i>
U4	<i>Festuca ovina – Agrostis capillaris – Galium saxatile</i>
U5	<i>Nardus stricta – Galium saxatile</i>
MG4	<i>Alopecurus pratensis – Sanguisorba officinalis</i>
MG5	<i>Cynosurus cristatus – Centaurea nigra</i>

H5.2 – Areas of semi-natural grassland larger than 0.5 ha which are identified as one or more of the NVC types in Table H5b and which support 20 or more species from Table H5c

**Table H5b – Other Semi-natural grassland types**

NVC code	Characteristic species
CG7	<i>Festuca ovina</i> – <i>Hieracium pilosella</i> – <i>Thymus praecox/pulegioides</i>
CG10	<i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Thymus praecox</i>
U1	<i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Rumex acetosella</i>
MG1	<i>Arrhenatherum elatius</i>
MG6	<i>Lolium perenne</i> – <i>Cynosaurus cristatus</i>
MG9	<i>Holcus lanatus</i> – <i>Deschampsia caespitosa</i>
MG10	<i>Holcus lanatus</i> – <i>Juncus effusus</i>
MG11	<i>Festuca rubra</i> – <i>Agrostis stolonifera</i> – <i>Potentilla anserina</i>
MG12	<i>Schedonorus arundinaceus</i>
MG13	<i>Agrostis stolonifera</i> – <i>Alopecurus geniculatus</i>

**Table H5c – Species occurring on grasslands of high conservation concern in Gloucestershire**

<i>Achillea ptarmica</i>	Sneezewort
<i>Agrimonia eupatoria</i>	Agrimony
<i>Aira caryophyllea</i>	Silvery hair-grass
<i>Aira praecox</i>	Early hair-grass
<i>Alchemilla sp.</i>	Lady's mantle
<i>Anacamptis morio</i>	Green winged orchid
<i>Anacamptis pyramidalis</i>	Pyramidal orchid
<i>Anthyllis vulneraria</i>	Kidney vetch
<i>Aquilegia vulgaris</i>	Columbine
<i>Arabis hirsuta</i>	Hairy rock-cress
<i>Asperula cynanchica</i>	Squinancy wort
<i>Astragalus danicus</i>	Purple milkvetch
<i>Astragalus glycyphyllos</i>	Wild licorice
<i>Betonica officinalis</i>	Betony
<i>Blackstonia perfoliata</i>	Yellow wort
<i>Briza media</i>	Quaking grass
<i>Calluna vulgaris</i>	Ling
<i>Caltha palustris</i>	Marsh marigold

<i>Campanula glomerata</i>	Clustered bellflower
<i>Campanula rotundifolia</i>	Harebell
<i>Carduus nutans</i>	Musk thistle
<i>Carex binervis</i>	Green-ribbed sedge
<i>Carex caryophylla</i>	Spring sedge
<i>Carex demissa</i>	Common yellow-sedge
<i>Carex disticha</i>	Brown sedge
<i>Carex distans</i>	Distant sedge
<i>Carex echinata</i>	Star sedge
<i>Carex flacca</i>	Glaucous sedge
<i>Carex humilis*</i>	Dwarf sedge
<i>Carex lepidocarpa</i>	Long-stalked yellow-sedge
<i>Carex leporina</i>	Oval sedge
<i>Carex nigra</i>	Common sedge
<i>Carex pallescens</i>	Pale sedge
<i>Carex panicea</i>	Carnation sedge
<i>Carex pilulifera</i>	Pill sedge
<i>Carex pulicaris</i>	Flea sedge
<i>Carex spicata</i>	Spiked sedge
<i>Carlina vulgaris</i>	Carlina thistle
<i>Centaurea nigra</i>	Lesser knapweed
<i>Centaurea scabiosa</i>	Greater knapweed
<i>Centaureum erythraea</i>	Common centaury
<i>Cirsium acaule</i>	Stemless thistle
<i>Cirsium dissectum</i>	Meadow thistle
<i>Cirsium eriophorum</i>	Woolly thistle
<i>Clinopodium acinos*</i>	Basil-thyme
<i>Clinopodium vulgare</i>	Wild basil
<i>Coeloglossum viride*</i>	Frog orchid
<i>Colchicum autumnale**</i>	Meadow saffron
<i>Conopodium majus</i>	Pignut
<i>Cynoglossum officinale</i>	Hound's-tongue
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid
<i>Dactylorhiza praetermissa</i>	Southern marsh orchid
<i>Danthonia decumbens</i>	Heath grass
<i>Deschampsia flexuosa</i>	Wavy hair grass
<i>Desmazeria rigida</i>	Fern-grass
<i>Echium vulgare</i>	Viper's bugloss
<i>Eleocharis palustris</i>	Common spike-rush

<i>Eleocharis uniglumis</i>	Slender spike-rush
<i>Epipactis helleborine</i>	Broad-leaved helleborine
<i>Epipactis palustris</i>	Marsh helleborine
<i>Erica cinerea</i>	Bell heather
<i>Erica tetralix</i>	Cross-leaved heath
<i>Erigeron acris</i>	Blue fleabane
<i>Euphrasia sp.</i>	Eyebright
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Filipendula vulgaris</i>	Dropwort
<i>Fragaria vesca</i>	Wild strawberry
<i>Fritillaria meleagris*</i>	Fritillary
<i>Galium palustre</i>	Marsh bedstraw
<i>Galium saxatile</i>	Heath bedstraw
<i>Galium verum</i>	Lady's bedstraw
<i>Genista anglica</i>	Petty whin
<i>Genista tinctoria</i>	Dyer's greenweed
<i>Gentianella aramella</i>	Autumn gentian
<i>Geranium columbinum</i>	Long-stalked crane's bill
<i>Geranium pratense</i>	Meadow crane's bill
<i>Geranium sanguineum</i>	Bloody cranesbill
<i>Gymnadenia conopsea s.l.</i>	Fragrant orchid
<i>Helianthemum nummularium</i>	Rock rose
<i>Avenula pubescens</i>	Downy oat grass
<i>Avenula pratensis</i>	Meadow oat grass
<i>Herminium monorchis*</i>	Musk orchid
<i>Hieracium pilosella</i>	Mouse-ear hawkweed
<i>Hippocrepis comosa</i>	Horseshoe vetch
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hypericum humifusum</i>	Trailing St. Johns wort
<i>Hypericum pulchrum</i>	Slender St Johns wort
<i>Hypochoeris radicata</i>	Cat's ear
<i>Inula conyza</i>	Ploughman's spikenard
<i>Isolepis setacea</i>	Bristle club rush
<i>Knautia arvensis</i>	Field scabious
<i>Koeleria macrantha</i>	Crested hair-grass
<i>Lathyrus linifolius</i>	Bitter vetch
<i>Lathyrus nissolia</i>	Grass vetchling
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Leontodon hispidus</i>	Rough hawkbit

<i>Leucanthemum vulgare</i>	Oxeye daisy
<i>Linum catharticum</i>	Fairy flax
<i>Lotus corniculatus</i>	Common birds foot trefoil
<i>Lotus pedunculatus</i>	Greater birds foot trefoil
<i>Luzula campestris</i>	Field wood-rush
<i>Luzula multiflora</i>	Heath wood-rush
<i>Lysimachia nummularia</i>	Creeping Jenny
<i>Microthlaspi perfoliatum</i>	Cotswold penny-cress
<i>Molinia caerulea</i>	Purple moor-grass
<i>Myosotis ramosissima</i>	Early forget-me-not
<i>Narcissus pseudonarcissus</i>	Wild daffodil
<i>Nardus stricta</i>	Mat-grass
<i>Neottia ovata</i>	Twayblade
<i>Oenanthe fistulosa*</i>	Tubular water-dropwort
<i>Oenanthe pimpinelloides</i>	Corky fruited water-dropwort
<i>Oenanthe silaifolia*</i>	Narrow-leaved water-dropwort
<i>Ononis repens</i>	Common restharrow
<i>Ononis spinosa</i>	Spiny restharrow
<i>Ophioglossum vulgatum</i>	Adder's tongue
<i>Ophrys apifera</i>	Bee orchid
<i>Ophrys insectifera*</i>	Fly orchid
<i>Orchis anthropophora*</i>	Man orchid
<i>Orchis mascula</i>	Early purple orchid
<i>Origanum vulgare</i>	Marjoram
<i>Ornithopus perpusillus</i>	Birds foot
<i>Pedicularis sylvatica</i>	Lousewort
<i>Persicaria bistorta</i>	Bistort
<i>Persicaria hydropiper</i>	Water-pepper
<i>Persicaria minor</i>	Lesser water-pepper
<i>Persicaria mitis*</i>	Tasteless water-pepper
<i>Picris hieracioides</i>	Hawkweed oxtongue
<i>Pimpinella saxifraga</i>	Burnet saxifrage
<i>Plantago media</i>	Hoary plantain
<i>Plantanthera bifolia</i>	Lesser butterfly orchid
<i>Plantanthera chlorantha</i>	Greater butterfly orchid
<i>Polygala calcarea**</i>	Chalk milkwort
<i>Polygala serpyllifolia</i>	Heath milkwort
<i>Polygala vulgaris</i>	Common milkwort
<i>Poterium sanguisorba</i>	Salad burnet

<i>Potentilla anglica</i>	Trailing tormentil
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla sterilis</i>	Barren strawberry
<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i>	Primrose
<i>Pulicaria dysenterica</i>	Fleabane
<i>Ranunculus bulbosus</i>	Bulbous buttercup
<i>Rhinanthus minor</i>	Hay rattle
<i>Rumex acetosella</i>	Sheep's sorrel
<i>Sanguisorba officinalis</i>	Greater burnet
<i>Saxifraga granulata</i>	Meadow saxifrage
<i>Saxifraga tridactylites</i>	Rue-leaved saxifrage
<i>Scabiosa columbaria</i>	Small scabious
<i>Scorzonerooides autumnalis</i>	Autumn hawkbit
<i>Scutellaria minor</i>	Lesser skullcap
<i>Serratula tinctoria</i>	Saw-wort
<i>Silaum silaus</i>	Pepper saxifrage
<i>Silene flos-cuculi</i>	Ragged robin
<i>Spiranthes spiralis</i>	Autumn lady's tresses
<i>Stellaria graminea</i>	Lesser stitchwort
<i>Succisa pratensis</i>	Devil's bit scabious
<i>Thalictrum flavum</i>	Common meadow rue
<i>Thesium humifusum**</i>	Bastard-toadflax
<i>Thymus praecox</i>	Wild thyme
<i>Thymus pulegioides</i>	Large thyme
<i>Tragopogon pratense</i>	Goat's beard
<i>Trifolium fragiferum</i>	Strawberry clover
<i>Trifolium medium</i>	Zigzag clover
<i>Trifolium scabrum</i>	Rough clover
<i>Trifolium striatum</i>	Knotted clover
<i>Trisetum flavescens</i>	Yellow oat-grass
<i>Ulex gallii</i>	Western gorse
<i>Vaccinium myrtillus</i>	Bilberry
<i>Valeriana dioica</i>	Marsh valerian
<i>Valeriana officinalis</i>	Common valerian
<i>Verbena officinalis</i>	Vervain
<i>Veronica officinalis</i>	Heath speedwell
<i>Veronica scutellata</i>	Marsh speedwell
<i>Viola hirta</i>	Hairy violet

<i>Viola riviniana</i>	Common dog violet
<i>Wahlenbergia hederacea</i>	Ivy-leaved bellflower

**H5.3 – All semi-natural grasslands below 0.5ha which fit the description for H5.1 or**

**H5.2 where they occur in connection with other qualifying habitats, either as a mosaic or as an adjacent patch.**

Rationale: semi-natural grasslands are among the more vulnerable habitats in the county, and are known to have suffered huge declines nationally. Semi-natural grasslands within a lowland farmland context tend to be fragmented into small areas that escape agricultural improvement or ploughing. Such fragments may play a part in the adaptation of species to changing environmental conditions, hence they should be included in mixed-habitat KWS even where they fall below the minimum size threshold.

## **H6 Saltmarsh**

### **Related Priority Habitats:**

Coastal saltmarsh  
Intertidal mudflats

**H6.1 – All saltmarsh over 0.5ha in extent**

**H6.2 – All saltmarsh, of any area, which is adjacent to a site which qualifies for any other reason**

### **Additional guidance on selecting saltmarsh habitats**

Saltmarsh is a very variable habitat which may be defined simply as any vegetation characteristic of land which is subject both to high levels of salinity and wet conditions. It may therefore occur either on the coast or inland on salt-rich sites.

Gloucestershire's saltmarsh is technically coastal rather than inland, but it occurs in estuarine conditions which may be found some distance from the sea due to the long tidal reach of the River Severn. Saltmarsh is often categorised according to zonation along the water's edge, the lowest zone typically having just a few, pioneer species whilst the zone nearest to land may be comparatively species-rich, possibly grading

into grazing marsh or other terrestrial habitats, at which point it may become hard to distinguish as exclusively saltmarsh.

Saltmarsh is also frequently categorised by the distinctive species or vegetation communities present, especially where they form dominant stands. Table H6 provides a guide to the main saltmarsh categories and how they relate to each other. Any of the types listed may be considered for KWS selection.

**Table H6: simplified guide to saltmarsh identification and classification<sup>7</sup>**

MAIN ZONE	NCC (Burd, 1989) <sup>8</sup>	NVC COMMUNITIES	KEY SPECIES
PIONEER MARSH (down to MHW)	1. <i>Spartina</i>	SM4, SM5, SM6	Cord-grass
	2a. <i>Salicornia/Suaeda</i>	SM7, SM8, SM9	Annual glasswort
	2b. <i>Aster</i>	SM11, SM12	Rayless sea aster
LOW MARSH (up to MHW)	3a. <i>Puccinellia</i>	SM10, SM13	Common saltmarsh-grass
	3b. <i>Atriplex (Atriplex)</i>	SM14	Sea Purslane
UPPER MARSH (from MHW up to EHWS)	4a. <i>Limonium/Armeria</i>	SM13	Sea lavender or Sea thrift
	4b. <i>Puccinellia/Festuca</i>	SM13, SM16, SM17	Red thrift
	4c. <i>Juncus gerardii</i>	SM16	Saltmarsh rush
	4d. <i>Juncus maritimus</i>	SM15, SM18	Sea rush
DRIFTLINE (around EHWS)	5a. <i>Agropyron (Elytrigia)</i>	SM24, SM28	Sea couchgrass
	5b. <i>Suaeda vera</i>	SM25	Shrubby sea-blite
TRANSITIONAL (around and above HAT)	6. Upper marsh swamps	S4, S19, S20, S21	Common reed & various rushes
(around and above HAT)	7i. Shingle/dune transition	SM21, SM22	Shrubby sea-blite Sea heath
	7ii. Freshwater transition	MG11	Various including Creeping bent-grass
	7iii. Grassland transition	MG12	Various including Tall fescue

<sup>7</sup> Taken from Environment Agency/DEFRA Saltmarsh Management Manual, electronic publication:

<http://www.saltmarshmanagementmanual.co.uk/Whatissaltmarsh/AppA231KeySpecies.htm>

<sup>8</sup> Burd, F. (1989) *The Salt Marsh Survey of Great Britain. An Inventory of British Salt Marshes. Research and Survey in Nature Conservation No. 17*, Nature Conservancy Council, Peterborough.



Guide to water levels: MHW – mean high water; EHW = extreme high water; HAT = highest astronomical tide; N = neap tide; S = spring tide

#### *Rationale*

Saltmarsh is a significant and threatened habitat found primarily along the River Severn although areas can also be found along the lower reaches of the River Wye. The different community types present in Gloucestershire include both gradual and stepped transitions from bare mud to upper salt marsh, and the unusual saltmarsh-to-woodland transition. These areas support many notable and nationally scarce species.

## **H7 – Lowland Heathland**

### **Related Priority Habitats**

Lowland heathland

**H7 – All heathland areas larger than 0.25 ha with ericaceous shrub cover of 25% of one or more of the following species:**

*Calluna vulgaris*

*Erica cinerea*

*Erica tetralix*

*Vaccinium myrtillus*

#### *Rationale*

Lowland heathland is a vulnerable habitat nationally, and was one of the original BAP Priority Habitats. Heathland sites are rare in Gloucestershire, with the majority of the habitat type found in the Forest of Dean.

Lowland heathland supports a diverse fauna, and may also have a wide range of lower plant species present. Sites are likely to be associated with acid grassland and wetland bog communities. They may also be found as part of a woodland mosaic, especially where areas of woodland have been cleared and allowed to develop a heathland flora in the absence of replanting. As such, lowland heathland is often a valuable extension to other Priority Habitats.

## H8 - Marsh, bog, swamp, mire and tall herb fen

### Related Priority Habitats:

Ponds  
 Eutrophic standing water  
 Mesotrophic standing water  
 Coastal and floodplain grazing marsh  
 Purple moorgrass and rush pastures  
 Lowland fens  
 Reedbeds  
 Lowland raised bog  
 Marsh (Local Priority)  
 Green infrastructure (Local Priority)

**H8.1 - All areas of marsh, bog, swamp, mire and tall herb fen over 0.5ha in extent which support 10 or more species from table H8a**

**Table H8a - Species occurring in wetlands of high conservation concern in Gloucestershire**

<i>Achillea ptarmica</i>	Sneezewort
<i>Anagallis tenella</i>	Bog pimpernel
<i>Angelica sylvestris</i>	Wild angelica
<i>Bidens cernua</i>	Nodding bur-marigold
<i>Bidens tripartita</i>	Trifid bur-marigold
<i>Blasmus compressus*</i>	Flat-sedge
<i>Calluna vulgaris</i>	Ling
<i>Caltha palustris</i>	Marsh marigold
<i>Cardamine amara</i>	Large bitter-cress
<i>Cardamine pratensis</i>	Ladies smock
<i>Carex acutiformis</i>	Lesser pond sedge
<i>Carex dioica</i>	Dioecious sedge
<i>Carex echinata</i>	Star sedge
<i>Carex flacca</i>	Glaucous sedge
<i>Carex hostiana</i>	Tawny sedge
<i>Carex nigra</i>	Common sedge
<i>Carex otrubae</i>	False fox sedge
<i>Carex panicea</i>	Carnation sedge
<i>Carex paniculata</i>	Greater tussock-sedge

<i>Carex pulicaris</i>	Flea sedge
<i>Centaurea nigra</i>	Lesser knapweed
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved golden saxifrage
<i>Cirsium palustre</i>	Marsh thistle
<i>Dactylorhiza incarnata</i>	Early marsh orchid
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid
<i>Dactylorhiza praetermissa</i>	Southern marsh orchid
<i>Danthonia decumbens</i>	Heath grass
<i>Dryopteris carthusiana</i>	Narrow buckler fern
<i>Eleocharis palustris</i>	Common spike-rush
<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush
<i>Epilobium palustre</i>	Marsh willow herb
<i>Epipactis palustris</i>	Marsh helleborine
<i>Equisetum fluviatile</i>	Water horsetail
<i>Equisetum palustre</i>	Marsh horsetail
<i>Erica tetralix</i>	Cross leaved heath
<i>Eriophorum angustifolium</i>	Cotton grass
<i>Eupatorium cannabinum</i>	Hemp agrimony
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Galium palustre</i>	Marsh bedstraw
<i>Galium uliginosum</i>	Fen bedstraw
<i>Hippurus vulgaris</i>	Marestail
<i>Hydrocotyle vulgaris</i>	Marsh pennywort
<i>Hypericum elodes</i>	Marsh St John's wort
<i>Hypericum tetrapterum</i>	Square-stalked St John's wort
<i>Iris pseudacorus</i>	Yellow iris
<i>Isolepis setacea</i>	Bristle club-rush
<i>Juncus acutiflorus</i>	Sharp flowered rush
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus bulbosus</i>	Bulbous rush
<i>Juncus conglomeratus</i>	Compact rush
<i>Juncus subnodulosus</i>	Blunt flowered rush
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Lotus pedunculatus</i>	Greater birds foot trefoil
<i>Luzula multiflora</i>	Heath woodrush
<i>Lychnis flos-cuculi</i>	Ragged robin
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Lycopus europaeus</i>	Gypsywort
<i>Mentha aquatica</i>	Water mint

<i>Molinia caerulea</i>	Purple moor grass
<i>Myosotis laxa</i>	Tufted forget-me-not
<i>Myosotis scorpioides</i>	Water forget-me-not
<i>Myosotis secunda</i>	Creeping forget-me-not
<i>Narthecium ossifragum</i>	Bog asphodel
<i>Nasturtium officinale</i> agg.	Water-cress
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort
<i>Oenanthe crocata</i>	Hemlock water-dropwort
<i>Oenanthe fistulosa</i>	Tubular water-dropwort
<i>Oenanthe lachenalii</i>	Parsley water-dropwort
<i>Ophioglossum vulgatum</i>	Adders tongue
<i>Oreopteris lymbosperma</i>	Lemon scented fern
<i>Pedicularis palustris</i>	Marsh lousewort
<i>Pedicularis sylvatica</i>	Lousewort
<i>Persicaria amphibia</i>	Amphibious bistort
<i>Persicaria bistorta</i>	Bistort
<i>Persicaria hydropiper</i>	Water-pepper
<i>Persicaria minor</i>	Lesser water-pepper
<i>Persicaria mitis</i> *	Tasteless water-pepper
<i>Phalaris arundinacea</i>	Reed canary-grass
<i>Pinguicula vulgaris</i>	Common butterwort
<i>Polygonum amphibium</i>	Amphibious bistort
<i>Polygonum hydropiper</i>	Water pepper
<i>Potentilla erecta</i>	Tormentil
<i>Pulicaria dysenterica</i>	Fleabane
<i>Ranunculus flammula</i>	Lesser spearwort
<i>Sanguisorba officinalis</i>	Great burnet
<i>Schoenoplectus lacustris</i>	Bulrush
<i>Scirpus sylvaticus</i>	Wood club-rush
<i>Scrophularia auriculata</i>	Water figwort
<i>Scutellaria minor</i>	Lesser scullcap
<i>Scutellaria galericulata</i>	Scullcap
<i>Senecio aquaticus</i>	Marsh ragwort
<i>Serratula tinctoria</i>	Saw-wort
<i>Sphagnum</i> sp.	Sphagnum moss
<i>Sparganium erectum</i>	Branched bur-reed
<i>Stachys palustris</i>	Marsh woundwort
<i>Stellaria alsine</i>	Bog stitchwort
<i>Succisa pratensis</i>	Devil's-bit scabious

<i>Thalictrum flavum</i>	Meadow rue
<i>Triglochin palustris</i>	Marsh arrowgrass
<i>Valeriana dioica</i>	Marsh valerian
<i>Valeriana officinalis</i>	Common valerian
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica scutellata</i>	Marsh speedwell
<i>Viola palustris</i>	Marsh violet
<i>Wahlenbergia hederacea</i>	Ivy-leaved bellflower

**H8.2 – All areas of marsh, bog, swamp, mire and tall herb fen over 0.5ha in extent which are dominated by one of the species in Table H8b and support 5 or more additional species from table H8a**

**Table H8b – Wetland plants which may form single-species dominated habitats**

<i>Angelica sylvestris</i>	Wild angelica
<i>Calluna vulgaris</i>	Ling
<i>Caltha palustris</i>	Marsh marigold
<i>Carex acutiformis</i>	Lesser pond sedge
<i>Eleocharis palustris</i>	Common spike rush
<i>Equisetum fluviatile</i>	Water horsetail
<i>Equisetum palustre</i>	Marsh horsetail
<i>Erica tetralix</i>	Cross leaved heath
<i>Eriophorum angustifolium</i>	Cotton grass
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Hippurus vulgaris</i>	Marestail
<i>Iris pseudacorus</i>	Yellow iris
<i>Juncus acutiflorus</i>	Sharp flowered rush
<i>Juncus subnodulosus</i>	Blunt flowered rush
<i>Molinia caerulea</i>	Purple moor-grass
<i>Schoenoplectus lacustris</i>	Bulrush
<i>Sphagnum sp.</i>	Sphagnum
<i>Sparganium erectum</i>	Branched bur-reed

**H8.3 – All areas of reedbed over 0.2ha in extent where common reed *Phragmites australis* makes up at least 80% of the overall vegetation cover**

**H8.4 – sites which fit the criteria for thresholds H8.1, H8.2 or H8.3 but are below the minimum size should be included in a KWS if they are adjacent to other habitat which qualifies for selection.**

### *Rationale*

Several wetland types have been combined for the purpose of KWS assessment, as they may be difficult to separate in the field, intermediate in nature, or occur in close proximity within the same site. All are vulnerable to habitat disturbance and in particular pollution, including eutrophication.

All may deteriorate in diversity under unsuitable management, or be optimised under favourable management.

Whereas some wetlands support a broad diversity of species, others are characterised by dominant stands of a particular species, often with a mosaic of patches or zones of different dominant species according to the hydrology of the site. Whilst the overall plant species richness may be reduced by single-species domination, the value of stands of e.g. bulrush or reed is as a habitat in its own right.

Reedbeds have suffered a huge decline in extent in the UK, often as a result of land drainage, river engineering and agriculture. They are now a rare habitat in the county, with only an estimated 20–25 ha remaining. This habitat type also supports many rare species and it is important that those fragments which remain are conserved.

## **H9 – Lakes, reservoirs and ponds**

### **Related Priority Habitats:**

Ponds  
Eutrophic standing water  
Oligotrophic and dystrophic lakes  
Mesotrophic lakes  
Lowland fens  
Reedbeds

**H9 .1 – All lakes, gravel pits and reservoirs larger than 0.25 ha which support at least 20 species from table H9**

**H9.2 – All ponds which support 15 or more species from table H9**

**Table H9 – Plants occurring in open water and marginal habitats in Gloucestershire**

<i>Alisma plantago-aquatica</i>	Water-plantain
<i>Alisma lanceolatum</i>	Narrow-leaved water-plantain
<i>Alopecurus geniculatus</i>	Marsh foxtail
<i>Angelica sylvestris</i>	Wild angelica
<i>Apium nodiflorum</i>	Fools watercress
<i>Barbarea vulgaris</i>	Wintercress
<i>Berula erecta</i>	Narrow-leaved water-parsnip
<i>Bidens cernua</i>	Nodding bur-marigold
<i>Bidens tripartita</i>	Trifid bur-marigold
<i>Butomus umbellatus</i>	Flowering rush
<i>Callitriche agg.</i>	Water-starworts
<i>Caltha palustris</i>	Marsh marigold
<i>Carex acuta</i>	Slender tufted sedge
<i>Carex acutiformis</i>	Lesser pond-sedge
<i>Carex otrubae</i>	False fox sedge
<i>Carex paniculata</i>	Greater tussock-sedge
<i>Carex pseudocyperus</i>	Cyperus sedge
<i>Carex riparia</i>	Greater pond-sedge
<i>Carex rostrata</i>	Bottle sedge
<i>Carex vesicaria</i>	Beaked sedge
<i>Catabrosa aquatica</i>	Whorl-grass
<i>Ceratophyllum demersum</i>	Rigid hornwort
<i>Ceratophyllum submersum</i>	Soft hornwort
<i>Characeae</i>	Stoneworts (all)
<i>Eleocharis acicularis</i>	Needle spike-rush
<i>Eleocharis palustris</i>	Common spike-rush
<i>Eleogitan fluitans</i>	Floating club-rush
<i>Equisetum fluviatile</i>	Water horsetail
<i>Equisetum palustre</i>	Marsh horsetail
<i>Eriophorum angustifolium</i>	Cotton grass
<i>Eupatorium cannabinum</i>	Hemp agrimony
<i>Galium palustre</i>	Marsh bedstraw
<i>Galium uliginosum</i>	Fen bedstraw
<i>Glyceria fluitans</i>	Floating sweet-grass
<i>Glyceria maxima</i>	Reed sweet-grass
<i>Glyceria plicata</i>	Plicate sweet-grass
<i>Groenlandia densa</i>	Opposite-leaved pondweed

<i>Hippuris vulgaris</i>	Mare's-tail
<i>Hydrocharis morsus-ranae</i>	Frogbit
<i>Hydrocotyle vulgaris</i>	Marsh pennywort
<i>Iris pseudacorus</i>	Yellow iris
<i>Lemna gibba</i>	Fat duckweed
<i>Lemna minor</i>	Duckweed
<i>Lemna trisulca</i>	Ivy-leaved duckweed
<i>Lychnis flos-cuculi</i>	Ragged robin
<i>Lycopus europaeus</i>	Gypsywort
<i>Lysmachia vulgaris</i>	Yellow loosestrife
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Mentha aquatica</i>	Water mint
<i>Menyanthes trifoliata</i>	Bogbean
<i>Myriophyllum spicatum</i>	Spiked water-milfoil
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil
<i>Myosotis scorpioides</i>	Water forget-me-not
<i>Myosoton aquaticum</i>	Water chickweed
<i>Nasturtium officinale</i>	Green watercress
<i>Nuphar lutea</i>	Yellow water-lily
<i>Nymphaea alba</i>	White water-lily
<i>Oenanthe aquatica</i>	Fine leaved water-dropwort
<i>Oenanthe crocata</i>	Hemlock water-dropwort
<i>Oenanthe fluviatilis</i>	River water-dropwort
<i>Persicaria amphibia</i>	Amphibious bistort
<i>Persicaria bistorta</i>	Bistort
<i>Persicaria hydropiper</i>	Water-pepper
<i>Persicaria minor</i>	Lesser water-pepper
<i>Persicaria mitis*</i>	Tasteless water-pepper
<i>Phalaris arundinacea</i>	Reed sweet grass
<i>Phragmites australis</i>	Common reed
<i>Potamogeton sp.</i>	Pondweeds (all)
<i>Ranunculus aquatilis</i>	Common water-crowfoot
<i>Ranunculus flammula</i>	Lesser spearwort
<i>Ranunculus fluitans</i>	River water-crowfoot
<i>Ranunculus peltatus</i>	Pond water-crowfoot
<i>Ranunculus penicillatus</i>	Stream water-crowfoot
<i>Ranunculus scleratus</i>	Celery-leaved crowfoot
<i>Ranunculus trichophyllus</i>	Thread-leaved water-crowfoot
<i>Rorippa amphibia</i>	Great yellow-cress



<i>Rumex hydrolapathum</i>	Water dock
<i>Sagittaria sagittifolia</i>	Arrowhead
<i>Schoenoplectus lacustris</i>	Common club-rush
<i>Schoenoplectus tabernaemontani</i>	Grey club-rush
<i>Scrophularia auriculata</i>	Water figwort
<i>Scutellaria galericulata</i>	Scullcap
<i>Senecio aquaticus</i>	Marsh ragwort
<i>Sparganium emersum</i>	Unbranched bur-reed
<i>Sparganium erectum</i>	Branched bur-reed
<i>Spirodela polyrhiza</i>	Greater duckweed
<i>Stachys palustris</i>	Marsh woundwort
<i>Stellaria alsine</i>	Bog stitchwort
<i>Thalictrum flavum</i>	Meadow rue
<i>Typha angustifolia</i>	Lesser bulrush
<i>Typha latifolia</i>	Bulrush
<i>Valeriana dioica</i>	Marsh valerian
<i>Valeriana officinalis</i>	Common valerian
<i>Veronica anagallis-aquatica</i>	Blue water speedwell
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica catenata</i>	Pink water speedwell
<i>Veronica scutellata</i>	Marsh speedwell
<i>Zanichellia palustris</i>	Horned pondweed

**H9.3 – All lakes, gravel pits, reservoirs and ponds which form a connection with other qualifying habitats, either as a mosaic or as an adjacent feature.**

**H12.1, 12.2, 12.3 and 12.4 – special habitat for otters, water voles, white-clawed crayfish or water shrew – may apply to standing water bodies. See below.**

**H12.5 – special habitat for grass snakes – may apply to ponds. See below.**

**S4 – bird assemblages – may apply to lakes and ponds. See below, and Appendix 3.**

#### *Rationale*

In most parts of the county, high quality standing water of significant area is rare. Large water bodies are of value for breeding and wintering wildfowl and may acquire a national or international significance for this reason. Water bodies not reaching the size criteria may be designated if they form part of a habitat mosaic or complex. Many field ponds have a low conservation value resulting from isolation and eutrophication. Species-rich examples are becoming less common and all should be conserved.

All categories of lakes, reservoirs and ponds may undergo marginal or total ecological change due to development of fen, mire or reedbed vegetation, and are closely linked. Semi-aquatic invertebrates and other marginal species such as water voles rely on the interface between open water and marginal vegetation, hence good examples of open water with vegetated edges should be treated as fitting the general criteria for Diversity, Naturalness and Connectivity with the landscape.

### **Additional guidance on selecting open water habitats**

Open water habitats can be hard to define. Oligotrophic and dystrophic lakes are unlikely to occur naturally in Gloucestershire, but may occur as a stage in the establishment of gravel pit or other man-made lakes. Ponds are generally defined as smaller than 0.25ha, and usually having a history of utility by man. Canals are not technically running water as they rely on a static head of reservoir water and are an extension of a standing water body; however, they share management factors with both standing and running water. Because their usage and features are similar to watercourses, they have been included in H10, below.

## **H10 – Watercourses – see Appendix 5 for supplementary guidance notes**

### **Related Priority Habitats:**

Rivers (incorporating Chalk rivers)

Eutrophic standing water

Ditches (Local Priority)

Streams (Local Priority)

Canals (Local Priority)

KWS selected under Watercourses will include a minimum buffer zone of 10 metres from the top of the bank.

As watercourses are a special case, a separate Appendix has been compiled to help with choosing watercourse KWSs. For more details please see **Appendix 5: Guidance Notes on selection of rivers and streams.**

### *Rationale*

In addition to adverse river management, many rivers and streams have suffered from the effects of eutrophication which seriously reduces biodiversity. Clean unpolluted stretches of river and stream are capable of supporting a wide variety of plants and animals and such watercourses should be retained in their natural state. It has become

apparent in recent years that activities on land adjoining watercourses can have a considerable impact on the biodiversity of the watercourse. A reduction in the amount of bankside vegetation, as a result of intensive agriculture has taken its toll on mammals such as the water vole. The restoration and appropriate management of the bankside improves habitat for water voles and allows a larger refuge area for them to escape mink predation. Bankside cover is also critical for otters.

Many of our rivers and streams have been modified by human activity to aid flood defence and land drainage. Features such as pools, riffles, beaches, meanders and cliffs which provide important habitats for a variety of species have been lost as a result of this 'improvement'. Stretches of river and stream exhibiting such features should therefore be conserved. Such stretches of river may also qualify under species thresholds due to their importance as bird, mammal and invertebrate territory.

**H12.1, 12.2, 12.3 and 12.4 – special habitat for otters, water voles, white-clawed crayfish or water shrew – may also apply to watercourses. See below.**

## **H11 – Urban habitats**

### **Related Priority Habitats:**

Ponds

Eutrophic standing waters

Rivers

Traditional orchards

Open mosaic habitats on previously-developed land

Streams

Canals

Ditches

Green infrastructure

Woodland, grassland and fragments of any of the other Priority Habitats listed

DEFRA guidance on Local Sites selection refers to the need to define what is “substantive” nature conservation value according to, amongst other factors, “*differing abundance and therefore significance of the nature conservation resources, for example between rural areas and urban areas*”.

In recognition of this, urban sites in Gloucestershire will be selected according to the

same criteria as other KWS, but are likely to include areas of habitat or species features which are below the usual minimum thresholds, due to the disproportionate importance of general criteria 7, 8 and 9 – Connectivity within the landscape, Value for appreciation of nature and Value for learning.

Urban KWS are frequently vulnerable to fragmentation, edge effects and disturbance. For these reasons, consideration should always be given to buffer zones and linking habitat as per **H14**, below, as these may be essential to preserve the more diverse parts of the site within an urban context.

## **H12 – Special habitats**

Areas of habitat which are crucial for certain legally-protected species, but not covered under other habitat criteria, are included in this section. They are included with Habitats, rather than Species, criteria as they apply to areas of habitat known to be of importance for the survival of one particular species (even if that species hasn't been recorded in all parts of the site in recent years). The following thresholds should be used as a guide to the General Criteria, in particular Criteria 2, 3 and 4 (Diversity, Naturalness and Rare/exceptional features).

Habitats which fall within this section should be selected regardless of whether any other minimum habitat thresholds have been met, because of their importance for key species. Any management recommendations should reflect this reason for selection. Note that all other key species are covered in **2.6, Minimum species selection criteria**.

### **H12: Special wetland habitats**

**H12.1 – All rivers, streams, canals and other water bodies where the presence of native white-clawed crayfish has been confirmed either currently or within the last ten years. KWS selected for this reason should extend for at least 100m on either side of the known crayfish presence, or up to the nearest clear barrier to crayfish expansion.**

#### *Rationale*

Native crayfish have been in decline for many years, chiefly due to competition and disease vectored by introduced signal crayfish. The reduction in suitable habitat is also thought to be an important factor in their decline. When selecting a stretch of river or other water body for the presence of white-clawed crayfish, careful thought needs to be given to how the site might be managed so as to keep it as isolated as possible

from incoming non-native crayfish.<sup>9</sup>

**H12.2 – All rivers, streams, canals and other water bodies where the presence of water voles has been confirmed either currently or within the last three years. KWS selected for this reason should extend for at least 300m on either side of the known vole presence, or up to the nearest clear barrier to water vole expansion.**

*Rationale*

Water voles are a priority for conservation action in Gloucestershire, having declined massively despite the presence of many suitable habitats. Their survival is directly linked to the presence of suitable waterside habitats, hence the inclusion of specific watercourse habitat criteria. Some populations may have declined or not shown any presence for two or three years, in which case their habitat should be selected with a view to optimising the conditions for their recovery or return. In such cases, only sites where the bankside habitat is still suitable for water voles (given appropriate management) should be selected.

**H12.3 – All rivers, streams, canals and other water bodies known to have excellent suitability for otters, as evidenced by abundance of suitable habitat and confirmed otter breeding sites for two or more consecutive years. KWS selected for this reason should extend for at least 500m on either side of the known otter presence.**

*Rationale*

Gloucestershire has many watercourses which might be used by otters. Known strongholds for the species, chosen for their optimum suitability for maintaining and increasing the otter population, should be selected as KWS in the unlikely event that they do not meet selection criteria on other habitat grounds.

**H12.4 – All rivers, streams, canals and other water bodies known to have excellent suitability for water shrews, as evidenced by abundance of suitable habitat and confirmed presence within the last three years. KWS selected for this reason should extend for at least 300m on either side of the known water shrew presence.**

*Rationale*

Water shrew are characteristic of clean, biodiverse water courses, and as such are likely to be protected under the selection criteria for rivers and streams. However, they are rarely recorded in the county, their status is not fully known, they are vulnerable to

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<sup>9</sup> See JNCC information page for Native white-clawed freshwater crayfish:

<http://jncc.defra.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1092>

habitat loss and disturbance, and any good examples of known water shrew habitat not already covered by habitat criteria should be selected.

**H12.5 – Any pond with suitable adjacent habitat where grass snakes and frogs and/or other amphibians have been regularly observed for three or more years.**

*Rationale*

Ponds are a stronghold habitat for grass snakes. Only those with suitable surrounding vegetation and a good supply of prey are suitable for long-term populations (hence the inclusion of frogs in the criterion). Dense, “untidy” grassy or scrubby vegetation is ideal habitat, especially where there is old dead wood and composting material.

Grass snakes emerge from hibernation during March / April with egg laying in June / July. Grass snakes regularly seen in spring would suggest a nearby hibernaculum and such observations will form the basis of the Key Wildlife Site designations. Once mated a female will seek a suitable site for egg laying. Suitable warm and moist egg laying sites occur infrequently in the wild and several females may congregate in one site. Such nesting sites will be included in the Key Wildlife Site wherever possible, and management should emphasise the need to leave such areas undisturbed.

**H12: Special woodland habitats**

**S12.6 – All woodlands and associated habitats known to have populations of Hazel dormice**

*Rationale*

Like the otter, white-clawed crayfish, grass snake, water shrew and water vole, the hazel dormouse is fully protected under Schedule 5 of the Wildlife and Countryside Act, 1981 (As amended 1985), and highly dependent on a particular habitat type, being a specialist feeder. It is naturally scarce, and sensitive to inappropriate woodland management. The risk of isolation and fragmentation of habitat is a real threat to populations.

The conditions needed to sustain viable populations are most likely to be found in ancient woodlands, and as such, sites supporting dormice may qualify on habitat criteria anyway. However, Dormouse Key Wildlife Sites will include linking habitat and smaller woodlands to ensure known populations have access to the maximum area of suitable habitat. Linking habitat can include hedgerows as well as broadleaved

woodland, and may even include some areas of mixed or coniferous woodland, particularly where ancient woodland sites have been replanted. Where a population of hazel dormice is known to be present, the KWS boundary should include as much good-quality contiguous habitat as possible.

**H12.7 – All hedgerows, woodland and scrub habitats with a high proportion of elm *Ulmus* where a colony of White-letter hairstreak butterflies is known to have been present within the last three years.**

*Rationale*

White-letter hairstreaks have undergone a population decline and are now listed by the IUCN as internationally rare and threatened. This particular species was categorised as a Red List Vulnerable species until recently; it is now listed as Endangered. It relies on elm as a foodplant, and benefits from well-established hedgerows and woodland margins which have sunny habitat and plenty of available food. They may therefore fall outside of the kind of species-rich habitats which tend to be selected on botanical or other species grounds.

Small colonies of this butterfly may rely on just a single tree or small group of trees, and may use the same site year after year. They do not move around much, and a colony may be completely lost as a result of inappropriate management that might not otherwise seem problematic on a wildlife site. Good examples of ideal White-letter hairstreak habitat should therefore be considered as KWS either in their own right, or as an extension to sites selected for other reasons. Site management on KWS selected for this reason should take into account the importance of the elm on the site.

**H13 – Other Habitat types**

**H13 – Artificial habitat types listed below, whether in rural or urban areas, may qualify for KWS selection according to the habitat or species thresholds outlined elsewhere:**

Arable land	Cemeteries	Churchyards
Derelict land	Disused airfields	Disused buildings
Disused railways	Dry stone walls	Gardens
Golf courses	Green lanes	Sewage works
Improved grassland	Industrial sites	Allotments
Urban parks	Railway and road verges	Tips



*Patch of structurally-diverse rough ground behind allotments. This easily-accessible but overgrown site is resilient to disturbance. Despite the informal appearance, small areas like this are often popular for their show of wildflowers and butterflies. They may also be valued as a habitat for species useful to gardeners, such as slow-worms and toads.*

#### **H14 – Buffer Zones and Linking Habitat**

**H14 – Any piece of land immediately adjacent to qualifying KWS features, without which the conservation needs of those features cannot be met, either due to the need to accommodate the species present, or because the important features are too fragmented and require buffering or linking habitat to stay in optimum condition.**

##### *Rationale*

Key Wildlife Sites will not normally be designated with an integral buffer zone, with the exception of watercourses and special watercourse habitats (see sections **H10** and **H12** above, and **Appendix 5: Guidance Notes on selection of rivers**). Other than these exceptions the site map will only show the area of conservation interest which meets the relevant criteria. Should sites be affected by adjacent development proposals a buffer zone might be an appropriate safeguard and may be recommended as a condition of consent, but this is not part of the KWS designation process.

In some circumstances, however, it may be appropriate to include within the boundary of the Key Wildlife Site adjoining land (which in itself does not meet any accepted minimum threshold for inclusion) if the land serves to link or support areas of high conservation value.



Such land may be of value in allowing populations of plants and animals to disperse freely, thus ensuring that viable populations are not threatened as a result of fragmentation and isolation. Other examples include very small features such as collections of small ponds, veteran trees or species-rich grassland patches within otherwise species-poor habitat.

Careful consideration will be given to the choice of KWS boundary in such cases, and any land included as buffering or linking habitat will be detailed as such and a reason given for its inclusion.

## 2.6 Minimum species selection thresholds

The **minimum** thresholds for meeting the general KWS criteria on species grounds alone are listed below. Thresholds vary according to the conservation status of the species in question. Please refer to **Appendix 3** for reference species lists; **Appendix 4** has a summary of the different legislation and conservation status categories. Many sites which support species listed in Appendix 3 will already be selected for habitat reasons; in such cases the presence of species of high conservation concern should still be noted in the KWS assessment sheet in support of the general KWS criteria, and as an indication of what would be appropriate management for the site. This is especially important where the site's selection on habitat grounds is borderline.

### *Species thresholds – overarching rationale*

Much of Gloucestershire's biodiversity relies on the protection of Priority Habitats for its survival. Many rare, declining and protected species will therefore occur on Key Wildlife Sites which have been selected as good examples of Priority Habitats. Key species which are entirely reliant on a very specific habitat not covered by other habitat criteria have been accorded a Special Habitats section, **H12** (above). However, there are still some species which are of local or national conservation concern that may not be adequately represented in the KWS system via choice of habitats alone.

Some species rely on a mosaic of relatively species-poor habitats, or a geographically-restricted range of species-poor habitat, or they may only occur on sites with a very specific topography or aspect but a broad range of habitat types. Some rare species populations are historically associated with just one or two sites, for which there may be no other protection, no obvious means of expansion and no plans for appropriate management. Species criteria help to ensure that such plants and animals are not left out of the KWS system, and receive preferential management on selected KWS. The species criteria thresholds also lend weight to the existing habitat criteria, helping to assess how important a particular site is for biodiversity conservation.

### **Timing of KWS assessments for species thresholds**

In some cases a species may be present on a site but dormant, (e.g. seeds, corms, pupae or eggs), below ground or otherwise concealed, for some time. It is therefore important to ensure that potential KWS are assessed in full detail and given sufficient time for possible features of interest to become apparent. This is particularly important when making decisions about the best management for a site.

### **Assessing whether species interest has been lost from a site**

KWS designation for species interest may involve plants, fungi or animals which are very hard to locate except when conditions are ideal, and then only by experts. Moreover, visible, measurable signs of their presence may naturally occur only sporadically or once during a long life-cycle. Such sites will not be de-designated just because a species listed in the reasons for designation hasn't been recorded recently. See the Key Wildlife Sites Handbook Part 1, Section **1.1.6 Monitoring and Revisions** for details of how and when a site might be deemed to have lost its original reasons for designation.

### **Updates to species checklists**

Note that the tables of species relevant to this section are listed in **Appendix 3**. The lists are subject to regular expert review, and both local and national statuses may change from time to time. A collated list of designations is available on the JNCC website as a downloadable spreadsheet, and will form the basis of Appendix 3. Download link: <http://www.jncc.gov.uk/page-3408>.

**When using the minimum species and habitat site selection thresholds it is important to make sure that you have the most up-to-date version of the Appendices! If in doubt, the current JNCC spreadsheet should be used as the latest source.**



*Selecting KWS on the grounds of species relates to local distinctiveness as well as national biodiversity priorities*

## S1 – Vascular Plants

### **S1.1 – All sites which support populations of vascular plant species of high conservation concern, as listed in Appendix 3: Table S1a.**

Species of high conservation concern comprise all those species occurring in Gloucestershire which are in the following categories:

- UK Priority Species (as listed on S41 of the Natural Environment and Rural Communities (NERC) Act 2006)
- Red Data Book endangered, threatened, vulnerable and data deficient categories
- Listed under The Conservation of Habitats and Species Regulations 2010<sup>10</sup>
- Nationally rare or scarce species
- Protected under Schedule 8 of the Wildlife and Countryside Act (as amended)
- listed under the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention)

#### *Rationale*

The majority of these species are associated with habitats which are vulnerable to insensitive management. Consequently, it is likely that many sites supporting nationally rare, scarce or declining species will qualify for designation under habitat criteria. Some of the species, however, may occur in habitats not usually considered to be of high nature conservation importance, or they may occur on sites which fail to satisfy the minimum habitat thresholds for selection. This criterion is designed to ensure that such species receive adequate recognition.

### **S1.2 – All sites supporting native species which have 10% or more of their English 10km grid square distribution in the county, as listed in Appendix 3: Table S1b. Only sites which have adequate amounts of suitable habitat for long-term survival of the species will be selected under this criterion.**

Table S1b relates to the current version of the Botanical Society for the British Isles' Atlas, native species recorded since 1987. Hybrids and poorly-recognized subspecies or other variants have not been included. Note that updates to the Atlas may change the list with time, with the possibility of an increase or decrease in the number of species on the list.

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<sup>10</sup> The Conservation of Habitats and Species Regulations 2010 is the latest UK application of the EU Habitats Directive; Schedules in the Regulations relate to Annexes in the Directive.

### *Rationale*

Gloucestershire is the stronghold for a number of species which, although fairly widespread in the county may be rare elsewhere in the country. Again such species will be associated primarily with quality habitats which are also well represented in the county, i.e. unimproved limestone grassland. This criterion will ensure that the national resource for which Gloucestershire is responsible is not allowed to decline.

### **S1.3 – All grasslands and woodlands with mass populations of native wild daffodil** *(Narcissus pseudonarcissus)*

#### *Rationale*

The wild daffodil is a characteristic species of fields and woodlands in the area around Dymock, and has a long cultural association with that area of Gloucestershire. Meadows and woodland with abundant populations of wild daffodils have an important part to play in increasing public awareness of nature, as well as being a good example of local distinctiveness in biodiversity.

As a species, wild daffodil does not fall into a rare or scarce category, but its appeal lies in the spectacular show produced each spring as large populations come into flower. Unless smaller than 2 hectares, woodlands may qualify under habitat criteria. Daffodil meadows, however, are frequently semi-improved and lack any other significant floristic value. This criterion is designed to ensure that the area around Dymock retains its essential character and conservation interest.

For the purpose of site selection, only sites with substantial populations of daffodils, either scattered or in one patch, should be selected on species grounds alone. Sites with just a few plants are unlikely to be selected unless there are other qualifying features present; sites selected purely for this criterion will generally have hundreds of plants. There exists already a grading scale for assessing wild daffodil sites, as used in Gloucestershire Wildlife Trust's long-running Wild Daffodil Survey. Any site with a grade of A\* or A should be selected as a KWS unless there are other factors which strongly militate against selection. Sites graded B should also be considered, especially if other criteria also apply. Sites graded C or NP (new plantings) will not qualify under criterion S1.3, although they may qualify for other reasons.

For details of how the Wild Daffodil Survey sites are graded, see **Appendix 3, Table S1c**.

## S2 – Lower plants and fungi

**S2.1 – Any site on which a population of any lower plant or fungus of high conservation concern has been recorded and confirmed as present within the last five years. Older records may be accepted in the case of species known to be sporadic in appearance. Relevant species are listed in Appendix 3, Table S2a. Only sites with adequate appropriate habitat for the conservation of the species in question will be selected.**

Lower plant species of high conservation concern consist of the following categories:

- UK Priority Species (as listed on S41 of the Natural Environment and Rural Communities (NERC) Act 2006)
- Red Data Book endangered, threatened, vulnerable and data deficient categories
- Nationally rare species
- Fully protected under Schedule 8 of the Wildlife and Countryside Act (with the latest amendments)

**S2.2 – Any site on which an assemblage of three or more lower plants or fungi of conservation concern has been recorded and confirmed as present within the last five years. Relevant species are listed in Appendix 3, Table S2b, and include nationally scarce species. Only sites with enough suitable habitat for the conservation of the species in question will be selected.**

### *Rationale*

Lower plants and fungi are widely recognised as being important indicators of ecological condition, and form both an essential part of any ecosystem and a key component of a wide range of habitats. However, they are usually not considered as charismatic as vascular plants, and may be overlooked when considering appropriate management for a KWS. Unlike vascular plants, lower plants and fungi often rely heavily on ambient moisture as they do not possess a well-developed system for drawing up and circulating water from below ground. The mild and humid climate of Gloucestershire is thus very favourable for them, and both lower plants and fungi feature prominently in a wide range of its habitats. The limestone geology of the county also favours some lower plants, notably stoneworts.

Because they do not always have the same ecological requirements as more noticeable vascular plants, lower plants and fungi can potentially suffer from management aimed at encouraging more conspicuous and popular species. Careful consideration should be given to the relative importance of rare, local and vulnerable lower plants and fungi,

and their place in any management recommendations for a KWS which is selected for their benefit.

Despite the deficiency of data concerning the status of many of the lower plant and fungus groups in the county, they should not be left out of the KWS selection process. Table S2a indicates species of high conservation importance, the majority of which occur on habitats which will already be selected by the KWS process. The lists should be used to identify sites not otherwise covered by the selection process, and as an indication of the importance of sites selected for other reasons.

The note in Part 1 of this Handbook, Section 1.1.6, relating to sites with species that aren't necessarily evident at every survey event relates particularly to fungi, many of which are identifiable from fruiting bodies which may not be produced except when conditions are ideal. As with other species which tend to be recordable only sporadically, a KWS designated for lower plant or fungus species will **not** be de-designated just because of a dearth of recent records. Where there is a concern that a species has actually disappeared from a site, expert advice will be sought before considering changing the KWS status.

**Note:** Lower plants and fungi are not closely related, but in terms of management needs and public recognition they are often treated as one category (along with lichens, which consist of both a fungus and a lower plant, living in association). They are therefore treated as one broad category for the purpose of KWS selection thresholds.

### **S2.3 All sites which support three or more of any stonewort (Characeae) species.**

#### *Rationale*

Stoneworts are a group of non-vascular plants which resemble vascular water plants and are frequently recorded alongside them. They are characteristic of certain types of water body, often with low nutrient content but high mineral load, such as newly-created gravel pits. They may be the only species present, or they may occur with other submerged plants. Their tendency to occur in specialised habitats means that when a habitat changes, e.g. a developing gravel pit lake, they often disappear and have no nearby habitats. Gloucestershire is an important area for stoneworts, with sites in the Forest of Dean, the Severn Vale and the Cotswold Water Park areas all supporting a relatively high diversity of stonewort species.

## S3 – Birds and Animals

Minimum thresholds for KWS selection on the grounds of bird and animal presence are detailed below. These thresholds apply to any habitats, provided that the species in question rely on the selected site for their survival. Species “just passing through” will not normally count unless they rely on the site as a regular migration stop-off point. For those species with very specific habitat requirements, special habitat criteria may apply: see section H12.

**Appendix 3** contains lists of the species to which the following thresholds apply:

**S3.1 – Any site on which any size of population of a bird or animal species of high conservation concern from Appendix 3, Table S3, has been recorded and confirmed as present within the last five years. Only sites relevant to the conservation of the species in question will be selected.**

**S3.2 – Any site on which a population of species from Appendix 3, Table S3 has been recorded and confirmed as present within the last five years, where that population is over a certain minimum size. The qualifying sizes are listed individually for the groups concerned. Only sites relevant to the conservation of the species in question will be selected.**

**S3.3 – Any site supporting a significant assemblage of different species from Appendix 3, Table S3.**

**S3.4 – Any site supporting a significant assemblage of breeding birds as described in Table S4.**

**S3.5 – Good examples of sites which support species listed in Table S3 which are known to be becoming increasingly scarce nationally through habitat loss and degradation, but which are not yet scarce or rare in Gloucestershire**

**S3.6 – Good examples of sites which support species listed in Table S3 which are known to be especially rare and/or declining in Gloucestershire or adjacent vice-counties, but which are not yet identified as nationally scarce.**

**In a few cases, special habitat criteria will apply – see Section H12.**



### *Rationale*

There is a very wide range of fauna of high conservation concern within Gloucestershire. For some (S3.1) their dependence on a site will warrant KWS selection regardless of the population size present. These include species which are listed as internationally or nationally rare or threatened. In most cases (S3.2) the KWS system is best served by choosing only the most thriving and/or relatively large populations, or the best species assemblages (S3.3 – or S3.4 in the case of birds, which have their own assemblage lists). Less commonly, species may be rare or threatened in a wider context, but retain a stronghold in Gloucestershire (S3.5, where not covered elsewhere); or may be common elsewhere but at risk of loss or decline in the county context (S3.6).

Detailed rationales for key species and assemblage selection thresholds are listed below. The relevant criterion is listed alongside (and also in the relevant part of Appendix 3). All other species are listed directly in Appendix 3. Appendix 4 has a guide to some of the international statuses of the species listed in Appendix 3. Note that many species occur on more than one list, and more than one criterion will apply to them, sometimes including Special Habitat Criteria.

**In all cases, selection on the grounds of a bird or animal species applies only if the site's habitat appears to be suitable for a resident colony or for some other form of dependent use such as feeding, supporting a host, or a crucial life-cycle stage (i.e. a site will not be selected purely on the grounds that a key species has been spotted there).**

## Selection threshold guidance for key species groups

### VERTEBRATES

Bats	
S3.1	All known breeding and/or hibernating sites for Barbastelle or Bechstein's bats.
S3.2	All known breeding sites, other roosts or complexes used by 5 or more individual animals, other than <i>Pipistrellus pipistrellus</i> . Contiguous flyways and feeding areas should be included.
S3.2	Any breeding roost of <i>Pipistrellus pipistrellus</i> with 50 or more animals.
S3.3	Any roost or complex with 3 or more species of bats.

#### *Rationale*

All bats and their roosts are protected under the Wildlife and Countryside Act, 1981. Breeding success is crucial to the survival of any population. Bats are very selective in their breeding roosts and may show long fidelity to them. These must have suitable access, climate, available space and not have been subjected to injurious chemicals.

Bats have a low reproductive rate, and their young are very vulnerable to site disturbance as all breeding females from an area congregate to give birth. Conservation of breeding populations and their homes is therefore vital. Other congregations occur at various times of the year and these and the sites at which they occur need conservation due to the low recovery rate following population losses.

Feeding areas need conservation since without good quality feeding, populations cannot remain stable. The most important feeding areas are those closest to roosts. These are especially important when females need to return to the breeding roost at intervals during the night to suckle young or when bats have low fat reserves e.g. in spring or during adverse weather conditions when there are few available insects.

Some species, particularly the horseshoe and long eared bats, will only leave a roost when it is dark, fly to the nearest cover and then use regular 'flyways' following landscape features such as hedge-lines in order to reach suitable feeding areas. Destruction of these 'flyways' or bright external lighting will be very damaging or may even render a site useless to these bats.

Some bats are more in need of conservation than others. All are protected under UK

law, but **Bechstein** and **Barbastelle** bats are both now also listed as Endangered on the global IUCN Red List (see Appendix 4 for details of status). **Pipistrelles** are more abundant and widespread than other species and therefore only sites with 50 or more animals are to be considered for selection. These will tend to be the more established, stable and important sites. (There may be many hundred sites occupied by low numbers of this species in Gloucestershire, many on an intermittent basis and to designate all of them is impractical, unwieldy and appears unnecessary for their conservation at the present time.)

<b>Birds</b>	
S3.1	Any site known to support a species of high conservation concern in Gloucestershire, including both nationally rare and threatened species <b>and</b> those which have are less than 10 regular breeding sites in Gloucestershire.
S3.2	Any heronry, provided it regularly holds 3 or more pairs
S3.2	Any sand martin colony, provided it regularly holds 5 or more pairs
S3.2	Any locality regularly used by 0.5% of the total British non-breeding population of any species at any season
S3.4	Any locality in regular use by an assemblage of breeding bird species characteristic of that habitat in Gloucestershire. The threshold for selection is defined by the habitat specific index score (See <b>Appendix 3, Table S4</b> ).

#### *Rationale*

Hérons and sand martins are colonial breeding species which are sensitive to disturbance and which have specific habitat requirements which aren't always covered by the usual Priority Habitat criteria. Both species have a restricted distribution in the county. Irrespective of their status outside the county it would be inappropriate not to include county rarities.

<b>Amphibians and Reptiles</b>	
S3.1	Any known adder hibernaculum and suitable adjacent habitat.
S3.2	All ponds (or other waterbodies) where, for three consecutive years, the spring time torching count is of 15 or more <b>great crested newts</b>
S3.2	All ponds or (other water body) where, for three consecutive years, the spring time torching count is of 20 or more <b>palmate newts</b>
S3.2	Any established field pond or similar water body (not garden ponds) in which 50 or more clumps of <b>common frog spawn</b> are counted in early spring.
S3.2	Any pond where 100 or more adult <b>common toads</b> are observed in early spring.

Note: the pond and all suitable contiguous habitat should be identified as a KWS. Other suitable habitat within 250m should be identified as such. The whole area within 250m of the pond (regardless of suitability of habitat) should be identified as an alert area for the KWS, e.g. for planning alerts.

S3.2	Any site in which 5 or more adult <b>common lizards</b> are observed for three consecutive years.
S3.3	Any site supporting populations of four amphibian species in any one year with one species at a Key Wildlife Site threshold.
S3.3	Any site supporting populations of any two amphibian species and at which grass snakes have been observed in any one year.
H12.5	Special habitat for <b>grass snakes</b>

*Rationale*

Amphibians and reptiles are vulnerable both to habitat loss (including pollution) and disturbance. Most are either protected or have some recognition of their high conservation importance, e.g. they are UK Priority Species.

The **great crested newt** is not uncommon in Gloucestershire and numerous locations are known, but there are very few sites where counts of adult newts exceed 15 individuals when employing the night surveying technique of “torching”. Since populations of adult newts fluctuate annually, and night counts can be influenced by various factors, it is recommended that surveys are carried out over several weeks during the peak breeding period of March to May, and repeated over three consecutive years. It is considered that a night time count detects approximately 10% of the adult newts present – thus, a count of 15 individuals infers a populations of 150 adults.

A terrestrial habitat requirement of 250 m from the shoreline of a breeding pond is considered necessary in order to support a viable population of great crested newts. For the purposes of mapping KWS for local authorities it is not practical to highlight every area within 250m of the breeding pond. Therefore the following guidelines should apply.

The **palmate newt** is restricted to two distinct areas of the county: the Forest of Dean and East of the Severn Vale running along the line of the Cotswold ridge. This is a newt that does well in nutrient poor ponds and is tolerant of acid conditions down to pH3.9.

The **common frog** is widely distributed throughout the county but is no longer common on farm land where is once flourished in good numbers. Since the loss of farm ponds and changes in agricultural practices the frog has declined and ornamental

garden ponds have become their salvation. The latter are not considered for Key Wildlife Site status as they are likely to be of recent origin and spawn is likely to have been introduced into them.

Nationally, a pond with 50 – 500 spawn clumps would represent a good population. In Gloucestershire the lowest figure of 50 clumps is taken as the threshold as it is considered that there are few sites in the county where more than 50 clumps could be found. Suitable adjacent habitat in the form of rank grass, ditches and scrub marsh etc is required to accommodate adult frogs following their dispersal after spawning.

The **common toad** is widespread and usually requires larger and deeper water bodies in which to spawn. It also exhibits breeding site fidelity. As spawn strings are impossible to separate a head count of adult toads is required in order to assess population size. Toads may follow distinct migration routes between breeding pond and hibernation area and it is essential that hibernation areas are protected and migration routes are not severed.

The **adder** is local and is found to be mainly present in the Forest of Dean and the Cotswold edge where there is rank grassland adjacent to hedgerows, stonewalls and scrub etc. March / April sightings would indicate emergence from a nearby hibernaculum and such observations will form the basis of Key Wildlife Site designations. Once mated, dispersal of adults to their home range, which may be 500 – 1900 metres from the hibernaculum, would be established by sightings during the active period. Such sightings will be used to delineate the boundaries of the Key Wildlife Site. Sightings of juveniles would indicate successful breeding and suggest a viable population on the site.

The **common lizard** is local and is found mainly in the Forest of Dean and along the line of the Cotswold edge where there is rank grassland adjacent to hedgerows, stonewalls and scrub – each with a sunny aspect. In the spring and on partially sunny days lizards tend to use favourite basking sites, usually of heat absorbing materials such as fence posts, ant hills etc with rank vegetation as cover for a quick escape route. Several adults may be seen in these habitats at any one time which would tend to suggest a reasonable population for consideration as a Key Wildlife Site. A pregnant female seen basking in the summer months, or basking juveniles in late summer, will indicate a breeding site. The habitat range requirements of the lizards would have to be assessed so that sufficient surrounding habitat is included in the Key Wildlife Site.

INVERTEBRATES

Butterflies	
S3.1	<p>All sites from which any nationally scarce (Notable A), IUCN Red List or UK Priority Species have been recorded, provided the habitat is suitable. This currently applies to the following species:</p> <p>Adonis Blue            Duke of Burgundy – now IUCN Red-Listed as Near Threatened            Large Blue            Small Blue – now IUCN Red-Listed as Near Threatened            Wood White            Marsh Fritillary            Small Pearl Bordered fritillary            High Brown Fritillary – likely extinct            Pearl Bordered Fritillary            Grayling – possibly extinct            Grizzled skipper – now IUCN Red-Listed as Vulnerable; uncommon in Gloucestershire            White Admiral – now IUCN Red-Listed as Near Threatened; also uncommon in Gloucestershire            White Letter Hairstreak – see also Special Habitat Criteria, <b>Section H12.7</b></p>
S3.2	<p>Sites with good populations of Near Threatened or Uncertain Status or Priority Species which are widespread in the county</p> <p>Dingy Skipper            Small Heath            Wall</p>
S3.5	<p>All sites supporting breeding colonies of species not covered by S3.1 which have 5% or more of their national 10km square distribution in the county.</p> <p>Chalkhill Blue</p>
S3.6	<p>All sites supporting breeding colonies of butterflies not covered by S3.1 or which are considered to have 25 or fewer breeding sites in the county. This currently applies to the following species:</p> <p>Dark Green Fritillary            Silver Washed Fritillary            Brown Argus</p>
H12.7	<p>Special habitat criteria for White letter hairstreak</p>

## Rationale

The majority of sites supporting the listed butterfly species will probably qualify for designation as Key wildlife sites on habitat criteria. These species criteria are aimed at ensuring that those sites with specific and significant butterfly interest are identified and registered even if there are other reasons for selection. This is important for management considerations, to ensure that the specific interest of the site is taken into account.

Although not all the species listed are rare in Gloucestershire, they are still vulnerable and the best sites in the county should be identified and registered. It should be noted that since the publication of the previous KWS Criteria, several of the more common species have moved up to higher levels of international rarity and national protection; this is a sad reflection of the vulnerability of species, in most cases to habitat loss.

White Letter Hairstreak is a special case: it meets several criteria, but is mainly recorded from the vicinity of hedgerows with elms, not on discrete sites; it is also mobile and as elms die off and the regrowth becomes taller it will move on. KWS boundary decisions can be hard for this species, therefore it is covered by a Special Habitat criterion, **H12.7**.

Dragonflies and damselflies	
S3.1	Species listed as Endangered, Vulnerable or Near Threatened on the IUCN Red List guidelines: Common club-tail <i>Gomphus vulgatissimus</i> Scarce blue-tailed damselfly <i>Ischnura pumilio</i> Scarce chaser <i>Libellula fulva</i> (this species appears to be slowly spreading; it may be more appropriate to treat it as a S3.2- listed species for KWS selection)
S3.3	Any site with an assemblage of 14 or more breeding Odonata species.
S3.5	Any site supporting breeding populations of species found in 10% or less of British 10km squares. These may not all be classed as vulnerable or near-threatened, but all are restricted in their distribution and at risk if key strongholds are lost. This currently includes: Downy emerald <i>Cordulia aenea</i>

	<p>Keeled skimmer <i>Orthetrum coerulescens</i>  White-legged damselfly <i>Platycnemis pennipes</i></p>
S3.6	<p>Any site supporting species which are rare or scarce in Gloucestershire, (found in less than 10% of the county's 10km squares). These could be lost from the county if key strongholds are not protected.</p> <p>At present only 3 species qualify under this criteria, they are:</p> <p>Common hawkler <i>Aeshna juncea</i>  Golden-ringed dragonfly <i>Cordulegaster boltonii</i>  Black darter <i>Sympetrum danae</i>  Small red-eyed damselfly <i>Erythromma viridulum</i> – unusual in that it is a recent, natural coloniser, apparently spreading in response to climate change.</p>

#### *Rationale*

These species are all vulnerable to loss of, or degradation of, their specific preferred habitats. Those in the S3.1 category are already vulnerable or near-threatened in a national context, and most of the others have a restricted distribution. It is hoped that Key Wildlife Site designation may help to prevent those species from being added to the Vulnerable or Near Threatened list in the future.

An assemblage of 14 or more species would indicate an important site in the county. Many such sites are likely to be identified under habitat criteria. However, dragonflies depend on a diversity of habitat types and thus a Key Wildlife Site may include grassland, hedgerows, rides or other habitat adjacent to breeding ponds or streams, some of which may not usually support notable biodiversity interest in its own right. The presence of important dragonfly populations as identified in these species criteria may indicate a need for wider site boundaries than might be obvious from the habitat thresholds alone.

The inclusion of a recent coloniser recognises that species may need safe territories to extend their distribution in response to changing climate. The conservation status of such species can change over time if they become safely established; this is likely to be the case with Small red-eyed damselfly, which has relatively unfussy habitat requirements and is showing signs of a fast spread northwards.



**Molluscs** \* = if re-found; \*\* = large populations only; \*\*\* = if found through survey

S3.1	<p>Sites with the following mollusc species meet the S3.1 threshold provided their specific habitat requirements are met:</p> <p><b>Freshwater</b>  <i>Margaritifera margaritifera</i>* <span style="float: right;"><i>Pseudanodonta complanata</i></span>  <i>Myxas glutinosa</i>* <span style="float: right;"><i>Segmentina nitida</i></span>  <i>Pisidium pseudosphaerium</i>***  <i>Pisidium tenilineatum</i> (RDB-rare)</p> <p><b>Woodland</b>  <i>Ena montana</i></p> <p><b>Calcareous grassland</b>  <i>Truncatellina cylindrica</i>*</p> <p><b>Walls and screes</b>  <i>Lauria sempronii</i></p> <p><b>Wetland</b>  <i>Oxyloma sarsi</i>***  <i>Vertigo angustior</i>***  <i>Vertigo moulinsiana</i>*</p>
S3.2	<p>Any site with regular sightings of Roman snail, <i>Helix pomatia</i>** , where 5% or more of the county population is estimated to depend on the site. In the absence of accurate population estimates, sites with regular sightings of ten or more snails should be prioritised.</p>
S3.2	<p>Any site which supports a large population of the following species:</p> <p><b>Wetland</b>  <i>Ashfordia granulata</i>**  <i>Zonitoides nitidus</i>**</p>
S3.6	<p>Any site which supports a population of one of the notable mollusc species listed below when in its appropriate habitat</p> <p><b>Freshwater</b>  <i>Aplexa hypnorum</i> <span style="float: right;"><i>Pisidium pulchellum</i>*</span>  <i>Bithynia leachi</i> <span style="float: right;"><i>Sphaerium rivicola</i></span>  <i>Pisidium henslowanum</i> <span style="float: right;"><i>Unio pictorum</i></span></p>

<i>Pisidium hibernicum</i>	<i>Unio tumidus</i>
<b>Woodland</b>	
<i>Acicula fusca</i>	<i>Malacolimax tenellus</i>
<i>Helicigona lapicida</i>	<i>Phenacolimax major</i>
<i>Leiostyla anglica</i>	<i>Spermodea lamellata*</i>
<i>Limax cinereoniger</i>	<i>Vertigo substriata</i>
<i>Macrogasta rolphii</i>	<i>Zonitoides excavatus</i>
<b>Calcareous grassland</b>	
<i>Abida secale</i>	<i>Pupilla muscorum</i>
<i>Helicella itala</i>	
<b>Walls and scree</b>	
<i>Vertigo pusilla</i>	
<b>Wetland</b>	
<i>Vertigo antivertigo</i>	

#### *Rationale*

These molluscs are either typical of high conservation value habitats or are rare and threatened species. Three species, *Pisidium psuedosphaerium*, *Oxyloma sarsi* and *Vertigo angustior* have not been found in Gloucestershire, although they have been found in the region. They are included as relevant species for site selection if found.

*Myxas glutinosa* was found near Chalford in about 1910 and is almost extinct in the UK. *Aplexa hypnorum* is a local species known in Gloucestershire only from the Coombe hill Canal/Leigh/Hasfield area, Alney Island and near Kemble. *Pisidium tenuilineatum*, an RDB rare species, has recently been found in the Rivers Churn, Coln and Windrush. Freshwater pearl mussel, *Margaritifera margaritifera*, is unlikely to be found but there are some poorly-documented ??1920's fresh-looking shells in Gloucester museum. Should the species be rediscovered it would be a very high priority for site protection.

All the woodland species (except *Helix pomatia* – see below) are ancient woodland indicators. All are probably declining in frequency in Britain and now are nationally at least only local. *Spermodea lamellata* is known from one 1920's record for Upton St Leonard's. *Ena montana* is an RDB rare species, and the Cotswolds is now probably its main centre of distribution in the UK.

*Pupilla muscorum*, *Abida secale* and *Helicella itala* arrived in Britain late in the last glacial period and are typical of short turfed calcareous sites with bare rubble soil and stones. *Truncatellina cylindrica* is an extreme xerophile now known from fewer than 10 sites in Britain, for which there is one 19th century record for the Cleeve Hill area.

The only recent (as opposed to sub-fossil) UK records of *Lauria sempronii* are from four sites in Gloucestershire, two within the last 5 years, the other two from more than 30 years ago. *Vertigo pusilla* is a rare species of old walls and (rarely) grassland in Britain and is known from four Cotswold sites.

*Helix pomatia* (Roman snail) has two main areas of distribution in Britain – the North Downs and the mid-Cotswolds. Populations spread very slowly and are known to centre on key sites, some of which are famously persistent. Occasional sightings of a snail e.g on a stone wall are not currently grounds for KWS selection; however, sites with several Roman snail records over a period of more than one year should be considered. **Note:** good Roman snail sites are vulnerable to collection for the restaurant trade, and site locations may need to be treated as sensitive.

Ants	
S3.1	All sites with a population of IUCN Red Listed species of conservation concern and appropriate habitat for the species. See <i>Formica rufa</i> , below.
S3.2	All sites with a significant and thriving population of a UK Priority Species or Nationally Notable species – see species in <b>bold</b> , below
S3.3	All sites with an assemblage of 8 or more species of formicidae
S3.5	Sites for species which are known to be becoming increasingly scarce nationally through habitat loss and degradation, but which are not yet scarce or rare in the county. At present 2 species qualify under this criterion:  Red ant <i>Formica rufa</i> – also listed by IUCN as Near Threatened Brown ant <i>Lasius brunneus</i> (Nationally Notable A)
S3.6	Good examples of sites which support species which are known from fewer than ten locations in Gloucestershire. At present 5 species qualify: <i>Lasius umbratus</i> <span style="float:right"><i>Lasius mixtus</i></span> <b><i>Formica sanguinea</i></b> (also Notable B) <span style="float:right"><i>Stenamamma debile</i></span> <b><i>Formicoxenus nitidulus</i></b> (also a UK Priority Species; reliant on <i>Formica</i> spp. as it is a “guest ant” in their nests)

### *Rationale*

Of the 47 species of Formicidae currently listed for Britain, 23 are recorded from Gloucestershire. This means that the county has a significant proportion of the UK's ant fauna. It is therefore important to recognise and register any site with a significant assemblage of 8 species or more. It is likely that such sites will also qualify on habitat grounds, in which case the needs of the ant populations need to be taken into account when undertaking site management.

Two species merit S3.5 listings due to having a stronghold in Gloucestershire despite a very patchy UK distribution. The Forest of Dean is one of the strongholds for Red ant *Formica rufa*, now an IUCN Near Threatened species, and there is evidence of a significant decline outside its stronghold areas. Brown ant is fairly frequent but only in two main parts of the UK, one of which is Gloucestershire. Both may be under-recorded and their status may change with time.

### Other species groups

**Appendix 3** lists a wide range of other species groups, some of which are under-recorded in the county and may be added to over time. This particularly applies to insects. They include large groups such as moths and beetles, and smaller lists for rare or restricted insects including lacewings, bugs, alder-flies, true flies etc.

Where the exact county distribution of species is not known, the UK JNCC conservation designation list has been included wholesale. In such cases the list is likely to be refined at a later date. Likewise lists which are currently incomplete or transitional will be updated as soon as practicable. If there is doubt about any of the entries in Table S3, the latest version of JNCC's designation status list should be used in conjunction with the knowledge and records provided by the relevant county experts.