BIODIVERSITY REPORTING AND INFORMATION GROUP

Report on the Species and Habitat Review

Report to the UK Biodiversity Partnership

This document contains Annexes 4-6 of the Species and Habitat Review Report 2007.

For the Report including Annexes 1-3, please see:

http://www.ukbap.org.uk/library/BRIG/SHRW/SpeciesandHabitatReviewReport2007andAnnexes1-3.pdf

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ANNEX 4

2005-7 UK BAP PRIORITY HABITATS REVIEW

SUMMARY OF PROPOSED CHANGES TO THE PRIORITY HABITAT LIST

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May 2007

1. The following tables summarise the changes that are proposed for the UK BAP priority habitat series. The complete new priority habitat series is given in Table 1 of the main report. For terrestrial and freshwater habitats the changes result in an increase from the 32 existing priority habitats (including two woodland types which have not yet been fully adopted) to 40 priority habitats. The new series accommodates all but two very rare habitat types listed on Annex I of the EU Habitats Directive. For marine habitats there is an increase from 17 to 25 priority habitats.

2. The 2005-7 priority habitats review represents the first full review of the UK BAP priority habitat series. Its principal aim was to ensure that the UK BAP remains focussed on the correct priorities for action, taking account of emerging priorities, conservation successes, and new information gathered since the original priority habitat series was established.

3. For terrestrial and freshwater habitats, the focus of the first work was to identify: (i) major gaps in the original priority habitat series; and (ii) possible revisions to existing priority habitats.

   The marine review represents the first audited UK BAP review of all the marine habitats in the UK. The review focused on major gaps and undertook a brief evaluation of the existing marine UK BAP habitats.

   Unlike the original priority habitat series, the approach taken was to identify the full range of habitats that merited priority status without a detailed consideration of appropriate actions or related aspects.

4. The following proposals were received for terrestrial and freshwater habitats: (i) nine for new UK BAP priority habitats (Table Ai); (ii) two to make substantive changes to existing UK BAP priority habitats (Table Ai); and (iii) four to make minor changes to existing BAP priority habitats (Table Ci). A number of additional habitats were identified by JNCC as possible ‘gaps’ in the proposed revised series (these are listed in Table D). Consideration was also given to making explicit important components of existing priority habitats that are often not recognised as such (see Table B).

   The following proposals were received for marine habitats (i) nine new marine UK BAP priority habitats (Table Aii); (ii) two existing UK BAP habitats are proposed for an expansion in scope (Table Aii); and (iii) to make minor changes to three existing BAP priority habitats (Table Cii)

5. Full reports are available from JNCC for all the revised and new habitats. These give a fuller explanation of the approach and methods used, details of how each proposal was assessed, and any issues that arose (for terrestrial and freshwater habitats see Annex 5).

6. We would like to thank the large number of the people and all organisations who have contributed to this work, especially those that took the time to prepare, discuss and comment on each of the habitat proposals.

Table Ai. Recommendations on proposed new and expanded existing terrestrial and freshwater priority habitats

Habitat	Proposal	Final conclusion/recommendation
Rivers	New priority habitat [including existing Chalk Rivers priority habitat]	• We support the proposal for Rivers to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species. • Two specific items require further work if the proposal is approved: (i) criteria need to be drawn up to specify which non-qualifying, degraded rivers/sections are excluded from the definition; and (ii) a sufficiently detailed description of the entire resource covered by the proposed habitat needs to be drawn up, including an assessment of all individual river types.
Oligotrophic and Dystrophic Lakes	New priority habitat	• We support the proposal for Oligotrophic & Dystrophic Lakes to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species. • Two specific items require further work if the proposal is approved: (i) the lower quality thresholds for the proposed habitat need to be specified, so that non-qualifying, low quality water bodies can be excluded; and (ii) a clearer definition needs to be drawn up, based on and complementing the definition developed for Mesotrophic Lakes.
Ponds	New priority habitat	• We support the proposal for Ponds to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
Mountain Heaths and Willow Scrub	New priority habitat	• We support the proposal for Mountain Heaths and Willow Scrub to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
Upland Flushes, Fens and Swamps	New priority habitat	• We support the proposal for Upland Flushes, Fens and Swamps to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II – Risk; and Criterion III - Key species. • If the proposal is approved, this will necessitate a change of name to the existing priority habitat for 'Fens' (to 'Lowland Fens' or similar).
Inland Rock Outcrop and Scree Habitats	New priority habitat	• We support the proposal for Inland Rock Outcrop and Scree Habitats to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II – Risk; and Criterion III - Key species.
Calaminarian Grasslands	New priority habitat	• We support the proposal for Calaminarian Grasslands to form a new BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (whole resource); Criterion II - Risk; and Criterion III - Key species.
Open Mosaic Habitats on Previously Developed Land	New priority habitat	• We support the proposal for Open Mosaic Habitats on Previously Developed Land to form a new BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species. • One specific item that requires further work, if the proposal is approved, is to further refine the criteria for the selection of the habitat and how these are applied.
Traditional Orchards	New priority habitat	• We support the proposal for Traditional Orchards to form a new BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species.
Wood-Pasture and Parkland	Change name to 'Wood Pasture and Parkland' and widen scope	• We support the proposal for the Wood-Pasture and Parkland BAP priority habitat to be extended to include occurrences in upland as well as lowland situations. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

Habitat	Proposal	Final conclusion/recommendation
Ancient and/or species-rich hedgerows	Change name to 'Hedgerows' and widen scope	• We have no objections to change the name of the priority habitat to Hedgerows. • Priority hedgerows should be those comprising 80% or more cover of any native tree/shrub species. This does not include archaeophytes and sycamore. For the purposes of the UK BAP 'native' will not be defined further; it will be left up to the Countries to provide guidance on this as they consider appropriate. • We are supportive in principle to widen the scope of the priority habitat, on the basis of Criterion III - Key species, possibly Criterion - II Risk, and also recognising that the 'functional importance' criterion adds support.

Table Aii. Recommendations on proposed new and expanded existing marine priority habitats

Habitat	Proposal	Final conclusion/recommendation
Tide-swept channels	Expanded existing priority habitat	• This replaces the existing habitat Tidal rapids. It now incorporates tide-swept channels, which could include estuarine environments. This proposal is fully supported.Criteria?
Cold water corals	Expanded existing Priority habitat	• This proposal replaces the priority habitat covering solely the deep-sea coral *Lophelia pertusa*. It allows the protects of other deep-sea corals. Name change to provide a better indication of what BAP is protecting to a lay audience. This proposal is fully supported.Criteria?
Peat and clay exposures	New priority habitat	• This habitat is proposed under Criterion III – Key species and Criterion IV- Other important factors. This proposal is fully supported.
Fragile sponge & anthozoan communities on subtidal rocky habitats	New priority habitat	• This habitat encompasses several habitats that are restricted in distribution/ area or both. It also encompasses species that are both on the existing priority species list and the newly proposed priority list. This priority habitat meets all four qualifying criteria; Criterion I Habitat for which the UK has international obligations, Criterion II Natural and semi-natural habitats at risk, Criterion III- Key species and Criterion IV- Other important factors • Although we support this proposal, a sufficiently detailed description of the entire resource is still required. • The term 'fragile' also needs clarification since here it means sensitive to impact and lack of quick recovery rather than structurally. However it is noted that erect forms are structurally fragile as well.
Intertidal boulder communities	New priority habitat	• This habitat is proposed under Criterion 1, Criterion II Natural and semi-natural habitats and Criterion IV- Other important factors. This proposal is supported on the basis of localised disturbance in Wales only.
Estuarine rocky habitats	New priority habitat	• The proposed new priority habitat meets all four qualifying criteria; Criterion I Habitat for which the UK has international obligations, Criterion II Natural and semi-natural habitats at risk, Criterion III- Key species and Criterion IV- Other important factors. This proposal is fully supported.
Seamount communities	New priority habitat	• This priority habitat is nominated from interpretations of information within OSPAR reports. On the basis of these reports it meets all four qualifying criteria; Criterion I Habitat for which the UK has international obligations, Criterion II Natural and semi-natural habitats at risk, Criterion III- Key species and Criterion IV- Other important factors. This proposal is fully supported.

Habitat	Proposal	Final conclusion/recommendation
Carbonate mounds	New priority habitat	• This priority habitat is nominated from interpretations of information within OSPAR reports. This habitat is proposed on the basis of the following two criteria, Criterion 1 Habitat for which the UK has international obligations and Criterion IV- Other important factors. • Although this habitat is listed on the OSPAR list of threatened and declining species and habitats it is acknowledged that it lacks sufficient information and clear definition of the habitat itself. It is therefore supported on the basis that, should it be removed from the OSPAR list at a future date, then it should also be removed from the BAP list.
Deep-sea sponge communities	New priority habitat	• This habitat is proposed under Criterion 1 Habitat for which the UK has international obligations and Criterion IV- Other important factors. This proposal is fully supported.
File shell beds	New priority habitat	• This habitat is proposed under, Criterion III- Key species and Criterion IV- Other important factors. This proposal is fully supported.
Blue mussel beds	New priority habitat	• This habitat is proposed under Criterion 1 Habitat for which the UK has international obligations (OPSPAR) and Criterion IV- Other important factors. • This proposal is supported, but the habitat will require a sufficiently detailed description of the entire resource including a definition of beds / typical bed density, so distinguish this habitat from the blue mussel species itself.

Table B. Recommendations on additional habitat components to accommodate/recognise within existing priority habitats

Habitat	Proposal	Final conclusion/recommendation
Roadside Verges	*Consider place in priority habitat series*	• We support the proposal to recognise the significance of roadside verges in supporting relevant grassland priority habitat types (i.e. lowland dry acid grassland, lowland calcareous grassland, lowland meadows, upland hay meadows, purple-moor grass pastures). This would involve only a clarification of definition, which will not significantly affect the scope of the existing priority habitats.
Scrub & Treeline Habitats	*Consider place in priority habitat series*	• We support the proposal to ensure that relevant scrub and treeline habitat types are further recognised as important constituents in related a number of existing/proposed BAP priority habitat types (this affects most of the individual priority habitat types as scrub is a widespread component). This activity should form part of future work on describing and defining the content of priority habitats. These scrub types will require consideration when habitat action planning is reviewed and targets are identified. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

Table Ci. Recommendations on proposed minor changes to existing terrestrial and freshwater priority habitats

Habitats	Proposal	Final conclusion/recommendation
Arable Field Margins	Change name 'Arable field margins' and clarify scope	• We agree with the proposal to change the name of the Cereal Field Margins BAP priority habitat to Arable Field Margins, and also with the details of the proposed clarification, which does not significantly affect the scope of the habitat.
Lowland Heathland	Clarify scope	• We agree with the details of the proposed clarification, which does not significantly affect the scope of the habitat.
Lowland/Upland Calcareous Grassland	Clarify scope	• We agree with the details of the proposed clarification, which does not significantly affect the combined scope of the habitats.

Table Cii. Recommendations on proposed minor changes to existing marine priority habitats

Habitat	Proposal	Final conclusion/recommendation
Littoral and sublittoral chalk	Name change to intertidal and subtidal chalk	• Title provides a better indication of what BAP is protecting to a lay audience. This proposal is fully supported.
Mudflats	Name change to Intertidal mudflats	• Title change to provide a better indication of what BAP is protecting to a lay audience and to reflect current plan. i.e. current plan specifies that the plan *only* covers the intertidal region. The name also corresponds with the OSPAR habitat 'Intertidal mudflats'. This proposal is fully supported.
Modiolus modiolus beds	Name change to Horse mussel beds	• Title change to provide a better indication of what BAP is protecting to a lay audience Horse mussel beds. This proposal is fully supported.

Table D. Recommendations on potential remaining 'gaps' in the revised BAP priority habitat series

Habitat	Proposal	Final conclusion/recommendation
Canals	Consider place in priority habitat series	• Although it is clear that at least some canals have developed semi-natural characteristics and a flora/fauna that are recognised as important for nature conservation, and these seem to meet with qualifying Criterion III - Key species and Criterion II – Risk, there is little support to give this habitat priority status because it is considered that sufficient action is already in place through the protected SSSI/SAC site series and Water Framework Directive. • Without the support of the JNCC Freshwater Lead Coordination Network, we consider it inappropriate to afford this habitat priority status. If canals are left out of the priority habitat series, this means that the series may not be comprehensive.
Arable Land	Consider place in priority habitat series	• It is clear that at least some in-field habitats associated with arable land are recognised as important for nature conservation, and these seem to meet with the qualifying Criterion III - Key species and Criterion II - Risk. However, a detailed habitat proposal was not submitted for this habitat, but instead the Cereal Field Margins HAP Steering Group advised that they would require at least another two years to produce an informed proposal. • We recommend that a process is put into place to ensure this work is carried out. Without this we consider it inappropriate to afford this habitat priority status. If arable land outside of arable field margins is left out of the priority habitat series, this may mean that the series may not be comprehensive.
Field Banks	Consider place in priority habitat series	• It is clear that at least some field banks are important for nature conservation, and these would seem to meet with qualifying Criterion III - Key species, Criterion II – Risk, and possibly Criterion I - International obligations (small part of resource). The most sensible solution, especially given the range of associated broad vegetation types and discrete nature of this linear habitat type, would seem to be to create a priority habitat type based on field banks. However, a proposal to this effect has not been forthcoming. • We recommend that a process is put into place so that so the value of this habitat can be fully assessed and a suitable proposal drawn up, in time for the next review of priority habitats. • Without the support of an appropriate group, we consider it inappropriate to afford this habitat priority status. If field banks are left out of the priority habitat series, this means that the series may not be comprehensive.

ANNEX 5
2005-7 UK BAP PRIORITY HABITATS REVIEW

DETAILED PROPOSALS AND EXPLANATION OF DECISIONS FOR TERRESTRIAL & FRESHWATER HABITATS

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May 2007

This paper presents the outcomes and recommendations of the first stage of the 2005-7 UK BAP priority habitats review. It gives an explanation of the aims of the work, the approach and methods used, details of how each proposal was assessed, and the issues that arose. Each proposal is presented, along with a summary statement and our recommendation.

We would like to thank all the people who have contributed to this work, especially those individuals/ organisations that took the time to prepare, discuss and comment on each of the habitat proposals. We are grateful to members of the Priority Species and Habitat Review Group (PSHRWG), particularly Pete Brotherton, Joanna Drewitt, Liz Howe, Margaret Palmer, Brigid Primrose and Richard Weyl.

1. Overall aims of 2005-7 priority habitats review

The principal aim of the 2005-7 priority habitats review was to ensure that the UK BAP remained focussed on the correct priorities for action. This has been the first full review of the UK BAP priority habitat series. It provided an opportunity to take account of emerging priorities, conservation successes, and new information gathered since the original priority habitat series was established. For terrestrial and freshwater habitats, the focus of the first stage of the work was on identifying: (i) major gaps in the original priority habitat series; and (ii) possible revisions to existing priority habitats.

The 2005-7 review built on the earlier Habitat Gaps Review of 1999-2001. As with the original priority habitat series, this included a requirement that priority habitat status should only be afforded if the production of a separate Habitat Action Plan was seen as necessary. This meant that certain important types were ruled out, because it was felt that actions under existing Habitat (or Species) Action Plans would suffice. This was *not* the approach taken for this review: our intention was to identify the full range of habitats that merited priority status *without a detailed consideration of appropriate actions or related aspects.* A review of the delivery mechanisms for priority habitats is the focus of a subsequent stage.

2. Methods used

2.1. Initial consultation and request for submissions

A set of guidance was prepared explaining the purpose of the review, along with two forms upon which proposals for new or revised priority habitat types could be submitted. The guidance was made available on the UK BAP website (go to: http://www.ukUK BAP.org.uk/GenPageText.aspx?id=103) to engage a wider audience. A request for submissions was then sent to all relevant HAP steering groups, inter-agency groups (especially the habitat Lead Co-ordination Networks) and other relevant parties. Species specialists were made aware through the PSHRWG.

2.2. Submissions received and other habitats considered

Most of the groups consulted made a proposal or, at least, commented on particular issues/habitats (see Table 1 for details). In all, nine proposals for new priority habitats were received (see Table 2a for

details). In addition, changes were proposed for five of the existing priority habitats (see Table 2b for details), though only two of these represented a substantive change in the overall scope of the habitat.

Table 1. List of consultees, respondents and final responses received for the 2005-7 UK BAP priority habitats review (Stage 1)

Consultee	Group	Response
Alison Lee, SNH/Anita Weatherby, Pond Conservation	JNCC Freshwater Lead Coordination Network/Pond Conservation	• *Proposal form for Rivers, Ponds* • *Comments on other river types and canals*
Simon Leaf, EA and Ian Fozzard, SEPA	Joint Lakes HAPs Steering Group	• *Proposal form for Oligotrophic and Dystrophic Lakes*
Sally Johnson, SNH	Upland HAPs Steering Group/ JNCC Upland Lead Coordination Network	• *Proposal forms for Mountain Heaths and Willow Scrub, Upland Flushes, Fens and Swamps, Inland Rock Outcrop and Scree Habitats*
Carrie Rimes, CCW	Lowland Grassland HAPs Steering Group, JNCC Lowland Grassland Lead Coordination Network	• *Proposal forms for Calaminarian Grasslands [originally called rock outcrops, screes and mine spoil rich in heavy metals], Lowland Calcareous Grassland* • *Comments on roadside verges*
David Knight, EN	Inter-agency Urban Habitat Working Group	• *Proposal form for Open Mosaic Habitats on Previously Developed Land [originally called Post-industrial sites]*
Heather Robertson, EN	Informal Orchard Working Group	• *Proposal form for Traditional Orchards*
Roger Meade, EN	Wetland HAPs Steering Group, JNCC Lowland Wetland Lead Coordination Network	• *Comments on reedbeds/fens*
Ann Davies, DEFRA	Cereal Field Margins HAP Steering Group	• *Proposal form for Arable Field Margins*
Ann Davies, DEFRA	Hedgerows HAP Steering Group	• *Proposal form for Hedgerows* • *Comments on field banks*
Keith Kirby, EN	Wood-Pasture and Parkland HAP Steering Group	• *Proposal form for Wood-Pasture and Parkland*
Isabel Alonso, EN	Lowland Heath HAP Steering Group	• *Proposal form for Lowland Heathland*
Gordon Patterson and Sallie Bailey, Forestry Commission	UK Native Woodland HAP Steering Group	• *Comments received, no changes proposed*
Pippa Langford, CA	Limestone Pavement HAP Steering Group	• *Comments received, no changes proposed*
Sue Rees, EN	Coastal HAPs Steering Group	• *Comments received, no changes proposed*
Pat Sones, EA	Aquifer-fed Naturally Fluctuating Water Bodies HAP Steering Group	• *No changes proposed*
Lawrence Talks, EA	Chalk Rivers HAP Steering Group	• *No changes proposed*

Full details of the submissions received and habitats considered were made available via the UK BAP website (go to: http://www.ukUK BAP.org.uk/GenPageText.aspx?id=103). The relationships between all the habitats considered and the existing UK BAP priority habitat series is summarised in Table 3.

2.3. Preliminary assessment of conservation status

All habitats put forward were assessed to determine their conservation status, apart from the three existing priority habitats for which only a change of name and/or clarification of definition was proposed (see below). The assessment was based primarily on the three qualifying criteria set out in the Guidance of

April 2005. In addition, functional importance was added as a secondary criterion. A series of questions were subsequently identified, which were used to inform the judgement process. These criteria and questions are detailed in Boxes 1 and 2. Full details of the preliminary assessment of all the habitats and conclusions reached were presented in a Consultation Report (go to: http://www.ukUK BAP.org.uk/GenPageText.aspx?id=103). This included details of how the assessments had been made, a habitat-by-habitat commentary, and a number of generic conclusions that appeared to be confounding the work (see below).

Table 2. Summary of the final proposals received for the 2005-7 UK BAP priority habitats review (terrestrial and freshwater habitats)

2a: proposed new priority habitats

	Proposed habitat	Lead proposer
1	Rivers	JNCC Freshwater Lead Coordination Network
2	Oligotrophic and Dystrophic Lakes	Joint Lakes HAP Steering Group
3	Ponds	Pond Conservation/JNCC Freshwater Lead Coordination Network
4	Mountain Heaths and Willow Scrub	JNCC Upland Lead Coordination Network
5	Upland Flushes, Fens and Swamps*	JNCC Upland Lead Coordination Network
6	Inland Rock Outcrop and Scree Habitats	JNCC Upland Lead Coordination Network
7	Calaminarian Grasslands**	JNCC Lowland Grassland Lead Coordination Network
8	Open Mosaic Habitats on Previously Developed Land***	Urban Habitat IAWG
9	Traditional Orchards	Natural England

2b: proposed revisions to existing habitats

	Existing habitat	Type of change proposed	Proposed by
1	Ancient and/or Species-Rich Hedgerows	Change name to 'Hedgerows' and widen scope	Respective HAP Steering Group
2	Lowland Wood-Pasture and Parkland	Change name to 'Wood-Pasture and Parkland' and widen scope	Respective HAP Steering Group
3	Cereal Field Margins	Change name to 'Arable Field Margins' and clarify scope	Respective HAP Steering Group
4	Lowland Heathland	Clarify scope	Respective HAP Steering Group
5	Lowland Calcareous Grassland	Clarify scope	Lowland Grassland HAP Steering Group

* if accepted, the name for the existing 'Fens' priority habitat would need to be changed to 'Lowland Fens'; ** originally called Rock outcrops, screes and mine spoil rich in heavy metals; *** originally called Post-industrial sites

It was apparent that three submissions represented only minor changes that clarified the definition of the existing priority habitat (see Table 2b, items 3-5). As these would not result in any significant changes to the scope of these habitats, it was concluded that these proposals would not require formal approval through the UK Biodiversity Partnership.

During the assessment process, an additional six habitats were identified that appeared to represent possible 'gaps' in the proposed revised series:

1. Other river types
2. Canals
3. Field banks
4. Roadside verges
5. Arable land
6. Scrub and treeline vegetation

These appeared to have the potential to meet with one or more of the qualifying criteria, but no formal submission had been received for them. Some seemed to be gaps in their own right, whereas for others they seemed to fit substantially within other priority habitats. A short description was prepared making the case for each of these habitats. This material was included in the Consultation Report. Note that some were incorporated into the final proposals listed above.

Table 3. Summary of the final proposed changes to the UK BAP priority habitat series. The major proposals are highlighted in bold. The first column shows the relation with the UK BAP Broad Habitat Series.

UK BAP broad habitat	UK BAP priority habitat	Proposed change (blank = no change)
Rivers and Streams	**Rivers**	***New priority habitat [including existing Chalk Rivers priority habitat]*** Further work by specialists is required to develop guidelines for the identification of river reaches which will be priorities for UK BAP action.
Standing Open Water and Canals	**Oligotrophic and Dystrophic Lakes**	***New priority habitat***
	Ponds	***New priority habitat***
	Mesotrophic Lakes	
	Eutrophic Standing Waters	
	Aquifer Fed Naturally Fluctuating Water Bodies	
Arable and Horticultural	**Cereal Field Margins**	***Change name to 'Arable field margins' and clarify scope***
Boundary and Linear Features	**Ancient and/or Species-Rich Hedgerows**	***Change name to 'Hedgerows' and widen scope***
Broadleaved, Mixed and Yew Woodland	**Traditional Orchards**	***New priority habitat***
	Lowland Wood-Pasture and Parkland	***Change name to 'Wood Pasture and Parkland' and widen scope***
	Upland Oakwood	
	Lowland Beech and Yew Woodland	
	Upland Mixed Ashwoods	
	Wet Woodland	
	Lowland Mixed Deciduous Woodland	
	Upland Birchwoods	
Coniferous Woodland	Native Pine Woodlands	
Acid Grassland	Lowland Dry Acid Grassland	
Calcareous Grassland	Lowland Calcareous Grassland	*Clarify scope*
	Upland Calcareous Grassland	
Neutral Grassland	Lowland Meadows	
	Upland Hay Meadows	
Improved Grassland	Coastal and Floodplain Grazing Marsh	
Dwarf Shrub Heath	Lowland Heathland	*Clarify scope*
	Upland Heathland	
Fen, Marsh and Swamp	**Upland Flushes, Fens and Swamps**	***New priority habitat***
	Purple Moor Grass and Rush Pastures	
	Fens	*Change name to 'Lowland Fens'*
	Reedbeds	
Bogs	Lowland Raised Bog	
	Blanket Bog	
Montane Habitats	**Mountain Heaths and Willow Scrub**	***New priority habitat***
Inland Rock	**Inland Rock Outcrop and Scree Habitats**	***New priority habitat***
	Calaminarian Grasslands	***New priority habitat***

UK BAP broad habitat	UK BAP priority habitat	Proposed change (blank = no change)
	Open Mosaic Habitats on Previously Developed Land	***New priority habitat***
	Limestone Pavements	
Supralittoral Rock	Maritime Cliff and Slopes	
Supralittoral Sediment	Coastal Vegetated Shingle	
	Machair	
	Coastal Sand Dunes	

Note that several priority habitats (e.g. Coastal and Floodplain Grazing Marsh, and Lowland Wood-Pasture and Parkland) actually occur in more than one broad habitat type or are habitat complexes, but for simplicity are listed against only one broad habitat in this table

Box 1. Questions considered when assessing proposals for new priority habitats

General

- Is the justification convincing? (see 'criteria' below)
- Has a UK perspective been taken?
- Have appropriate groups/individuals been involved in developing the proposal?

Definition

- Is the description provided clear enough and the full scope of the habitat type clear?
- Is the priority habitat mappable with measurable quantitative or qualitative attributes to estimate the extent of the resource and for monitoring purposes? Could a definition be devised to compile an inventory?
- Is the description clearly linked to the justification against the criteria, i.e. related to its importance for nature conservation? Bearing in mind that a future action plan could be wider in scope than a priority habitat, to what extent does the definition include 'non-priority' elements and would it be feasible to exclude them from the definition?
- Is it clear what sets the habitat apart from other habitats? Does it overlap with other habitats and, if so, is it clear why? Is it at a consistent hierarchical level compared with other priority habitats? Does it fit within a single Broad Habitat and, if not, is there a sound reason?
- Is the proposed name clear, unambiguous and precise?

Distribution and extent

- Is there reasonable information about the distribution and extent? Has this been updated since the previous review (if applicable)?
- Are there other sources of data that might usefully inform on the distribution and extent?
- To what extent does the habitat occur within designated sites?

Qualifying criteria

- International obligations: Is the correspondence with international habitat types clear? Is the degree of importance clear, e.g. how extensive, context, etc.
- Risk: Are any data provided on this? Do they include data on recent trends? Which elements of risk apply: rarity, decline or threat?
- Key species: How comprehensively are these covered? What categories of conservation concern have been considered (UK BAP, RDB etc)? How thoroughly have species been surveyed in the habitat? Are all relevant species groups included? Is the relative importance of the habitat made clear compared to other semi-natural (priority) habitats?
- Functional importance: Is functional importance an issue of concern as a secondary qualifying criteria? Does the habitat complement other semi-natural (priority) habitats, as a resource for conserving wider-ranging species?

Box 2. Questions considered when assessing proposed changes to existing priority habitats

- Is the nature of the proposed change(s) clear? Are the benefits of the change clear and convincing? Are there any disadvantages?
- Have appropriate groups/individuals been involved in the proposal?
- Is the revised definition (if relevant) clearly linked to importance of the habitat for nature conservation – would it meet the criteria for new types? Bearing in mind that a future action plan could be wider in scope than a priority habitat, does the proposed change go beyond what could be considered to be a priority?
- Have implications for other habitats been considered, if so are these clear and justified?

2.4. Comments received on the preliminary assessments and conclusions

The Consultation Report was posted on the UK BAP website to seek comment from habitat and species groups/specialists, representatives from conservation organisations, and others involved with the review. A range of individuals/organisations responded, including most of the groups/individuals involved who presented the original submissions. All the comments were collated and made available at http://www.ukUK BAP.org.uk/GenPageText.aspx?id=103. In general, commentators appeared supportive of the approach and direction of the work, although few expressed this explicitly. Most individuals naturally focused in on one or more of the proposed habitats, offering their support or expressing reservations and suggestions for improvement.

2.5. Habitats Sub-Group

To help consider the set of proposals, the preliminary assessments and subsequent comments, a sub-group was established. This was delegated the task of advising on the merits of each proposal against the qualifying criteria and in light of the comments received. It offered advice on the final conclusions and recommendations, and where proposals could be usefully clarified or amended. The membership was: Pete Brotherton, Natural England; Joanna Drewitt, Scottish Executive; Liz Howe, CCW; Ed Mountford, JNCC; Margaret Palmer, Wildlife and Countryside Link; Brigid Primrose, SNH; Ian Strachan, JNCC; Richard Weyl, Department of Environment, Northern Ireland.

The Habitats Sub-Group met on 20 July 2006, at the JNCC office in Peterborough. They discussed the basis for the review work, the confounding issues identified from the consultation exercise, and how they would approach the analysis. Each of the proposals and comments received were then discussed. So far as was possible, a provisional judgement was made on each habitat. This included listing the possible reasons for qualification and any associated caveats, points of concern, reservations and/or matters for iteration. This material was then used as a basis for further discussion with the original proposers, in order to seek a final agreed position.

2.6. General issues affecting the assessment process

A number of issues and difficulties were encountered in the assessment process described above (see below). For some habitats, these were not particularly significant and did not seem to generate any major hurdles in agreeing a recommendation. For other habitats, however, the issues were more serious and restricted us in making a fully informed and transparent assessment. Some issues appeared to have diverted consultees from proper consideration and submission of proposals or elements therein.

1. It was apparent that there seemed to be widespread misunderstanding and/or misgivings about the basis and principal aims of the work, and how it differed from previous approaches (see Section 1). The aim was to identify which habitats merited priority status on nature conservation grounds without a detailed consideration of appropriate priorities and mechanisms for action/target setting, especially through Habitat Action Plans (HAPs). It was not intended that qualifying habitats should be aligned to, confined by, or judged according to perceived priorities for action, as part as a Habitat Action Plan (HAP) or otherwise. The basis on which habitats should have been accepted/rejected was their importance for nature conservation and whether they met with any of the three primary qualifying criteria. Although there were obviously practical concerns, the intention was to consider these as part of the second stage of the review work. The matter was, no doubt, confused by the parallel review work on HAP targets. Even so, in a good many instances there was an overt focus on actions, existing delivery/policy/protective/ monitoring frameworks, and resource implications.

2. There was widespread and persistent confusion about the distinction between priority habitats, Habitat Action Plans, HAP habitats, and the scope of each. Priority habitats were often inappropriately referred to as HAPs, suggesting these terms were synonymous or inter-changeable (though this may well have

been symptomatic of the confusion described in the previous paragraph). Given the aims of the review work, the scope of each of these should not be taken as synonymous (although the main focus of a HAP should clearly be on the associated priority habitat, the scope of individual actions/ targets could be wider or narrower as is the case already).

3. A limited number of criteria and questions were devised to guide and inform on the process, but it was not a simple, straightforward matter of applying these. As proved the case in 1999-2001, it was not possible to make a rigorous, highly structured and quantitative assessment. Even if this would have been possible, i.e. that there was a plentiful supply of detailed information on specific habitats, it was inevitable that, to some degree, expert judgement and pragmatism was required in reaching a conclusion.

4. The work was inevitably constrained by the knowledge base, experience and engagement of those involved. This applied to those involved with the assessment of the submissions and subsequent commentary, albeit that habitat specialists at JNCC led this process and tried to involve a spread of expertise. It also applied to the relevant specialist groups, i.e. Lead-Coordination Networks, other Inter-Agency Groups and HAP groups, and to those who commented on the submissions. In this matter, we relied on and respected the material and opinion supplied, even though it was apparent in a number of cases that groups/individuals did not entirely appreciate/agree with the aims and basis for the work.

5. The work proved to be inherently difficult because, unlike species, habitats are not simple to define or assess in a consistent, quantifiable manner. By definition, habitats are multifaceted and cannot be neatly packaged, identified and understood like most species: compared to an oak tree, an oak woodland is many thousands times more complex in composition and much more difficult to define precisely. In addition, terms used to describe habitats, such as semi-natural, traditional, native, ecologically important, significant, predominately, structural, etc., are not simply defined or understood in the same manner. Nor are the systems by which habitats are classified a simple surrogate: these are not necessarily well-designed in terms of prioritisation for nature conservation. In any order, proposals for new/revised priority habitats often related only partially to existing habitat classifications.

6. Proposers were encouraged to provide a sufficiently clear and detailed habitat description, making clear the scope of the proposed habitat, including some idea about the limits to the habitat in terms of lower quality and overlaps with other priority habitats, and how the scope was justified against the qualifying criteria. Without this it was difficult to make an informed and relatively consistent assessment against the qualifying criteria. Even where fuller details were provided, there were still the general issues (outlined above) to deal with.

7. It was considered desirable to have a reasonable degree of hierarchical consistency in the scope of each priority habitat. The aim was, in the main, to have each priority habitat sitting comfortably within recognised broad habitat types, unless another arrangement made good sense. We also took the view that priority habitats ought to be relatively homogeneous in terms of their overall composition, ecological functioning and management. There were, however, disagreements about our interpretation on this matter: a few of the expert groups preferred to stick with their justification of the hierarchical level they had proposed.

8. The review broadly aimed to stick with the existing priority habitat series, including the scope of individual habitats, i.e. these should not be broadened unless a good case could be made. This approach created difficulties, not least because the same degree of rigour had not been pursued in drawing up the existing priority habitat series, i.e. qualification was not dependent on meeting with the three criteria used in this review. This did not go un-noticed and certain proposers used it to defend their submissions and question the process. Although certain of the existing habitats may not meet

fully with qualifying criteria applied in this review, at least in terms of their overall scope, we did not attempt to challenge or resolve this matter. To some extent, the revised series is therefore likely to be somewhat imbalanced, though we have tried to ensure that the final recommendations set out are defensible and robust.

9. Considerable disagreement and confusion arose about the naming of priority habitats. Although some clarity and consistency was obviously required, the choice of names was clearly subjective, more than one format for the name could be defended, and no one name would please everyone. Nonetheless, a recommendation was reached after it was accepted that the names should be: (i) relatively short; (ii) broadly recognisable and understood; and (iii) indicative of the core of the habitat, not every facet. This meant that the use of qualitative terminology, particularly high ecological quality/conservation value, was seen as inappropriate.

2.7. How the qualifying criteria were understood

The criteria used to assess the proposals were interpreted in the following way.

2.7.1. Habitats for which the UK has 'International obligation'

The basis by which we approached this criterion was the list of habitats on Annex I of the EU Habitats Directive and the interpretation of how these are represented in the UK (go to: http://www.jncc.gov.uk/Publications/JNCC312/UK_habitat_list.asp). Any proposed habitat or part of it that constituted an Annex I habitat was immediately recognised as qualifying for UK BAP priority habitat status.

We attempted to ensure that (almost) all Annex I Habitats Directive habitats would be accommodated in the revised priority habitat series, i.e. that this criterion would (almost) be fully accounted for. There were two Annex I habitats that we decided not to force into the revised series, as neither fits within the UK BAP priority habitat framework: (i) H1340 Inland salt meadows, a rare habitat type, the only significant example of which covers just 0.5ha and is already designated as an SAC; and (ii) H8310 Caves not open to the public, a specialised subterranean habitat type. We did, however, attempt to get full coverage of other more widespread Annex I types, including a number that were only partially accommodated and another 14 were not included at all. Particularly important in this respect were the new priority habitats relating to Rivers, Lakes, Ponds, Upland habitats and Calaminarian Grasslands. Several of these new habitats were recognised as important during the Habitat Gaps Review of 1999-2001, but were not taken forward primarily because they were considered to be insufficiently at risk to merit the preparation of a Habitat Action Plan, which was a limitation that was not meant to influence the current review work.

There were, nonetheless, complications because the UK interpretation and definition of certain Annex I habitats is not altogether clear, satisfactory or fully agreed on. Nor is the correspondence between the Annex I and UK BAP priority habitat series simple: only in a few cases do habitats relate to each other exactly.

Several proposers suggested that certain habitats qualified under this criterion because they contributed to the ecological coherence of the EU Natura 2000 network (*sensu* Article 10 of the EU Habitats Directive). This, however, did not seem justified because: (i) Article 10 is not obligatory; and (ii) we did not have a mechanism by which we could readily assess the significance and importance of particular habitat types to this network. We did, nonetheless, attempt to accommodate this aspect via criterion four (see below).

2.7.2. Habitats at 'Risk'

The basis by which we approached this criterion was the information supplied in the proposals, subsequent comments, and the knowledge/experience of the individuals involved in judging the assessments. 'Risk' was recognised in three main forms:

(i) decline – habitats most at risk have declined substantially in extent and/or quality over the past few decades;

(ii) threat – habitats most at risk remain threatened because protective or other measures appear inadequate;
(iii) rarity – habitats most at risk are limited in extent and/or occur only in small patches in a few places.

We tried to accommodate information on more recent trends (where these differed from past-trends), qualitative as well as quantitative information, known and potential (future) threats, and the relative vulnerability/fragility of individual habitats. Substantial difficulties nevertheless emerged when we tried to reach sure conclusions on this criterion, because information was insufficient, too generic/imprecise or qualitative. Threat was also difficult to assess in a changing world, especially where profound climatic changes are predicted and support for environmental measures is in flux. It would have been helpful if a systematic analysis of risk had been undertaken: although a Red Data book for terrestrial and freshwater habitats has been drafted, this has not been formally published.

2.7.3. Habitats important for 'Key species'

We approached this criterion in the same way as for 'risk' (see above), but those involved generally had rather less knowledge/experience of species matters compared to habitats.

It was accepted that this criterion ought to apply more widely than to just UK BAP priority species. Other species considered important in a national or international context were, for example Red Data Book species and species listed on Annex II and IV of the Habitats Directive. However, it remained unclear how this criterion should be applied to other important species, especially more widespread habitat specialists and keystone species that are deemed important to the functioning of habitats and, presumably, to their overall composition/condition. It also remained unclear just how many species of a certain type were necessary for qualification. Even is these issues could have been overcome, there is not a comprehensive list of species for all habitats. Survey work is not always sufficient, nor have the results been collated and made available. Not all species groups have been treated equally during survey. Another complication was how we could have accommodated the expected changes to the UK BAP species list, without this being finalised.

Certain proposals approached this criterion by way of specific limits/lower quality thresholds. They presented one or more minimum values to specify the limit to the proposed habitat. This approach was best evidenced in the proposal for Ponds, one criterion for which was that qualifying ponds need to support a minimum number of wetland plant or aquatic macro-invertebrate species. This habitat is particularly amenable to this approach: ponds often occur as relatively discrete landscape features with particular attributes that can be fairly quickly and completely assessed. This approach did not, however, prove altogether popular with freshwater experts, partly because it sets up narrow, relatively simplistic criteria that could be abused. Unless carefully considered and improved on (as necessary), this type of criteria could lead to some, otherwise valuable, habitat areas being excluded. Even so, such criterion offer a means by which the limits of a habitat can be clearly defined and scrutinised. It was certainly far more difficult to conclude where such an approach was not taken.

2.7.4. Habitats of 'Functional importance'

Functional importance was added as a secondary criterion, i.e. habitats could not qualify on this aspect alone. It was approached in the same way as for 'risk' (see above), though information provided via the habitat proposals was often limited.

This criterion related to the supportive, inter-connecting role that proposed habitat types had for other priority habitats and wider-ranging mobile/migratory species. It was meant to recognise the potentially damaging effects of habitat fragmentation and isolation. It was appreciated that many habitats may form corridors, links and possible route for movement, but that this does not mean that they actually function as such or that this is critical. Such pathways are likely to only help conserve wider-ranging species and those that have effective, medium-long distance, dispersal strategies.

We analysed this criterion only in general terms based, for example, on the extent to which the habitat is known to complement/form a physical linkage between other important habitat areas, or offers habitat for key species that utilises more than one habitat type. This was not altogether satisfactory and we remained unsure about the absolute and relative functional importance of the proposed habitats.

3. Synopsis and conclusions reached on each habitat proposal

The final conclusions and recommendations on new priority habitats and changes to existing types have been summarised and presented in Annex 4. On the following pages, we have provided a separate summary statement on each of the habitat proposals, including:

- a synopsis and commentary on the final proposal;
- a synopsis of the key comments received;
- a final recommendation/conclusion.

In reaching our final view, we tried to make a fair and consistent assessment of the merits of each proposal against the qualifying criteria, taking into account all the comments received and the discussions made with the expert groups. It should, nevertheless, be appreciated that a number of confounding issues were encountered during the assessment work (see preceding sections). These made our task challenging and required us to accept a degree of compromise, rather than being dogmatic about strictly applying an approach about which there were perceived misunderstandings and/or misgivings.

3.1. Summary statement on Rivers proposal

3.1.1. Synopsis and commentary on final proposal

- The proposal for Rivers to become a UK BAP priority habitat was developed at a relatively late stage of the review work. It followed on from two original proposals, which were prepared by the Freshwater Lead Co-ordination Network in consultation with the Environment Agencies, for Active Shingle Rivers and Headwaters to become new UK BAP priority habitats. The proposal was devised after discussions were held with the JNCC Freshwater Lead Coordination Network during the latter part of 2006.
- Further to receiving the proposals for Active Shingle Rivers and Headwaters, it was pointed out by the Priority Habitats Review Sub-Group that these did not seem to go far enough to ensure coverage of the whole range of important river types for nature conservation, even allowing for the existing priority habitat type covering Chalk Rivers. Nor would these three habitats ensure full coverage of the Annex I river type H3260 Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.
- It was agreed with the JNCC Freshwater Lead Coordination Network that the whole range of natural rivers types could potentially qualify under the review criteria, excepting any degraded rivers. However, due to difficulties in using any existing river typology to satisfactorily discriminate priority types for the purposes of UK BAP, the preferred approach was to adopt a single, over-arching, priority habitat for all important river types. Within this broad category a few additional national priority areas were identified. However, the JNCC Freshwater Lead Coordination Network considered that such priorities would be best finalised and defined in due course by a 'Rivers' Steering Group. Although they should be clearly identifiable and non-overlapping, they may not be aligned to any pre-existing rivers typology per se.
- The concept of defining riverine priority habitats on the basis of quality criteria was strongly opposed by certain members of the Freshwater Lead Co-ordination Network. They questioned the logic of doing this as it gives a false reassurance that the scale of the UK BAP task is containable by drawing a tight circle around a small portion of the habitat resource: yet it is widely acknowledged that most of the UK BAP work will focus on that portion of the resource that falls outside of these quality criteria.
- The final proposal extends to all natural and near-natural running waters, including the existing Chalk Rivers UK BAP priority habitat and all rivers conforming to the Annex I river type H3260 Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.
- There is clear justification to cover most, if not all, types of natural and near-natural running waters. A proportion conforms to the Annex I type H3260. Collectively, UK rivers support an exceptionally rich suite of species on Annex II of the Habitats Directive.
- Rivers have also been widely adversely affected by many different anthropogenic pressures and in many instances the risks remain. Major impacts and threats include: change in flow and siltation; increased nutrients; other types of pollution; channel modification; catchment change; and invasive non-native species. Habitat destruction and deterioration have put much of habitat at risk. As only a limited part occurs within designated sites, much is relatively unprotected and accordingly at significant risk.
- Natural and near-natural rivers support a wide range of key species of vertebrates, invertebrates and plants, including numerous UK BAP priority species. One feature of particular note is the invertebrate fauna of exposed shingle banks. In addition to the three primary criteria, rivers have strong functional importance in various respects e.g. as corridors for migratory species such as salmon.
- The proposal provides a general outline of habitat and detailed descriptions for several sub-types, which are recognised as of particular importance, though these are not intended to be comprehensive. Without a fully detailed description of the entire resource, it is difficult to assess how all elements meet with qualifying criteria. This will to also generate problems when it comes to implementation and reporting, but the proposal is to focus on a limited sub-set of priorities. Criteria for excluding degraded rivers/sections will be added at a later stage, possibly using SERCON (a system for evaluating the conservation value of rivers).
- There remain some concerns about having such a broad priority habitat. This could appear to be at odds with the other major habitat types. It could weaken the focus on key priorities. However, it was accepted that this was probably the best practicable solution under the terms of the current review, with prioritisation for action taking place at the implementation stage. Prioritisation is likely to take the form of identifying reaches of rivers where near-natural hydromorphology exists or is realistically achievable, or which are important for priority features. Such reaches would be eligible for UK BAP action.

3.1.2. Synopsis of key comments received

- The proposal for Rivers has not been consulted on widely as it was proposed at a late stage. Nonetheless, members of the Chalk Rivers HAP Steering Group have expressed concern that subsuming the existing priority type into a wider Rivers priority habitat would 'dilute the status' of Chalk Rivers. On balance however, and following consultation with the Environment Agency, the freshwater group considered that it would be illogical to split off Chalk Rivers from other river types, especially as this then splits up the Annex I type H3260. Chalk Rivers are highlighted in the new proposal as a key type for action and there is no reason why the existing HAP group should not continue to operate as at present.
- In the original consultation there was some support for the need to consider further a greater range of river types than those proposed initially, though others were against a 'blanket approach' due to general protection for rivers under WFD and/or difficulties of definition. Freshwater experts reiterated that there is great difficulty in defining river types beyond the three existing/proposed types.
- Commentators were unanimously supportive of the original proposal for Active Shingle Rivers, at least in the sense that it would substantially increase the representation of freshwater river habitats in the UK BAP priority habitat series and potentially accommodated habitat that was important for nature conservation. However, several commentators expressed concern about the meaning of the definition given and possible scope and overlap of the proposed habitat. This habitat was agreed by the UK Targets Group in 2001 following wide consultation, discussion and revision, but approval was deferred until the present review.
- Commentators were similarly generally supportive of the original proposal for Headwaters. However, concerns were expressed about the definition given, the basis for the selection of the habitat (i.e. based on OS maps), the possible scope and overlaps with other habitat types, and the concept of headwaters as a distinctive and commonly understood unit. This habitat type was put forward in the previous gaps review, but was not taken forward at that time because it was considered too broad in scope.

3.1.3. Final conclusion/recommendation

- We support the proposal for Rivers to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
- Two specific items require further work: (i) criteria need to be drawn up to specify which non-qualifying, degraded rivers/sections are excluded from the definition; and (ii) a sufficiently detailed description of the entire resource covered by the proposed habitat needs to be drawn up, including all of the individual river types covered and how any overlaps are to be dealt with.

3.2. Summary statement on Oligotrophic and Dystrophic Lakes proposal

3.2.1. Synopsis and commentary on final proposal

- The Joint Lakes HAP Steering Group proposed that Oligotrophic and Dystrophic Lakes were considered as a new UK BAP priority habitat.
- This habitat proposal was agreed by the UK Targets Group in 2001 following wide consultation and discussion, but approval was deferred until the present review. The proposal has subsequently been reviewed by the Joint Lakes HAP Steering Group, which has confirmed its support subject to concerns that should be addressed at the implementation stage.
- This habitat is extensive in the north and west, but sparse elsewhere. Only a rather small proportion is included in protected sites, although measures under the WFD should help protect the wider resource. It complements the existing priority types for Mesotrophic Lakes and Eutrophic Standing Waters, as well as the proposed Ponds priority habitat, and has the support of key freshwater organisations and specialists.
- The proposal is clearly justified against the criteria. It clearly meets the 'international obligation' criteria for priority status, filling a major gap in representation of Habitats Directive Annex I habitats, including parts of four standing water types. Oligotrophic Lakes also support a range of UK BAP priority species and other species on the Habitats and Birds Directives, e.g. slender naiad *Najas flexilis*, salmon *Salmo salar*, common scoter *Melanitta nigra*, black-throated diver *Gavia arctica*, and otter *Lutra lutra*.
- The habitat is at risk from a number of factors. Its ecological functioning is critically dependent upon low nutrient levels, making it very vulnerable to eutrophication. Throughout the UK, oligotrophic and dystrophic lakes have suffered deleterious changes due to nutrient enrichment and/or acidification. Hydro power, water abstraction, fish farming, afforestation and recreational development have all affected oligotrophic and dystrophic lakes in recent decades, and the habitat continue to be under significant threat from development pressure. Acidification continues to affect many sites.
- It is functionally important, complementing other priority habitats (e.g. blanket bog), and acts as a habitat for wide-ranging species such as salmon *Salmo salar* and otter *Lutra lutra*.
- Potential overlap with the proposed Ponds priority habitat has been agreed. Although the size distinction between lake and ponds will not be absolute, relevant water bodies >2ha in area will mainly fall within the remit of the Oligotrophic and Dystrophic Lake priority habitat, whilst relevant water bodies <2ha will mainly fall within the remit of the Pond priority habitat. The current (1ha) threshold for other Lake priority habitats will similarly be increased. Oligotrophic marl lakes (which are oligotrophic but with high alkalinity) will be treated as meso/eutrophic lakes. Oligotrophic turloughs will remain within the scope of Aquifer fed naturally fluctuating water bodies priority habitat.
- The habitat description would benefit from some further clarification. It would have been useful to have had more information on the lower quality thresholds for this habitat, to judge which low quality water bodies fail to meet with the qualifying criteria (e.g. degraded natural lakes of low conservation interest). The Tier Allocation Spreadsheet, produced by the UK Lakes HAP Steering Group, could inform this. This database tool attempts assess the importance of individual lakes for nature conservation, predict their 'natural' trophic status, and determine which sites are 'damaged'.
- A clear definition will need to be drawn up to produce an inventory, based on and complementing the definition recently developed by the Lakes HAP group for Mesotrophic Lakes. Information on the relations to the JNCC revised lakes classification has been added.

3.2.2. Synopsis of key comments received

- Commentators were generally supportive of the proposal. It would ensure that the main 'missing' component in the lake priority habitat series was 'plugged'. Even so, concerns were raised about the strength and basis of the proposal. Various points were highlighted, notably how overlaps with other habitats would be resolved.

3.2.3. Final conclusion/recommendation

- We support the proposal for Oligotrophic and Dystrophic Lakes to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
- Two specific items require further work: (i) the lower quality thresholds for the proposed habitat need to be specified, so that non-qualifying, low quality water bodies can be excluded; and (ii) a clearer definition needs to be drawn up, based on and complementing the definition developed for Mesotrophic Lakes.

3.3. Summary statement on Ponds

3.3.1. Synopsis and commentary on final proposal

- The Freshwater Lead Co-ordination Network and Pond Conservation, in consultation with the Environment Agencies, proposed that Ponds were considered as a new UK BAP priority habitat.
- A proposal covering this type of habitat was agreed by the UK Targets Group in 2001 following wide consultation and discussion, but approval was deferred until the present review. The final proposal has subsequently been reviewed and updated by Pond Conservation with the support of the Freshwater JNCC Lead Coordination Network.
- The justification provided is convincing. The submission has involved a thorough consultation process, and has attracted the support of a large number of individuals and associated groups from around the UK. It is based on a substantial knowledge of the biodiversity associated with ponds.
- The UK has clear international obligations to conserve part of the habitat and associated species, under both the EC Habitats and Water Framework Directives. The proposed habitat covers six Annex I habitats, in part or entirely.
- The habitat supports many species of conservation importance, including a range of invertebrates, plants, amphibians and mammals. An exceptional number of UK BAP priority species (at least 65 species) are dependent on either temporary or permanent ponds, and six pond species are listed on Annex II of the Habitats Directive.
- The resource is at substantial risk, as it is poorly represented in the SSSI site series and subject to serious degradation though enrichment, diffuse pollution and other impacts. There has been a dramatic long-term loss of ponds and, despite some recent respite, turnover remains high and this is only partly compensated for by habitat creation. There is also a substantial risk from the spread of alien invasive species.
- Ponds are generally recognised as being functionally important, complementing other semi-natural habitats (including watercourses, other water bodies and wetland habitats), and act as a resource for conserving wider-ranging species, including a range of amphibians.
- The criteria and thresholds identified to define which ponds should be considered for inclusion are well considered and have been subjected to thorough discussion. A relatively narrow sub-set of ponds is accommodated in the proposal: these are clearly linked to the criteria set and nature conservation importance of individual sites, particularly in terms of key species.
- The definition provided is clear. There is, inevitably, some potential overlap with other water/wetland habitats, with likely overlapping areas having been discussed and criteria to separate them agreed on. The 'cut-off' from lake UK BAP priority habitat will mainly be water-bodies <2 ha (lakes being mainly >2 ha).
- Although the proposal is not at a consistent hierarchical level compared with lake priority habitats, it is not considered appropriate to sub-divide ponds using the same trophic basis. In addition, the proposal does fit within a single Broad Habitat type.
- Reasonable and clear information is provided about the distribution and extent of the habitat. Improvements have been made to the original proposal to accommodate information on ponds throughout the UK. Work has already begun on mapping and compiling an inventory of the resource through the National Pond Monitoring Network.
- The name for habitat has been much discussed and the most simple format agreed on, i.e. Ponds.

3.3.2. Synopsis of key comments received

- Commentators were unanimously supportive of the proposal, at least in the sense that, in some form, ponds are important for nature conservation and merit recognition as priority habitat. However, there were various comments/suggestions on the habitat name, scope, criteria by which priority sites ought be recognised, and relation with an associated HAP.

3.3.3. Final conclusion/recommendation

- We support the proposal for Ponds to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

3.4. Summary statement on Canals

3.4.1. Synopsis and commentary on final proposal

- Following on from the suite of proposals received, JNCC Habitats Team advised that Canals should be considered as a priority habitat in its own right or as part of other existing/proposed priority habitat types.
- Canals form a linear network of wetland habitat in some parts of the UK. These can be important for nature conservation, especially in areas where more 'natural' wetland habitats are scarce and boat usage is limited. Some of the most important stretches in England and Wales are notified as SSSIs/SACs, principally for their aquatic flora and fauna.
- Although some fen and swamp habitats associated with canals would be covered by the existing Fens priority habitat type, the open water zone appears not to be generally included within the current UK BAP priority habitat series or the new proposals in this review. However, the freshwater specialists did not consider that there was a sufficiently strong justification for proposing a UK BAP priority habitat for canals in this review.

3.4.2. Synopsis of key comments received

- The predominant view of commentators (which was reaffirmed in subsequent discussions with the JNCC Freshwater Lead Coordination Network) was that there is little point in accommodating canals within UK BAP priority habitat series. The principal reasons given were that: (i) the best examples are already designated as SSSIs/SACs (often related to specific plant species interest); (ii) they will be covered by the objectives of the Water Framework Directive; and (iii) they are an artificial habitat.

3.4.3. Final conclusion/recommendation

- It is clear that at least some canals have developed semi-natural characteristics and a flora/fauna that are recognised as important for nature conservation (hence designation as SSSIs/SACs). These seem to meet with qualifying Criterion III - Key species and Criterion II - Risk. To some extent, canal vegetation could be accommodated within other priority habitat types, but this would not seem to an entirely satisfactory solution. The SSSI Guidelines may serve as a basis by which the canal priority habitat could be defined. Nonetheless, there is little support from the JNCC Freshwater Lead Coordination Network to give this habitat priority status, primarily because they consider that sufficient action is already in place through the protected SSSI/SAC site series and Water Framework Directive.
- Without the support of the JNCC Freshwater Lead Coordination Network, we consider it inappropriate to afford this habitat priority status. If canals are left out of the priority habitat series, this means that the series may not be comprehensive, i.e. canals must be considered to be a 'missing' component.

3.5. Summary statement on Mountain Heaths and Willow Scrub

3.5.1. Synopsis and commentary on final proposal

- The Upland Lead Co-ordination Network proposed that Mountain Heaths and Willow Scrub were considered as a new UK BAP priority habitat.
- This habitat proposal was agreed (as 'Montane Heaths') by the UK Targets Group in 2001 following wide consultation and discussion, but approval was deferred until the present review. It has subsequently been reviewed, revised and updated by the JNCC Upland Lead Coordination Network. The proposal has the support of all the statutory conservation agencies and the Montane Scrub Action Group.
- A detailed and convincing justification has been presented, based on the three main criteria for selection. Mountain Heaths and Willow Scrub are of international importance for nature conservation, encompassing three Habitats Directive Annex I types, including one that is especially rare in the UK (H4080 Sub-Arctic *Salix* scrub).
- This habitat supports over twenty UK BAP priority species including vascular plants, bryophytes and lichens and a moth. Many other rare and local arctic-alpine plants and invertebrates occur. Notable birds include ptarmigan, and dotterel (listed on Annex I of the EU Birds Directive). Additional information on key species of plants and invertebrates has been added.
- Mountain Heaths and Willow Scrub are at considerable risk due to various factors. They include some of the most extensive areas of near-natural vegetation in the UK, and are highly susceptible to human influences. They are threatened by grazing and trampling, nitrogen deposition, recreation, use of all-terrain vehicles (ATVs), burning and climate change.
- There is widespread evidence of accelerating decline in extent and condition of this habitat type over the last 50 years from several causes and there is concern that some changes may become irreversible. Habitats such as mountain willow scrub are especially vulnerable because of their extreme scarcity.
- Mountain Heaths and Willow Scrub occur widely across the north and west of the UK, with the main concentration in Scotland, where much lies outside of the protected site network. Work currently in progress on upland heath for the Upland HAP Group needs to be extended for the production of an inventory and improved estimates of extent. Mapping the habitat can be particularly difficult in steep and complex terrain.
- The habitat is described in terms of vegetation communities and the tree line, to distinguish it from other habitats. It complements the definition for the Upland heath priority habitat. It is clearly related to the qualifying criteria, excluding degraded habitats, such as NVC U4 acid grassland, that ought to be a target for restoration.
- The habitat has been renamed 'Mountain Heaths and Willow Scrub' rather than 'Montane Heaths', to use more familiar terminology, although it can occur at low altitudes in northern Scotland and not all localities contain both of these vegetation types.
- The position regarding the inclusion or exclusion of specific scrub types has been clarified. The intention has always been that only montane willow scrub is included (equivalent to the Annex I habitat H4080 Sub-Arctic *Salix* sp. scrub).
- It is recognise that this habitat type is diverse, compared with some other priority habitats, as it includes forms of heath, grassland and scrub as well as snow-bed and dwarf-herb communities. Whilst this makes it difficult to treat as a single entity, for purposes such as mapping or monitoring, this issue can be addressed at the implementation stage, with separate targets or actions for different elements as appropriate.

3.5.2. Synopsis of key comments received

- Commentators were unanimously supportive of the proposal to put this habitat forward for priority habitat status. However, there were various comments/suggestions on the content of the proposal, including the description, scope, distribution and extent, potential threats, overlaps with other habitats, inclusion of scrub, qualifying criteria and its name (mostly in favour of including scrub in name).

3.5.3. Final conclusion/recommendation

- We support the proposal for **Mountain Heaths and Willow Scrub** to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

3.6. Summary statement on Upland Flushes, Fens and Swamps

3.6.1. Synopsis and commentary on final proposal

- The Upland Lead Co-ordination Network proposed that Upland Flushes, Fens and Swamps were considered as a new UK BAP priority habitat.
- This habitat is not properly covered by the existing Fens UK BAP priority habitat. The introductory description of the Habitat Action Plan (1995) for this habitat covered both lowland and upland fens (in a wide sense, including springs/flushes and swamps), but the targets and actions in the plan only covered lowland fens. The UK Targets Group formally agreed to this in May 2001, in recognition of the fact that the conservation issues and pressures on fens in the lowlands and uplands are substantially different. This change in remit was not reflected in a change of name to the habitat (i.e. to 'Lowland Fens' or similar).
- The original proposal has subsequently been reviewed, revised and updated by the JNCC Upland Lead Coordination Network. A sound justification is presented, based on international responsibility, risk and dependent species. It has the support of the upland habitat specialists in all of the conservation agencies.
- The habitat is the main locus for Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* and includes a substantial proportion of the UK representation of three other habitats listed on Annex I of the Habitats Directive (Transition mires and quaking bogs, Petrifying springs with tufa formation (*Cratoneurion*) and Alkaline fens).'
- It also supports many nationally and internationally rare and scarce species, notably vascular plants, bryophytes and invertebrates, including a range of UK BAP priority, Red Data, and/or Annex II Habitats Directive species. Examples of notable invertebrates have been updated.
- Upland Flushes, Fens and Swamps are at risk because of various human activities and related impacts. Although evidence of historical losses are not quantified, there is clear evidence of widespread and continuing adverse impacts from grazing animals (stock and deer) and damaging activities such as vehicle use, drainage and afforestation.
- Such habitat occurs throughout the uplands of the UK though extent data are not readily available. Individual stands tend to be small, and some specific types such as *Cratoneurion* springs are rare, both factors making them more vulnerable to adverse impacts. Although well represented within the SAC and SSSI/ASSI series, much of the resource occurs outside protected sites and so is at greater risk.
- Upland Flushes, Fens and Swamps are usually closely associated with other existing or proposed priority habitats (blanket bog, upland calcareous grasslands, upland heaths, montane heaths and willow scrub, limestone pavements, inland rock outcrop and scree) and can be of functional importance for species associated with these wider habitats, e.g. as feeding habitat for breeding birds.
- This habitat is clearly defined to meet the qualifying criteria and to complement, but not overlap, other UK BAP priority habitats such as Blanket Bog, Upland Heath, Purple Moor Grass and Rush Pastures, Reedbeds, and Lowland Fens. Although defined well enough in terms of vegetation type to be mappable, a comprehensive inventory would be difficult to compile because of the habitat's extensive distribution combined with the small size of many stands.
- The scope of the proposed habitat is certainly broad, though changes have been made to exclude certain extensive, degraded vegetation types, which are considered to be of low biodiversity value. Revisions have also been made to clarify the relationships with other related UK BAP priority habitats (as listed see above). Further amendments give a more accurate description of the relationship to Annex I habitats.
- Some elements of the proposed habitat are undoubtedly of higher priority than others for conservation action. This can be largely addressed through prioritisation at a later stage in this review. In addition, much of the necessary conservation action for Upland Flushes, Fens and Swamps (e.g. controlling grazing impacts) could be taken as part of other habitat plans, since this habitat is generally a minor component associated with these more extensive habitats. This does not reduce the justification for priority listing.
- The term 'fens' is often used by the conservation agencies (e.g. in the SSSI guidelines and CSM guidance) in a compendious way, to include flushes, springs and swamps as well as fens in their narrower sense. However, to avoid the risk of confusion for readers, such as LUK BAP groups, we propose that the fuller name of 'Upland Flushes, Fens and Swamps' be used. This also highlights the particular importance of flushes/springs in upland situations.
- If the proposal is accepted, it will be necessary to modify the current 'Fens' priority habitat should be renamed as 'Lowland fens' (or possibly a longer name).

3.6.2. Synopsis of key comments received

- Commentators were unanimously supportive of the proposal to put this habitat forward for priority habitat status. However, there were various comments/suggestions on the content of the proposal, including the name, description, distribution, reasons for recommendation, importance for invertebrates, and overlaps with other habitats.

3.6.3. Final conclusion/recommendation

- We support the proposal for Upland Flushes, Fens and Swamps to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II – Risk; and Criterion III - Key species. This will necessitate a change of name to the existing priority habitat for 'Fens' (to 'Lowland Fens' or similar).

3.7. Summary statement on Inland Rock Outcrop and Scree Habitats

3.7.1. Synopsis and commentary on final proposal

- The Upland Lead Co-ordination Network proposed that Inland Rock Outcrop and Scree Habitats were considered as a new UK BAP priority habitat.
- This proposal was considered in the previous gaps review, but a decision was deferred until the current review. It has subsequently been reviewed, revised and updated by the JNCC Upland Lead Coordination Network and has the support of all the statutory conservation agencies.
- A convincing case for priority status for Inland Rock Outcrop and Scree Habitats is presented. The nature conservation value of the habitat is substantial and should justify priority status. It is clearly of international importance, as it encompasses five quite widespread habitat types listed on Annex I of the Habitats Directive. The habitat description has been amended to make this link explicit and estimates of its extent have been added. It has also been made clear that this habitat would exclude Limestone Pavement and Calaminarian Grassland UK BAP priority habitats.
- This is one of the most valuable habitat complexes in the uplands for vascular and non-vascular plants, and lichens. Many nationally rare, nationally scarce and uncommon plants are associated with it, including five UK BAP priority vascular plant species and several priority bryophytes and lichens. It also supports various notable breeding birds and invertebrates. Further information has been added about characteristic invertebrate species.
- Much of the habitat is not considered to be under significant risk, though a good deal is judged to be in unfavourable condition. The impacts of climate change and air pollution may be deleterious. Some features, such as tall-herb ledges, are very rare types, and so more vulnerable. Grazing impacts and trampling are locally significant on accessible areas of rock ledges and scree, particularly where adjacent pressures are high. Certain species or assemblages are at greater risk, especially those that are grazing-sensitive, with small relict populations clinging to rock ledges that are at risk of extinction. Some of these have the potential to become more widely distributed and secure, if restoration action allows them to colonise open slopes below rock habitats. The extension of plant populations on to more accessible rock habitats is likely to benefit dependant invertebrates.
- The scope of this habitat is broad, but it would be difficult to exclude specific sub-types on the basis of rock type or altitude. Whilst some kinds of rock and some localities are more important than others (e.g. high altitude outcrops of base-rich rock), there are gradations between different kinds of rock and it is important to conserve the range of habitats on the Habitats Directive. Ongoing work, including recent surveys of upland chasmophytic bryophyte and lichen assemblages in England, Wales and Scotland, will be useful for our understanding of their conservation significance and prioritising conservation action. Nevertheless, rock outcrop and scree habitats are inherently difficult to survey and map due to topographic complexity, inaccessibility and classification difficulties. A comprehensive inventory is unlikely to be feasible.
- Whilst the scree and tall-herb ledge habitats are restricted to the uplands, the two Annex I chasmophytic types also occur in the lowlands, though to a much lesser extent than in the uplands (lowland examples are included in the Annex I definition only where they include cliffs supporting distinctive crevice communities). Rather than split the Annex I types, it was recommend that these lowland rock features are included in this priority habitat. Issues affecting them are largely similar to upland rock features and any differences can be considered at the implementation stage.
- To reflect the (limited) occurrence of this habitat beyond upland localities, the name has been be amended from ‘Upland’ to ‘Inland’. ‘Rock Outcrop’ has been adopted as this is more descriptive than just ‘Rock’, which includes scree, and avoids the need for the contentious term ‘Natural’.

3.7.2. Synopsis of key comments received

- Commentators were mostly supportive of the proposal to put this habitat forward for priority habitat status. There were, nevertheless, various comments/suggestions on the content of the proposal, including the name, description and overlaps with other habitats.

3.7.3. Final conclusion/recommendation

- We support the proposal for Inland Rock Outcrop and Scree Habitats to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

3.8. Summary statement on Calaminarian Grasslands

3.8.1. Synopsis and commentary on final proposal

- The Lowland Grassland Lead Co-ordination Network proposed that Calaminarian Grasslands (originally called Rock outcrops, screes and mine spoil rich in heavy metals) were considered as a new UK BAP priority habitat. Plantlife made a similar proposal for this habitat in 1999. This was agreed by the UK Targets Group in 2001, but approval was deferred until the present review. The proposal has subsequently been reviewed and updated by the JNCC Lowland Grassland Lead Coordination Network with input from others and in response to comments received.
- The proposed habitat meets with all of the main criteria for priority habitat status. It also attracts the support of the Lowland Grassland HAP steering group, including the statutory conservation agencies, as well as Plantlife.
- The vegetation of Calaminarian grassland is typically sparse and open due to the toxicity and low nutrient status of the substrate. This enables certain species or races of vascular plants, lichens and bryophytes to occur, which are specifically adapted to the conditions.
- The habitat is of international importance, being equivalent to the habitat Calaminarian grasslands of the *Violetalia calaminariae*, as listed on Annex I of the Habitats Directive.
- The habitat supports a specialised flora, which includes five UK BAP priority plant species, mainly bryophytes, and a range of other rare species restricted to this habitat type.
- Anthropogenic stands, in particular, are declining and under considerable threat from programmes for the rehabilitation of derelict land, as well as from landfill schemes and mineral re-working. For example, in the Peak District 50% of lead rakes have been lost this century and losses are continuing.
- Vegetation development is generally curtailed by the toxicity of the substrate, but on some sites a lack of active disturbance has led to significant losses due to the natural development of coarse grassland and scrub.
- Near-natural examples are highly localised on outcrops and scree of serpentine and related rock types, mostly in the Scottish Highlands and Islands. Metalliferous mine spoil and river gravels are more widespread, particularly in parts of England and Wales. Though the habitat is sufficiently well defined, it is rather a neglected type and a comprehensive inventory is not available. Guidance on condition assessment developed by JNCC could help in setting targets.
- The habitat has a relatively narrow focus, relating to its nature conservation value, and is defined on ecological criteria.
- It makes practical sense to have this as a separate priority habitat, particularly as it would then be equivalent to the related Habitats Directive Annex I type.
- Relations with other proposed priority habitats have been clarified to avoid overlap. The option to cover the various component types of the habitat within other habitat proposals (i.e. Open Mosaic Habitats on Previously Developed Land, Inland Rock Outcrop and Scree Habitats, Rivers) has been rejected.

3.8.2. Synopsis of key comments received

- Commentators were mostly supportive of the proposal to put this habitat forward for priority habitat status, subject to considerations particularly about its scope, inclusion of elements that might fit in other priority habitat types, and need for separate status. There were also various comments/suggestions about the content of the proposal, including the degree of threat and concern over difficulties of monitoring the habitat.

3.8.3. Final conclusion/recommendation

- We support the proposal for Calaminarian Grasslands to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (whole resource); Criterion II - Risk; and Criterion III - Key species.

3.9. Summary statement on Open Mosaic Habitats on Previously Developed Land

3.9.1. Synopsis and commentary on final proposal

- The Urban Inter-agency Working Group proposed that Open Mosaic Habitats on Previously Developed Land (originally called Post-industrial sites) were considered as a new UK BAP priority habitat.
- This habitat proposal was considered by the UK Targets Group in 2001, but was deferred for further consideration. The proposal has subsequently been reviewed and updated by the Urban Inter-agency Working Group, specifically to improve: (i) the scope and focus of proposed habitat; (ii) the criteria by which the habitat will be defined; (iii) information on correspondences and overlaps with other habitats; and (iv) its importance for species conservation.
- The proposal is convincing, well prepared and supported by a recent and comprehensive review of the biodiversity associated with Open Mosaic Habitats on Previously Developed Land. It also receives the support of the inter-agency habitat group and a number of other organisations dealing with the industrial-urban environment, including the Land Restoration Trust that has indicated an interest in 'championing' this habitat. There will, of course, be a need to prioritise at the implementation stage.
- This habitat is clearly at substantial risk and subject to destruction and serious degradation. Major factors threatening it include urban development, landfill, unsuitable reclamation, eutrophication, lack of appropriate management and natural succession. Few previously developed sites have been afforded SSSI protection and creation of new sites is limited.
- The habitat clearly supports many species and some habitat types that are a priority for nature conservation. Sites can support exceptionally important invertebrate communities, including rare species of Hymenoptera and Coleoptera. They are of particular importance for species requiring bare substrate, sandy burrowing or nesting sites, and nectar sources. Certain UK BAP priority plant species are strongly associated with this habitat. The habitat includes several scare and threatened open vegetation communities described in the NVC. In addition, important areas of grassland, heathland and scrub occur.
- The submission also points to the functional importance of previously developed land, as it often provides areas of early/pioneer habitat and general refugia within otherwise impoverished landscape areas.
- The definition provided is relatively clear, though the extent of the habitat is unclear. At the site scale, the proposed priority habitat is best defined as a mosaic of semi-natural vegetation types and development stages, typically with very early pioneer communities on skeletal substrates and inclusions of bare ground and features like spoil mounds. In addition, more established areas of open, species-rich grassland are normally found and/or patches of other habitats, such as heathland, swamp, ephemeral pools and inundation grasslands. The habitat can often persist for decades without active intervention because of the severity of the edaphic conditions.
- Only a limited part of the total habitat resource found on previously developed land will be included, though any associated action plan might be more inclusive. The criteria to define which areas ought to be included are well considered and appropriately linked to their nature conservation importance.
- There is, given the range of vegetation types included in the proposal, some inevitable overlap with other priority habitats. However, given that sites will be identified and separated from other habitats by their former industrial use, this is not thought to be a significant issue.
- There is not an inventory of habitats on previously developed land at present, but there are means by which a definition, inventory and map of sites could be devised given resources (for example using the contaminated and brownfield land registry and knowledge of local wildlife sites).
- The proposal seems to make good sense in ecological and conservation terms. It essentially fits within a single Broad Habitat type and is at a similar hierarchical level to other types.

3.9.2. Synopsis of key comments received

- Commentators were strongly supportive of the proposal to put this habitat forward for priority habitat status, particularly because of the threat and importance for invertebrate conservation. However, there were major concerns about its scope, and debate about its about name and criteria for selection. In addition, various comments were made on the detail of proposal, including its description and overlap with other priority habitats (including with Calaminarian Grasslands).

3.9.3. Final conclusion/recommendation

- We support the proposal for Open Mosaic Habitats on Previously Developed Land to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species.

3.10. Summary statement on Arable Field Margins

3.10.1. Synopsis and commentary on final proposal

- The Cereal Field Margins HAP Steering Group proposed to change the name and clarify the scope of the existing UK BAP priority habitat for Cereal Field Margins.
- The Group has reviewed the definition for this habitat and submitted the proposal form. This issue was raised (but not satisfactorily resolved) at the time of the previous 'gaps' review in 1999, when it was decided by the HAP Group that it was not appropriate to afford priority habitat status to all low-input arable and horticultural weed communities. It arose again through the 2005 UK Targets Review and the Group submitted revised targets on the basis of the proposed revision in definition. See also 3.11 for proposals regarding Arable Land as a whole.
- The proposed name change for the priority habitat to Arable Field Margins is sensible, given the proposed change to the definition, i.e. that the priority habitat should be extended to include field margins set against all arable crops.
- The refined definition provides a general description of arable field margins linked to the scope of the current HAP. It also defines their physical limits and specifies which type of margins and included or excluded.

3.10.2. Synopsis of key comments received

- There was strong support for the proposed name change and clarification to the habitat definition.

3.10.3. Final conclusion/recommendation

- We support the proposal to change the name of the Cereal Field Margins UK BAP priority habitat to Arable Field Margins and clarify its scope.

3.11. Summary statement on Arable Land

3.11.1. Synopsis and commentary on final proposal

- Following on from the suite of proposals received, JNCC Habitats Team advised that the status of Arable Land (beyond arable field margins) should be considered further, recognising that this was mentioned as a longer-term aspiration in the end of the proposal put forward by the Cereal Field Margins HAP Steering Group.
- Arable farmland includes a number of species, habitat types and features that have declined greatly and are considered to be importance for nature conservation. Amongst these are the threatened non-crop arable plant species and open vegetation communities (described in the NVC under types OV1-6, OV16-17). These are mainly associated with ground that undergoes periodic cultivation, receives only low inputs of fertiliser and broad-spectrum herbicide, and supports relatively open vegetation and/or relatively non-vigorous arable crops. Margins of arable crops tend to contain the highest density of 'weed' species, though these certainly occur and can potentially be restored across whole fields with appropriate treatment. A preliminary inventory of key sites and important areas for arable plant conservation shows that these are concentrated in the southern half of the UK.
- Arable landscapes also support a number of bird species of conservation concern. These include birds that nest in arable fields (e.g. corn bunting, reed bunting, lapwing), particularly when these are sown with spring crops or are left fallow. They also include birds that feed within arable fields (e.g. grey partridge, tree sparrow, turtle dove), particularly if the crop contains a reasonable abundance of 'weed' species and insect life. Over-wintered stubbles that contain grain split during harvest also provide an important food source for arable farmland birds, as does ground that is inundated during the winter period. Winter stubbles also provide a critical habitat for certain bryophyte species, some of which are very rare and UK BAP listed priority species.
- Cultivated areas important for arable weeds are a key element of the Machair priority habitat. Some of the species/habitats/features described above are also incorporated within the existing scope of the Cereal (arable) field margin priority habitat. Encouragingly, there are indications that the status of arable field margins has improved recently: Countryside Survey showed that the boundaries of arable fields increased significantly in species-richness and butterfly larval food sources between 1990 and 1998. The same results, however, also showed that certain plant types within arable fields declined, including some (e.g. *Polygonum aviculare*) that act as key food sources for seed eating birds.
- It is concerning that the current and proposed new definition for cereal field margins excludes whole-field options from the priority habitat definition, albeit that their value for wildlife is acknowledged and the associated HAP Group intends to review their status in due course. This review is very much endorsed. The UK BAP should certainly afford due consideration to all arable land that meets the criteria for priority status, even if delivery mechanisms continue to focus on the margins of fields.

3.11.2 Synopsis of key comments received

- There was widespread support for a more comprehensive review of important habitats associated with arable land. However, the Cereal Field Margins HAP Steering Group stressed this would take at least two years to achieve and require consultation with a number of specialists/specialist groups to accommodate arable plant, farmland bird and invertebrate interests.

3.11.3. Final conclusion/recommendation

- It is clear that at least some in-field habitats associated with arable land are recognised as important for nature conservation. These seem to meet with the qualifying Criterion III - Key species and Criterion II - Risk. Although no specific detailed habitat proposals were submitted, the Cereal Field Margins HAP Steering Group did outlined the priorities. They stressed, however, that they would need to consult further with a number of specialists/specialist groups, to accommodate arable plant, farmland bird and invertebrate interests, and that this work would require at least another two years to finalise. We advise that this work needs to consider not only species interests, but also certain rare and threatened open vegetation communities associated with arable land.
- We recommend that a process is put into place to ensure this work is carried out. Without this we consider it inappropriate to afford this habitat priority status. If arable land outside of arable field margins is left out of the priority habitat series, this means that the series may not be comprehensive, i.e. arable land beyond arable field margins must be considered to be a 'missing' component.

3.12. Summary statement on Traditional Orchards

3.12.1. Synopsis and commentary on final proposal

- Natural England, in consultation with a range of other bodies, proposed that Traditional Orchards were considered as a new UK BAP priority habitat.
- This habitat was proposed at a late stage in the previous 'gaps' review and so was not adequately considered at that time. The proposal has been subsequently reviewed and revised by Natural England in consultation with a range of other bodies.
- The justification provided for Traditional Orchards as a priority habitat was generally convincing. The submission has involved a thorough consultation process, attracted the support of a large number of individuals and associated groups from around the UK, and is based on a substantially improved knowledge of the biodiversity associated with orchards.
- The proposed habitat includes a range of fruit and nut orchards, with a low-density of open-grown trees set in semi-natural mainly herbaceous vegetation, managed in a low-intensity way.
- It has become clearer with recent survey work that Traditional Orchards can support many species of conservation importance. These include important saproxylic invertebrate and epiphytic lichen assemblages, which is especially significant given the conservation concern afforded to these species and the scarcity of other habitats that support them. They can also support interesting fungi and bryophyte assemblages, have some invertebrate interest, and contain important areas of semi-natural grassland.
- The resource is clearly at substantial risk. It is poorly represented in the SSSI site series. Evidence is presented to demonstrate a dramatic, on-going loss of sites, only partly compensated for by improved management and restoration.
- Orchards also play an important complementary role, supporting other important semi-natural habitats (including wood-pasture/parkland, woodland, hedges, rough grassland, ponds and watercourses), and acting as a resource for wider-ranging species, including bird species and bats of conservation concern.
- The criteria identified to define which orchards should be considered for inclusion are well considered and linked to the nature conservation importance of individual sites.
- The habitat can be defined according to a range of simple visual criteria based on structural and management characteristics. These provide a reasonable basis to define and estimate the extent and distribution of the resource, and to also create a national mappable inventory of sites for monitoring purposes.
- There is some inevitable potential overlap with/inclusion of other priority habitats, including semi-natural grassland, wood-pasture, woodland, hedgerows and hedge trees. The conclusion reached to treat Traditional Orchards separately from the Wood-Pasture and Parkland priority habitat is considered to be sensible. Further material has been added to the proposal that makes it clearer how the cut-off from other habitat types and reporting under HAP will be approached.
- Orchards are generally viewed as being more artificial habitats than semi-natural types (for example compared to wood-pasture). This is, nevertheless, much more difficult to justify when considering Traditional Orchards, and especially when these are compared to hedgerows or cereal field margins, which are already recognised as priority habitats. In addition, the types of trees used are generally native or related species, which is part of the reason for the associated faunal and floral interest.

3.12.2. Synopsis of key comments received

- Commentators were strongly supportive of the proposal to include traditional orchards in the priority habitat status and there were relatively few concerns about the details of the proposal. There seemed to be widespread approval/understanding of proposed name 'Traditional orchards'.

3.12.3. Final conclusion/recommendation

- We support the proposal for Traditional Orchards to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species.

3.13. Summary statement on Hedgerows

3.13.1. Synopsis and commentary on final proposal

- The Hedgerows HAP Steering Group proposed to change the name and substantially widen the scope of the existing UK BAP priority habitat for Ancient and/or Species-Rich Hedgerows.
- The Hedgerows HAP Group, who submitted the proposal form, reviewed the definition for this habitat. This issue first arose through the 2005 UK Targets Review with revised targets having been submitted by the group on the basis of the proposed change in definition.
- The submission proposes an extension to the priority habitat definition to include all hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody native species.
- The proposed extension would broadly include all native hedgerows, a greater number of hedgerow trees and more wildlife associated with hedges, including species that are not limited by features associated with ancient and/or species-rich hedges. It would also include more hedges in Scotland and Northern Ireland, where the existing definition encapsulates a limited number of hedgerows.
- The proposed change would also recognise that the hedgerow network as a whole plays an important functional role, particularly in lowland areas, connecting other priority habitats (notably native woodland, wood-pasture and parkland, traditional orchards and ponds) and redressing the effects of habitat isolation and fragmentation. This issue looks set to become even more important in the face of climate change and other continued environmental pressures.
- The proposed name change for the priority habitat, from Ancient and/or Species-Rich Hedgerows to simply Hedgerows, seems sensible given the proposed change in definition.
- A detailed rationale for the change is given based on conservation of biodiversity, fit to policy, and feasibility of monitoring targets. Several policy instruments do not isolate ancient/species-rich hedgerows from other hedgerows and monitoring of ancient/species-rich hedgerows in isolation is problematic. It would, however, be inconsistent to base the priority habitat definition on such considerations rather than importance for nature conservation.
- There were concerns that the proposal could be seen as going beyond what ought to be considered a priority and the degree to which it met with the qualifying criteria. After discussion, the case was accepted to increase the scope, though not as extensively as first proposed.
- It was accepted that the same basis for qualifying species should be adopted across the UK. This should be limited to native woody species and would results in different country-based lists.

3.13.2. Synopsis of key comments received

- Most responses in favour of expanded definition, though some people subsequently expressed concerns following on from points made in Consultation Report.

3.12.3. Final conclusion/recommendation

- We have no objections to change the name of the priority habitat to Hedgerows.
- We are supportive in principle to widen the scope of the priority habitat, on the basis of Criterion III - Key species, possibly Criterion - II Risk, and also recognising that the 'functional importance' criterion adds support.
- Priority hedgerows should be those comprising 80% or more cover of any native tree/shrub species. This does not include archaeophytes and sycamore. For the purposes of the UK BAP 'native' will not be defined further; it will be left up to the Countries to provide guidance on this as they consider appropriate.

3.14. Summary statement on Wood-Pasture and Parkland

3.14.1. Synopsis and commentary on final proposal

- The Lowland Wood-Pasture and Parkland HAP Steering Group proposed to change the name and substantially widen the scope of the existing UK BAP priority habitat for Lowland Wood-Pasture and Parkland.
- The Lowland Wood-Pasture and Parkland HAP Group reviewed the definition for this habitat and submitted the proposal form. This issue first arose through the 2005 UK Targets Review with revised targets having been submitted by the group on the basis of the proposed change in definition.
- The three GB statutory conservation agencies have been involved in the proposal, together with the Forestry Commission and the Woodland Trust.
- The submission proposes to remove the 'lowland' element from the existing name of the priority habitat, concomitant with an extension of the definition to include suitable wood-pastures and parkland in upland as well as lowland situations.
- The proposal to revise the existing name is sensible, given the proposed change to extend the habitat definition.
- There are also clear and convincing benefits to the proposed expansion of the definition, given that it is now recognised that wood-pastures of comparable importance to those in lowland situations exist in the uplands (though details to this effect are not provided). It will extend, albeit in a limited way, the coverage of a number of Annex I Habitat Directive types.
- Some suggested modifications are given indicating how the existing habitat definition ought to be revised, and some additional information is provided as to what is meant by the term wood-pasture. Nevertheless, some further information would have been beneficial to assess the proposal.
- It is recognised that wood-pasture is a land-use category, defined in structural/management terms, which covers several broad types of vegetation, i.e. it is woodland, heathland and/or grassland with ancient trees. As a consequence it overlaps with a number of other priority habitat types. This situation is not substantially changed by the proposed extension of the existing priority habitat to the uplands, though the ecological and physical separation between wood-pastures and 'woodland' is less distinct in upland compared to lowland settings. A number of issues will remain as regards mapping, reporting, and discrimination from other habitats.

3.14.2. Synopsis of key comments received

- Commentators were strongly supportive of the proposal to change the priority habitat name and its scope.

3.14.3. Final conclusion/recommendation

- We support the proposal for the Wood-Pasture and Parkland UK BAP priority habitat to be extended to include occurrences in upland as well as lowland situations. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

3.15. Summary statement on Native Woodland

3.15.1. Synopsis

- The UK Native Woodland HAP Steering Group proposed (via the 2005 UK Targets Review) that all the action plans for the existing woodland priority habitat types should be combined into a single framework that retained the ability to monitor and set targets for individual priority woodland types. There was also some debate about combining the existing native woodland types into a single 'native woodland' type, but the consensus view (as reflected by the targets proposal) was to retain the existing priority woodland type subdivisions. This was supported as they are sufficiently extensive, distinctive and individualistic in terms of their treatment and conservation, to merit recognition as individual priority habitat types.

3.15.2. Synopsis of key comments received

- Strong support to retain individual woodland priority habitat types

3.15.3. Final conclusion/recommendation

- No recommendation necessary as no effective change is proposed to the status of individual UK BAP woodland priority habitat types. The UK Native Woodland HAP Steering Group do, however, need to ensure that appropriate consideration is given to individual priority woodland types within the native woodland reporting framework.

3.16. Summary statement on Scrub and Treeline Habitats

3.16.1. Synopsis and commentary on final proposal

- Following on from the suite of proposals received, JNCC Habitats Team asked if any scrub or treeline habitat types should be highlighted further within the existing/proposed priority habitat series.
- Scrub, in its broadest sense, covers a very wide category of habitat based on low-growing (e.g. bramble *Rubus*) or taller woody species (e.g. willow *Salix*). It is associated with many different habitat types and explicitly mentioned in a number of existing priority habitat descriptions. Many forms of scrub are invasive and transitional, responding to, for example, declines in grazing pressure and opening of tree canopies. Scrub control is often a major management issue to retain other types of semi-natural habitat. Other forms of scrub are, nevertheless, more permanent. For example, on exposed ground at the upper altitudinal limit of tree growth and in coastal areas, forms of willow and hazel *Corylus* scrub are characteristic. Stable willow scrub is characteristic of certain wet sites, particularly those fringing water bodies. At lower altitudes, semi-permanent scrub occurs in the form of hedgerows. The nature conservation value of scrub was the subject of an inter-agency review (JNCC Report 308, http://www.jncc.gov.uk/page-2445). Further to this, a comprehensive scrub management handbook, giving guidance on the management of scrub on nature conservation sites, has been produced by FACT in association with English Nature and RSPB. Various types of scrub provide essential or important habitat requirements for many species of higher plants, herbivorous insects and birds, including Red Data Book and UK BAP priority species. It is also likely to be equally important for lower plants, non-herbivorous invertebrates, reptiles and amphibians, and mammals. There are several Annex I types which are based on scrubby formations, including coastal and heath types, montane willow scrub, juniper scrub, and scrubland facies on calcareous grasslands.
- The status of scrub habitats within the UK BAP priority habitats series was addressed during the previous gaps review. It was recommended that scrub habitats should be dealt with as an integral component of the various woodland, coastal, grassland, wetland, heath, rock and hedgerow priority habitats, rather than being considered separately. This could be addressed through the habitats manual being developed by JNCC. The conservation value of scrub as a structural component of these priority habitats also needs to be fully acknowledged in relevant Habitat Action Plans. It would be desirable to produce a guidance note regarding scrub conservation and management issues which could be circulated to all relevant HAP Steering Groups.
- Specific concern was expressed by the Montane Scrub Action Group that upland scrub types are not covered sufficiently in existing upland/woodland priority habitats. Montane willow scrub was specifically included within the proposed Mountain Heaths and Willow Scrub priority habitat. Treeline scrub/Krumholtz vegetation is a high priority for restoration and it is recommended that it should be clearly encompassed within relevant priority habitats, such as Upland Birchwoods and Native Pinewoods. Concern has also been expressed about the status of juniper scrub if juniper is removed from the priority species list as a consequence of the current species review.

3.16.2. Synopsis of key comments received

- There was strong support that scrub and treeline habitats should be recognised as an important component of various priority habitat types and not as an individual type in its own right.

3.16.3. Final conclusion/recommendation

- We support the proposal to ensure that relevant scrub and treeline habitat types are further recognised as important constituents in a number of existing/proposed UK BAP priority habitat types. This should form part of future work on describing and defining the content of priority habitats. These scrub types will require consideration when habitat action planning is reviewed and targets are identified. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

3.17. Summary statement on Field Banks

3.17.1. Synopsis and commentary on final proposal

- Following on from the suite of proposals received, JNCC Habitats Team asked if Field Banks should be considered further, either as a priority habitat in its own right or as part of other existing/proposed priority habitat types.
- Field banks are important features for nature conservation in some localities. They are traditional boundaries, formed from raised earth banks that are usually stone faced. In coastal fringe and upland parts of western Britain, where hedgerows struggle to develop due to severe exposure, they can be prevalent, for example, in Cornwall and western Wales where they are known as Cornish hedges and Cloddiau respectively. Field banks typically support a wide range of plants and semi-natural communities associated with grassland, heathland, coastal and open scrub vegetation. They provide habitat for a range of invertebrates, amphibians, reptiles and small mammals. Factors adversely affecting field banks include: (i) inappropriate or lack of appropriate maintenance/management; (ii) removal; (iii) damage by livestock; (iv) nutrient enrichment; and (v) invasion by bracken and non-native species.
- The Steering Group for the Ancient and/or Species-Rich Hedgerow HAP discussed the position of hedge/field banks during 2005. They decided that, although wooded hedge banks were within the scope of the HAP, unwooded field banks were beyond their remit. It was also concluded that the group did not have sufficient knowledge to propose field banks for consideration as a priority habitat, though they agreed that their conservation ought be encouraged by local and regional HAPs (see Annex 3a). As a contribution to this discussion, a Welsh Assembly Government representative prepared a note outlining the position for field/hedge banks in Wales. They did not, however, receive any further encouragement and decided not to take this habitat forward for consideration by this review.
- The Lowland Grassland Lead Co-ordination Network agreed on the importance of field banks, but, unlike roadside verges, felt that this habitat did not fit naturally under the umbrella of grassland habitats as the vegetation is not consistently grassland in character and its linear nature would cause big problems with their current system of reporting.
- Despite not receiving a formal submission for field banks, there is clear support for them as an important habitat in Wales and from Cornwall County Council. They certainly seem worthy of proper consideration, at least so that they are recognised as an important landscape feature capable of supporting significant areas of recognised priority habitat. Even if field banks do not merit treatment as a separate priority habitat, they could be recognised as part of any action plan directed at field boundaries (including hedgerows and field margins) or, at the very least, as an important feature in the definition of certain priority habitat types.

3.17.2. Synopsis of key comments received

- There was substantial support about the potential importance of field banks, but views differed as regards making them a separate priority habitat or including them as components of other priority habitat types.

3.17.3. Final conclusion/recommendation

- It is clear that at least some field banks are important for nature conservation, partly because of their associated vegetation, particularly for related grassland, heathland, coastal and open scrub communities, but also from a key species perspective. They would seem to meet with qualifying Criterion III - Key species, Criterion II – Risk, and possibly Criterion I - International obligations (small part of resource). The most sensible solution, especially given the range of associated broad vegetation types and discrete nature of this linear habitat type, would be to create a priority habitat type based on field banks. However, a proposal to this effect has not been forthcoming.
- We recommend that a process is put into place so that so the value of this habitat can be fully assessed and a suitable proposal drawn up, at least in time for the next review of priority habitats.
- Without the support of an appropriate group, we consider it inappropriate to afford this habitat priority status. If field banks are left out of the priority habitat series, this means that the series may not be comprehensive.

3.18. Summary statement on Roadside Verges

3.18.1. Synopsis and commentary on final proposal

- Following on from the suite of proposals received, JNCC Habitats Team advised that Roadside Verges should be considered further, either as a priority habitat in its own right or as part of other existing/proposed priority habitat types. Subsequently, agreement was reached with the Lowland Grassland HAP umbrella group that the significance of roadside verges should be recognised within the descriptions of all relevant lowland grassland priority habitat types.
- Road verges are similar to field banks as features of importance for nature conservation in many areas of the country. They have been estimated to cover an area over 200,000 ha across the UK. Vegetation in the majority of road verges corresponds to mesotrophic grassland MG1 *Arrhenatherum elatius* in the NVC, but occurrences of other grassland communities and habitats are widespread. In some regions, roadside verges form important reservoirs of grassland habitat, e.g. for neutral grassland in Cumbria and for calcareous grassland in Lincolnshire. They also harbour rare species, including UK BAP priority species such as *Arabis glabra* and *Dianthus armeria*. Twenty of the UK's 50 mammal species have been know to breed on roadside verges, as well as all six reptiles, a fifth of the 200 species of birds, 25 of the 60 species of butterfly, almost half of the 17 species of bumble bee, and five of the six amphibian species.
- The decline in nature conservation value on many roadside verges has been linked with changes in management responsibility and approach, particularly the move from cutting by scythe to flail cutting, changes in cutting frequency, and the leaving of cuttings on the verges leading to an increase in nutrient status. There is evidence that the biodiversity value of road verges continues to decline: Countryside Survey 2000, for example, compared results from road verge plots samples in 1990 and 1998 and found a reduction in species-richness and increase in dominance of tall competitive plants, particularly in lowland farmed landscapes in England and Wales.
- Like field banks, road verges are clearly a landscape feature of some importance. They can certainly support extensive amounts of priority habitat types, particularly unimproved, infertile, species-rich grassland. Particularly in intensively farmed lowland areas, road verges can be the single most important location for these habitats and associated species, hence the development of specific action plans in many local UK BAPs. Roadside verges should, at least, be given recognition within the definition of relevant priority habitats. They should be identified as part of any action plan directed at field boundaries in general or any associated species or habitat. Such action could include: best practice guidance on roadside verge management for biodiversity; mechanisms for information exchange between roadside verge managers; and specific agri-environment guidance for roadside verge management and enhancement.
- The Lowland Grassland HAP umbrella group considered the case for road verges during 2005-7. The group was supportive of the need for action, but not fully convinced that this should be progressed through a specific new priority habitat. The identification of this habitat would be complicated as road verges are more specifically a land use rather than habitat type. It would not sit distinctly within any one broad habitat, particularly at a UK level.

3.18.2. Synopsis of key comments received

- There was unanimous support about the importance of roadside verges within relevant grassland priority habitat types, and that this needs to be recognised in the habitat descriptions.

3.1.8.3. Final conclusion/recommendation

- We support the proposal to recognise the significance of roadside verges in supporting relevant grassland priority habitat types (i.e. lowland dry grassland, lowland calcareous grassland, lowland meadows, upland hay meadows, purple-moor grass pastures). This involves only a clarification of definition, which will not significantly affect the scope of the existing priority habitats.

3.19. Summary statement on Lowland Heathland

3.19.1. Synopsis and commentary on final proposal

- The Lowland Heathland HAP Group proposed to clarify the scope of the existing UK BAP priority habitat for Lowland Heathland.
- The Lowland Heathland HAP Group have reviewed the definition for this habitat and submitted the proposal form. The proposed refinement to the definition of the priority habitat is generally clear. It represents only a minor change, which helps to clarify/improve the existing definition. The change will not significantly affect the overall scope of priority habitat. The proposed amendment appears to attract support from the Lowland Heathland HAP group.
- Although the proposed definition would benefit from further precision, particularly with regard to the spatial and temporal occurrence of non-Ericaceous vegetation with lowland heathland sites, there is no suggestion that the proposal goes beyond what ought to be included in the priority habitat.

3.19.2. Synopsis of key comments received

- There was strong support for this proposal.

3.19.3. Final conclusion/recommendation

- We support the proposal to clarify the scope of the Lowland Heathland priority habitat. This involves only a clarification of definition, which will not significantly affect the scope of the existing priority habitats.

3.20. Summary statement on Lowland Calcareous Grassland

3.20.1. Synopsis and commentary on final proposal

- The Lowland Grassland HAP Group proposed to clarify the scope of the existing UK BAP priority habitat for Lowland Calcareous Grassland.
- The Lowland Grassland HAP Group have reviewed the definition for this habitat and submitted the proposal form included in Annex 3(d). This issue first arose through the 2005 UK Targets Review, with revised targets having been submitted by the HAP Group on the basis of the proposed change in definition.
- The proposed refinement to the definition of the priority habitat is clear. It is based on new knowledge of the distribution of particular NVC calcareous grassland types above/below the limit of agricultural enclosure. The amendment has the support of all the main inter-agency grassland expert groups.
- This is a relatively minor, technical change, which helps to clarify/improve the existing definition. It will not result in any significant change to the overall scope of priority habitat. It does, however, require that the Upland calcareous grassland priority habitat is similarly redefined.

3.20.2. Synopsis of key comments received

- There was unanimous support for the proposal.

3.20.3. Final conclusion/recommendation

- We support the proposal to clarify the scope of the Lowland Calcareous Grassland priority habitat in relation to Upland Calcareous Grassland. This involves only a clarification of definitions, which will not significantly affect the combined scope of the existing priority habitats.

4. Final versions of habitat proposals

A summary of the proposed changes and suggested final recommendations/conclusions to the UK BAP priority habitat series (as detailed in Section 3) are given in Table 4. If the recommendations are adopted, the revised list of terrestrial and freshwater UK BAP priority habitats would increase from 32 to 40 habitats, as detailed in Table 5.

The revised series would accommodate nearly all the habitat types listed on Annex I of the EU Habitats Directive. It does not, however, seem to provide a fully complete and comprehensive list of all terrestrial and freshwater habitats that might meet with one or more of the qualifying criteria.

Table 4. Summary of proposed changes and suggested final recommendations/conclusions to the UK BAP priority habitat serie

Habitat	Proposal	Final conclusion/recommendation
Rivers	*New priority habitat [including existing Chalk Rivers priority habitat]*	• We support the proposal for Rivers to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species. • Two specific items require further work if the proposal is approved: (i) criteria need to be drawn up to specify which non-qualifying, degraded rivers/sections; and (ii) a sufficiently detailed description of the entire resource covered by the proposed habitat needs to be drawn up, including all of the individual river types and how any overlaps are to be dealt with.
Oligotrophic and Dystrophic Lakes	*New priority habitat*	• We support the proposal for Oligotrophic & Dystrophic Lakes to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species. • Two specific items require further work if the proposal is approved: (i) the lower quality thresholds for the proposed habitat need to be specified, so that non-qualifying, low quality water bodies can be excluded; and (ii) a clearer definition needs to be drawn up, based on and complementing the definition developed for Mesotrophic Lakes.
Ponds	*New priority habitat*	• We support the proposal for Ponds to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
Canals	*Consider place in priority habitat series*	• Although it is clear that at least some canals have developed semi-natural characteristics and a flora/fauna that are recognised as important for nature conservation, and these seem to meet with qualifying Criterion III - Key species and Criterion II – Risk, there is little support to give this habitat priority status because it is considered that sufficient action is already in place through the protected SSSI/SAC site series and Water Framework Directive. • Without the support of the JNCC Freshwater Lead Coordination Network, we consider it inappropriate to afford this habitat priority status. If canals are left out of the priority habitat series, this means that the series may not be comprehensive.
Mountain Heaths and Willow Scrub	*New priority habitat*	• We support the proposal for Mountain Heaths and Willow Scrub to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II - Risk; and Criterion III - Key species.

Habitat	Proposal	Final conclusion/recommendation
Upland Flushes, Fens and Swamps	*New priority habitat*	• We support the proposal for Upland Flushes, Fens and Swamps to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II – Risk; and Criterion III - Key species. • If the proposal is approved, this will necessitate a change of name to the existing priority habitat for 'Fens' (to 'Lowland Fens' or similar) and, as a result, an adjustment to the definition of this habitat.
Inland Rock Outcrop and Scree Habitats	*New priority habitat*	• We support the proposal for Inland Rock Outcrop and Scree Habitats to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (for some of proposed resource); Criterion II – Risk; and Criterion III - Key species.
Calaminarian Grasslands	*New priority habitat*	• We support the proposal for Calaminarian Grasslands to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion I - International obligations (whole resource); Criterion II - Risk; and Criterion III - Key species.
Open Mosaic Habitats on Previously Developed Land	*New priority habitat*	• We support the proposal for Open Mosaic Habitats on Previously Developed Land to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species.
Traditional Orchards	*New priority habitat*	• We support the proposal for Traditional Orchards to form a new UK BAP priority habitat. The primary reasons for qualification are: Criterion II - Risk; and Criterion III - Key species.
Wood-Pasture and Parkland	*Change name to 'Wood Pasture and Parkland' and widen scope*	• We support the proposal for the Wood-Pasture and Parkland UK BAP priority habitat to be extended to include occurrences in upland as well as lowland situations. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
Ancient and/or species-rich hedgerows	*Change name to 'Hedgerows' and widen scope*	• We have no objections to change the name of the priority habitat to Hedgerows. • We are supportive in principle to widen the scope of the priority habitat, on the basis of Criterion III - Key species, possibly Criterion - II Risk, and also recognising that the 'functional importance' criterion adds support. • Priority hedgerows should be those comprising 80% or more cover of any native tree/shrub species. This does not include archaeophytes and sycamore. For the purposes of the UK BAP 'native' will not be defined further; it will be left up to the Countries to provide guidance on this as they consider appropriate.

Habitat	Proposal	Final conclusion/recommendation
Arable Land	*Consider place in priority habitat series*	• It is clear that at least some in-field habitats associated with arable land are recognised as important for nature conservation, and these seem to meet with the qualifying Criterion III - Key species and Criterion II - Risk. However, a detailed habitat proposal was not submitted for this habitat, but instead the Cereal Field Margins HAP Steering Group advised that they would require at least another two years to produce an informed proposal. • We recommend that a process is put into place to ensure this work is carried out. Without this we consider it inappropriate to afford this habitat priority status. If arable land outside of arable field margins is left out of the priority habitat series, this may mean that the series may not be comprehensive.
Field Banks	*Consider place in priority habitat series*	• It is clear that at least some field banks are important for nature conservation, and these would seem to meet with qualifying Criterion III - Key species, Criterion II – Risk, and possibly Criterion I - International obligations (small part of resource). The most sensible solution, especially given the range of associated broad vegetation types and discrete nature of this linear habitat type, would seem to be to create a priority habitat type based on field banks. However, a proposal to this effect has not been forthcoming. • We recommend that a process is put into place so that so the value of this habitat can be fully assessed and a suitable proposal drawn up, in time for the next review of priority habitats. • Without the support of an appropriate group, we consider it inappropriate to afford this habitat priority status. If field banks are left out of the priority habitat series, this means that the series may not be comprehensive.
Roadside Verges	*Consider place in priority habitat series*	• We support the proposal to recognise the significance of roadside verges in supporting relevant grassland priority habitat types (i.e. lowland dry acid grassland, lowland calcareous grassland, lowland meadows, upland hay meadows, purple-moor grass pastures). This would involve only a clarification of definition, which will not significantly affect the scope of the existing priority habitats.
Scrub & Treeline Habitats	*Consider place in priority habitat series*	• We support the proposal to ensure that relevant scrub and treeline habitat types are further recognised as important constituents in a number of existing/proposed UK BAP priority habitat types. This should form part of future work on describing and defining the content of priority habitats. These scrub types will require consideration when habitat action planning is reviewed and targets are identified. The primary reasons for qualification are: Criterion I - International obligations (some of proposed resource); Criterion II - Risk; and Criterion III - Key species.
Arable Field Margins	*Change name 'Arable field margins' and clarify scope*	• We support the proposal to change the name of the Cereal Field Margins UK BAP priority habitat to Arable Field Margins and clarify its scope.

Habitat	Proposal	Final conclusion/recommendation
Lowland Heathland	*Clarify scope*	• We support the proposal to clarify the scope of the Lowland Heathland priority habitat. This involves only a clarification of definition, which will not significantly affect the scope of the existing priority habitats.
Lowland Calcareous Grassland	*Clarify scope*	• We support the proposal to clarify the scope of the Lowland Calcareous Grassland priority habitat in relation to Upland Calcareous Grassland. This involves only a clarification of definitions, which will not significantly affect the combined scope of the existing priority habitats.

Table 5. Potential revised list UK BAP priority habitats and their relation with the UK BAP Broad Habitat Series.

UK BAP broad habitat	UK BAP priority habitat
Rivers and Streams	Rivers
Standing Open Water and Canals	Oligotrophic and Dystrophic Lakes
	Ponds
	Mesotrophic Lakes
	Eutrophic Standing Waters
	Aquifer Fed Naturally Fluctuating Water Bodies
Arable and Horticultural	Arable Field Margins
Boundary and Linear Features	Hedgerows
Broadleaved, Mixed and Yew Woodland	Traditional Orchards
	Wood-Pasture and Parkland
	Upland Oakwood
	Lowland Beech and Yew Woodland
	Upland Mixed Ashwoods
	Wet Woodland
	Lowland Mixed Deciduous Woodland*
	Upland Birchwoods*
Coniferous Woodland	Native Pine Woodlands
Acid Grassland	Lowland Dry Acid Grassland
Calcareous Grassland	Lowland Calcareous Grassland
	Upland Calcareous Grassland
Neutral Grassland	Lowland Meadows
	Upland Hay Meadows
Improved Grassland	Coastal and Floodplain Grazing Marsh
Dwarf Shrub Heath	Lowland Heathland
	Upland Heathland
Fen, Marsh and Swamp	Upland Flushes, Fens and Swamps
	Purple Moor Grass and Rush Pastures
	Lowland Fens
	Reedbeds
Bogs	Lowland Raised Bog
	Blanket Bog
Montane Habitats	Mountain Heaths and Willow Scrub
Inland Rock	Inland Rock Outcrop and Scree Habitats
	Calaminarian Grasslands
	Open Mosaic Habitats on Previously Developed Land
	Limestone Pavements
Supralittoral Rock	Maritime Cliff and Slopes
Supralittoral Sediment	Coastal Vegetated Shingle
	Machair
	Coastal Sand Dunes

* these two woodland types, although agreed on, have never been fully adopted; note also that several priority habitats actually occur in more than one broad habitat type or are habitat complexes, but for simplicity are listed against only one broad habitat in this table

Proposed new freshwater priority habitat

Suggested habitat name: Rivers

Correspondence with existing habitat/s

UK BAP broad habitat: Rivers and streams

Phase 1: G2 Running water

NVC: Various, including A2, A8-9, A11-20, S4-9, S11-14, S16-19, S22 and others

Annex I: H3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

JNCC river types: I-X

Description

Characteristic features

This habitat type includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems) [SERCON, a system for evaluating the conservation value of rivers, may be of use in defining these]. These range from torrential mountain streams to meandering lowland rivers.

Numerous factors influence the ecological characteristics of a watercourse, for example geology, topography, substrate, gradient, flow rate, altitude, channel profile, climate, catchment features (soil, landuse, vegetation etc). Human activities add to this complexity. In addition most river systems change greatly in character as they flow from source to sea or lake. Although various classifications and typologies for rivers exist, none is considered adequate for identifying a discrete but comprehensive series of specific priority types against the criteria. Consequently this proposal is for a single 'Rivers' priority habitat, which is considered to meet the criteria as set out under 'Reasons for recommendation' below.

Nevertheless within this overall type the existing priority habitat Chalk rivers can be separated as a discreet sub-type of high priority for conservation (see Annex below). In addition three broad features or components present in some or all rivers have been identified as of particular national priority, though they are not exclusive:

- The Habitats Directive Annex I habitat type Rivers with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (see Annex below);
- Headwaters (see Annex below);
- Exposed riverine sediments, a feature of active shingle rivers (see Annex below) and other rivers with predominantly sandy sediments.

As a minimum the Rivers priority habitat would be defined as extending to the top of the adjacent banks, recognising that (a) it may be desirable to restore a river to a previous course, and (b) a river's floodplain (present or historical) may be essential to its ecological functioning. Significant areas of adjoining priority habitats (such as fen, woodland, grassland and heathland types) may form an integral component of river systems for the purposes of conservation and management, but would be excluded from the formal definition of the Rivers priority habitat. This would also apply to areas of metalliferous river shingle supporting Calaminarian grassland (part of a separate proposed priority habitat). Adjacent ponds would be included within the River habitat if they have been formed as a result of river dynamics (e.g. oxbows), but not if they are artificial or formed by an unrelated process (e.g. pingos).

The following are also excluded from this priority habitat:

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

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

The plant and animal assemblages of rivers and streams vary according to their geographical area, underlying geology and water quality. Swiftly-flowing upland, nutrient-poor rivers support a wide range of mosses and liverworts and relatively few species of higher plants. The invertebrate fauna of upland rivers is dominated by stoneflies, mayflies and caddisflies, while fish such as salmon *Salmo salar* and brown trout *Salmo trutta* will almost certainly be present. In contrast, lowland nutrient-rich systems are dominated by higher plants, and coarse fish such as chub *Leuciscus cephalus*, dace *Leuciscus leuciscus* and roach *Rutilus rutilus*. Exposed sediments such as shingle beds and sand bars are important for a range of invertebrates, notably ground beetles, spiders and craneflies. Marginal and bankside vegetation is an integral part of a river, supporting a range of river processes, as well as acting as habitat in its own right for a diverse flora and fauna, and as a migration corridor. Notable species are referred to under Reasons for recommendation.

Geographic distribution

This habitat occurs extensively throughout the UK (see Annexed material below for specific types).

Reasons for recommendation

Habitat for which the UK has international obligations

Includes the Annex I type H3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. UK rivers also support an exceptionally rich suite of species on Annex II of the Habitats Directive (see Key Species section below).

Habitat at risk

Rivers have been adversely affected by many different anthropogenic pressures, and in many instances the risks remain; some are reducing but others are increasing. These are mostly well documented, e.g. the WFD Article 5 characterisation and impact analyses by the UK environment agencies. Impacts and threats include:

- Change in flow and siltation – through land use change, abstraction, river engineering
- Increased nutrients - from agriculture, forestry and other discharges
- Other pollution – from herbicides, pesticides, industrial waste, aerial pollution/acidification
- Channel modification – river engineering, aggregate extraction, fisheries management, change in marginal vegetation
- Catchment change – agriculture, forestry, urban development etc
- Invasive non-native species – aquatic species such as signal crayfish, non-indigenous fish spp., terrestrial species such as Japanese knotweed

Further details of threats for specific river types is given in Annexes below and in Hatton-Ellis et al (2003).

Habitat important for key species

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

Habitats of functional importance

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

Annex: Further details of existing Chalk Rivers UK BAP priority habitat

Extracted from the *UK HAP for Chalk rivers* (1995). Further, updated information is given in *The state of England's chalk rivers* (2004).

Current status

There are approximately 35 chalk rivers and major tributaries ranging from 20 to 90 kilometres in length. They are located in south and east England - from the Frome in Dorset to the Hull in Humberside.

Chalk rivers have a characteristic plant community, often dominated in mid-channel by river water crowfoot *Ranunculus penicillatus* var *pseudofluitans* and starworts *Callitriche obtusangula* and *C. platycarpa*, and along the edges by watercress *Rorippa nasturtium-aquaticum* and lesser water-parsnip *Berula erecta*. They have low banks which support a range of water-loving plants. This plan considers action required for the river channel and banks but not for the whole catchment or floodplain.

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

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

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

Current factors affecting the habitat

Abstraction: Excessive abstraction mainly for public water supply from the chalk aquifer has contributed to low flows on a number of chalk rivers. This has led not only to drying out of upper sections and riparian zones, but also to accumulation of silt and changes in the aquatic vegetation structure. Artificial measures to counter these effects, such as

sealing of the bed with concrete and narrowing of the channel, can themselves have negative ecological consequences.

Physical modification: Like most lowland rivers, many chalk rivers have had their beds dredged and lowered and have been confined to specific channels for flood defence, drainage, navigation, and other purposes. As 'low energy' systems, chalk rivers have been less able than other river types to reassert their channel structure. Some have side channels, created during much higher flows after the last ice age. These have sometimes been modified to create lakes for ornamental or fishery purposes. The management of water meadows from a mill head was also a familiar practice in recent centuries. The full extent of these modifications on the animal and plant communities of chalk rivers is not known.

Pollution: In common with most lowland rivers, chalk rivers are significantly affected by sewage discharges and in times of low flow, de-oxygenation may occur. This has caused the upper reaches of at least one SSSI river to be classified in the lowest water quality category. High levels of nitrates (leaching from ploughed land into groundwater) and phosphate (from sewage effluent) are found in many chalk rivers. Because of this enrichment, excessive growths of blanket-weed have been observed on what were previously crystal-clear waters. Changes in plant communities have occurred, including loss of water crowfoot beds from some river stretches. Effluent from fish farms, water-cress beds and light industry can have similar effects.

Fisheries management: On many chalk rivers this is intensive, with regular 'weed' cuts in the channel; fencing off and mowing of strips along the bank; infilling and stabilisation of banks; removal of unwanted fish species (e.g. pike, grayling); and stocking with farm-reared trout. Some fisheries management practices are evidently beneficial to conservation, such as cleaning gravels, while others are neutral providing they do not either impact on characteristic plant and animal communities or are carried out in previously unmanaged areas.

Annex: Supplementary information on Rivers with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Extracted from *McLeod et al (2005) Selection of SACs in the UK: habitat accounts,* see: http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H3260. A fuller description and classification of this habitat type in the UK, together with details of threats and impacts, are given in Hatton-Ellis *et al* (2003) Ecology of watercourses characterised by *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough.

Description and ecological characteristics

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

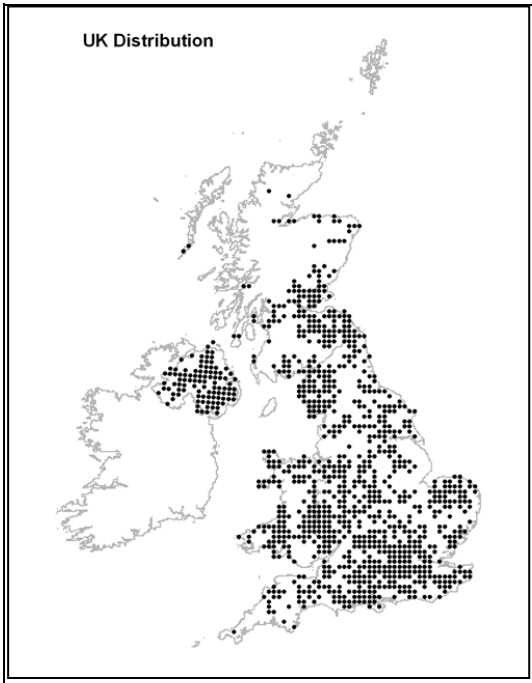
There are several variants of this habitat in the UK, depending on geology and river type. In each, *Ranunculus* species are associated with a different assemblage of other aquatic plants [but see sub-type 3], such as water-cress *Rorippa nasturtium-aquaticum*, water-starworts *Callitriche* spp., water-parsnips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

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

Sub-type 2: This variant is found on other substrates, ranging from lime-rich substrates such as oolite, through soft sandstone and clay to more mesotrophic and oligotrophic rocks. There is considerable geographic and ecological variation in this sub-type. Faster-flowing western rivers on harder rocks, for example in Wales and south-west England, support stream water-crowfoot *Ranunculus penicillatus* ssp. *penicillatus*, while western and northern rivers on sandstone or alluvial substrates often support both *R. penicillatus* ssp. *penicillatus* and river water-crowfoot *R. fluitans.* Sub-type 2 rivers elsewhere in the UK contain a mixture of species, and often hybrids, but rarely support *R. penicillatus* ssp. *penicillatus* or *R. fluitans*. Associated species which may be present include lesser water-parsnip *Berula erecta*, blunt-fruited water-starwort *Callitriche obtusangula*, and, in more polluted rivers, curled pondweed *Potamogeton crispus*, fennel pondweed *P. pectinatus* and horned pondweed *Zannichellia palustris*. Flowering-rush *Butomus umbellatus* is an occasional bank-side associate.

Sub-type 3: This variant is a mesotrophic to oligotrophic community found on hard rocks in the north and west. Rivers in Wales, Northern Ireland and south-west England are significant for the occurrence of stream water-crowfoot *Ranunculus penicillatus* ssp. *penicillatus*. Other typical species include the aquatic moss *Fontinalis squamosa*, alternate water-milfoil *Myriophyllum alterniflorum* and intermediate water-starwort *Callitriche hamulata*. More oligotrophic examples of this community lack *Ranunculus* spp. and are dominated by *M. alterniflorum*, *C. hamulata* and bog pondweed *Potamogeton polygonifolius*.

UK status and distribution



The map below shows the UK Distribution of Annex I habitat 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. The habitat type is widespread in rivers in the UK, especially on softer and more mineral-rich substrates. It is largely absent from areas underlain by acid rock types (principally in the north and west). It has been adversely affected by nutrient enrichment, mainly from sewage inputs and agriculture, and where agriculture has caused serious siltation. It is also vulnerable to artificial reductions in river flows and to unsympathetic channel engineering works. Consequently, the habitat has been reduced or has disappeared from parts of its range in Britain.

The main variants have very different distributions and have different significance for conservation in a European context. Sub-type 1 has a limited distribution in the UK, being found only in those areas where chalk is present, and is therefore restricted to southern and eastern England. Sub-types 2 and 3 are widespread in those parts of the UK where the substrate is suitable. In general, sub-type 2 is commoner in the south and east, whereas sub-type 3 is largely restricted to south-west England, Wales, northern England, Northern Ireland, and parts of Scotland. A few southern rivers show a transition from one substrate to another, as geology changes from chalk to clay.

UK extent

There are no comprehensive data available for the extent of this habitat type in the UK. However, it has been estimated that there are about 2,500 km length of river which have *Ranunculus* cover in England and Wales (D. Withrington, EN, pers. comm.). The length of rivers with *Ranunculus* cover in Scotland and Northern Ireland is unknown, but the comparable figures are likely to be much lower. The length of river in Scotland outwith the River Tweed with *Ranunculus* cover as a native habitat is considered to be insignificant.

Annex: Supplementary information on Headwaters

Based on submission to priority habitats review dated 2/11/05

Characteristic features

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

Physical and chemical characteristics of headwaters vary greatly according to their location, altitude, geology, and surrounding land-use. By definition, headwaters form the uppermost segments of rivers, and as such play an important role in the overall functioning of river ecosystems downstream. Although some headwaters, either deliberately or incidentally, are included within protected areas such as SACs and SSSIs/ASSIs most are not, and the total length of headwaters receiving some form of special protection is a very small percentage of all headwaters in the UK.

Species

There have been few detailed studies specifically targeting headwater streams; the work by IFE in the early 1990s (Furse, 1995) probably represents the most significant dataset for this habitat, and focuses exclusively on macro-invertebrates. The conclusions from the IFE study were that an average of 45 invertebrate taxa per river system were exclusively found in headwater samples, suggesting that headwaters may contribute about 20% of the total aquatic macro-invertebrate richness of complete river systems. Many of the taxa exclusively or predominantly found in headwaters are sufficiently rare to have national conservation status.

Headwaters are critically important habitats for other taxa as well as invertebrates. For example, they form important spawning grounds for species such as Atlantic salmon, and in large catchments such as the Spey the headwaters form an extensive portion of the available spawning habitat. Headwaters are also known to be used extensively by water vole, sometimes comprising refuge areas in catchments where populations are under threat. For example, in the main stem of the River Spey, American mink have wiped out most water vole populations, leaving small but important populations in the headwaters and on areas of adjacent blanket bog.

Threats

The results from Countryside Survey (CS) data (Furse, 1995) showed that headwater habitats are exposed to a wide range of environmental threats. Acidification is a major problem in some areas, especially in catchments with acidic soils and where rocks have a medium to low buffering capacity. More recent studies in river SACs such as the Teifi and the Spey have identified acidification as a serious threat to biotic communities in the tributaries, and a recent 'state of the environment' report for Wales concluded that as much as 40% of the total length of headwater streams may be affected by acidification. In agricultural catchments, headwaters suffer a range of impacts caused by poor water quality (e.g. pollution from silage or slurry, or as a result of nutrient enrichment from fertilisers). In addition, CS data showed that

more than 40% of headwaters in predominantly arable landscapes have been channelised. Unfortunately, the removal of adjacent streamside vegetation has seriously weakened the role of riparian areas in ameliorating some of the threats to headwaters. For example, Furse (1995) found that 75% of headwater bank length was bordered by buffer zones less than 1m wide, and a further 14% had buffer zones less than 2.5m wide. The overall conclusion of IFE's study was that only 40% of headwater sites in England and Wales were in 'good' biological condition (according to the standard river quality classification), and the condition of 30% was either 'poor' or 'bad'.

Annex: Supplementary information on Active shingle rivers

Based on submission to priority habitats review dated 2/11/05

Characteristic features

This habitat comprises those rivers which have significant reaches composed of a gravel or pebble bed material (with grain sizes in the range 2-256 mm), sometimes with discrete sandy reaches or deposits (0.064-2 mm diameter) in areas of lower slope, and having characteristic suites of features generated by the processes of erosion, sediment transport, deposition, and storage. Their headwaters are usually in upland areas which generate high-energy discharges, resulting in intermittent sediment movement. Average bed sediment size usually declines downstream (with the downstream reduction in underlying gradient and stream power) generating a commensurate change in habitat.

Typically, these rivers have extensive reaches of gravel, pebble and sand bed material in their middle reaches and in the piedmont zone, these shingle deposits being associated with a wandering, dynamic, meandering or divided channel and active erosion and sediment deposition features. The gravel-bed reaches exhibit characteristic macro-scale bed form morphology with features including point bars and eroding cliffs, side- and mid-channel bars, and pool–riffle sequences. These features are typically unvegetated, reflecting their dynamic nature. Sediment transport and the formation of the characteristic habitat features typically occur only at high flows, when bedload may comprise up to 50% of the total sediment load in transit. Many of the macro-scale features are exposed in the channel as shingle during low-flow conditions. Sand bed reaches or deposits typically exhibit micro-scale bed form morphology with features such as ripples, dunes and plane beds. The transport and deposition of sand-sized material occurs across a wide range of discharges.

Species

The dynamic nature of these river channel and bank habitats is critical for the species they support. Active shingle rivers have a characteristic fauna of fish and aquatic invertebrates associated with the well-oxygenated conditions, flow and substrate characteristics. Notable Habitats Directive Annex II species associated with this river type include Atlantic salmon, freshwater pearl mussel, otter and lampreys. Shingle and sand banks form the habitat for an important fauna of 'terrestrial' invertebrate species characteristic of exposed riverine sediments (ERS). ERS support a large assemblage of invertebrates specialised for life at the humid water margin where vegetation is absent or sparse. Dominant groups are ground beetles, rove beetles, flies and spiders. This includes a very large number of rare invertebrates, e.g. 180 ERS beetle species are nationally rare or scarce.

Threats

The biota associated with this river type rely on natural processes of erosion, sediment transport and deposition. These processes can be interrupted or altered by a range of engineering works. Evidence indicates that engineering work leading to increased stabilisation or fossilisation of channels is common across the UK. Schemes to prevent bank erosion, to extract gravel for fisheries management, and to provide flood defences are part of a trend towards the prevention of channel change and increased human control over natural processes. Although extensive long-term data are not available, studies also indicate significant losses of exposed shingle habitat on several river systems in the UK. Other threats include agricultural pollution (especially the use of pyrethroid sheep dips), acidification, introduction of cyprinids, and stocking of inappropriate strains of salmonids (which damages or destroys the genetic distinctiveness of populations).

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Name of proposer/organisation(s)

JNCC Freshwater Lead Coordination Network/Margaret Palmer (based on previous submissions and subsequent discussions)

Proposed new freshwater priority habitat

Suggested habitat name: Oligotrophic and Dystrophic lakes

Correspondence with existing habitat/s

Broad Habitat: Standing open water and canals

Phase 1: G1 Standing water

JNCC revised lakes classification: Types A, B, C1 and C2

NVC: Various, including A7, A9, A13, A14, A22- A24; S4, S8-S11, S19b

Annex I: H3110 Oligotrophic waters containing very few minerals of sandy plains (part): *Littorelletalia uniflora*; H3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part); H3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* species (part); H3160 Natural dystrophic lakes and ponds (part)

Other: Palmer lake macrophyte classification types 2 and 3

Description

Oligotrophic and Dystrophic lakes are water bodies mainly >2 ha in size which are characterised by their low nutrient levels and low productivity. Their catchments usually occur on hard, acid rocks, most often in the uplands. This habitat type encompasses a wide range of size and depth, and includes the largest and deepest water bodies in the UK. Good examples may support some of the least disturbed aquatic assemblages in the UK.

Oligotrophic lakes usually have very clear water, whilst some examples with dystrophic characteristics have peat-stained waters. Characteristic plankton, zoobenthos, macrophyte and fish communities occur, including several UK BAP species and species of economic importance. Fish communities, generally dominated by salmonids, may include charr *Salvelinus alpinus* and *Coregonus* spp. A number of benthic and planktonic invertebrates, found only in oligotrophic lakes, are possibly glacial relicts. Macrophytes are typically sparse, with species such as shoreweed *Littorella uniflora* and quillwort *Isoetes* spp. Shores are typically stony, and emergent vegetation is generally restricted to sheltered bays, where species such as bottle sedge *Carex rostrata* and bulrush S*cirpus lacustris* may be found.

Geographic distribution

Throughout the UK but mostly in upland areas of the north and west.

Reasons for recommendation

Habitats for which the UK has international obligations

This type includes all or part of four Annex I habitats.

Habitats at risk

The ecological functioning of oligotrophic and dystrophic lakes is critically dependent upon low nutrient levels, making them very vulnerable to eutrophication. Throughout the UK oligotrophic lakes have suffered deleterious changes due to nutrient enrichment and/or acidification. Work by UCL, MLURI and SEPA has indicated that even the most apparently pristine oligotrophic waters in Scotland have undergone significant phosphorus enrichment over the last century or so. The MLURI work was published as a key element of the 1995 Scottish Office classification of waters. It was also published in *Hydrobiologia* 395/396: 433-453, 1999 (A quality classification for management of Scottish standing waters). The UCL work on the palaeolimnology of 29 Scottish standing waters was funded by SNIFFER and SNH, and the project was managed by SNH and SEPA. The final report was approved in March 2001 and should be published very soon. The findings support the MLURI data.

Hydro power, water abstraction, fish farming, afforestation and recreational development have all affected oligotrophic and dystrophic lakes in recent decades, and oligotrophic lochs continue to be under significant threat from development pressure. Acidification has also affected, and continues to affect, many sites.

Habitats important for key species

Oligotrophic and dystrophic lakes support a range of UK BAP priority species and other species listed on Annexes of the Habitats and Birds Directives, e.g. slender naiad *Najas flexilis*, salmon *Salmo salar*, common scoter *Melanitta nigra*, black-throated diver *Gavia arctica*, and otter *Lutra lutra.*

Habitats which are functionally critical

This habitat is important for certain wide-ranging species e.g. salmon, otter, divers.

Conservation Gain

Two-thirds of the trophic spectrum of lakes in the UK is covered by existing priority habitats - Mesotrophic lakes and Eutrophic standing waters. There is a very strong case for extending the HAP approach to cover oligotrophic and dystrophic waters - the remaining part of that continuum - particularly as these waters are the most sensitive to ecological damage through nutrient enrichment. This would provide a sound basis for meeting the requirements of the Water Framework Directive in relation to standing waters. The Joint UK Lakes HAP Steering Group is developing a

risk-based approach applicable to all lake types which would ensure that conservation effort is directed to appropriate sites to gain the greatest benefit. Whilst the scenic and amenity value of oligotrophic and dystrophic lakes is well recognised in the UK, their international biodiversity importance is less so. Priority habitat status would raise awareness and understanding of the nature conservation issues associated with oligotrophic and dystrophic lakes and help to direct conservation effort, which requires a multi-partner catchment approach.
Name of proposer/organisation(s) Joint UK Lake HAPs Steering Group

Proposed new freshwater priority habitat

Suggested habitat name: Ponds

Correspondence with existing habitat/s

UK BAP broad habitat: Standing open waters and canals

Phase 1: G1 Standing water

NVC: Various aquatic, swamp and fen communities; OV28-OV35; and others

Annex I: Includes H3170 Mediterranean temporary ponds, H3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*) (part), H3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part), H3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (part), H3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (part), and H3160 Natural dystrophic lakes and ponds (part)

Description

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

- *Habitats of international importance.* Ponds that meet criteria under Annex I of the Habitats Directive.
- *Species of high conservation importance*. Ponds supporting Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.
- *Exceptional assemblages of key biotic groups*: Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥30 wetland plant species or ≥50 aquatic macroinvertebrate species).
- *Ponds of high ecological quality:* Ponds classified in the top PSYM category ("high") for ecological quality (i.e. having a PSYM score ≥75%). [PSYM (the Predictive SYstem for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales; plant species and / or invertebrate families are surveyed using a standard method; the PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset; comparison of the prediction and observed data gives a % score for ponds quality]
- *Other important ponds:* Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context e.g. pingos, duneslack ponds, machair ponds.

Geographic distribution, extent, identification and monitoring

Distribution. Widespread throughout the UK, but high-quality examples are now highly localised, especially in the lowlands. In certain areas high quality ponds form particularly significant elements of the landscape, e.g. Cheshire Plan marl pits, the New Forest ponds, pingos of East Anglia, mid-Wales mawn pools, the North East Wales pond landscape, the forest and moorland pools of Speyside, dune slack pools, the machair pools in the Western Isles of Scotland, and examples of Habitats Directive Annex I pond habitats across Northern Ireland.

Extent. Estimates, based on the relatively small pond data sets currently available, suggest that around 20% of the c.400,000 ponds outside curtilage in the UK might meet one or more of the above criteria.

Identification. Priority habitat Ponds can be readily identified by standard survey techniques such as those developed for NVC, Common Standards Monitoring, the National Pond Survey or for specific species groups. Ponds will need to be distinguished from other existing priority habitat types. The general principle to be applied is that where the standing water element is functionally a component of another priority habitat and that priority habitat definition takes account of the standing water element then it should be treated as part of that habitat.. For example small waterbodies within blanket bog should be considered as part of the blanket bog priority habitat, but ponds in heathland (which are not dealt with through the heathland HAP) should be considered under the pond priority habitat. Agreement has been reached with the lake HAP group that the pond priority habitat will cover to most water bodies up to 2ha while the lake priority habitat will cover most water bodies >2 ha. As with other potentially overlapping priority habitat types a small proportion of cases will need to be individually assessed to decide how they are best dealt with.

Inventory and Monitoring. An inventory of ponds, including many high quality sites, has been established as part of the National Pond Monitoring Network and work is in progress to add further known sites to this database. This is publicly accessible (for non-sensitive sites/species) at www.pondnetwork.org.uk. Currently about 500 high quality sites are listed on this database. The National Pond Monitoring Network (NPMN) will provide the main mechanism for monitoring priority habitat ponds. The NPMN was established in 2002 as a partnership of organisations involved in pond monitoring led by the Environment Agency and Pond Conservation.

Reasons for recommendation

Habitats for which the UK has international obligations

Six Habitats Directive Annex I types are included within this habitat (either entirely or in part), these include upland lochans, ponds in blanket bogs, machair pools and Mediterranean temporary pools in the Lizard in Cornwall.. The importance of ponds as 'stepping stone' habitats is recognised in Article 10 of the Habitats Directive. Current freshwater priority habitats, in particular, do not adequately meet UK obligations under the Directive because the majority currently cover only lakes. In addition, many high quality ponds will not be covered by SACs. UK guidelines for implementation of the Water Framework Directive indicate a UK responsibility for assessing and monitoring ponds under the Directive. In August 2006 English Nature submitted a proposal to Defra for River Basin Characterisation to identify a limited number of ponds of significance for EU or UK biodiversity.

Habitats at risk

Ponds are vulnerable to loss and damage by a wide range of factors including nutrient enrichment and infilling. The 1996 Lowland Pond Survey (LPS96) shows that at least 50% of ponds in the wider countryside are highly degraded and that there is widespread evidence of enrichment and other diffuse pollution impacts. Temporary ponds are believed to be more degraded than permanent ponds. There is also growing concern that even ponds in semi-natural landscapes are at risk from air-borne pollution (e.g. acidification, nutrient-enriched rainfall) and climate change, to which shallow ponds are recognised as being particularly vulnerable. Pond numbers in the UK are probably at an historic low, with the loss of about 70% of the ponds existing in 1880. Much of the loss appears to have occurred in the second half of the 20th century as a result of agricultural change and urbanisation. In addition, LPS96 and Countryside Survey 2000 data show that, although pond numbers are now beginning to stabilise, there is an exceptionally high turnover of ponds, with 1% of the total resource both destroyed and created each year. There is currently no indication of the quality of ponds lost compared to those gained. However, LPS96 suggests that most new ponds are created (a) with stream inflows - a practice discouraged in many other European countries, since most inflows are polluted, and (b) as fishing lakes. Both trends are worrying. Recent evidence shows that many high value ponds are seriously at risk from the spread of alien invasive species of plants and animals. With increased emphasis on access to the countryside, this risk is likely to increase.

Habitats important for key species

At the landscape level, ponds typically support more invertebrate and plant species than other water body types (i.e. lakes, rivers, streams and ditches). The criteria and thresholds listed in the habitat description have been selected so that the priority habitat includes ponds that qualify as important for key taxon groups, particularly in terms of international obligation, threat / rarity, exceptional populations / richness, and ecological quality. Ponds support considerable numbers of key species. Species with statutory protection include at least 65 UK BAP priority species (e.g. water vole, tadpole shrimp, lesser silver water and spangled water beetles, starfruit, pennyroyal, three-lobed crowfoot), at least 28 animal and plant species listed under the WandC Act Schedules 5 and 8, and six Habitats Directive Annex II species including: great crested newt, white-clawed crayfish, otter (in larger ponds) and floating water-plantain. Ponds have additionally been shown to support at least 80 aquatic RDB species. The number of RDB species using the damp margins and drawdown zones of ponds (e.g. Diptera, ground beetles) has never been estimated but is likely to be considerable. There is increasing evidence that ponds are an important feeding resource for bats and also for farmland birds, including species for which there is a current Public Service Agreement, such as Tree Sparrow and Yellow Wagtail.

Name of proposer/organisation(s)

Anita Weatherby, on behalf of Pond Conservation, JNCC Freshwater Lead Coordination Network, Environment Agency, Scottish Environment Protection Agency

Proposed new terrestrial priority habitat

Suggested habitat name: Mountain Heaths and Willow Scrub

Correspondence with existing habitat/s

UK BAP broad habitat: Montane habitats

Phase 1: D3 lichen/bryophyte heath; D4 montane heath/dwarf herb; D1 dry dwarf-shrub heath (part); A2 scrub (part)

NVC: H13-H15, H17-H20, H22; U7-U15, U18, W20.

Annex I: Alpine and boreal heaths; Sub-Arctic *Salix* scrub; Siliceous alpine and boreal grassland

Description

Biological features

This habitat encompasses a range of natural or near-natural vegetation occurring in the montane zone, lying above or beyond the natural tree-line. It includes dwarf-shrub heaths, grass-heaths, dwarf-herb communities, willow scrub, and snowbed communities. The most abundant vegetation types are heaths dominated by *Calluna vulgaris* and *Vaccinium myrtillus* typically with abundant bryophytes (e.g. *Racomitrium lanuginosum*) and/or lichens (e.g. *Cladonia* species) and siliceous alpine and boreal grasslands with *Carex bigelowii* moss and sedge heaths. Rarer vegetation types include snow-bed communities with *Salix herbacea* and various bryophytes and lichens, and sub-arctic willow scrub (as described in McLeod et al 2005).

As in the Annex I habitat H4080 Sub-Arctic *Salix* sp. Scrub, montane willow scrub, corresponding largely to NVC type W20 (though not all types fit W20), is included. Heaths with prostrate juniper of NVC type H15 are included, but upland stands of upright juniper (W19) fall within the Upland heathland or Native pinewood priority habitats, apart from more isolated stands that would usually be included in the Upland heathland priority habitat. Stands of *Betula nana* would mostly be included within Blanket bog or Upland heathland priority habitats. Scrub forms of W17 and W18 should be included within the appropriate woodland priority habitat, as has been previously agreed.

The invertebrate fauna is diverse, with species such as the mountain burnet, the beetles *Stenus glacialis* and *Phyllodecta polaris,* the flies *Alliopsis atronitens* and *Rhamphomyia hirtula*, and the spider *Micaria alpina.*

Other characteristic features

The lower altitudinal limit of montane communities varies in different parts of the UK, occurring at lower altitudes in the north and west of Britain. Most communities occur on thin soils, which may be acidic or calcareous. Some communities are characteristic of very exposed ridges and summits, whereas others are restricted to sheltered situations where there is late snow-lie. A range of important rock outcrop and scree types, including tall herb ledge vegetation, often occur in close association with this habitat, along with high-altitude springs, flushes and other mire types, and Alpine calcareous grasslands.

Geographic distribution and extent

Extensive in the Scottish Highlands, but highly localised in southern Scotland, England, Wales and Northern Ireland. Some montane communities (e.g. sub-arctic willow scrub and snowbeds) are extremely rare in the UK, and are only found in very small amounts south of the higher Scottish mountains, where they represent the southernmost extent of this vegetation type. Although most of this habitat occurs above 600 m, in the exposed areas of the northwest Highlands and Islands of Scotland the characteristic montane plant communities can occur almost at sea level. The full extent of Mountain heaths and willow scrub has not been fully surveyed. There is an estimated 120ha in Wales, between 400-600 ha in England, 60,000 ha in Scotland and 150 ha in Northern Ireland.

Reasons for recommendation

Habitats for which the UK has international obligations

This habitat encompasses two moderately extensive Annex I types (Alpine and boreal heaths and Siliceous alpine and boreal grassland), and one very rare Annex I type (Sub-Arctic *Salix* scrub). It also provides a major breeding habitat for dotterel (listed on Annex I of the Birds Directive).

Habitats at risk

Montane habitats include some of the most extensive areas of near-natural vegetation in the UK, and are highly susceptible to human influences. They are threatened by grazing and trampling, nitrogen deposition, recreation, use of all-terrain vehicles (ATVs), burning and climate change.

The first six year report for the UK on Common Standards Monitoring for designated sites (Williams 2006) indicated that approximately two thirds of montane habitat features (inncluding Alpine calcareous grasslands as well as the types covered by this priority habitat) monitored were in unfavourable condition, with only 11% classed as recovering.

Heavy grazing (especially by sheep) is a major mechanism for the loss of characteristic *Racomitrium* moss cover in summit heath vegetation and its replacement by fine-leaved grasses. Much of the *Carex-Racomitrium* moss-heath south of Scotland has lost *Racomitrium*, while the Southern Uplands have a partial cover of grasses. Heavily grazed areas further north, such as on the Trotternish Ridge, also have a high grass cover, and on some mountain moss-heaths in the Highlands (e.g. East Drumochter) there are indications of incipient *Racomitrium* decline. Similar grazing-related

impacts, including trampling and nitrogen deposition through urine and faeces, take place in montane *Vaccinium-Cladonia* heaths. In many cases there is evidence of change in community composition and that loss of *Racomitrium* and *Cladonia* species has taken place over the last 30-40 years (e.g. from repeat surveys for CCW of the Carneddau in north Wales) together with deleterious changes in soil properties which could slow restoration in the most damaged areas of this habitat. In some areas there are signs of recovery where grazing levels have been reduced (e.g. Rhinns of Kells), but the extent of damage to vegetation and soils elsewhere means that unless action is urgently undertaken, then attempts to restore the communities may be too late. A PhD studentship has begun (at Aberdeen University) to develop methods for restoring these heaths.

Mountain areas receive large inputs of wet-deposited atmospheric pollutants as a result of their high annual rainfall and the 'seeder-feeder' effect where rain falls through polluted hill cloud. While recent air-pollution legislation has been successful in reducing sulphur emissions and deposition, nitrogen deposition remains relatively unchanged. Deposition of nitrogen can cause both acidification and eutrophication of plant communities and has been linked to changes in species composition and loss of important species from a variety of habitats across Europe. Recent experimental work on mountain heaths has shown that increased nitrogen deposition has a detrimental effect on the growth of *Racomitrium*, a key species of mountain moss-heath, and can result in a decline in moss cover and increased cover of grasses and sedges. This is particularly the case where the vegetation is already in poor condition through overgrazing and trampling. As they are at the southern edge of the distribution of this habitat, all forms of mountain heaths are likely to be adversely affected by warming conditions due to climate change.

Threats from recreational activities are more localised but erosion of montane vegetation can be serious where footpaths are ill-defined. Skiing developments continue to pose a threat to montane habitats in some parts of Scotland and the use of ATVs can have highly damaging consequences for fragile summit lichen and moss-rich heaths. Managed fires may become uncontrolled and spread from sub-montane slopes below on to steep upper slopes or on to wind-swept ridges with montane heather-rich heaths where damage may be caused to the thin soils leading to erosion.

In the Highlands, widespread grazing confines montane willow scrub to fragments on rock ledges where there are problems with the viability of small populations.

Habitats important for key species

UK BAP priority species include three vascular plant spp, *Salix lanata, Artemisia norvegica* and *Juniperus communis*; six bryophyte species including *Herbertus borealis and Andraea frigida;* eight lichen species; and two moths, the northern dart and the netted mountain moth. Many other rare and local arctic-alpine plants and invertebrates occur. Notable birds include dotterel and ptarmigan. See also Thompson *et al* (2003).

Habitats which are functionally critical

Mountain heaths are important for summer migrants such as dotterel, ptarmigan and as hunting ground for wide-ranging species such as golden eagle. They reach their southernmost extent in the UK and as such have a high conservation value, as they contribute an important part of the within-community diversity. Also, being on the edge of this habitat's range, they are likely to be affected by environmental change and so will be important early indicators, particularly of climate change.

Conservation gain

The threats to these fragile habitats have increased in the last 50 years resulting in a decline in their extent and condition. The more recent threats from climate change have urgently increased the need to improve the condition of the remaining heaths and willow scrub and restore those which have been badly degraded to enable them better to withstand future environmental change. It may not be possible to restore some of the most badly degraded sites to their original vegetation type, but management control can improve their condition and increase their extent, even with the current levels of nitrogen deposition. Target vegetation types for restoration include U4e, H18c, species-poor montane *Vaccinium* heath and montane willow scrub.

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Name of proposer/organisation(s)

JNCC Upland Lead Co-ordination Network

Proposed new terrestrial priority habitat

Suggested habitat name: Upland Flushes, Fens and Swamps

Correspondence with existing habitat/s

UK BAP broad habitat: Fen, marsh and swamp *pp*

Phase 1: E2 Flush/spring *pp*; E3 Fen *pp*; F1 Swamp *pp*; B5 Marsh/marshy grassland *pp*

NVC: (mostly *pp*) M4-M12, M21, M23a, M25c, M27-M29, M31-M35, M37, M38, S9-S11, S19, S27

Annex I: Alpine pioneer formations of the *Caricion bicoloris-atrofuscae*; Transition mires and quaking bogs *pp*; Petrifying springs with tufa formation (*Cratoneurion*) *pp*; Alkaline fens *pp.*

Birks and Ratcliffe types: C4 *pp*, H2, H3b-j, H4, I1, I2, I4

JNCC upland CSM feature types: Alkaline fen (upland); Alpine flush; Short-sedge acidic fen (upland); Soakway and sump (upland); Spring-head, rill and flush (upland); Transition mire, ladder fen and quaking bog (upland); Mire grassland and rush pasture (upland)

Description

Biological features

Defined as peat or mineral-based terrestrial wetlands in upland situations which receive water and nutrients from surface and/or groundwater sources as well as rainfall. The soil, which may be peaty or mineral, is waterlogged with the water table close to or above the surface for most of the year. Includes both soligenous mires (springs, flushes, valley fens) and topogenous mires (basin, open-water transition and flood-plain fens), as well as certain *Molinia* grasslands and rush pastures, but excludes ombrotrophic bogs and associated bog pools and seepages (Blanket bog priority habitat). Also excluded are species-poor *Molinia* swards (M25 except M25c) and species-poor or 'weedy' *Juncus effusus* swards (M23b and MG10). Swamps are included except for those forming a fringe less than 5 m wide adjacent to standing waters, which are included in the relevant standing water priority habitat type; and those reedbeds (S4) which qualify as the Reedbed priority habitat.

This is a varied habitat category but is typically dominated by sedges and their allies, rushes, grasses (e.g. *Molinia, Phragmites*), and occasionally wetland herbs (e.g. *Filipendula ulmaria*), and/or a carpet of bryophytes e.g. *Sphagnum* spp., *Cratoneuron* spp. Vegetation generally short (<1m, often <30cm) but sometimes taller e.g. swamps.

The habitat overall supports a rich flora of vascular plants with many rare species e.g. scorched alpine-sedge (*Carex atrofusca*), bristle sedge (*C. microglochin*), sheathed sedge (*C. vaginata*), mountain scurvygrass (*Cochlearia micacea*), alpine rush (*Juncus alpinoarticulatus*), two-flowered rush (*J. biglumis*), chestnut rush (*J. castaneus*), three-flowered rush (*J. triglumis*), false sedge (*Kobresia simpliciuscula*), Iceland-purslane (*Koenigia islandica*) and Scottish asphodel (*Tofieldia pusilla*). Also exceptionally important for bryophytes with notable species including *Sphagnum lindbergii, S. riparium, Hamatocaulis vernicosus.*

The habitat may also be important as nesting habitat for waders, such as curlew, snipe and redshank. It also supports a varied invertebrate fauna, notably taxa such as Diptera (e.g. *Clinocera nivalis* and *Pseudomyopina moriens),* Coleoptera (e.g. *Gabrius scoticus* and *Elaphrus lapponicus),* spiders (e.g. *Maro lepidus)* and Mollusca (e.g. *Vertigo* spp*)*, which in turn provide an important food source for upland breeding birds at critical times of year.

Other characteristic features

Restricted to upland areas i.e. above the limit of agricultural enclosure, so complementing but not overlapping the existing Fens priority habitat. This 'upland/lowland' boundary definition is intended to match that for grassland and heathland priority habitats. For consistency with the Broad habitat definitions, *Upland flushes, fens and swamps* includes montane/alpine springs and flushes, but not snowbeds (U11-14) which are part of the Mountain heaths and willow scrub proposed priority habitat. Usually this habitat is grazed by deer and/or sheep, sometimes cattle, in conjunction with surrounding grassland/heath. Some types e.g. springs may be ungrazed. Generally this habitat is too wet to be burned.

Conservation actions required

The conservation actions required for this habitat primarily include (1) preventing adverse impacts of grazing animals and (2) protection from damaging activities such as vehicle use, drainage and afforestation. Active restoration is needed in a few areas to undo some of the latter impacts. Many of the actions needed are covered by actions under existing HAPs (Upland heath, Blanket bog, Upland calcareous grassland) or the proposed Mountain heaths priority habitat, since most fens and flushes are generally a minor component associated with these more extensive habitats.

Geographic distribution and extent

Widespread but local throughout the uplands of Scotland, Wales, England and Northern Ireland. Extent is difficult to assess because the habitat has not been comprehensively surveyed in many areas and tends to occur in small, sometimes numerous stands.

Reasons for recommendation

Habitat for which the UK has international obligations

It is the main locus for Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* and includes a substantial proportion of the UK representation of three other habitats listed on Annex I of the Habitats Directive (Transition mires and quaking bogs, Petrifying springs with tufa formation (*Cratoneurion*) and Alkaline fens), Two of these (Alpine pioneer formations and Petrifying springs) are priority types i.e. especially threatened in Europe. Although mostly well represented within the SAC and SSSI/ASSI series, all four types also occur widely outside protected sites.

Habitat at risk

Specific data on decline not available but there have undoubtedly been extensive losses to forestry and agricultural improvement in the 1960s-1980s. Monitoring by the UK statutory conservation bodies over the period 1999-2005 indicates that less than half of the upland fen, marsh and swamp features on designated sites are in favourable condition (Williams, 2006). No data are available for the wider countryside but overall condition there is likely to be worse. Probably the key factor affecting this habitat adversely is overgrazing and trampling by deer, sheep and cattle, but other localised pressures include damage by ATVs, recreational activities and energy developments; drainage operations; water-borne pollution; forestry; colonisation by non-native plants e.g. New Zealand willowherb *Epilobium brunnescens*. Climate change and air pollution may also pose threats to some types of upland fens and flushes.

Habitat important for key species

Supports many nationally rare and scarce species, notably vascular plants, bryophytes and invertebrates. UK BAP priority species include: Mountain Scurvy Grass *Cochlearia micacea*, Yellow Marsh Saxifrage *Saxifraga hirculus*, and the mosses *Bryoerythrophyllum caledonicum*, *Campylopus setifolius* and *Hamatocaulis vernicosus*. Faunal species of note include the snails *Vertigo geyeri* and *V. genesii* (both UK BAP priority and Habitats Directive Annex II species) and a range of other invertebrates.

References/information sources

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Name of proposer/organisation(s)

JNCC Upland Lead Coordination Network

Proposed new terrestrial priority habitat

Suggested habitat name: Inland Rock Outcrop and Scree Habitats

Correspondence with existing habitat/s

UK BAP broad habitat: Inland rock

Phase 1: Upland species-rich ledges; inland cliff; scree

NVC: U16-U18, U21, OV38-OV40

Annex I: H8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*); H8120 Calcareous and calcshist screes of the montane to alpine levels (*Thalaspietea rotundifolii)*; H8210 Calcareous rocky slopes with chasmophytic vegetation; H8220 Siliceous rocky slopes with chasmophytic vegetation*;* H6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels;Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

This habitat comprises five Annex I habitat types (see above box). These are summarised here and described in more detail in the Annex material below (information taken from McLeod et al 2005). Rock ledges with NVC type U16 are also included. Serpentine habitats and related metallophyte vegetation are excluded as they fall within the proposed Calaminarian grasslands priority habitat (Annex I type H6130). Limestone pavements are also a separate priority habitat.

Description

Biological features

Natural rock exposures support a wide range of communities. Screes are typically dominated by *Cryptogramma crispa* and other ferns, lichens and bryophytes. On cliff ledges, tall herbs such as *Sedum rosea* and *Angelica sylvestris* are generally abundant. Chasmophytic vegetation (in rock crevices) is usually dominated by ferns such as *Asplenium viride* and small herbs such as *Thymus polytrichus* and *Saxifraga* spp.. Bryophytes and lichens also occur in crevices but are able to flourish on the open rock surfaces where there is a lack of competition from vascular plants.

The inaccessibility of rock habitats to grazing animals, especially of rock ledges, provides a refuge for many vascular plants that are sensitive to grazing, including numerous local and rare species. Notable species of upland rock and scree habitats include *Athyrium distentifolium, Woodsia ilvensis, Carex rupestris, Cicerbita alpina, Saxifraga cespitosa* and *S. cernua*.

The botanically rich rock habitats support a number of notable invertebrate species. Key groups include beetles such as *Leistus montanus* and *Nebria nivalis* , Diptera such as species of *Tipula* spp, *Thricops* spp and *Helina vicina*, and spiders such as *Pardosa trailli.* Several key species of birds use inland cliffs for nesting, notably the raptors peregrine and golden eagle, and raven.

Other characteristic features

This habitat covers a wide range of rock types, varying from acidic to highly calcareous. The habitat occurs throughout the uplands, and is particularly characteristic of high altitudes, but is also found at low altitudes notably in northern Scotland. Representation of the two Annex I chasmophytic vegetation types in the lowlands (see Annex) is also included. Coastal cliff and ledge habitats are excluded as they form part of the Maritime Cliffs and Slopes priority habitat.

Many rock habitats, especially cliff faces, rock ledges, gorges and boulder fields are inaccessible to grazing animals and are unmanaged. Others are more accessible such as fine screes and gently sloping rock outcrops. Where accessible grazing may keep the vegetation in check. Burning can affect the more heather-rich rock faces with fires spreading up on to rocky slopes from muirburn below.

Geographic distribution and extent

Widespread in upland areas of the UK, with more limited occurrence in the lowlands. Acidic rock and scree are especially widespread, whereas calcareous communities are restricted by the underlying geology, and good stands of tall-herb vegetation also tend to be restricted by heavy grazing. Reliable extent data are not available but the JNCC website gives the following broad estimates for the Annex I habitats: tall-herb ledge vegetation, H6430: 100-300 ha; siliceous rock and scree types, H8110 and H8220: 87 000-123 000 ha; calcareous rock and scree types, H8120 and H8210: 800-1700 ha.

Reasons for recommendation

Habitats for which the UK has international obligations

Includes all of the representation of five Annex I habitats in the UK (as listed above).

Habitats at risk

The habitat itself is under less of a risk than many of the species. Physical damage to the habitat is very localised e.g. through quarrying or use of scree for footpath repair. Rock faces and ledges tend to be protected from damage by fire and grazing by their inaccessibility but there can be impacts round the margins. Heavy grazing pressure on adjacent habitats may lead to increased pressure on these areas. Feral goats pose a particular threat. Screes can be threatened

locally by erosion due to trampling by grazing animals and by recreational activities. This can reduce vegetation cover and may result in the loss of important fern species. In some cases, lack of disturbance or grazing can result in the overgrowth of vegetation and consequent loss of characteristic species.

Availability of data on the condition of upland rock outcrop and scree habitats is limited, but the first six year report for the UK on Common Standards Monitoring for designated sites (Williams 2006) indicated that 29% of rock crevice, 28% of scree and 21% of tall-herb ledge habitat features monitored were in unfavourable condition,

Climate change poses particular threats for Arctic-Alpine species of high-altitude rock habitats, which may become locally extinct. The increasing confinement of grazing sensitive vascular plant species to rocky, inaccessible localities creates small isolated populations that are at risk of extinction. Sexual reproduction is thereby restricted, thus reducing genetic variation which could affect the adaptability of these populations, making them more susceptible to the effects of climate change. The impact of air pollution on these habitats is uncertain.

Specific management is needed to reduce pressures on these habitats and allow the vegetation to spread beyond its currently restricted sites onto adjacent, accessible rocky ground. This would not only improve the habitat extent and condition, but also increase the population sizes of a number of upland rare species.

Habitats important for key species

This is one of the most valuable habitat complexes in the uplands for flora (vascular and lower plants) and for invertebrates. Many nationally rare, nationally scarce and uncommon plants are associated with it. At least four UK BAP priority vascular plant species are associated with the habitat (*Artemisia norvegica*, *Hieracium Sect. Alpestria, Salix lanata* and *Woodsia ilvensis*). Other rarities include *Cicerbita alpina* confined to a few ledges in the Caenlochan area. Several priority lichens and bryophytes are also restricted to this habitat type.

Habitats which are functionally critical

These habitats provide important refuges for grazing-sensitive species which can colonise adjacent habitats if restored e.g. through reduction of grazing. Some of these vegetation types, particularly those with arctic-alpine species, are represented at the edge of their range in the UK and so could be indicators of the early effects of climate change.

Annex: Descriptions of Habitats Directive Annex I habitats included in the proposed Inland Rock Outcrop and Scree Habitats UK BAP priority habitat (from MacLeod et al 2005)

H6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

This habitat type is typically found on ungrazed upland cliff ledges, occasionally extending on to open ground, and is restricted to base-rich substrates and somewhat sheltered situations. This is one of the few near-natural habitats remaining in Britain and frequently occurs in intimate mosaics with other Annex I habitat types in these ungrazed, or very lightly grazed, situations. It provides a refuge for rare, grazing-sensitive, montane plants. Closely related vegetation types, such as the hay meadows of the Pennines, conform to Annex I type 6520 Mountain hay meadows.

Hydrophilous tall herb fringe communities is a species-rich habitat corresponding to NVC type U17 *Luzula sylvatica – Geum rivale* tall-herb community. It is characterised by the abundance of a species-rich mix of tall, broad-leaved herbs, most of which are otherwise rare in the uplands owing to their sensitivity to grazing. These include species such as great wood-rush *Luzula sylvatica*, wild angelica *Angelica sylvestris*, roseroot *Sedum rosea*, wood crane's-bill *Geranium sylvaticum*, water avens *Geum rivale* and globe-flower *Trollius europaeus*. Some of these species, such as the last three, can be found as very impoverished, non-flowering specimens in grazed pastures adjacent to cliff refuges. This demonstrates the restrictive effects of grazing and the potential for expansion of the habitat. *L. sylvatica* is one of the more tolerant species, both with respect to soil conditions and grazing impacts, and occurs in a variety of communities other than this one.

Variation within the habitat type is related chiefly to geographical position, altitude, and soil conditions and rock type. Stands in the Scottish Highlands are richer in northern species, while stands further south have species of a more southerly distribution. In the Highlands stands at high-altitude are enriched by scarce arctic-alpine plants, such as holly fern *Polystichum lonchitis*, alpine saw-wort *Saussurea alpina*, black alpine-sedge *Carex atrata* and alpine cinquefoil *Potentilla crantzii*. The rarer species tend to occur on the more calcareous or base-rich ledges at high altitude and some species prefer wetter soils.

*H8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae *and* Galeopsietalia ladani*)*

Scree habitats consist of rock fragments covering the frost-shattered summits of mountains or accumulating on slopes below cliffs. Siliceous screes are made up of siliceous rocks such as quartzite, granite and sandstone. They may occur at any altitude, but screes in the lowlands are excluded from the Annex I definition. The scree may be colonised by a range of pioneer species. It also provides shelter for many species sensitive to frost, such as parsley fern *Cryptogramma crispa*, species requiring a humid microclimate such as Wilson's filmy-fern *Hymenophyllum wilsonii*, and species sensitive to grazing such as stone bramble *Rubus saxatilis*.

Screes in the UK provide a habitat for plant communities with affinities to the *Thlaspietea rotundifolii*, as described from continental Europe. Both siliceous scree and 8120 Calcareous and calcshist screes of the montane to alpine levels

(*Thlaspietea rotundifolii*) are important for their rich fern flora and act as refugia for a number of rare species.

Floristically the habitat type is principally characterised in the UK by two NVC types in which parsley fern *Cryptogramma crispa* and other ferns are prominent:

- U18 *Cryptogramma crispa – Athyrium distentifolium* snow-bed community
- U21 *Cryptogramma crispa – Deschampsia flexuosa* community

U18 *Cryptogramma – Athyrium* snow-bed community occurs principally in the Scottish Highlands above 600 m, where prolonged snow-cover provides suitable conditions for alpine lady-fern *Athyrium distentifolium*, the rare Newman's lady-fern *Athyrium flexile*, and other montane vascular plants, bryophytes and lichens. U21 *Cryptogramma – Deschampsia* community extends to lower altitudes in mild oceanic climates in western Scotland, north-west England and north Wales, and has a less well-developed montane flora.

Other forms of siliceous scree are dominated by bryophytes and lichens and are not described in the NVC. In the west and, more locally at high altitude in the eastern Scottish Highlands, such screes provide an important habitat for Atlantic bryophytes, such as *Anastrophyllum donnianum*, *Bazzania pearsonii*, *Herbertus aduncus*, *Scapania nimbosa* and *Scapania ornithopodioides*, many of which have a restricted world distribution.

Siliceous scree of the montane to snow levels can occur in close association with Annex I type 8220 Siliceous rocky slopes with chasmophytic vegetation, while stabilised block screes may support a range of vegetation types including other Annex I types.

*H8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)*

Scree habitats consist of rock fragments covering the frost-shattered summits of mountains or accumulating on slopes below cliffs. Calcareous and calcshist screes consist of base-rich rocks including limestone, calcareous-schists and the more basic igneous rocks, such as serpentine and basalt. They may occur at any altitude, but screes in the lowlands are excluded from the Annex I definition. The scree is colonised by a range of pioneer species and provides shelter for many species sensitive to frost or grazing. Similar species may be found in the habitat known as 'fell field'. Screes in the UK provide a habitat for various plant communities with affinities to the *Thlaspietalia rotundifolii* described from continental Europe. Both Calcareous and calcshist screes and 8110 Siliceous scree of the montane to snow levels are important for their rich fern flora and act as refugia for a number of rare species.

The vegetation consists of assemblages of calcicole and basiphilous species, the composition of which is heavily influenced by altitude. Characteristic species at high altitude include purple saxifrage *Saxifraga oppositifolia*, holly-fern *Polystichum lonchitis* and alpine meadow-grass *Poa alpina*, while at lower altitude limestone fern *Gymnocarpium robertianum*, herb-robert *Geranium robertianum* and wall lettuce *Mycelis muralis* are more usual. A large number of calcicolous mosses occur in the habitat type. Some low-lying examples are referable to NVC type OV38 *Gymnocarpium robertianum – Arrhenatherum elatius*. OV40 *Asplenium viride – Cystopteris fragilis* community is usually associated with rock crevices but is occasionally developed in scree. Other forms of calcareous and calcshist scree vegetation are not described by the NVC.

This habitat type may occur in close association with Annex I type 8210 Calcareous rocky slopes with chasmophytic vegetation, or grade to other Annex I types where the scree is stable.

H8210 Calcareous rocky slopes with chasmophytic vegetation

Chasmophytic vegetation consists of plant communities that colonise the cracks and fissures of rock faces. The type of plant community that develops is largely determined by the base-status of the rock face. Calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists, whereas siliceous communities develop on acid rocks. The presence of calcareous bands within otherwise mainly siliceous rocks often brings the two types together on the same rock outcrop. As a result, Calcareous rocky slopes with chasmophytic vegetation may occur in close association with Annex I type 8220 Siliceous rocky slopes with chasmophytic vegetation, and some sites are listed for both types. Calcareous rocky slopes may also be closely associated with 8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) or 8240 Limestone pavements. Lowland examples are included in the Annex I definition only where they include cliffs supporting distinctive crevice communities; coastal examples are referable to Annex I type 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts.

Both forms of chasmophytic vegetation in the UK correspond to the rock fissure communities described from continental Europe (*Asplenietea trichomanis*). Some forms of the calcareous type correspond to NVC types OV39 *Asplenium trichomanes – Asplenium ruta-muraria* community and OV40 *Asplenium viride – Cystopteris fragilis* community, but other forms are not described by the NVC. The vegetation is characterised by bryophytes such as *Tortella tortuosa*, *Anoectangium aestivum* and *Ctenidium molluscum*. Associated vascular plants include brittle bladder-fern *Cystopteris fragilis*, green spleenwort *Asplenium viride* and glaucous meadow-grass *Poa glauca*.

Floristic variation within the habitat type is influenced by geographical location, altitude and rock type. High-altitude examples on mica schist in the Scottish Highlands have a particularly rich montane flora, including alpine woodsia *Woodsia alpina*, tufted saxifrage *Saxifraga cespitosa* and many rare bryophytes and lichens. In contrast, base-rich crevice vegetation on limestone in northern England includes some species with a predominantly southern distribution, such as bird's-foot sedge *Carex ornithopoda*.

H8220 Siliceous rocky slopes with chasmophytic vegetation

Chasmophytic vegetation consists of plant communities that colonise the cracks and fissures of rock faces. The type of plant community that develops is largely determined by the base-status of the rock face. Siliceous communities develop on acid rocks whereas calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists. The presence of calcareous bands within otherwise mainly siliceous rocks often brings the two types together on the same rock outcrop. As a result, Siliceous rocky slopes with chasmophytic vegetation may occur in close association with Annex I type 8210 Calcareous rocky slopes with chasmophytic vegetation, and some sites are listed for both types. Lowland examples are included in the Annex I definition only where they include cliffs supporting distinctive crevice communities; coastal examples are referable to Annex I type 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts.

Both forms of chasmophytic vegetation in the UK correspond to the rock fissure communities described from Europe (*Asplenietea trichomanis*). Siliceous rock crevice vegetation is poorly covered by the NVC, although some forms can be referred to U21 *Cryptogramma crispa – Deschampsia flexuosa* community. The habitat type typically comprises mixtures of bryophytes, such as *Amphidium mougeotii* and *Racomitrium* spp., and vascular plants, such as wavy hair-grass *Deschampsia flexuosa* and fir clubmoss *Huperzia selago*.

Altitude and geographical location account for a large part of the ecological variation exhibited by this habitat type. High-altitude examples in northern Scotland are particularly important for a range of rare species, such as alpine speedwell *Veronica alpina* and Highland cudweed *Gnaphalium norvegicum*, that have an arctic-alpine or boreal distribution.

In western localities, especially close to the coast, the habitat type is enriched by oceanic species, such as Wilson's filmy fern *Hymenophyllum wilsonii* and sea spleenwort *Asplenium marinum*, as well as rich assemblages of Atlantic bryophytes. In the southern uplands of Wales and England, northern floristic elements are reduced. Although some species, such as dwarf willow *Salix herbacea*, have their most southerly occurrence in this habitat type, southern species, such as forked spleenwort *Asplenium septentrionale*, tutsan *Hypericum androsaemum* and wood bitter vetch *Vicia orobus*, also occur.

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Name of proposer/organisation(s)

Upland Lead Co-ordination Network

Proposed new terrestrial priority habitat

Suggested habitat name: Calaminarian Grasslands

Correspondence with existing habitat/s

UK BAP broad habitat: Inland rock

Phase 1: I1.2 Scree *pp*; I2.2 Spoil *pp*

NVC: OV37 and other un-described types, i.e. not fully covered by NVC

Annex I: synonymous with H6130 Calaminarian grasslands of the *Violetalia calaminariae* (see http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H6130)

Description

Biological features

Includes a range of semi-natural and anthropogenic sparsely vegetated habitats on substrates characterised by high levels of heavy metals such as lead, chromium and copper, or other unusual minerals. These are associated with outcrops of serpentine and river gravels rich in heavy metals, as well as with artificial mine workings and spoil heaps. Seral succession is slowed or arrested by the toxicity of the substrate. Open-structured plant communities, sometimes known as 'Calaminarian grasslands', typically occur, composed of ruderal/metallophyte species of lichens, bryophytes and vascular plants, such as spring sandwort *Minuartia verna*, alpine pennycress *Thlaspi arvense*, and genetically adapted races of species such as thrift *Armeria maritima* and bladder campion *Silene maritima*. Notable species include *Epipactis youngiana*, *Asplenium septentrionale* and *Ditrichum plumbicola.* In northern parts of the UK there are local populations of boreal species which characterise these habitat conditions in Scandinavia, such as Scottish sandwort *Arenaria norvegica* and the endemic Shetland mouse-ear *Cerastium nigrescens*.

Other characteristic features

Vegetation on metalliferous substrates is found in three distinct settings in the UK:

(i) Near-natural substrates;

(ii) Mine spoil, in situations where naturally occurring metalliferous outcrops have been quarried away;

(iii) Metalliferous river gravels, sometimes derived from washed-out mine workings. In many localities the metalliferous outcrops which would have been the natural habitat for the species referred to above have been quarried away but the mine spoil still provides suitable habitat.

Geographic distribution and extent

Although this habitat occurs widely across the north and west of the UK, its extent is restricted because of the limited occurrence of suitable rock types. Near-natural examples are highly localised on outcrops and scree of serpentine and related rock types, mostly in the Scottish Highlands and Islands. Metalliferous mine spoil and river gravels are more widespread, but still local, in certain urban and post-industrial areas, particularly in parts of England and Wales. A map of known distribution of the Annex I type 6130 (which forms the bulk of this habitat) from JNCC Report no. 312 is given below.

No comprehensive data are available on the UK extent, but estimates of the extent are given in the table below. This is based mainly on NVC and Phase 1 surveys undertaken over the last 15-20 years, but accurate survey data are lacking for many areas. A total of 326 ha is thought to occur in SACs. Forms referable to the *Festuca ovina - Minuartia verna* community (OV37) are estimated to cover less than 100 ha in Britain (David Stevens, pers. comm.). In Scotland, most of the resource appears to occur within SSSIs (Dave Horsfield, pers. comm.).

Extent of H6130 *Calaminarian grasslands of the Violetalia calaminariae* in the UK

	Area (ha)	Reliability of measure/estimate
England	<200	Estimate based on areas on SACs and expert opinion
Scotland	<200	Estimate based on areas on SACs and expert opinion
Wales	50	Estimate based on areas on SACs and Stevens *et al.* (2002) (areas of OV37 in Wales)
Northern Ireland	absent	–
Total UK extent	<450	Estimate calculated from different data sources, incomplete inventory data and expert opinion

Reasons for recommendation

Habitat for which the UK has international obligations

This habitat is equivalent to and includes the total UK resource of the Annex I type H6130 Calaminarian grasslands of the *Violetalia calaminariae*.

Habitat at risk

All forms of this habitat are rare and under threat.

Artificial sites supporting this habitat are often considered to be of low value, unsightly, and sometimes hazardous. The toxic nature of the soils means that successional changes are slow but a greater threat is the rehabilitation of derelict land, often with grant aid from the EC and Government. Such restoration is often misinformed, usually involving landscaping, levelling topography, spreading topsoil and planting grasses, herbs and trees, all of which are usually very damaging to the intrinsic wildlife interest.

In the Peak District, 50 % of 'lead rakes' (areas created by former lead mining activity which include this habitat type) have been lost this century, and losses are continuing (www.peakdistrict.org/pubs/UK BAP/UK BAP6_2_lr.pdf).

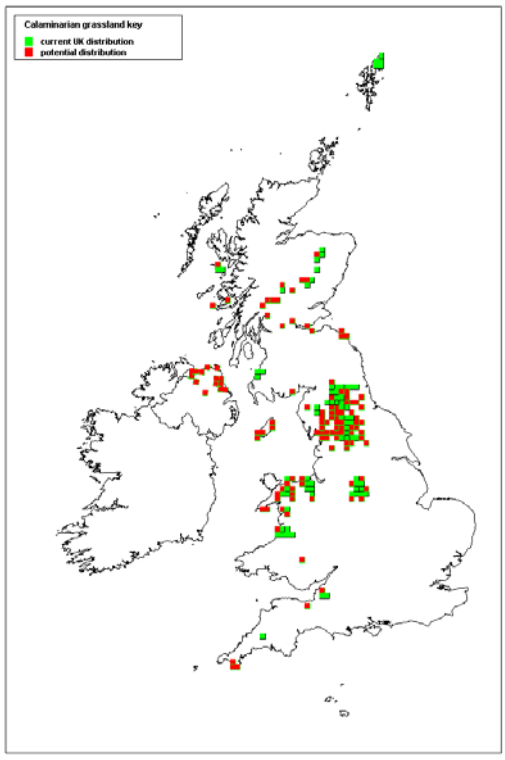
Calaminarian grasslands on river deposits in Northumberland are declining rapidly with no more than 12 ha estimated to be in favourable condition (Northumberland County Council).

Calcareous forms with *Minuartia verna*, referable to the *Festuca ovina - Minuartia verna* community (OV37) are estimated to cover less than 100 ha in Britain (David Stevens, pers. comm.) and are classified as endangered by Rodwell and Cooch (1997).

Habitat important for key species

This habitat is important for a number of key species. Plants found in the habitat include the following UK BAP species: Cornish path moss *Ditrichum cornubicum*, lead path moss *Ditrichum plumbicola*, western rustwort *Marsupella profunda* (also listed on Annex II of the Habitats Directive), the liverwort *Cephaloziella nicholsonii*, and Young's helleborine *Epipactis youngiana.* A range of other rare and scarce bryophytes and lichens also occur.

H6130 Calaminarian grasslands of the Violetalia calaminariae



Map 1: UK distribution of Annex I type 6130 Calaminarian grasslands of the *Violetalia calaminariae*. Current distribution shown in green (from Rodwell et al. 2007) The European Context of British Lowland Grasslands. JNCC Report in press). The potential distribution shown in red is an amalgamation of the distributions of indicator species *Minuartia verna*, *Thlaspi caerulescens*, *Lychnis alpina*, *Cerastium nigrescens* (Preston *et al.*, 2002) and *Ditrichum plumbicola* (Hill *et al.*, 1992).

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Name of proposer/organisation(s)

JNCC Lowland Grassland Lead Coordination Network, based on original submission by Martin Harper (Plantlife), Richard Jefferson (EN) and David Stevens (CCW) and edited by JNCC.

Proposed new terrestrial priority habitat

Suggested habitat names: Open Mosaic Habitats on Previously Developed Land (originally Post-industrial sites)

Correspondence with existing habitat/s

UK BAP broad habitat: Built up areas and gardens.

Phase 1: Quarry, Spoil, Mine, Ephemeral/short perennial, Bare Ground.

NVC: Overall there is a poor fit to described communities and this weakness is identified in the review of coverage of the NVC communities (Rodwell & others 2000). Although some components of the habitat are characterised by annual /open vegetation plant communities described in the NVC (Rodwell & others 2000) others are allied to sclerotic associations better described in continental Europe. Grassland communities associated with this habitat complex include MG1-2, MG9, MG10, MG11, MG13; CG10 (Rodwell & others 1992); and U1-2, whilst the scrub communities W6 and W23 are also commonly encountered (Rodwell & others 1991). Complexes and mosaics can also include a range of aquatic plant communities (see Rodwell & others 1995) and swamp communities (Rodwell & others 1995).

Annex I: None (Calaminarian grasslands are covered by another priority habitat proposal).

Other: Poor fit to Shimwell (1983), but includes 3B and artificial-substrate equivalents of 7A

The proposed priority habitat is delimited by edaphic and other site conditions, and specific sites are likely to include elements of other priority habitats as minor components of the overall mosaic. With the specific exception of post-industrial substrates that are rich in heavy metal which would qualify as the proposed Calaminarian grassland priority habitat, sites with such mosaics will be considered as qualifying as 'open mosaic habitats on previously developed land' priority habitat.

Description

Biological features

The habitat is best defined in terms of structure and growth forms, rather than through specific vegetation communities. It comprises mosaics of bare ground with, typically, very early pioneer communities on skeletal substrates, more established open grasslands, usually dominated by fine-leaved grasses with many herbs, areas of bare ground, scrub and patches of other habitats such as heathland, swamp, ephemeral pools and inundation grasslands. High quality examples may be characterised as "unmanaged flower-rich grasslands with sparsely-vegetated areas developed over many years on [edaphically-] poor substrates" (Harvey 2000, referring to the East Thames Corridor, but it applies to all types).

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

Plant assemblages are unusual, selected by propagule supply as well as site conditions (Ash, Gemmell and Bradshaw 1994 for several waste types, Shaw 1994 on Pulverized Fuel Ash (PFA)). The habitat supports a range of notable vascular plant, moss and lichen species. These often include species declining in the wider countryside such as *Ophrys apifera*, *Gymnadenia conopsea* (alkaline wastes), *Epipactis youngiana* (acid waste), *Osmunda regalis* (acid sandstone quarries), *Peltigera rufescens* (lime waste, PFA), *Cladonia pocillum* (calcareous wastes), *Diploschistes muscorum* (PFA) and a UK BAP priority liverwort, *Petalophyllum ralfsii* (PFA). Exotic plant species, which are well adapted to the prevailing environmental conditions, are a characteristic component of associated plant assemblages.

Invertebrate faunas can be species-rich and include many uncommon species (Eyre and others 2002, 2004). Between 12 and 15% of all nationally-rare and nationally-scarce insects are recorded from brownfield sites, which will include many post-industrial examples (Gibson 1998; Jones 2002) (see below). Exotic plants provide for an extended flowering season and, with the floristic and structural diversity of the habitat mosaic, contribute to the value of the habitat for invertebrates (see Bodsworth and others 2005).

Some areas are important for birds that are primarily associated with previously developed or brownfield land such as little ringed plover (in 1984 97% of LRP nests in England were in 'man-made' habitats), as well as more widespread, but UKUK BAP priority species, including skylark and grey partridge. The habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

Other characteristic features

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

Edaphic conditions for this habitat are severely limiting on plant growth. Examples are substrates with extreme pH,

whether alkaline (e.g., chemical wastes) or acid (e.g., colliery spoils); deficiency of nitrogen (PFA), or available phosphate (highly calcareous Leblanc waste, blast furnace slag and calcareous quarry spoil); or water-deficient (dry gravel and sand pits). Other typical situations where such conditions arise include disused quarries, former railway sidings, extraction pits and landfill sites.

Criteria for the selection of habitats

The main criteria for selection of qualifying habitats of high nature conservation value are:

1. Rich and/or large examples of habitats typical of the substrate/edaphic conditions concerned, which demonstrate the characteristic mosaic of bare ground, pioneer communities, flower rich grassland and other habitat patches with associated structural and topographical features.

2. Areas that have retained bare ground and pioneer communities over an extended period, demonstrating arrested succession;

3. Threatened areas that support either the last remaining examples where the habitat was formerly widespread/extensive, or rare/ specialised types of this habitat for example where the nature of the substrate is particularly unusual

4. Presence of UK BAP priority species or Red Data Book/List species;

5. Importance for an exceptional assemblage of key species groups.

Geographic distribution and extent

The habitat is concentrated in urban, urban fringe and large-scale former industrial landscapes, especially in the lowlands, though more isolated examples can be found on previously developed land in more remote rural areas. Although there are inventories of previously developed land the habitat has not been mapped consistently at a UK level. This situation is beginning to be addressed (e.g. the partnership led by Buglife and Natural England to map the entire resource of previously developed land in the Thames Gateway, which had identified and mapped over 500 sites by mid 2006) and a clearer agreed definition of the priority habitat type will further assist.

Reasons for recommendation

Habitat for which the UK has international obligations

None (Calaminarian grasslands are excluded).

Habitat at risk

The decline of mining and heavy industry and the requirement for such types of development to include land restoration as part of planning permission has virtually halted the creation of new, large scale post industrial landscapes where colonisation and natural succession are left to prevail. Some of the best examples of this habitat were created some decades ago by industries that are now defunct (Leblanc, blast furnace slag), or spoil disposal methods that are no longer used (Solvay), Today, they would be unlikely to survive long enough to acquire a valuable flora or fauna before intervention. They are therefore effectively irreplaceable; at the time of their creation/abandonment, the wider landscape would have been much richer in species, providing a source for colonization. Today it is the previously developed land that is the source and represents important elements in wider landscape mosaics in supporting meta-populations of species of conservation importance.

Extant sites are at risk from redevelopment, landfill, industrial and commercial use, or housing, the latter being targeted on brownfield land. The ‘reclamation’ of bare ground and early successional habitats on previously developed land as amenity greenspace can be just as damaging, commonly involving the re-grading of landforms; the burial of existing substrates with the import of fertile soils; and the sowing of amenity grass mixes and planting of shrubs and trees, usually with the intention of ‘quick greening’.

Although a few notable examples of this habitat have been given statutory protection as SSSIs e.g., Canvey Wick (Essex), Nob End Leblanc Tip, Bolton, or LNRs e.g., Pelsall North Common, Walsall (Urban Wildlife News 1991), most enjoy little recognition and have little protection as Local Sites or none at all. Despite some protection notionally afforded by planning policy (such as in Annex C of PPG 3 Housing and paragraph 13 of PPS 9 Biodiversity and Geological Conservation in England), the types of land of highest nature conservation value remain largely unrecognised, their early successional communities and sparsely vegetated areas being commonly mistaken as being of no nature conservation interest.

Sites with this habitat have not been consistently described or mapped so far, making it difficult to quantify losses. However, for example, all the Widnes and most of the St. Helens Leblanc heaps have been lost , as well as most of Wigan's colliery tips, five out of six London Sites of Metropolitan Importance (*Urban Wildlife News 1997*). Many remaining sites are now changing into scrub and/or tall tussock grassland and in desperate need of suitable management (e.g., Nob End SSSI). Suitable management in these cases may involve re-starting the succession by removing the organic layer in sections to reveal the underlying waste or substrate (Kirby 1992; Shaw 1994 and H. Ash in Urban Wildlife News 1994). The stage of this succession most valuable to biodiversity is the open, flower-rich grassland, which persists without management for decades, but eventually accumulates sufficient nutrients for dense grassland and/or scrub to develop and so declines in conservation value.

Such habitats are increasingly rare in the general landscape, as eutrophication has become marked (Preston and others 2002a). They may be particularly valuable as the climate changes, being sufficiently open to allow colonisation by suitably adapted species.

Habitat important for key species

These habitats can be exceptionally important for invertebrate communities, with very rich faunas and large numbers of rare species (Eyre and others 2002, 2004). Typically these include heat- or sand-loving species such as the cuckoo bee *Nomad ferruginata* and those species living under stones, such as the ground beetle *Harpalus obscurus* (Falk 2000). The fauna includes a high proportion of Red Data Book, Nationally Scarce and some UKUK BAP priority species. At least 40 invertebrate species are wholly confined to brownfields and at least 18 of the UK BAP priority invertebrate species have key populations on brownfield sites. For example, Harvey (2000) recorded two UKUK BAP priority bumble bees (*Bombus sylvarum*, *B.humilis*) and a rare parasitic fly *Gymnosoma nitens* on post-industrial sands and gravels in the East Thames corridor, whilst the rhopalid ground bugs *Stictopleurus abutilon* and *S. punctatonervosus* appear to be characteristic of such sites. In particular, they provide vital habitat to many invertebrate species which require bare ground for basking/nesting and nectar sources for adult feeding, especially aculeate Hymneoptera (e.g. the spider-hunting wasp *Arachnospila wesmaeli* (UK BAP) known from pulverised fuel ash sites; *Philanthus triangulum* (RDB2), a bee-killing wasp strongly associated with flower-rich grasslands on post-industrial land) and Coleoptera (e.g., Adonis ladybird *Adonia variegata* (Nationally Notable Nb), strongly associated with sparsely vegetated mosaics on post-industrial land; *Psylliodes sophiae* (RDB3; UK BAP) whose larvae feed on *Descurainia sophiae*).

Other UK BAP species include the Phoenix fly (*Dorycera graminum*), the Distinguished jumper (*Sitticus distinguendus*), the 5-Banded weevil wasp (*Cerceris quinquefasciata*), the Lesser bombardier beetle (*Brachinus sclopeta*), the Saltmarsh shortspur (*Anisodactylus poeciloides*), the Lagoon sand shrimp (*Gammarus insensibilis*), and there will also be a significant number of UK BAP moths and butterflies on brownfield habitats.

To put the importance of this habitat into context, one site in Essex supports 33 Red Data Book, 105 Nationally Scarce and 5 UK BAP priority invertebrate species (Buglife, personal communication)

Functional Importance

The habitat often provides a source of great species diversity relative to their surroundings. Such habitat has become increasingly rare in the general landscape, as eutrophication has become marked (Preston and others 2002a). They therefore provide many of the more important landscape elements in supporting meta-populations of species of conservation importance. They may be particularly valuable refuges as the climate changes, being sufficiently open to allow colonisation by suitably adapted species.

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Name of proposer/organisation(s)

David Knight, Natural England; Pete Frost, Countryside Council for Wales; Peter Cush, Enviornment and Heirtage Service (NI); Ian Angus, Scottish Natural Heritage – for the Urban Inter-agency Working Group; and Mark Crick, Joint Nature Conservation Committee

Proposed new terrestrial priority habitat

Suggested habitat name: Traditional Orchards

This name has wide currency among organisations involved in conservation of the habitat including LUK BAP partners, government departments and agencies. Examples of use of the term include agri-environment scheme option descriptions in England, Northern Ireland and Wales, CAP Single Payment eligibility criteria and LUK BAP Habitat Action Plans in England and Wales.

Correspondence with existing habitat/s

UK BAP broad habitat: Broadleaved, mixed and yew woodland (the proposed habitat is a habitat complex like lowland wood-pasture and parkland, which is in this broad habitat)

Phase 1: A. Woodland and scrub, A 1.1.2. Broadleaved plantation, orchard, to be identified by existing/added symbols (England Field Unit 1990).

NVC: Incorporates several types as part of the orchard habitat complex eg MG5, MG6, W24.

Annex I: Incorporates parts of several Annex I types, for example lowland calcareous grassland in some sites within the Annex I type H6210 semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).

Description

Biological features

Habitat structure rather than vegetation type, topography or soils, is the defining feature of the habitat. Traditional orchards are structurally and ecologically similar to wood-pasture and parkland, with open-grown trees set in herbaceous vegetation, but are generally distinguished from these priority habitat complexes by the following characteristics: the species composition of the trees, these being primarily in the family Rosaceae; the usually denser arrangement of the trees; the small scale of individual habitat patches; the wider dispersion and greater frequency of occurrence of habitat patches in the countryside. Traditional orchards include plantings for nuts, principally hazel nuts, but also walnuts. Biodiversity characteristics of the habitat are described under 'Reasons for recommendation' below.

Other characteristic features

Management of the trees is the other main feature distinguishing traditional orchards and wood-pasture and parkland. Trees in traditional orchards are, or were, grown for fruit and nut production, usually achieved through activities such as grafting and pruning, whereas timber has been the main product from trees in wood-pastures and parkland, mostly derived from pollarding or selective felling. Grazing or cutting of herbaceous vegetation are integral to orchard management, as they are in wood-pastures and parkland. The presence of scrub, mostly the form of hedgerows on the site boundaries, or sometimes, especially in unmanaged orchards, among the orchard trees, is analogous to the frequent occurrence of scrub in wood pastures and parkland and plays a similar ecological role (see under biodiversity characteristics described below). Ponds and other wetland features are often present, being used now, or in the past, for watering livestock.

Traditional orchards are defined for priority habitat purposes as orchards managed in a low intensity way, in contrast with orchards managed intensively for fruit production by the input of chemicals such as pesticides and inorganic fertilisers, frequent mowing of the orchard floor rather than grazing or cutting for hay, and planting of short-lived, high-density, dwarf or bush fruit trees. Spacing of trees in traditional orchard can vary quite widely (from c.3 m in some plum orchards and traditional cobnut plats to over 20 m in some large perry pear and cherry orchards. There is some overlap of density of planting with intensive orchards, but these orchards often have densities at least twice the density of the most closely-spaced traditional orchard.

Like wood-pastures and parklands, traditional orchards can occur on a wide range of soil types from slightly acid, relatively infertile soils to fertile river floodplain soils and lime-rich soils. Orchards can be found on slopes ranging from steep to level, and with any aspect. Generally, sites do not have badly impeded drainage, although locally, within sites, there may be wetter areas. Orchards are found in the lowland landscape in the UK, defined as the land below the altitudinal limit of enclosure (ie below the 'moor wall').

A range of simple, mappable criteria covering the visual appearance of traditional orchards have been used in a variety of projects, for example the development of the CAP Single Payment criteria, the English Nature orchard biodiversity review project, and in orchard mapping in Essex and Herefordshire. These criteria provide a ready basis for development of an agreed mappable definition for traditional orchards (see below).

Geographic distribution and extent

Traditional orchards are found in all countries of the UK although England has the bulk of the resource. Areas digitally mapped by the Ordnance Survey have been found to provide a relatively accurate estimate of total orchard area, through testing by ground-truthing and aerial photograph interpretation (English Nature in prep). Together with country information on extent of commercial orchards in agricultural census returns, digital Master Map polygons can be used to make initial estimates of the extent of the resource (see table below).

The estimated extent of traditional orchards in the UK (28,750 ha), puts the habitat at the rarer end of the scale compared

to existing priority habitats. These range from Upland hay meadows 1,100 ha, Lowland wood-pasture and parkland 35,000 ha, Lowland heathland over 60,000 ha, Upland oakwood 85,000 ha to Upland heath 2,109,400 ha).

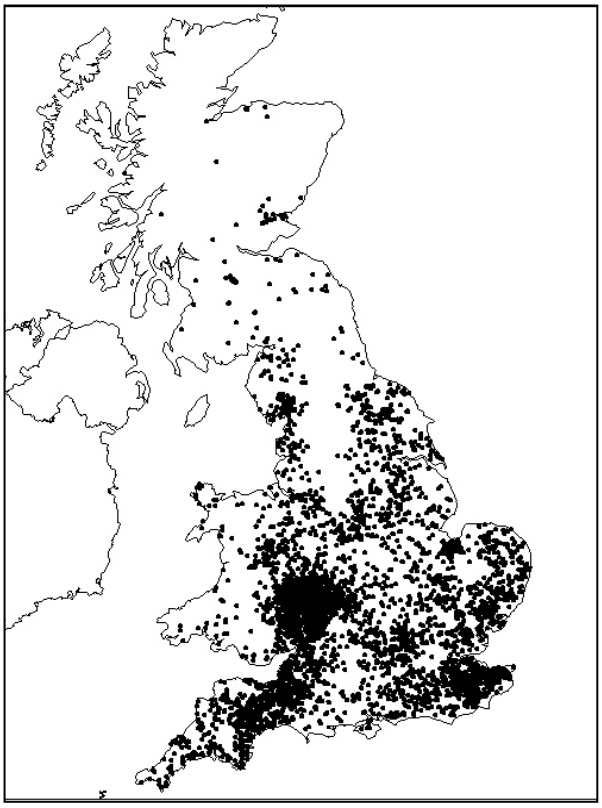
Table: Estimated extent of traditional orchards in UK

Country	**Orchard area (ha)*	***Traditional orchard area (ha)*
England	47,000	28,000
Scotland	290	250
Wales	840	440
Northern Ireland	(1600)	60

*Ordnance Survey area except in Northern Ireland where area under fruit (top and soft) is given from the agricultural census 2004.

** England = Ordnance Survey area minus area of commercial orchards in census of 2000 defined as intensive (84%) by lack of fully grassed orchard floor (Central Science Laboratory data). Scotland and Wales = Ordnance Survey area minus area of commercial orchards in agricultural censuses of 2003 and 2002 respectively. Note that some of the commercial orchards in Scotland and Wales may be traditional orchards, thus the estimate of traditional orchard area may be an underestimate. Northern Ireland estimate from figure given in the Environmentally Sensitive Areas scheme booklet, traditional orchards option.

The Ordnance Survey data, which do not distinguish traditional and intensive orchards, show that orchards are dispersed throughout the lowlands of Britain (see Map 1), though there are concentrations in some areas particularly Kent, Cambridgeshire, Somerset and the Three Counties of Herefordshire, Worcestershire and Gloucestershire. The bulk (78%) of the commercial fruit production occurs in these concentrations in England, which implies that traditional orchards comprise the majority of the orchards elsewhere, as well as being known to occur in the orchard concentration areas.



Map 1: Orchard distribution in England, Scotland and Wales. Reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceeding. English Nature 100017954 [2005].

The Master Map data, and the 2003 aerial photograph coverage of England held by Natural England, provide a ready basis for the development of a national inventory of traditional orchards. This inventory should be linked to the local inventory projects which are already underway is some areas, for example in the Forest Of Dean and Cambridgeshire, and involve the network of volunteer local orchard groups, whose members have both expertise and on-the-ground knowledge. Orchards do not feature in Countryside Survey reports, perhaps because samples are too few.

Mapping traditional orchards

Traditional orchards can easily be distinguished from other wooded habitats based on the preponderance of domestic fruit and nut species: apple, plum, pear, damson, cherry, walnut and cobnut. Only in a very few cases will there be a significant number of other tree species in a traditional orchard, unless the orchard is becoming woodland through neglect. An arbitrary distinction of, say, 50% of trees should be domestic fruit or nut species in an orchard, is rarely likely to be invoked for distinguishing orchards from wood-pasture/parkland.

With regard to estimating extent of habitat and reporting, the experience of the wood-pasture and parkland HAP is instructive. Here, the number of sites rather than area is used for target reporting purposes. Extent may be mapped as the extent of the mosaic incorporating wood-pasture, the extent of the tree-ed area or number of veteran trees. While the first and third types of extent have some relevance to traditional orchards, it may be more feasible to map the tree-ed area as orchards generally have more concentrated distributions of trees than many wood-pastures or parklands. A simple mappable definition would need to be discussed and agreed by the HAP group but simple rules adopted for the Natural England orchard project refer to the distance between crown edges and number of trees (for this project, crown edges of trees must be within 20m of each other to be included in the orchard patch, and there must be more than 5 trees within 20m of each other's crown edges). Alternative limits may be decided by the HAP group.

Traditional orchards, as distinct from non-traditional orchards are defined for priority habitat purposes as orchards managed in a low intensity way. They contrast with orchards managed intensively for fruit production, where there are inputs of chemicals such as pesticides and inorganic fertilisers, frequent mowing of the orchard floor rather than grazing or cutting for hay, and planting of short-lived, high-density, dwarf or bush fruit trees (stems generally 75 cms or less). The simplest visual indicator of intensive management is the presence of herbicided strips along the tree rows, where the

ground is generally bare or with some annual plant regrowth, contrasting with the permanent grassland of the between-row spaces. Such strips are readily observable on aerial photographs. According to orchard pesticide usage surveys by the Central Science Laboratory, use of herbicide is associated with other pesticide use and intensive mowing between tree-rows, while in contrast, orchards with fully grassed floors can be considered traditional (Dr Joe Crocker, CSL, pers comm.). There may potentially be cases where other pesticides or inorganic fertilisers or other intensive management practices are used without herbicide. As a consequence, there may be occasionally instances for limited ground-truthing, for instance, where herbicide strips are not evident but the trees appear small and closely-spaced, by checking density / spacing (see below) and stature of trees on the ground. Spacing of trees in traditional orchard can vary quite widely from around 3 m to over 20 m between trees (see above). There is some overlap of density of planting with intensive orchards, so a density distinction is not useful on its own. However, non-traditional orchards often have densities at least twice the density of the most closely-spaced traditional orchard, and density/planting distance (< 3m in many intensive orchards) can help in the distinction of intensive orchards as described above.

Approach for UK BAP reporting

The approach to definitions and incorporation of other features for traditional orchards is likely to be modelled on that adopted for the UK BAP wood-pastures and parkland priority habitat. Associated habitats may or may not be reported on separately, but are treated as part of a lowland wood-pasture site. Other UK BAP priority habitats occur in wood-pastures and traditional orchards eg priority grassland types. These are treated as a separate layer for reporting purposes in wood-pastures, yet are incorporated within this habitat for condition assessment and conservation action. Other habitats such as scrub are also incorporated in wood-pastures and feature in the condition assessment and conservation action. Scrub and hedgerows (linear scrub) and ponds would also form associated features in traditional orchard sites, either as priority habitats in their own right or features to condition assess as part of the orchard. Improved grassland in wood-pastures is considered as either requiring restoration or de-intensification, or as acceptable in its current state, as long as the other features of the site are in favourable condition. A similar approach is recommended for traditional orchards. It should be noted however that reduced species-richness of some grasslands in orchards may not be related to fertiliser use (improvement), rather to shading effects of the trees or nutrient inputs from unharvested fruit and leaf litter of the trees, and thus 'de-intensification' is not appropriate management.

Reasons for recommendation

Habitat at risk

Historical data gathered from England (se over page) show that over the whole country orchard area has declined by 57% since 1950. This estimate of loss was made by comparing the agricultural census figure of 108,555 ha of orchards in 1950 with the current Ordnance Survey figure of 47,000 ha. As part of English Nature's current study of traditional orchards, assessments of loss have been made for several objectively chosen sample areas in England. The results show that there have been much greater declines in traditional orchard area than in orchard area as a whole. Severe declines have been continuing over the last 20 years, and have even increased in some cases in this time period compared with the last 50-60 years.

A study of orchards in Wales reported a 94% reduction in area of orchards in the agricultural census between 1958 and 1992 (TACP 1994). In Scotland, agricultural census returns for Lanark County indicated a decline of 86% between 1953 and 1987 (Ironside Farrer 2001). Traditional orchards were not distinguished from intensive orchards in these studies.

Sample area (National Grid square), County	*Period*	*Net loss of traditional orchard*	*Loss per year*
SO70, Gloucs	1995-2003	15%	1.9%
TF40 Cambs	1997/98-2003	6%	1.0%
TQ84, Kent	1990-2003	38%	2.9%
TQ84, Kent	1946-2003	92%	1.6%
ST34, Somerset	1994-2003	3%	0.3%
ST11 Devon	1946-2003	89%	1.6%

Statutory protection of traditional orchards is very limited. There are a few orchards in SSSIs, or protected by TPOs, probably amounting to less than 200 ha. The current Environmental Impact Assessment Regulations (related to agricultural intensification) do not cover traditional orchards. Traditional orchards have been recognised by the European Union as of environmental value and eligible for Single Payment under the Common Agricultural Policy, in contrast to intensive orchards. Positive incentives under agri-environment scheme options are available in England, Wales and Northern Ireland, with an estimated 3,000 ha of traditional orchards under agreement within these schemes.

Habitat importance for key species

Overview

Orchards are hotspots for biodiversity in the countryside, supporting a wide range of wildlife and containing UK BAP priority habitats and species, as well as an array of Nationally Rare and Nationally Scarce species. The wildlife of orchard sites depends on the mosaic of habitats they encompass, including fruit trees, scrub, hedgerows, hedgerow trees,

non-fruit trees within the orchard, the orchard floor habitats, fallen dead wood and associated features such as ponds and streams. This richness is illustrated by the results of an intensive study of a set of 3 orchards in the Wyre Forest SSSI in 2004, the first of its kind in the UK. The orchards only cover a total area of 5.4 ha, yet the survey found over 1,400 species from across the plant, fungi and animal kingdoms (Winnall and Smart 2005). Traditional orchards are referred to as having significant wildlife interest in areas of otherwise intensively managed farmland in the description of priority habitats of Wales (Jones and others 2003).

Ecological similarities to biodiversity of lowland wood-pasture and parkland and other ancient wooded habitats in the landscape

Invertebrate and lichen species which are characteristic of ancient woodland and wood-pasture, which are already classified as priority habitats partly on these grounds, also occur in traditional orchards. Saproxylic invertebrates, defined by Alexander (2002) as dependent on wood-decay habitats, are particularly diverse. A compilation of survey data on occurrence of saproxylic invertebrates in traditional orchards totals 390 species, to which have been added 13 species associated in the literature with orchards or fruit species. The overall total of 403 species includes 102 Red Data Book or Nationally Scarce species. The fauna benefits from the veteran tree features of orchard trees and fallen and standing dead wood in orchards. It includes species dependent on a variety of niches, including those directly dependent on decaying wood, fungi-feeders, predators and parasites. The list includes 4 priority UK BAP beetles: *Gnorimus nobilis* (noble chafer), which is almost confined to traditional orchards, *Gastrallus immarginatus*, *Lucanus cervus* (stag beetle) and *Ampedus rufipennis*, all of which have been found in traditional orchards since 1990. The beetle fauna includes 50 Indicators of Ecological Continuity, which are defined by Alexander (2004) as species that seem to require continuity of tree cover in the landscape. The compilation includes data from Welsh traditional orchards which have similar saproxylic faunas to English orchards, including Red Data Book and Nationally Scarce species, as well as beetle Indicators of Ecological Continuity (Whitehead and Whitehead 2002). The fauna includes *Ampedus cinnibarinus*, an RDB3 beetle not found as yet in English orchards.

The epiphytic lichen flora also includes Indicators of Ecological Continuity (defined by Rose 1992). Surveys of 6 orchards in 2004 by English Nature revealed 16 Nationally Rare or Nationally Scarce species and 12 Indicators of Ecological Continuity among 131 species of epiphytic lichens. The flora included one species on Schedule 8 of the Wildlife and Countryside Act 1981 (*Parmelinopsis minarum*) and 5 species for which Britain has International Responsibility, according to Woods and Coppins (2003). *Telioschistes chrysopthalmus*, a priority UK BAP lichen species now extinct in the UK (2002 UK BAP report), once typically occurred on orchard trees in south-west England. Species typical of the *Lobarion* lichen community (James and others 1977) have been recorded on fruit trees in the unpolluted oceanic west of Scotland and species of the *Usnion* community in the west of Northern Ireland (Albert Henderson, pers comm., B. J. Coppins and A .M. Coppins unpublished data).

Comparative compilations of invertebrates and lichens of wood pastures and parklands and analysis of their particular characteristics in relation to orchards are not yet available. However, some differences can be expected, as illustrated by the association of the noble chafer beetle with traditional orchards rather than wood pasture. Conversely, any species associated with veteran trees with larger girth sizes would be expected to occur rarely in orchards, given the generally relatively small girth sizes of trees in orchards. The difference in scale of habitat patch will mean that large wood pastures and parklands are likely to have many more species than traditional orchards, which are usually a few hectares or less in size. However, early evidence suggests that species may be densely packed in orchards. For instance, Boconnoc Park in Cornwall has 190 epiphytic lichen species in an area of 100 ha, while Slew Orchard on the Devon/Cornwall border has 80 species in 1.3 ha.

The results of the orchard surveys by English Nature, together with other information on the ecological relationship of orchards to other habitats, suggest that traditional orchards are a significant part of a spatial series or network of habitats at a landscape scale that are able sustain scarce lichens and invertebrates that require continuity of habitat through time. This network is made up of traditional orchards, hedgerow trees, wood-pasture and ancient semi-natural woodland, which are all within existing Biodiversity Action Plan priority habitats apart from orchards.

Biodiversity of orchard trees

Thirteen provisional Red Data List or rare fungi were found in the EN 2004 surveys, every site having at least one species of interest. About half of the 175 species of fungi found were associated with dead and living wood and most of the remainder with orchard floor grassland (see below). A rare species recently found on apple in an orchard in Oxfordshire is *Sarcodontia crocea* (Judy Webb pers comm.) which is thought to be decreasing throughout Europe due to loss of orchards. It is a possible candidate UK BAP species, or, as a spine fungus, be within a possible "Spine Fungi UK BAP".

As well as the epiphytic lichen flora discussed above, the epiphytes on orchard trees include a range of bryophytes. Epiphytic bryophyte floras found in 2004, while not including more than locally rare species, were diverse, especially on apple, compared with those on many other tree hosts. This characteristic is illustrated by the finding that the study orchards encompassed, within 40 ha, 36% of species found on all tree species examined in a transect area of 42,800 ha running from east to west across southern England (EN 2004 surveys and Bates and others 1997).

Orchard trees support other wildlife, including canopy species such as the Nationally Scarce hoverfly, *Eupeodes nitens*, which is usually associated with ancient woodland (EN 2004 surveys, Falk 1991). The semi-parasitic plant, mistletoe, is

particularly associated with traditional orchards and in these habitats hosts species such as *Anthocoris visci*, a Nationally Scarce predatory bug (EN 2004 surveys, Hollier and Briggs 1999), and *Celypha woodiana*, the Red Data Book 2 mistletoe tortrix moth (Andrew 2004). The latter species is a proposed priority UK BAP species (Tom Brereton, Butterfly Conservation pers comm.).

As well as epiphytic lichens and bryophytes, orchard trees support epiphytic fauna which depend on these lower plants, along with algal crusts and fungal spores. A good variety of barklice (Psocoptera) were found in western orchards in 2004 and it should be noted that this group of invertebrates has not yet been assessed for Red Data Book or Nationally Scarce status. A large population of the Nationally Scarce epiphytic lace bug (*Physatocheila smreczynskii*) was found in one study site.

Biodiversity of orchard floor habitats

Orchard floor vegetation includes species-rich grassland in some sites, the diversity being influenced by factors such as grazing intensity and density of shading by fruit trees. Lowland Meadow priority UK BAP habitat (MG5 and MG8) occurs, and is of SSSI quality in places (for example Brotheridge Green Meadows SSSI and Mutlow's Orchard SSSI, Worcestershire, English Nature unpublished data). The flora can include green-winged orchard (*Anacamptis morio*) and adder's tongue fern (*Ophioglossum vulgatum*) as well as species of more woodland character such as bluebell (*Hyacinthoides non-scripta*) and wild daffodil (*Narcissus pseudonarcissus*). Cobnut plats (hazel), can support a diverse woodland herb flora (Game 1995), including a range of ancient woodland indicators (as listed by Dr Keith Kirby, English Nature, unpublished), such as moschatel (*Adoxa moschatellina*), common cow-wheat (*Melampyrum pratense*), tutsan (*Hypericum androsaemum*) and notably large populations of toothwort (*Lathraea squamaria*).

Waxcap species of fungi, belonging to a threatened assemblage of fungi depending on unimproved grassland, were found in traditional orchards in 2004, indicating that these orchards can provide continuity of management at low intensity, suitable for these fungi. The priority UK BAP waxcap, *Hygrocybe calyptriformis*, was among the fungi found in 2004 (EN 2004 surveys, Winnall and Smart 2005).

Orchard floor grasslands support invertebrates of interest, including, in the Wyre Forest study, the Nationally Scarce grass-feeding bug *Amblytus brevicollis*, and the Nationally Scarce lace-winged planthopper, *Oliaris panzeri*, which is characteristic of dry grassland, and, in the Devon study orchards, the Nationally Scarce weevil *Rhinocyllus conicus,* which was found in marshy areas.

Biodiversity of orchard habitat mosaics

The structure of traditional orchards adds another dimension to the value of the orchard floor vegetation, which provides resources for orchard invertebrates from other components of the habitat complex. For example, the Nationally Scarce saproxylic beetle, *Anisoxya fuscula*, was found on meadowsweet flowers (*Filipendula ulmaria*) in one of the 2004 study sites. The Aculeate Hymenoptera fauna (bees, wasps and ants) provide another good illustration of how orchards work as mosaics of habitats. For example, 100 species were found in the Wyre Forest study (Winnall and Smart 2005), including 12 Red Data Book or Nationally Scarce species. Species found included ground-nesting and tree-nesting representatives, and many species would be using pollen and nectar resources from the herbaceous layer as well as fruit blossom on the trees.

Hedgerows, scrub and non-fruit tree species, occurring on boundaries or in orchards, also contribute directly to the biodiversity value of orchards, as well as having value as part of the habitat mosaic through providing shelter and food supplies, such as pollen and nectar for saproxylic invertebrates. This role is the same as that played by scrub in wood pastures and parklands. The rare fungus *Entoloma saepium*, a possible ectomycorhizal species on Rosaceae, was found on the ground close to sloe (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*) growing in the hedgerow around a Devon study site in 2004. The provisional Red Data List fungus *Schizophyllum amplum* was found on a dead fallen poplar twig in the row of poplars along one of the boundaries of a Cambridgeshire orchard in 2004. Saproxylic invertebrates can benefit from non-fruit veteran trees of hedgerows and elsewhere in orchards, an example is *Tanyptera nigricornis,* (a Red Data Book 3 cranefly) which was recorded on ash (*Fraxinus excelsior)* in the hedgerow boundary at one of the Devon orchards in 2004.

Biodiversity of wide-ranging species found in orchards

Traditional orchards are suitable for wide-ranging species that require a complex of habitats. Great crested newt, a priority UK BAP species, specially protected under the Habitats and Species Directive, has been found in an orchard pond in Herefordshire (James Marsden pers comm) and located sheltering on the orchard floor beneath cherry logs in the Wyre Forest study orchards. Traditional orchards in the landscape can provide the package of habitats required, ie networks of ponds, rough grassland for foraging and hedgerows for shelter (Langton and others 2001). Dormice (priority UK BAP species) have been found in cobnut plats (hazel) in Kent (Game 1995).

A wide variety of birds have been recorded in traditional orchards, including 14 Red List birds, 8 of which are priority UK BAP species, 15 Amber List birds, 31 out of 33 Quality of Life Woodland Bird Indicators and 15 out of 19 Quality of Life Farmland Bird Indicators. One UK BAP species, wryneck, now more or less absent from England, was historically strongly associated with orchards (Balston and others 1907) and is still reliant on orchard habitat in Europe (Bautz 1998). The declining Red List birds, tree sparrow and lesser spotted woodpecker are recorded as breeding in orchards, and are among the species able to occupy nest cavities in orchard trees.

A variety of bat species forage over traditional orchards. These orchards form part of the foraging landscape for greater horseshoe bats, a priority UK BAP species, specially protected under the Habitats and Species Directive (English Nature 2000). Pipistrelles, priority UK BAP species, were recorded at the Wyre Forest site, both 45 KHZ and 55 KHZ species, as were noctules.

Other features

A feature of the biodiversity of traditional orchards is the great variety of fruit cultivars that they contain, for example Luckwill and Pollard (1963) list 101 varieties of perry pear distributed across the parishes of Gloucestershire. This agricultural biological diversity is not an explicit part of the current UK BAP, although the UK Government is a signatory to the Global Strategy for Plant Conservation 2001. The Government response (Cheffings and others 2004) includes a target for conserving crop diversity. In addition, the conservation of genetic resources is a secondary objective of Environmental Stewardship in England.

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Name of proposer/organisation(s)

Dr Heather Robertson, Lowland Farmland Ecologist, Natural England

Proposed change to existing terrestrial priority habitat

Name of habitat	[Ancient and/or Species-Rich] Hedgerows
Nature of recommended change	1. Change name of priority habitat to Hedgerows 2. Extend the priority habitat definition to cover all hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species. Further clarification of the new definition is detailed below (see section on 'Notes on new definition'). Other aspects of the existing definition are retained: for example, lines of trees are still included. Banks without woody vegetation would remain outside of the Hedgerow priority habitat definition.
Which groups and/or individuals have been involved in this proposal?	Members of the Steering Group, including representatives from Natural England, Countryside Council for Wales, Scottish Natural Heritage and the Department for Agriculture and Rural Development Northern Ireland. The proposal received support from the 4 Local Authority members of LUK BAPS in England who were consulted (Bedfordshire, Cornwall, Devon and Mid-Suffolk).
What would be the benefits of such a change	*1. Improved conservation of biodiversity, including priority species* Hedgerow wildlife is not restricted to species-rich hedgerows or ancient hedgerows. Hedgerow trees, and their associated wildlife, are also not restricted to these types either. For some animal species, woody species-rich hedgerows are more likely to supply necessary resources, eg the dormouse, a UK BAP priority species, requires hard mast and soft fruit as forage, so would not find a pure hawthorn hedgerow a congenial habitat. There is also some evidence of greater small mammal abundance and greater bird species richness or abundance in woody species-rich hedgerows (Kotzageorgis and Mason 1997, Macdonald and Johnson 1995, Green et al 1994). However, for hedgerow plants, there does not seem to be a relationship between woody species-richness and herbaceous species-richness (Barr et al 2003, CEH draft contract report to Defra, BD2110, 2004). The presence of particular woody species may be the most critical factor in some cases, eg blackthorn as host for scarce brown hairstreak butterflies and barberry for the UK BAP priority moth, the barberry carpet. Other wildlife may be more influenced by the physical structure of a hedgerow than its species-richness, for instance the findings that larger hedgerows support a wider range of birds compared to smaller hedgerows (Parish et al 1994). For other species, the connectivity, and sometimes dimensions, of hedgerows are important, eg for greater horseshoe bats and other priority UK BAP bats, which fly and hunt along hedgerow networks, (English Nature 2000, Limpens and Kapteyn 1991), often favouring tall hedgerows, apparently irrespective of their other characteristics. Northern Ireland representatives favoured the new definition as hedgerows satisfying the existing definition are limited in these countries, thus the impact of their conservation for hedgerow wildlife is small. Local Authority comments referred to the importance of all hedgerows for wildlife, with hedgerows often being the only habitat of wildlife value over much of the countryside. The targets review guidance asked that where appropriate, climate change and the ecosystem approach be taken into account. The change in definition and the revised targets proposed should lead to action to improve the long-term viability of hedgerow habitats and species populations and enhance resilience to environmental change, by encompassing all hedgerows as interconnected habitats, where further fragmentation would be resisted and reversed. *2. Better fit with policy, including LUK BAPs* The following policies apply to all hedgerows rather than a sub-set of ancient / and / or species-rich hedgerows: European policy; a) Article 10 of the Habitats and Species Directive refers to the importance of the connectivity function of continuous linear structures, including traditional field boundaries aii) The European Community's Biodiversity Action Plan for Agriculture includes specific reference to the priority of maintenance and development of linear features, including hedges (pps.11 and 39 Communication from the Commission to the Council and the European Parliament COM (2001) 162 final Volume III); b) Good Agricultural and Environmental Condition requirements in England include 2 metre margins to protect all hedgerows as part of CAP reform and GEAC conditions protect hedgerows from removal in Northern Ireland; c) requirements of current agri-environment schemes are that all hedgerows on agreement holdings be retained d) hedgerows are included among the existing features that must be retained in agreements under the proposed English Entry Level agri-environment scheme e) the England Biodiversity Strategy uses hedgerows as countryside quality indicators f) In the 2002 UK BAP reporting round, 41 LUK BAPS reported on plans that used wider definitions of hedgerows than the

	existing priority type. In contrast, the Hedgerow Regulations for England and Wales are more exclusive than the existing scope of the HAP in relation to biodiversity, though the Regulations cover other public values of hedgerows as well as biodiversity. *3. Feasibility of monitoring targets* It is not practical to monitor targets for the HAP as currently defined, because of difficulties in identifying ancient hedgerows, plus complexities introduced by the need to survey and assess what is the herbaceous species-rich hedgerow resource. The new definition would enable existing Countryside Survey data sets to be used as baselines and allow repeats of the Survey in future to be used to monitor targets.
Are there implications for other priority habitats?	The proposed definition does not spatially impinge on other priority habitats if the proposed division from field margins, including priority Cereal / Arable Field Margins, is accepted as described in note iii) below. In conservation terms, the greater attention towards conservation of hedgerows as networks, which would be a consequence of including all hedgerows in the priority habitat, should aid conservation for priority species using a range of habitats across the countryside, eg greater horseshoe bats which fly/forage along hedgerows, and thus improve the biodiversity of a matrix of habitats at the landscape level, including priority habitats.
Notes on new definition:	i) Each UK country will be define the list of woody species native to their respective country. ii) Climbers such as honeysuckle and bramble are recognised as integral to many hedgerows and they provide important food resources and shelter for wildlife. However, they require other woody plants to be present to form a distinct woody boundary feature, and therefore they are not included in the definition as woody species. iii) The existing priority habitat definition is limited to boundary lines of trees or shrubs. It excludes banks or walls without woody shrubs on top of them and the new definition would also exclude these features. However, features associated with woody shrubs and trees, such as banks, ditches and verges will continue to be considered as part of a hedgerow in the new definition. Hedgerows with a rich basal flora, included in the existing habitat definition, will automatically be included by the new definition. The spatial limits of the hedgerow habitat are now further clarified as follows, including an arbitrary boundary to divide hedgerows from adjacent features such as field margins: • A hedgerow is defined as any boundary line of trees or shrubs over 20m long and less than 5 m wide, and where any gaps between the trees or shrubs species are less than 20 m wide (from Bickmore 2002, the Hedgerow Survey Handbook). • Any bank, wall, ditch or tree within 2 m of the centre of the hedgerow is considered to be part of the hedgerow habitat, as is the herbaceous vegetation within 2 m of the centre of the hedgerow (see also revised definition for arable field margins). iv) *Extent of hedgerows based on revised definition.* It is estimated (based on an analysis of Countryside Survey data using the proposed threshold of at least 80% cover of any UK native woody species) that 84% of countryside hedgerows in GB would be included.
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Proposed change to existing terrestrial priority habitat

Name of habitat	Arable [Cereal] Field Margins
Nature of recommended change	*Name change* From Cereal Field Margins to Arable Field Margins *Definition change to following text* *General description:* Arable field margins are herbaceous strips or blocks around arable fields that are managed specifically to provide benefits for wildlife. The arable field must be in a crop rotation which includes an arable crop, even if in certain years the field is in temporary grass, set-aside or fallow. Arable Field Margins are usually sited on the outer 2-12m margin of the arable field, although when planted as blocks they occasionally extend further into the field centre. *Physical limits of the Arable Field Margin priority habitat:* In general terms, the physical limits of the Arable Field Margin priority habitat are defined by the extent of any management undertaken specifically to benefit wildlife. Single payment cross-compliance margins are considered as part of the boundary habitat and are not part of the Arable Field Margin Habitat. The *outer edge* refers to the edge closest to the field boundary. Where there is a living field boundary (hedgerow or line of trees), any herbaceous vegetation within 2m from the centre of the living boundary is considered to be part of the living boundary habitat. The arable field margin outer boundary starts at the edge of this boundary habitat. Where the boundary is a ditch or other water body, any herbaceous vegetation within 2m from the centre of the water body (or one metre from the edge of the water body if this extends further into the field) is considered to be part of the boundary habitat. The arable field margin outer boundary starts at the edge of this boundary habitat. Where the boundary is non-living (e.g. a fence or wall), the outer edge is defined by the extent of any management undertaken specifically to benefit wildlife. Where the habitat comprises a block of, for example, wild bird seed mixture, it has only an outer edge. The *inner edge* refers to the edge closest to the centre of the field. In all cases, the inner edge is defined by the extent of any management undertaken specifically to benefit wildlife. *The following margin types are included:* a. Cultivated, low-input margins. These are areas within arable fields that are cultivated periodically, usually annually or biennially, but are not sprayed with spring/summer insecticides and not normally sprayed with herbicides (except for the control of injurious weeds or problem grasses such as creeping thistle, black grass, sterile brome or wild oat). Cultivated, low-input margins include conservation headlands and land managed specifically to create habitat for annual arable plants. b. Margins sown to provide seed for wild birds. These are margins or blocks sown with plants that are allowed to set seed and which remain in place over the winter. They may be sown with cereals and/or small-seeded broad-leaved plants or grasses but areas sown with maize are excluded as they are of lower value for wild birds. c. Margins sown with wild flowers or agricultural legumes and managed to allow flowering to provide pollen and nectar resources for invertebrates. d. Margins providing permanent, grass strips with mixtures of tussocky and fine-leaved grasses. Areas of grass established as cross compliance requirements (see below) are excluded from this definition, but all other strips of grassland created by sowing or natural regeneration, such as field margins or beetle banks, are included. Separate targets will be set for each margin-type, reflecting the varying priorities for conservation action. *The following margin types are excluded:* Although set-aside, biomass and organic crops can have incidental benefits for wildlife in arable fields, these areas are not managed specifically for wildlife and are therefore excluded from the definition. Margins established as cross compliance requirements under the Single Payment Scheme (in England and Scotland) or as mandatory requirements of an Entry-Level Agri-environment Scheme (in Wales and likely in Northern Ireland) are excluded. These margins, where present, would be included as part of the priority hedgerow habitat, where put in place to protect the hedgerow. Whole-field options such as over-wintered stubbles (with or without a fallow) and in-field options such as skylark plots are currently excluded from the definition of priority habitat, although their value for wildlife is acknowledged and their status will be reviewed in due course.

Which groups and/or individuals have been involved in this proposal?	Attending and corresponding members of the UK Cereal Field Margin HAP Group, including representatives from Natural England, Countryside Council for Wales, Welsh Assembly Government, Scottish Natural Heritage, Scottish Executive Environment and Rural Affairs Department, Department for Agriculture and Rural Development Northern Ireland, Royal Society for the Protection of Birds and Game Conservancy.
What would be the benefits of such a change?	• The wildlife of field margins in arable landscapes is not confined to margins of fields planted with cereals. Cultivated land in general provides opportunities for species requiring open disturbed habitats such as arable plants, and provides resources for species depending on such habitats eg seed-eating birds. In addition, margins that are not cultivated but are under permanent grass or sown with plants providing pollen and nectar sources for invertebrates or plants providing seed for farmland birds can be created in any arable field. • Cereals are often grown in rotation with other crops, thus the priority status of a margin, ie cereal priority/non-cereal non-priority, could be regarded as changing regularly over time in any one field. A permanent grass margin, for instance, would thus be inside and outside the current definition over time in any particular field. Rotation regimes can also change, for example, if new crops or current minor crops are grown more extensively as replacements for cereals in response to CAP reforms. Change to the definition so that all arable margins are included would remove this source of confusion. • The policy context fits with the revised definition. Options in higher tier and entry level agri-environment schemes do not usually make distinctions based on crop type in awarding funding for margin conservation. • The new definition and classification into four distinct types would make monitoring of the HAP targets through means such as Countryside Survey easier and more statistically powerful, as divisions into crop types across different Survey periods, with consequent reductions in sample sizes, would be unnecessary.
Are there implications for other priority habitats?	The habitat, as currently proposed, potentially could overlap with the priority Hedgerow habitat, but the definition given above explains how the two habitat types can be distinguished.
Longer-term aspiration	Options discussed, but not yet agreed upon, include: a) Developing an ecological definition for the 'habitat' e.g. arable land of high biodiversity value, defined as: Areas of arable land that meet one or more of the following criteria: • Hosting a Nationally Scarce or Rare arable plant species. • Having a mean within-crop plant species richness of (say) >18 per 100m square (upper quartile, CS 2000 arable field margin plots). • Regularly supporting a breeding population of the following crop-nesting bird species with a restricted distribution: corn bunting, reed bunting or lapwing. • Regularly supporting a breeding population of the following bird species with a restricted distribution which nest in hedges or grass margins and feed within the arable field: grey partridge, tree sparrow, turtle dove. • Used for foraging by any of the following bumblebee species: Shrill Carder bee, Common Carder bee, Large Garden Bumblebee, Great Yellow Bumblebee (Scotland). b) Have a 'broad habitat' type definition (which would include arable and horticulture) but with targets for various margins types and wider targets for associated species, for example: • 10-30% of all arable land is priority habitat by 2010. • The distribution (ranges) of all UK BAP 'priority' or 'species of conservation' arable plant taxa are stable or increasing (using Atlas data supplemented by Countryside Survey or targeted survey). • The mean species richness of plants within arable fields (particularly bird, butterfly and bee forage plants) is stable or increasing (from Countryside Survey data). • The following bird species are stable or recovering in number and range on farmland: grey partridge, skylark, tree sparrow, turtle dove, corn bunting, reed bunting, cirl bunting, stone curlew, lapwing, linnet and yellowhammer (by 2020). The farmland bird steering group would report while CFM group would look at management of habitat as a whole and ensure priorities are fed up the line.

Proposed change to existing terrestrial priority habitat

Name of habitat	[Lowland] Wood-Pasture and Parkland
Nature of recommended change	Proposed extension to priority habitat to include sites in upland areas and associated name change to 'Wood-pasture and parkland' The original reference to *lowland* wood-pastures and parkland should be dropped. Originally, it was believed that this habitat was largely confined to the lowlands. However it became apparent early on that equivalent habitats and sites also occurred in the upland zone. Therefore the priority habitat should include these in its considerations. *Minor changes proposed to original habitat description (shaded)* 1.1.1 Wood-pastures and parkland are the products of historic land management systems, and represent a vegetation structure rather than being a particular plant community. Typically this structure consists of large, open-grown or high forest trees (often pollards) at various densities, in a matrix of grazed grassland, heathland and/or woodland floras. 1.1.2 There are no reliable statistics on the extent of the overall resource, nor on historical and current rates of loss or degradation of this type of habitat. The figure of 10-20,000 ha currently in a working condition given in the habitat statement of the UK Biodiversity Steering Group report is the current best estimate. This habitat is most common in southern Britain, but scattered examples occur throughout the country for example Hamilton High Parks and Dalkeith Oakwood in Scotland. Recently it has been recognised as also being widespread formerly in the uplands. Outgrown wood-pasture and mature high forest remnants (virgin forests) occur in northern and central Europe, but the number and continuity of ancient (veteran) trees with their associated distinctive saproxylic (wood-eating) fauna and epiphytic flora are more abundant in Britain than elsewhere. Parklands and wood-pasture may also be of interest for bats and birds and may preserve indigenous tree genotypes. These areas are outstanding at a European level. 1.1.3 These sites are frequently of national historic, cultural and landscape importance. Some, but not all, of the individual habitat components (lowland beech and yew woodland, lowland heathland, lowland dry acid grassland) are biodiversity action plan priority habitats in their own right. Requirements of these plans will need to be given due regard during implementation. 1.1.4 Included in this plan are: i. Wood-pastures and parklands derived from medieval forests and emparkments, wooded commons, parks and pastures with trees in them. Some have subsequently had a designed landscape superimposed in the 16th to 19th centuries. A range of native species usually predominates amongst the old trees but there may be non-native species which have been planted or regenerated naturally. ii. Parklands with their origins in the 19th century or later where they contain much older trees derived from an earlier landscape. iii. Under-managed and unmanaged wood-pastures with veteran trees, in a matrix of secondary woodland or scrub that has developed by regeneration and/or planting. iv. Parkland or wood-pasture that has been converted to other land uses such as arable fields, forestry and amenity land, but where surviving veteran trees are of nature conservation interest. Some of the characteristic wood-pasture and parkland species may have survived this change in state. 1.1.5 Not normally included in this plan are: i. Upland sheep-grazed closed-canopy oak woodland, derived from coppice, or Caledonian pine forest (see the respective plans for these habitats), although in some cases grazing may be part of the desirable management approaches for these woods. ii. Parklands with 19th century origins or later with none of the above characteristics. 1.1.6 In terms of the National Vegetation Classification (NVC) of plant communities lowland wood-pastures and parkland are most commonly associated with W10 *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland, W14 *Fagus sylvatica - Rubus fruticosus* woodland, W15 *Fagus sylvatica - Deschampsia flexuosa* woodland and W16 *Quercus* spp. - *Betula* spp.- *Deschampsia flexuosa* woodland, although others may occur. Upland examples may show more resemblance to W11 and W17 woodland types. In addition the more open wood-pastures and parkland may include various scrub, heathland, improved and unimproved grassland NVC communities.

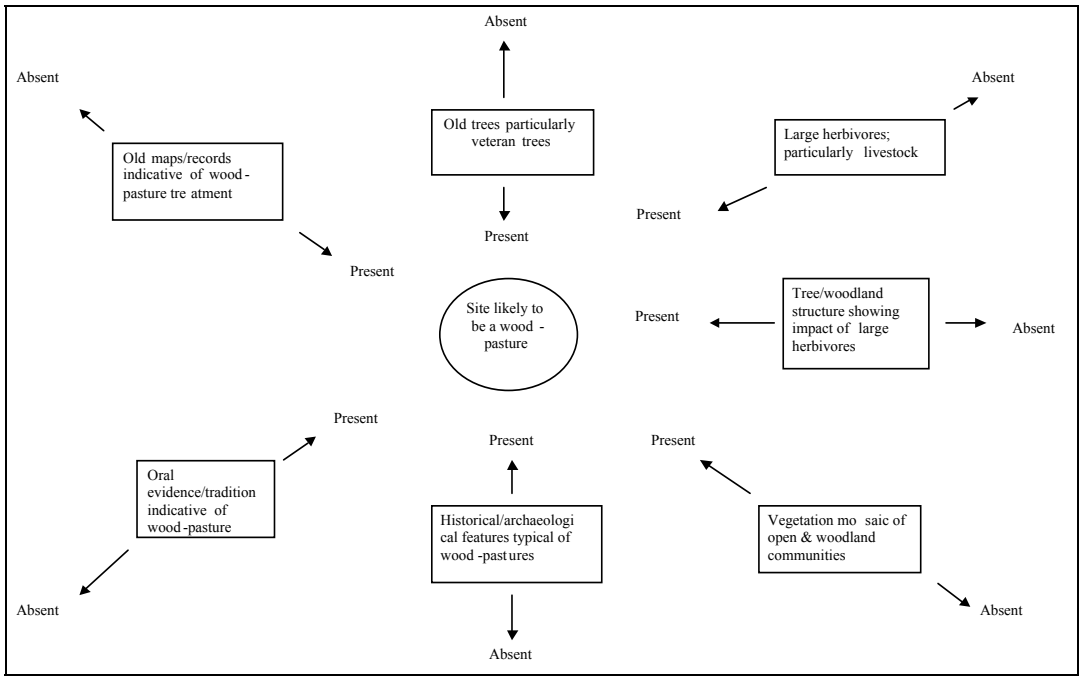
Additional explanation of what is meant by Wood-Pasture

Scope. This definition was produced for the Advisory Group for the Parkland and Wood-Pasture HAP by the Definitions Sub-Group Meeting. The terms of reference were to produce: 'a practical set of working definitions for different types of wood-pasture systems (both upland and lowland) to guide implementation of the HAP'. It can include parkland although this can usually be defined by its distinctive features involving enclosure of a set area to maintain deer or for landscape effect. This definition is intended to mainly cover semi-natural wood pastures on unenclosed rangeland, relics of these and other similar habitats. In recent years it has become increasingly clear that wood pastures occur and occurred much more widely and in more varied forms than had previously been widely appreciated. These are linked by some basic features and are rich in rare and declining species but can be found in many different landscapes. As such there is a need for a loose definition that can accommodate very different types of wood pasture.

Synonymy and the Problem. Wood-pasture and pasture woodland are taken to be synonymous here. This has not always been so, the latter term has been used to cover both trees and shrubs over pasture (savanna) and the denser cores of trees over grazed woodland communities (grazed high forest), this structure encourages the survival of rich epiphytic lichen floras. The New Forest exemplifies this structure, which is produced by patchy natural regeneration in the presence of grazing. Many definitions of wood-pasture confine it to savanna, regarding all closed canopy woodland as wood, anciently grazed or not. Open savanna is a more conducive habitat for warmth loving dead wood invertebrates than for lichens and the pure savanna habitat is typical of wood-pasture suffering from regeneration failure and planted parkland. The inclusion of the New Forest within the HAP, however means that any definition based on pure savanna habitat with all closed canopy woodland being excluded as wood is untenable.

Definition. Wood-pastures are areas that have been managed by a long-established tradition of grazing allowing, where the site is in good condition, the survived of multiple generations trees, characteristically with at least some veteran trees or shrubs. The tree and shrub component may have been exploited in the past and can occur as scattered individuals, small groups, or as more or less complete canopy cover. Depending on the degree of canopy cover other semi-natural habitats, including grassland, heath, scrub etc may occur in mosaic with woodland communities. While oak, beech, alder, birch, ash, hawthorn, hazel or pine are often dominant, a wide range of other tree and shrub species may occur as part of wood-pasture systems.

The diagram below may help judge whether a site is/was a wood-pasture. Wood-pastures in good condition are likely to have most factors scoring towards the central circle. Sites with a wood-pasture history (relic wood pastures) that have not been managed as such recently may be lacking some of the characteristic features. Landuse is fluid and just as relic wood pastures are evolving into different woodland types, other woodlands, or formerly open ground, may be evolving towards wood pastures with increases in grazing pressure or tree/shrub invasion respectively. Again these will not score as closely to the centre of the diagram.



	Notes (clockwise from top left): 1. Old maps, these are variable across the country, but many do indicate unclosed grazed woodland as different from enclosed woodland, as is seen if one compares known wood pastures with known enclosed woods. A very useful source, especially in the uplands, is the 1st series 6 inch OS maps dating from 1860s and 1870s. At this time most coppices will still be shown as enclosed, any wood shown as unenclosed, with dense stands irregular in shape and with areas of open scattered trees is likely to be an ancient pasture woodland. Enclosed relic stands will, however often have been enclosed in the lowlands by this time. 2. The term veteran tree includes both ancient (massive limb loss and large visible hollows) and post mature trees (or shrubs) (thinning of crown and hollowing starting but not very visible yet). Old trees are a strictly a consequence of wood-pasture management and not part of the definition, but they do indicate sites likely to be of great biodiversity interest. The more the better but any are significant. 3. Significant numbers of herbivores must be present in working pasture woodland but these may have been long gone in relic sites. Presence in past can be significant in relic sites, if significant numbers of trees originated under grazing pressure survive. 4. and 5. Structure is a complex factor and can be very different between woods and between regions, but characteristic features are irregular boundaries, very uneven stocking, frequent glades and areas with scattered trees. In healthy and expanding wood pastures scrub and thickets of infilling young trees are also to be expected but are normally patchy in working pasture woodlands, only where all enveloping due to the cessation of grazing are these negative features. Closed canopy stands are also typical in many wood pastures but these will be in mosaics with more open stands, uniform even aged closed canopies are a negative feature, but not closed canopies per se. Non-boundary pollards nearly always indicate grazing but not all pasture woodlands have pollards. Alder pollards are highly indicative of summer grazed upland wood-pasture but unprotected Alder coppice on wet soils is characteristic of lowland pasture woodlands. Open grown trees and shrubs are typical but this does not mean just fully open grown individuals but also includes tall partially open grown ones with irregular growth forms in low density grazed high forest. No fixed boundaries with open vegetation. 6. Archaeological features will vary regionally and can include the total absence of features, as in many New Forest pasture woodlands, in particular an absence of boundary banks is a positive feature. Charcoal can be made from pollards or unenclosed Alder coppice, so a few charcoal heaths does not indicate enclosed coppice but a high density may. 7. Useful for 20th century, not usually before this. *Boundaries.* Some wood-pastures have very clearly defined boundaries; in others it may be difficult to set limits and many may simply be part of a much larger range landscape. In the same way that a mire will be only part of a larger moorland ecology with the heath and grassland on drier ground wood-pasture is often intimately linked to non treed land. While it may be pragmatic to distinguish the area that represents the tree component of the wood-pasture from the broader grazing unit, this should not lead to the treed area being regarded as uniquely separate from the rest of the ecological unit. *Consequences.* This is intended as a guide to the identification of high quality relic and evolving wood pasture. Identification does not mean that all areas identified as such should be managed as wood-pasture but it is vital that its existence is appreciated and the possibility of maintaining or enhancing wood-pasture features considered. The positive features of grazing in woodland and the role of wood-pasture in planning ecological restoration needs recognition.
Which groups and/or individuals have been involved in this proposal?	Proposal submitted by Keith Kirby and Rebecca Isted (English Nature/JNCC) on behalf of the Advisory Group for the Wood-Pasture and Parkland HAP. Key organisations involved in agreeing the proposal include the Forestry Commission, SNH, CCW, English Nature, Woodland Trust.
What would be the benefits of such a change?	The revised definition reflects our improved awareness of the distribution of the habitat and the reality of how partner organisations are working (cf SNH booklet on Wood-pasture; extensive surveys in Wales, RSPB recognition of Geltsdale Reserve as part upland wood-pasture; Woodland Trust Reserve at Glen Finglas; RDS work at Glenamara Park in Cumbria; FC at Castle Hill, Yorkshire). The types of management (for veteran trees, grazing mosaics etc) needed for these upland sites is comparable to that in the lowlands, the threats are also similar. Not including them creates anomalies.
Are there implications for other priority habitats?	There is overlap between wood-pastures and other habitats because it is a structural type. Extending the definition to the Uplands does not bring in any new issues in this respect. It will continue to overlap with various UK BAP priority woodland types (mainly Lowland beech and yew woodland, Lowland mixed deciduous woodland, Upland birchwoods, Upland mixed ashwoods, and Upland oakwoods) and various UK BAP priority non-woodland types (especially Lowland dry acid grassland, Lowland calcareous grassland, Lowland meadows, Upland heathland, and Lowland heathland).

Proposed change to existing terrestrial priority habitat

Name of habitat	Lowland Heathland
Nature of recommended change	*Refine the definition of priority habitat as follows:* Lowland heathland is a broadly open landscape on impoverished, acidic mineral and shallow peat soil, which is characterised by the presence of plants such as heathers and dwarf gorses. It is generally found below 300 metres in altitude in the UK, but in more northerly latitudes the altitudinal limit is often lower. Areas of heathland in good condition should consist of an ericaceous layer of varying heights and structures, plus some or all of the following additional features, depending on environmental and/or management conditions: scattered and clumped trees and scrub; bracken; areas of bare ground; areas of acid grassland; lichens; gorse; wet heaths, bogs and open water. Lowland heathland can develop on drift soils and weathered flint beds over calcareous soils (limestone or chalk heath). Lowland heathland is a dynamic habitat which undergoes significant changes in different successional stages, from bare ground (e.g. after burning or tree clearing) and grassy stages, to mature, dense heath. These different stages often co-occur on a site. The presence and numbers of characteristic birds, reptiles, invertebrates, vascular plants, bryophytes and lichens are important indicators of habitat quality.
Which groups and/or individuals have been involved in this proposal?	Proposal submitted by Isabel Alonso (Natural England) on behalf of the Lowland Heathland HAP Group
What would be the benefits of such a change?	It would include within the lowland heathland UK BAP priority habitat, areas that do not conform to the standard "heathy" definition.
Are there implications for other priority habitats?	The boundaries with genuine acid grassland need to be clarified for mapping purposes. In general, a 25% limit can be used, i.e. <25% dwarf shrub cover = grassland; more is heathland.

Proposed change to existing terrestrial priority habitat

Name of habitat	Lowland calcareous grassland
Nature of recommended change	Amend definition to: (i) include examples of NVC CG10 *Festuca ovina - Agrostis capillaris - Thymus praecox* grassland where they clearly occur below the upper limits of agricultural enclosure; and (ii) exclude examples of CG1 *Festuca ovina - Carlina vulgaris* grassland and CG2 *Festuca ovina - Avenula pratensis* grassland where these clearly occur above the upper limits of enclosure.
Which groups and/or individuals have been involved in this proposal?	Lowland Grassland Lead Co-ordination Network, Lowland Grassland Habitat Action Plan umbrella group, JNCC Upland Lead Coordination Network.
What would be the benefits of such a change?	The current definition specifically excludes CG10 which, at the time of writing the original HAP and defining the priority habitat type, was thought to be primarily an upland NVC community. Subsequent investigation has shown that some examples of CG10 occur below the upper limit of agricultural enclosure and otherwise do not fit the characteristics of upland calcareous grassland. In Scotland, the extent of CG10 in the lowlands is estimated to be roughly 10% of that in the uplands. Thus an amended Lowland Calcareous Grassland priority habitat will include a significant proportion of all calcareous grassland in Scotland. (NB definition on UK BAP website also suggests that CG1-9 do not occur in Scotland; subsequent survey has found examples of both CG2 and CG7 *Festuca ovina – Hieracium Pilosella – Thymus praecox/ pulegioides* grassland in the Scottish Borders). In Northern Ireland, enclosed calcareous grassland (mainly CG9 and CG10) is very limited and similar floristically to unenclosed grassland. For practical purposes all calcareous grassland in Northern Ireland is treated as Upland Calcareous Grassland.
Are there implications for other priority habitats?	The upland calcareous grassland priority habitat definition will have to be amended to refer only to examples of CG1, CG2 and CG10 that clearly occur in an upland setting (i.e. above the level of agricultural enclosure). Similarly the definition should be amended to include the predominantly lowland communities CG1 *Festuca ovina - Carlina vulgaris* grassland and CG2 *Festuca ovina - Avenula pratensis* grassland where these occur above the upper limit of agricultural enclosure.

ANNEX 6

ACKNOWLEDGEMENTS

Consultee name	Group	Affiliation
Adrian Fowles	Butterflies, Beetles	Countryside Council for Wales
Adrian Plant	Flies	National Museum of Wales
Adrian Pont	Flies	University of Oxford Museum of Natural History
Aethne Cooke	Marine	Countryside Council for Wales
Alan Hale	Bryophytes, Charophytes	Countryside Council for Wales
Alan Stewart	True bugs	Auchenorrhyncha Recording Scheme
Alan Stubbs	Terrestrial & Freshwater Invertebrate Expert Group, Flies, Terrestrial & Freshwater Habitats	Dipterists Forum, Buglife
Alex Ramsay	Beetles	University of Reading
Alex Turner	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Ali Hood	Marine	Shark Trust
Alisa Watson	Molluscs	English Nature/Natural England
Alison Champion	Marine	World Wildlife Fund
Alison Lee	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Alison Rasey	Mammals	Bat Conservation Trust
Alistair Church	Terrestrial & Freshwater Habitats	Environment & Heritage Service, DOENI
Alistair Crowle	Terrestrial & Freshwater Habitats	English Nature/Natural England
Alistair Ward	Mammals	Central Science Laboratory
Alister Jones	Bees/wasps	Forestry Commission
Allison Crofts	Beetles	The Wildlife Trusts
Andrea Kelly	Charophytes	Broads Authority
Andrew Dodd	Marine	Royal Society for the Protection of Birds
Andrew Mackie	Marine	NMGW
Andrew Pullin	Butterflies	University of Birmingham
Andrew Thompson	Working Group member	DEFRA
Andrew Whitehouse	Beetles	Buglife
Andy Amphlett	Flies	Royal Society for the Protection of Birds
Andy Barker	Butterflies	Hampshire County Council
Andy Brown	Birds	English Nature/Natural England
Andy Douse	Birds	Scottish Natural Heritage
Andy Foster	Moths	National Trust
Andy Godfrey	Flies	Dipterists Forum
Andy Jones	Vascular plants	Countryside Council for Wales
Andy Keay	Millipedes and centipedes	British Myriapods and Isopods Group
Andy Musgrove	Moths	British Trust for Ornithology
Andy Simpkin	Beetles	Lincolnshire Wildlife Trust
Angela Moffat	Marine	English Nature/Natural England
Anita Weatherby	Terrestrial & Freshwater Habitats	Pond Conservation
Ann Davies	Terrestrial & Freshwater Habitats	DEFRA
Anna Griffith	Bryophytes, Lichens & fungi	Scottish Natural Heritage
Anne Baker	Mites	Natural History Museum
Anne Lewis	Molluscs	Environment Agency
Aquifer-fed naturally fluctuating water bodies HAP Steering Group	Terrestrial & Freshwater Habitats	
Arjun Amar	Birds	Royal Society for the Protection of Birds
Athayde Tonhasca	Terrestrial & Freshwater Invertebrate Expert Group, Butterflies, Beetles	Scottish Natural Heritage

Consultee name	Group	Affiliation
B. Merz	Flies	Muséum d'histoire naturelle, Geneva
Barbara Jones	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Barbara Schulten	Flies (co-ordinator)	Dipterists Forum UK BAP officer
Barry Coleville	Molluscs	Conchological Society
Barry Dickerson	Moths	Butterfly Conservation/BENHS/ County Recorder (Hunts)
Barry Stewart	Moths	Glamorgan Moth Group
Baz Hughes	Birds	WWT
Bernard Nau	True bugs	Heteroptera Study Group
Beth Newman	Fungi	Plantlife
Bird Expert Group	Birds	
Bob George	Fleas	Siphonaptera Recording Scheme
Bob Heckford	Moths	BENHS
Bob Palmer	Moths	BENHS
Bob Saville	Booklice	Lothian Wildlife
Brian Coppins	Lichens	British Lichen Society
Brian Eversham	Beetles	The Wildlife Trusts
Brian Levey	Beetles	National Museum & Galleries of Wales
Brian Spooner	Fungi	
Bridget Peacock	NHM	Natural History Museum
Brigit Primrose	Working Group member	Scottish Natural Heritage
British Lichen Society Conservation Committee	Lichens	
Bryan Edwards	Lichens	British Lichen Society
Bryophyte BAP Technical Committee	Bryophytes	
Caitriona Carlin	Mammals	English Nature/Natural England
Cameron Durie	Fish	Environment Agency
Camilla Lambrick	Vascular plants	English Nature/Natural England
Carl Borges	Fungi	English Nature/Natural England
Carl Mitchell	Flies	Royal Society for the Protection of Birds
Caroline Bulman	Butterflies	Butterfly Conservation
Caroline Daguet	Dragonflies	British Dragonfly Society
Carrie Rimes	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Catrin Grimstead	Molluscs	Conchological Society
Cereal Field Margins HAP Steering Group	Terrestrial & Freshwater Habitats	
Chalk Rivers HAP Steering Group	Terrestrial & Freshwater Habitats	
Charles Lienhard	Booklice	Geneva Natural History Museum
Charlotte Gault	Working Group member	The Wildlife Trusts
Charlotte Johnston	Marine	Joint Nature Conservation Committee
Chris Cheffings	Working Group member & contact, Bryophytes, Lichens, Fungi, & Vascular plants	Joint Nature Conservation Committee
Chris Gleed-Owen	Amphibian & Reptile Expert Group	Herpetological Conservation Trust
Chris Harrod	Fish	Max Plank Institute
Chris Lyal	Lice	Natural History Museum
Chris Mainstone	Terrestrial & Freshwater Habitats	English Nature/Natural England
Chris Manley	Moths	Dorset
Chris Preston	Bryophytes, Charophytes, Vascular Plants	Biological Records Centre
Chris Raper	Flies	Tachinidae Recording Scheme
Chris Thomas	Butterflies	University of York
Chris Wynne	Charophytes	The Wildlife Trusts
Clare Pinches	Terrestrial & Freshwater Habitats	English Nature/Natural England

Consultee name	Group	Affiliation
Coastal HAP Steering Grp	Terrestrial & Freshwater Habitats	
Colin Adams	Fish	Glasgow U./Scottish Natural Heritage
Colin Bean	Working Group member & contact, Fish	Scottish Natural Heritage
Colin Catto	Mammals	Bat Conservation Trust
Colin Plant	Lacewings	Neuropterida Recording Scheme
Colin Pratt	Moths	BENHS
Colin Smith	Moths	County Recorder (Lincs)
Craig MacAdam	Mayflies	Ephemeroptera Recording Scheme
Cyril Bennett	Mayflies	JSLTANS
Darren Mann	Beetles	Scarabaeoidea Recording Scheme
Dave Allen	Moths	Environment & Heritage Service, DOENI
Dave Beaumont	Birds	Royal Society for the Protection of Birds
Dave Chambers	Working Group member, data analyst	Joint Nature Conservation Committee
Dave Cowen	Mammals	Central Science Laboratory
Dave Genney	Bryophytes, Lichens, & Fungi	Scottish Natural Heritage
Dave Gibbons	Working Group member, contact, Birds	Royal Society for the Protection of Birds
Dave Grundy	Moths	Butterfly Conservation Consultant
Dave Hoccom	Birds	Royal Society for the Protection of Birds
Dave Horsfield	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Dave Rumble	Fungi	Hampshire Wildlife Trust
David Aldridge	Molluscs	Cambridge University
David Barbour	Moths	Butterfly Conservation Consultant (Scotland)
David Bilton	Beetles	University of Plymouth
David Bolton	Millipedes	Exeter University
David Burrows	Moths	Butterfly Conservation
David Connor	Marine	Joint Nature Conservation Committee
David Fraser	Fish	English Nature/Natural England
David Gibbs	Flies	Dipterists Forum
David Hill	Lichens	British Lichen Society
David Holdich	Crustaceans	EMEC Ecology
David Holyoak	Bryophytes	British Bryological Society
David Horne	Crustaceans	University of London
David Hunt	Nematodes	CABI Bioscience
David John	Algae	British Phycological Society
David Knight	Terrestrial & Freshwater Habitats	English Nature/Natural England
David Long	Molluscs	Conchological Society
David Long	Bryophytes	Royal Botanic Garden Edinburgh
David MacDonald	Mammals	University of Oxford
David Manning	Moths	Microlepidoptera County Recorder
David Noble	Birds	British Trust for Ornithology
David Pearman	Vascular plants	Botanical Society of the British Isles
David Pryce	Stoneflies	Environment Agency
David Pryce	Stoneflies	Stonefly recording scheme
David Rogers	Crustaceans	Independent Consultant
David Sheppard	Terrestrial & Freswater Invertebrate Expert Group,Bees/wasps, Butterflies	Symphyta Recording Scheme, English Nature/Natural England
David Slade	Moths	Southeast Wales Biodiversity Records Centre/BENHS
David Smallshire	Dragonflies, Butterflies	DEFRA (RDS), Natural England
David Stevens	Terrestrial & Freshwater Habitats	Countryside Council for Wales
David Williamson	Algae	British Phycological Society
Debbie Cousins	Charophytes	Environment Agency
Deborah Long	Terrestrial & Freshwater Habitats, Vascular plants	Montane Scrub Action Group, Plantlife Scotland

Consultee name	Group	Affiliation
Deborah Procter	Terrestrial & Freshwater Invertebrate Expert Group, Working Group member, contact, Spiders	Joint Nature Conservation Committee
Declan Looney	Mammals	Environment and Heritage Service
Derek Yalden	Mammals	Manchester University
Des Thompson	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Desmond Kime	Millipedes	European Invertebrate Survey
Diana Reynolds	Terrestrial & Freshwater Habitats	Welsh Assembly Government
Dominic Price	Charophytes	Plantlife
Dorothy Casey	Beetles	The Wildlife Trusts
Dorothy Wright	Amphibian & Reptile Expert Group	Herpetological Conservation Trust
Douglas McKean	Vascular plants	Royal Botanic Garden Edinburgh
Duncan Williams	Moths	Forest Research
Ed Mountford	Terrestrial & Freshwater Habitats, Working Group member & contact	Joint Nature Conservation Committee
Eddy Mayhew	Marine	Natural England
Eleanor Hill	Marine	Natural England
Elizabeth Barrat	Mammals	The Wildlife Trusts
Environment Agency	Terrestrial & Freshwater Habitats	
Eric Philp	Millipedes	British Myriapods and Isopods Group
Fiona Hunter	Birds	Royal Society for the Protection of Birds
Fiona Mason	Marine	Scottish Natural Heritage
Forestry Commission	Terrestrial & Freshwater Habitats	
Francesca Marubini	Marine	JNCC
Frank Dobson	Lichens	British Lichen Society
Fred Currie	Fungi	Forestry Commission
Fred Rumsey	Bryophytes, Vascular plants	Natural History Museum
Freshwater LCN	Terrestrial & Freshwater Habitats	
Fungus Conservation Forum	Fungi	
Gail Jeffcoate	Butterflies	Butterfly Conservation
Garth Foster	Beetles	Aquatic Coleoptera Conservation Trust
Gary Rushworth	Beetles	Environment Agency
Gavin Broad	BRC	Centre for Ecology and Hydrology
Gavin Measures	Terrestrial & Freshwater Habitats	English Nature/Natural England
Geoff Boxshall	Crustaceans	Natural History Museum
Geoff Oxford	Beetles	University of York
George Lees	Marine	Scottish Natural Heritage
Georgette Shearer	Mammals	The Mammal Society
Gerald Legg	Pseudoscorpions	Pseudoscorpions Recording Scheme
Geraldine Holyoak	Molluscs	Conchological Society
Gerry Haggett	Moths	BENHS
Gill Stevens	Lichens	Natural History Museum
Glenda Orledge	Ants	University of Bath
Gordon Patterson	Terrestrial & Freshwater Habitats	Forestry Commission
Gordon Rothero	Bryophytes	BBS
Graham Jones	Moths	Lancashire
Graham Proudlove	Crustaceans	British Cave Research Association
Graham Rotheray	Flies	Malloch Society
Graham Scholey	Mammals	Environment Agency
Gy Ovenden	Chair, Working Group member	DEFRA
Heather Robertson	Terrestrial & Freshwater Habitats	English Nature/Natural England
Hedgerows HAP Steering Group	Terrestrial & Freshwater Habitats	
Helen Baker	Birds	Joint Nature Conservation Committee

Consultee name	Group	Affiliation
Helen Read	Millipedes	British Myriapods and Isopods Group
Herbert Nickel	True bugs	University of Göttingen
Howard Mendel	Beetles	Elateroidea Recording Scheme
Hugh Jones	Flatworms	Terrestrial Flatworm Recording Scheme
Huw Jones	Molluscs	Conchological Society
Iain Sime	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Ian Bennallick	Vascular plants	Botanical Society of the British Isles
Ian Davidson	Fish	Environment Agency
Ian Dawson	Spiders	British Arachnological Society
Ian Ferguson	Moths	Butterfly Conservation
Ian Fozzard	Terrestrial & Freshwater Habitats, Charophytes	Scottish Environment Protection Agency
Ian Killeen	Molluscs (co-ordinator)	Conchological Society
Ian MacGowen	Flies	Scottish Natural Heritage
Ian McLean	Flies	Sciomyzidae Recording Scheme
Ian Middlebrook	Terrestrial and Freshwater Invertebrates	Action for Invertebrates
Ian Reach	Saline lagoons	English Nature/Natural England
Ian Smith	Moths	Cheshire
Ian Strachan	Terrestrial & Freshwater Habitats, Working Group member & contact	JNCC/Scottish Natural Heritage
Ian Taylor	Vascular plants	English Nature/Natural England
Ian Thirlwell	Moths	Butterfly Conservation
Ian Wallace	Caddisflies, Moths	Trichoptera Recording Scheme
Ian Winfield	Fish	Centre for Ecology and Hydrology
Ian Woiwod	Moths, Butterflies	Rothamsted Research Station
Inter-agency Urban Habitat Working Group	Terrestrial & Freshwater Habitats	
Isabel Alonso	Terrestrial & Freshwater Habitats	English Nature/Natural England
Ishpi Blatchley	Lichens	British Lichen Society
Ivan Perry	Flies	Dipterists Forum
Jackie Brinton	Mammals	Deer Initiative
Jacqui Ward Dyer	Amphibians, Reptiles	Froglife
James McGill	Moths	Somerset Moth Group
Jamie Roberts	Terrestrial & Freshwater Invertebrate Expert Group, Working Group member	Buglife
Jan Clemons	Amphibian & Reptile Expert Group	HGBI
Jane Ashley	Worms	The Wildlife Trust for Lancashire
Jane MacKintosh	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Jane Sears	Terrestrial & Freshwater Invertebrate Expert Group, Bees/wasps, Birds, Working Group member	Royal Society for the Protection of Birds
Jean Matthews	Mammals	Countryside Council for Wales
Jean-Luc Solandt	Marine	
Jen Ashworth	Marine	Natural England
Jenny Bryant	Charophytes	Natural History Museum
Jenny Duckworth	Bryophytes, Lichens, Fungi	Plantlife
Jenny Rowntree	Bryophytes	Royal Botanic Gardens Kew
Jeremy Thomas	Butterflies	Centre for Ecology and Hydrology
Jerry Wilson	Birds	Royal Society for the Protection of Birds
Jessa Battersby	Mammals	Joint Nature Conservation Committee
Jill Nelson	Mammals	People's Trust for Endangered Species
Jill Sutcliffe	Vascular plants, Fungi	English Nature/Natural England
Jim Asher	Butterflies	Butterfly Conservation
Jim Foster	Amphibian & Reptile Expert Group	English Nature/Natural England

Consultee name	Group	Affiliation
Jo Girvan	Charophytes	Scottish Environmental Protection Agency
Jo Lenthal	Working Group member	Royal Society for the Protection of Birds
Jo Wharam	Marine	Whale & Dolphin Conservation Society
Joan Edwards	Marine	
Joanna Drewitt	Terrestrial & Freshwater Habitats, Chair, Working Group member	Scottish Executive
Joe Breen	Marine	Environment & Heritage Service, DOENI
John Baker	Amphibian & Reptile Expert Group	Herpetological Conservation Trust
John Bass	Molluscs	Centre for Ecology and Hydrology
John Baxter	Working Group member	Scottish Natural Heritage
John Bishop	Bryzoans	Marine Biological Association
John Bowler	Bees/wasps	Royal Society for the Protection of Birds
John Buckley	Amphibian & Reptile Expert Group	Herpetological Conservation Trust
John Davis	Butterflies	Butterfly Conservation
John Ismay	Flies	Dipterists Forum
John Marchant	Birds	British Trust for Ornithology
John McKinnell	Amphibian & Reptile Expert Group	Scottish Natural Heritage
John Milbourn	Amphibians, Reptiles, Mammals	Environment & Heritage Service, DOENI
John Milburne	Amphibian & Reptile Expert Group, Mammals	Environment & Heritage Service, DOENI
John Murray Bligh	Molluscs	Environment Agency
John Steel	Molluscs	Environment Agency
Joint Lakes HAP Steering Group	Terrestrial & Freshwater Habitats	
Jon Cooter	Beetles	
Jon Webb	Terrestrial & Freswater Invertebrate Expert Group, Flies	English Nature/Natural England
Jonathan Cole	Flies	Dipterists Forum
Jonathan Shelley	Fish	Environment Agency
Jonathan Spencer	Beetles	Forest Enterprise
Jonathon Reynolds	Mammals	Game Conservation Trust
Jonty Denton	Beetles	Scirtidae and Stenininae Recording Schemes
Judith Young	Working Group member	Scottish Executive
Julian Hughes	Working Group member	Wildlife & Countryside Link
Julie Bywater	Crustaceans	Environment Agency
Juliette Hall	Molluscs	Conchological Society
Karen Robinson	Marine	Countryside Council for Wales
Kate Holl	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Kathy Friend	Molluscs	Environment Agency
Katie Parsons	Mammals	Bat Conservation Trust
Katie Parsons	Terrestrial & Freshwater Habitats	Joint Bat BAP steering group
Keith Alexander	Beetles	Cantharoidea & Buprestoidea Recording Scheme
Keith Easton	Fish	Environment Agency
Keith Hiscock	Marine	Independent consultant
Keith Kirby	Terrestrial & Freshwater Habitats	English Nature/Natural England
Ken Smith	Birds	Royal Society for the Protection of Birds
Kenny Kortland	Birds	Royal Society for the Protection of Birds
Kery Dalby	Lichens	British Lichen Society
Kirsten Ramsey	Marine	Countryside Council for Wales
Laurence Bellamy	Flatworms	Freshwater Flatworm Recording Scheme
Laurence Clemons	Flies	Recording Scheme Organiser
Lawrence Bee	Spiders	Oxfordshire Invertebrate Recording Grp

Consultee name	Group	Affiliation
Lawrence Talks	Terrestrial & Freshwater Habitats	Environment Agency
Lee Knight	Crustaceans	Hypogean Crustacea Recording Scheme
Lesley Taylor	Habitats	DEFRA
Lesley Taylor	Terrestrial & Freshwater Habitats	DEFRA
Limestone Pavement HAP Steering Group	Terrestrial & Freshwater Habitats	
Linda Barnett	Amphibian & Reptile Expert Group	Froglife
Lissa Goodwin	Marine	
Liz Halliwell	Mammals	Countryside Council for Wales
Liz Holden	Fungi, mycological contractor	British Mycological Society
Liz Howe	Terrestrial & Freshwater Habitats, Amphibians, Reptiles	Countryside Council for Wales
Louise Lieberknecht	Marine Working Group member & contact	Joint Nature Conservation Committee
Lowland Grassland HAP Steering Group	Terrestrial & Freshwater Habitats	
Lowland Grassland LCN	Terrestrial & Freshwater Habitats	
Lowland Heath HAP Steering Group	Terrestrial & Freshwater Habitats	
Lowland Wetland LCN	Terrestrial & Freshwater Habitats	
Lynne Farrell	Terrestrial & Freshwater Habitats, Vascular plants, Charophytes, Working Group member & contact	Vascular BAP Plant Expert Group, Scottish Natural Heritage
Mairi Cole	Amphibian & Reptile Expert Group	Scottish Natural Heritage
Malcolm Ausden	Worms	Royal Society for the Protection of Birds
Malcolm Smart	Flies	Dipterists Forum
Malcolm Vincent	Marine	JNCC
Margaret Palmer	Terrestrial & Freshwater Invertebrate Expert Group, Terrestrial & Freshwater Habitats, Working Group member	Buglife
Margaret Ramsay	Bryophytes	Royal Botanic Gardens Kew
Mark Eaton	Birds, Working Group member	Royal Society for the Protection of Birds
Mark Hill	Bryophytes	British Bryological Society
Mark Parsons	Moths	Butterfly Conservation
Mark Simmonds	Marine	Whale & Dolphin Conservation Society
Mark Tasker	Marine	JNCC
Mark Telfer	Beetles	Ground Beetle Recording Scheme
Mark Wright	Fungi	Environment and Heritage Service
Mark Young	Terrestrial & Freshwater Habitats, Butterflies	Aberdeen University
Marlynne Good	Lichens	Environment Agency
Martin Willing	Molluscs	Conchological Society
Martin Allison	Fungi	Royal Society for the Protection of Birds
Martin Drake	Flies	
Martin Gaywood	Amphibians, Reptiles	Scottish Natural Heritage
Martin Harvey	Butterflies, Beetles	The Wildlife Trusts
Martin Rejzek	Beetles	Cerambycid recording scheme
Martin Warren	Butterflies	Butterfly Conservation
Martyn Ainsworth	Fungi	English Nature/Natural England
Martyn Gorman	Mammals	Aberdeen University
Mary Swan	Amphibian & Reptile Expert Group	British Herpetalogical Society
Matt Dalkin	Marine	Scottish Natural Heritage
Matt Heydon	Mammals	,DEFRA (RDS)
Matt Shardlow	Terrestrial & Freshwater Invertebrate Expert Group, Terrestrial & Freshwater Habitats	Buglife
Matt Smith	Flies	Tachinidae Recording Scheme

Consultee name	Group	Affiliation
Matthew Oates	Butterflies	National Trust
Matthew Smith	Beetles	Peoples Trust for Endangered Species
Melanie Hardy	Working Group member & contact Mammals	Joint Nature Conservation Committee
Melissa Moore	Marine	
Michael Ackland	Flies	Dipterists Forum
Michael Jordan	Fungi	Association of British Fungus Groups
Michael Woods	Mammals	Mammal Society
Michelle Calnan	Working Group member	Welsh Assembly Government
Mike Atkinson	Fish	Environment Agency
Mike Cox	Beetles	Natural History Museum
Mike Daniels	Mammals	Deer Commission for Scotland
Mike Edgington	Fungi	English Nature/Natural England
Mike Edwards	Bees/wasps/ants	Bees, Wasps & Ants Recording Society
Mike Majerus	Beetles	Ladybird Recording Scheme
Mike Morris	Beetles	Natural History Museum
Mike Pawson	Fish	CEFAS
Mike Raven	Birds	British Trust for Ornithology
Mike Sutcliffe	Lichens	English Nature/Natural England
Mike Toms	Mammals	British Trust for Ornithology
Mike Williams	Beetles	Environment Agency
Mike Wilson	True bugs	Cardiff Museum
Miran Aprihamian	Fish	Environment Agency
Montane Scrub Action Grp	Terrestrial & Freshwater Habitats	
Morag McCracken	Butterflies	Butterfly Conservation
Neil Sanderson	Lichens	British Lichen Society
Nicholas Aebischer	Birds	Game Conservation Trust
Nick Bromage	Fish	Environment Agency
Nick Evans	Bryozoans, Bryophytes, Lichens	Natural History Museum
Nick Stewart	Charophytes	
Nicky Hewson	Beetles	University of Leeds
Nicola Hutchinson	Vascular plants, Charophytes	Plantlife
Nida Al-Fulaij	Beetles	Peoples Trust for Endangered Species
Nigel Bourn	Terrestrial & Freshwater Expert Group, Working Group member & contact	Butterfly Conservation
Nigel Marley	Tardigrades	University of Plymouth
Nikki Chapman	Marine, Working Group member & contact	Joint Nature Conservation Committee
Norbert Maczey	True bugs	CABI Bioscience
Norman Baldock	Flies	Dartmoor National Park
Norman Ratcliffe	Birds	Royal Society for the Protection of Birds
Norrie Russell	Birds	Royal Society for the Protection of Birds
Oliver Cheesman	Terrestrial & Freshwater Invertebrate Expert Group, Crickets/grasshoppers	CABI Bioscience
Owen Lewis	Butterflies	University of Oxford
Pam Taylor	Dragonflies	British Dragonfly Society
Pat Morris	Mammals	The Mammal Society
Pat Sones	Terrestrial & Freshwater Habitats	Environment Agency
Pat Wolseley	Lichens	British Lichen Society
Paul Barwick	Beetles	Forest Enterprise
Paul Bright	Mammals	Royal Holloway University of London
Paul Corbett	Terrestrial & Freshwater Habitats	Environment & Heritage Service, DOENI
Paul Edgar	Amphibian and Reptile Expert Group	Herpetological Conservation Trust
Paul Frear	Fish	Environment Agency

Consultee name	Group	Affiliation
Paul Harding	Fish	Centre for Ecology and Hydrology
Paul Hillyard	Ticks	Natural History Museum
Paul Kirk	Fungi	CABI Bioscience
Paul Kirkland	Butterflies	Butterfly Conservation (Scotland)
Paul Lee	Millipedes	Millipede Recording Scheme
Paul Walton	Birds	Royal Society for the Protection of Birds
Paul Wood	Crustaceans	Loughborough university
Pete Brotherton	Working Group member	English Nature/Natural England
Pete Stevens	Fungi	English Nature/Natural England
Peter Barnard	Caddisflies	Natural History Museum
Peter Chandler	Flies	Fungus Gnat Recording Scheme
Peter Evans	Marine	
Peter Hammond	Beetles	Staphylinidae Recording Scheme
Peter Harvey	Spiders	British Arachnological Society
Peter Hayes	Mayflies	Salmon and Trout Association
Peter Hayward	Bryzoans	University of Swansea
Peter Hodge	Beetles	Cerambycidae Recording Scheme
Peter Jones	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Peter Kirby	True bugs	
Peter Lambley	Lichens	English Nature/Natural England/British Lichen Society
Peter Maitland	Fish	Fish Conservation Centre
Peter Merrett	Spiders	British Arachnological Society
Peter Quelch	Ants	Forestry Commission Scotland
Peter Roberts	Fungi	Royal Botanic Gardens Kew
Peter Sutton	Crickets/grasshoppers	Orthoptera Recording Scheme
Phil Boon	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Pippa Langford	Terrestrial & Freshwater Habitats	Countryside Agency
Pjotr Oosterbroeck	Flies	Amsterdam Museum
Plantlife/Plantlife Scotland	Terrestrial & Freshwater Habitats	
Pond Conservation	Terrestrial & Freshwater Habitats	
Ray Gibson	Worms	Liverpool John Moores University
Ray Woods	Lichens, Fungi	Countryside Council for Wales/Plantlife
Rebecca Isted	Terrestrial & Freshwater Habitats	English Nature/Natural England
Richard Cove	Fish	Environment Agency
Richard Evans	Terrestrial & Freshwater Habitats	Welsh Assembly Government
Richard Fox	Butterflies	Butterfly Conservation
Richard Gregory	Birds	Royal Society for the Protection of Birds
Richard Jefferson	Terrestrial & Freshwater Habitats	English Nature/Natural England
Richard Lawrence	Molluscs	Ivel and Ouse Countryside Project
Richard Rafe	Terrestrial & Freshwater Habitats	English Nature/Natural England
Richard Thomson	Beetles	Natural History Museum
Richard Weyl	Terrestrial & Freshwater Invertebrate Expert Group, Butterflies, Beetles, Working Group member	Environment & Heritage Service DOENI
Rob Blyth-Skyrme	Marine	Natural England
Rob Evans	Fish	Environment Agency
Rob Raynor	Mammals	Scottish Natural Heritage
Robbie MacDonald	Mammals	Queen's University Belfast
Robert Rosell	Fish	Dept. Agriculture NI
Robin Wynde	Birds	Royal Society for the Protection of Birds
Roddy Mavor	Birds	Joint Nature Conservation Committee
Roger Booth	Beetles	Natural History Museum

Consultee name	Group	Affiliation
Roger Dennis	Butterflies	University of Birmingham
Roger Handford	Fish	Environment Agency
Roger Key	Terrestrial & Freshwater Invertebrate Expert Group, Beetles, Vascular plants	English Nature/Natural England
Roger Meade	Terrestrial & Freshwater Habitats	English Nature/Natural England
Roger Smith	Butterflies	Butterfly Conservation
Roger Trout	Mammals	Forestry Commission
Ron Porley	Bryophytes, Vascular plants	English Nature/Natural England
Ron Vasse	Terrestrial & Freshwater Habitats	Scottish Executive
Rose Murphy	Vascular plants	Botanical Society of the British Isles
Ross Gardiner	Fish	FRS
Roy Anderson	Beetles	DARD
Roy Baker	Molluscs	Independent consultant
Roy Crossley	Flies	Dipterists Forum
Russel Hobson	Butterflies	Butterfly Conservation (Wales)
Sallie Bailey	Terrestrial & Freshwater Habitats	Forestry Commission
Sally Johnson	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Sam Bosanquet	Bryophytes	Countryside Council for Wales
Samantha Forster	Ants	Forestry Commission Scotland
Sandra McInnes	Tardigrades	British Antarctic Survey
Sandy Coppins	Lichens	British Lichen Society
Sandy Downie	Marine	Scottish Natural Heritage
Sarah Brook	Butterflies	Butterfly Conservation
Sarah Niemann	Birds	Royal Society for the Protection of Birds
Scottish Environment Protection Agency	Terrestrial & Freshwater Habitats	
Sheila Brooke	True bugs	Terrestrial/Aquatic Heteroptera Recording Scheme
Shelagh Wilson	Molluscs	Environment Agency
Shelley Evans	Fungi	British Mycological Society
Simon Brockington	Marine	Natural England
Simon Hayhow	Flies	Dipterists Forum
Simon Leach	Vascular plants	English Nature/Natural England
Simon Leaf	Terrestrial & Freshwater Habitats	Environment Agency
Stephen Chambers	Working Group member	Welsh Assembly Government
Stephen Grady	Working Group member	Joint Nature Conservation Committee
Stephen Harris	Mammals	Bristol University
Stephen Lambert	Charophytes	University of East Anglia
Stephen Miles	Flies	British Entomological and Natural History Society
Stephen Ward	Lichens	British Lichen Society
Steve Atkins	Marine	Joint Nature Conservation Committee
Steve Compton	Beetles	University of Leeds
Steve Gregory	Isopods	Woodlouse Recording Scheme
Steve Hewitt	Caddisflies	Carlisle Museum
Steve Hopkin	Springtails	Reading University
Steve Judd	True bugs	Liverpool Museum
Steve Judd	True bugs	Liverpool Museum
Steve Lee Bapty	Chair Working Group member	DEFRA
Steve Lucas	Working Group member	Welsh Assembly Government
Steven Falk	Flies	Dipterists Forum
Stewart Angus	Terrestrial & Freshwater Habitats	Scottish Natural Heritage
Stewart Clarke	Charophytes, Vascular plants	English Nature/Natural England
Stuart Benn	Birds	Royal Society for the Protection of Birds
Stuart Roberts	Bees	BWARS

Consultee name	Group	Affiliation
Stuart Smith	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Stuart Warrington	Beetles	National Trust
Sue Rees	Terrestrial & Freshwater Habitats	English Nature/Natural England
Terence Gledhill	Crustaceans	Freshwater Biological Association
Tim Blackstock	Terrestrial & Freshwater Habitats	Countryside Council for Wales
Tim Collins	Terrestrial & Freshwater Habitats	English Nature/Natural England
Tim New	Booklice	Latrobe University
Tim Russell	Mammals	British Association for Shooting and Conservation
Tom Blasdale	Marine	JNCC
Tom Brereton	Butterflies	Butterfly Conservation
Tom Huxley	True bugs	Heteroptera Recording Scheme
Tony Davis	Moths	Butterfly Conservation
Tony Barber	Centpedes	Centipede Recording Scheme
Tony Dalby-Welsh	Mammals	British Deer Society
Tony Drane	Beetles	Ecosurveys
Tony Fletcher	Lichens	British Lichen Society
Tony Gent	Amphibian & Reptile Expert Group	Herpetological Conservation Trus
Tony Mitchell-Jones	Mammals	English Nature/Natural England
Tony Morris	Birds	Royal Society for the Protection of Birds
Tony Russell-Smith	Spiders	British Arachnological Society
Tony Waterman	Fish	Environment & Heritage Service DOENI
Trevor Piearce	Worms	University of Lancaster
Trevor Beebee	Beetles	University of Sussex
Trevor Dines	Vascular plants	Plantlife Wales
Tristan Hatton-Ellis	Fish	Countryside Council for Wales
UK Native Woodland HAP Steering Group	Terrestrial & Freshwater Habitats	
Upland HAP Steering Grp	Terrestrial & Freshwater Habitats	
Upland LCN	Terrestrial & Freshwater Habitats	
Valerie Standen	Worms	University of Durham
Valerie Keeble	Beetles	Peoples Trust for Endangered Species
Vicky Morgan	Terrestrial & Freshwater Habitats	English Nature/ Joint Nature Conservation Committee
Vince Giavarini	Lichens	British Lichen Society
Walter Crozier	Fish	Dept. Agriculture NI
Wetland HAP Steering Grp	Terrestrial & Freshwater Habitats	
William Dolling	True bugs	
Wood Pasture and Park-land HAP Steering Group	Terrestrial & Freshwater Habitats	
Woodland Trust	Terrestrial & Freshwater Habitats	