Annex 1. List of consultees and respondents

Consultee	Group	Response
Alison Lee, SNH	JNCC Freshwater LCN	• *Proposal form for Active shingle rivers, Headwaters, Ponds of high ecological quality/conservation value* • *Comments on other river types and canals*
Simon Leaf, EA & Ian Fozzard, SEPA	Joint Lakes HAPs Steering Group	• *Proposal form for Oligotrophic lakes*
Sally Johnson, SNH	Upland HAPs Steering Group/ Upland LCN	• *Proposal forms for Mountain heaths, Upland flushes and fens, Upland natural rock and scree habitats*
Carrie Rimes, CCW	Lowland Grassland HAPs Steering Group, Lowland Grassland LCN	• *Proposal forms for Rock outcrops, mine spoil and river shingle rich in heavy metals and Lowland calcareous grassland* • *Comments on Roadside verges*
David Knight, EN	Inter-agency Urban habitat Working Group	• *Proposal form for Post-industrial sites of high nature conservation value*
Heather Robertson, EN		• *Proposal form for Orchards*
Roger Meade, EN	Wetland HAPs Steering Group Lowland wetland LCN	• *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 & 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*

Annex 2. Proposals for new priority habitats

Proposed new freshwater priority habitat: 2a. Active shingle rivers

Suggested habitat name: Active shingle rivers

Correspondence with existing habitat/s

BAP broad habitat: Rivers and streams

Phase 1:	G2 Running water; possibly I1.4. Other rock exposures (part)
NVC:	Various
Annex I:	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (part); Calaminarian grasslands (part).
other:	River shoals

Description

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.

Biological features

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 species associated with this river type include Atlantic salmon, freshwater pearl mussel, otter and lamprey. 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.

On a number of these rivers, banks of gravel rich in heavy metals support a specialist flora characteristic of Calaminarian grasslands, an Annex I habitat. Some of these gravels have washed down from old mine workings upstream.

Some rivers may meet the criteria in their upper/middle reaches but lack the dynamic characteristics and associated fauna in their lower stretches. In such cases the lower reaches, which are often heavily modified, would not be included in the definition.

Geographic distribution and extent

This habitat occurs predominantly in upland and piedmont areas of north and west UK.

Reasons for recommendation

Habitat for which the UK has international obligations

Includes part of the UK resource of two Annex I types.

Habitat at risk

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).

Habitat important for key species

Active shingle rivers are important for their populations of salmon and a number of other Habitats Directive Annex II species, such as freshwater pearl mussel, otter and lampreys. Rivers of this type are also important for their ERS fauna. This includes a very large number of rare invertebrates, e.g. 180 ERS beetle species are nationally rare or scarce.

Name of proposer/organisation(s)

Freshwater LCN, Environment Agency, Scottish Environment Protection Agency

Received 2nd November 2005

Proposed new freshwater priority habitat: 2b. Headwaters

Suggested habitat name: Headwaters

Correspondence with existing habitat/s

BAP broad habitat: Rivers and streams

Phase 1:	G2 Running water
NVC:	Various
Annex I:	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (part); Calaminarian grasslands (part).
other:	N/A

Description

Biological 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. 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.

Other characteristic features

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.

Geographic distribution and extent

Widespread around the whole of the UK

Reasons for recommendation

Habitat for which the UK has international obligations

Includes part of the UK resource of two Annex I types.

Habitat at risk

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'.

Habitat important for key species
See 'biological features' section above.

References

Furse M.T. (1995). The faunal richness of headwater streams: Stage 4 – development of a conservation strategy. R & D Note 455, National Rivers Authority, Bristol.

Name of proposer/organisation(s)

Freshwater LCN, Environment Agency, Scottish Environment Protection Agency
Received 2nd November 2005

Proposed new freshwater priority habitat: 2c. Oligotrophic lakes

Suggested habitat name: Oligotrophic lakes

CORRESPONDING HABITATS

Broad Habitat: Standing open water and canals
Phase 1: G1 Standing water
NVC: Various, including A7, A9, A13, A14, A22- A24; S4, S8-S11, S19b
Annex I: Oligotrophic waters containing very few minerals of sandy plains: *Littorelletalia uniflora*; Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part); Hard oligo-mesotrophic waters with benthic vegetation of *Chara* species (part); Natural dystrophic lakes and ponds (part)
Other: Palmer lake macrophyte classification types 2 and 3

DESCRIPTION

Oligotrophic lakes are water bodies >1 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, although some examples with dystrophic characteristics have peat-stained waters. Characteristic plankton, zoobenthos, macrophyte and fish communities occur, including several 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 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 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 lakes support a range of 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 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 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 lakes and help to direct conservation effort, which requires a multi-partner catchment approach.

NAME OF PROPOSER/ORGANISATION
Joint UK Lake HAPs Steering Group
Received October 2005

Proposed new freshwater priority habitat: 2d. Ponds of high ecological quality/conservation value

Suggested habitat name: 'Ponds of high ecological quality' [or alternatively 'Ponds of High Conservation Value' or simply 'Ponds'] [see Supp Note 1]

CORRESPONDING HABITATS

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: Oligotrophic waters containing very few minerals of sandy plains (part); Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part); Hard oligo-mesotrophic waters with benthic vegetation of *Chara* species (part); Natural dystrophic lakes and ponds (part); Mediterranean temporary ponds; Natural eutrophic lakes (part)

DESCRIPTION

Ponds of high ecological quality/conservation value are defined as permanent and seasonal standing water bodies up to 2ha in extent (Note 1) which meet one or more of the following criteria (Note 2):

- *Ponds of high conservation importance.*

Ponds that meet criteria under Annex I of the Habitat Directive;

- *Species of high conservation importance*.

Ponds supporting Red Data Book, BAP, W&C Act Schedule 5 and 8 or Habitats Directive Annex II species [Supp Note 2];

- *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 ≥40 wetland plant species or ≥50 aquatic macroinvertebrate species) (Note 3);

- *Additional criteria for discussion* (see Note 4)

Data from Defra's Lowland Pond Survey suggests that about 2-5% of ponds would fall into the category of 'high ecological quality/conservation value' based on these criteria. The criteria are intended to take account of natural regional variations in species richness (e.g. naturally species-poor acid upland ponds), covering the range of trophic types and successional states. It is expected that between 8,000 and 20,000 ponds, with a mid-point of 14,000, will be covered by the proposal. This is equivalent to roughly 6 ponds in each 10x10km square [Supp Note 3].

GEOGRAPHIC DISTRIBUTION AND EXTENT

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. southern Cheshire, New Forest.

Identification of the proposed habitat: Ponds of high conservation value 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.

Inventory. 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.

Monitoring. The National Pond Monitoring Network (NPMN) will provide the main mechanism by which ponds of high conservation value/ecological quality are monitored. The NPMN was established in 2002 as a partnership of organisations involved in pond monitoring and is led by the Environment Agency and Pond Conservation. [Supp Note 4]

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), and it supports six Annex II species. 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, and River Basin Characterisation (Phase 2) will identify approximately 500 ponds which are 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 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) (Note 5). Ponds support considerable numbers of key species. Species with statutory protection include at least 65 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 W&C Act Schedules 5 & 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. (Note 6).

NAME OF PROPOSER/ORGANISATION(S)

Alison Lee, on behalf of: Freshwater LCN, Pond Conservation, Environment Agency, Scottish Environment Protection Agency

Revised version received 30th January 2006

See also supporting material at: http://www.ukbap.org.uk/GenPageText.aspx?id=103 – Supplementary notes on the proposed Priority Habitat/HAP for Ponds of High Ecological Quality (Format: Adobe Acrobat, Size: 62 Kb)

Proposed new terrestrial priority habitat: 2e. Mountain heaths

Suggested habitat name: Mountain heaths

Correspondence with existing habitat/s

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

Target vegetation types for restoration: U4e, H18c, species poor montane *Vaccinium* heath

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.

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 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.

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 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.

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. 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 which are functionally critical

Montane habitats 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 habitats' range, they are likely to be affected by environmental change and so will be important early indicators, particularly of climate change. They are important for summer migrants such as dotterel, ptarmigan and as hunting ground for wide-ranging species such as golden eagle.

Habitats important for key species

BAP priority species include six vascular plants, six bryophyte species, eight lichen species and a moth. Many other rare and local arctic-alpine plants and invertebrates occur. Notable birds include dotterel and ptarmigan. See also Thompson *et al* (2003).

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.

References

Thompson D B A, D P Whitfield D P, Galbraith H, Duncan K, Smith R D, Murray S and Holt S (2003) *Breeding bird assemblages and habitat use in alpine areas in Scotland.* In Nagy, L, Grabherr, G, Körner, C, & Thompson, D B A (eds) (2003). *Alpine Biodiversity in Europe*. Ecological Studies Series, Springer Verlag, Berlin.

Name of proposer/organisation(s)

JNCC Upland Lead Co-ordination Network

Received 22 November 2005

Proposed new terrestrial priority habitats: 2f. Upland flushes and fens

Suggested habitat name: Upland flushes and fens

Correspondence with existing habitat/s

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*) M1-M12, M21, M23, M25-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*; Depressions on peat substrates of the *Rhynchosporion pp*.
Birks & 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), but excludes ombrotrophic bogs (Blanket bog 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.

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.*

May be important nesting habitat for waders such as curlew, snipe and redshank. Also supports a varied invertebrate fauna, notably taxa such as Diptera and Mollusca, 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 and fens* includes montane/alpine springs and flushes, but not snowbeds (U11-14) which are part of the Mountain heaths proposed priority habitat.

Usually 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.

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

Includes all or most of the UK representation of five habitats listed on Annex I of the Habitats Directive (as above), of which two (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 five 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 (in press) indicates that less than half of the upland fen, marsh and swamp features on designated sites are in favourable condition. 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. 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 BAP priority and Habitats Directive Annex II species) and a range of other invertebrates.

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.

Name of proposer/organisation(s)

JNCC Upland Lead Coordination Network
Revised version received February 2006

Proposed new terrestrial priority habitats: 2g. Upland natural rock and scree habitats

Suggested habitat name:	Upland natural rock and scree habitats
Correspondence with existing habitat/s	
BAP broad habitat:	Inland rock
Phase 1:	Upland species-rich ledges; inland cliff; scree
NVC:	U16-U18, U21, OV38-OV40
Annex I:	Calcareous rocky slopes with chasmophytic vegetation *pp*; Siliceous rocky slopes with chasmophytic vegetation *pp*; Calcareous and calcshist screes of the montane to alpine levels (*Thalaspietea rotundifolii)*; Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*); Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

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. Several key species of birds use inland cliffs for nesting, notably the raptors peregrine and golden eagle, and raven.

Other characteristic features

Habitat covers a wide range of rock types, varying from acidic to highly calcareous. The habitat occurs throughout the uplands, defined as above the limit of agricultural enclosure (to match the lower limit for upland heaths and upland calcareous grasslands) and is particularly characteristic of high altitudes, but is also found at low altitudes notably in northern Scotland.

Many rock habitats, especially cliff faces, rock ledges 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. 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.

Reasons for recommendation

Habitats for which the UK has international obligations

Includes all or most of the representation of five Annex I habitats in the UK (as 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.

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.

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.

Climate change poses particular threats for Arctic-Alpine species of high-altitude rock habitats, which may become locally extinct. The impact of air pollution on these habitats is uncertain.

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 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.

Name of proposer/organisation(s)
Upland Lead Co-ordination Network/JNCC
Date: 20th March 2006

Proposed new terrestrial priority habitats: 2h. Rock outcrops, mine spoil and river shingle rich in heavy metals

Suggested habitat name: Rock outcrops, river shingle and mine spoil rich in heavy metals

Correspondence with existing habitat/s

BAP broad habitat:	Inland rock
Phase 1:	I1.2 Scree *pp*; I2.2 Spoil *pp*
NVC:	OV37 and other undescribed types
Annex I:	6130 Calaminarian grasslands of the *Violetalia calaminariae*

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:

- Near-natural substrates.
- Mine spoil, in situations where naturally occurring metalliferous outcrops have been quarried away.

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 the total UK extent is estimated to be considerably less than 10,000 ha. Forms referable to the *Festuca ovina - Minuartia verna* community (OV37) are estimated to cover less than 100 ha in Britain (David Stevens, pers. comm.).

Reasons for recommendation

Habitat for which the UK has international obligations

This habitat includes the total UK resource of the Annex I type 6130 Calaminarian grasslands of the *Violetalia calaminariae*.

Habitat at risk

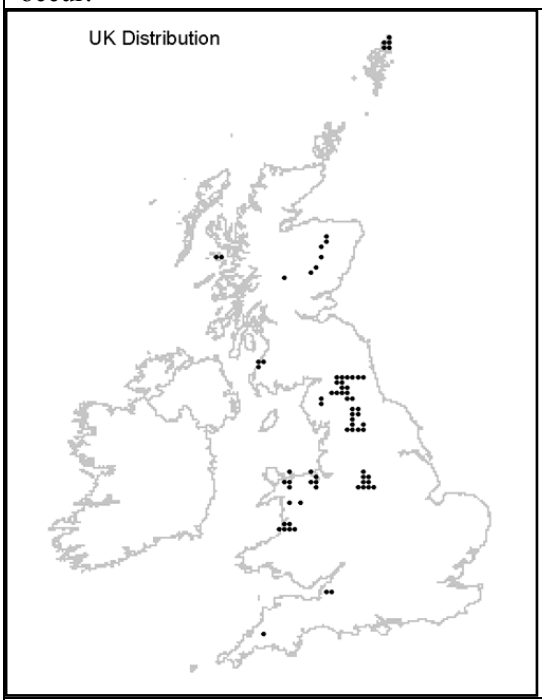
Artificial sites supporting this habitat are often considered to be of low value, unsightly, and sometimes hazardous. The toxic nature of the soils means that successional changes are slow but a greater threat is the rehabilitation of derelict land, often with grant aid from the EC and

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/bap/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 were classified as endangered by Rodwell & Cooch (1997, Red Data Book of British Plant Communities, unpublished report to WWF).

Habitat important for key species
Plants found in this habitat include the following 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.



Map 1. Distribution in the UK of Annex I type 6130 Calaminarian grasslands of the *Violetalia calaminariae*. The map shows records for NVC community OV37 together with additional records for metallophyte grasslands from other sources, and Special Areas of Conservation supporting this Annex I type

References

Birse, EL (1982) Plant communities on serpentine in Scotland. *Vegetation*, 49, 141-162
Northumberland County Council. Calaminarian Grassland Habitat Action Plan. In *Working for wildlife; the Northumberland Biodiversity Action Plan.* www.
Peak District National Park Authority. *Lead Rakes Action Plan.* www.peakdistrict.org/pubs/bap/bap6
Sellars, B & Baker, AJM (1987) Review of metallophyte vegetation and its conservation. CSD Report no. 797.

Name of proposer/organisation(s)

JNCC Lowland Grassland Lead Coordination Network, based on original submission by Martin Harper (Plantlife), Richard Jefferson (EN) & David Stevens (CCW) and edited by JNCC.
Revised submission received 9th March 2006

Proposed new terrestrial priority habitats: 2i. Post-industrial sites of high nature conservation value

Suggested habitat name: Post-industrial sites of high nature conservation value

Correspondence with existing habitat/s

BAP broad habitat: Built up areas and gardens.
Phase 1: Quarry, Spoil, Mine, Ephemeral/short perennial, Bare Ground.
NVC: Individual sites may have some similarities to OV21, OV22, OV28 and other open ground communities, or incorporate these and several other types in habitat complexes e.g. MG9, CG10, U1, U2, OV37, but overall poor fit to described communities. This weakness is identified in the review of coverage of the NVC communities Rodwell and others (2000).
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. Proposed habitat has some close correspondence with new priority habitat proposal for rock outcrops, river shingle and mine spoil rich in heavy metals. However, proposed habitat is associated with substrates and edaphic conditions that directly result from industrial processes.

Description

Biological features

The habitat of post-industrial sites is best defined in terms of structure and growth forms, rather than through specific vegetation communities. Examples of post-industrial habitat of high nature conservation value 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). Typically they comprise 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. The vegetation can have similarities to early/pioneer communities (particularly grasslands) on more 'natural' substrates but, due to the severity of the edaphic conditions, the habitat can often persist (remaining relatively stable) for decades without active management (intervention).

Plant assemblages on post-industrial sites are unusual, selected by propagule supply as well as site conditions (Ash, Gemmell & 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 BAP Priority liverwort, *Petalophyllum ralfsii* (PFA).

Exotic species such as red valerian *Centranthus ruber*, mugwort *Artemisia vulgaris,* Oxford ragwort *Senecio squalidus*, which are well adapted to the prevailing environmental conditions often form part of plant assemblages in this habitat, extending the 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 for a more thorough treatment).

Invertebrate faunas on post-industrial sites 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). For example, Harvey (2000) recorded two UKBAP priority bumble bee species (*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. Sites in the north of England and the Midlands are recognized as important for the dingy skipper butterfly

Some sites 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). Others support more widespread UKBAP priority species, including the song thrush, skylark and grey partridge, as the habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

Other BAP priority herptile and mammal species use post-industrial sites for part or all of their life cycle, e.g. great crested newt and water vole (Stoke-on-Trent: Colin Hayes pers. comm.). Post-industrial sites can hold high densities of more widespread BAP Species of Conservation Concern, including common frog, common toad, common lizard, grass snake and slow worm.

Other characteristic features
The variation within the habitat mosaic and structure reflects chemical and physical modification by past industrial processes and subsequent development, 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, provides 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.

Edaphic conditions found in post-industrial habitats are severely limiting for plant growth. Such conditions include substrates with extreme pH, whether alkaline (e.g., chemical wastes) or acid (e.g., colliery spoils); deficiencies of nitrogen (PFAs) or available phosphate (highly calcareous Leblanc waste, blast furnace slag and calcareous quarry spoil); or water (dry gravel and sand pits).

Criteria for selection of post-industrial sites of high nature conservation value
The main criteria for selecting post-industrial sites of high nature conservation value are:
1. Rich and/or large examples of habitats typical of the substrate/edaphic conditions, which demonstrate the characteristic mosaic of bare ground, pioneer communities, flower rich grassland and other habitat patches;
2. Presence of UK BAP priority species;
3. Presence of a significant population of any Red Data Book or Red Data List species and/or important populations of any UK BAP Species of Conservation Concern (SoCC);
4. Sites which have retained areas of bare ground and pioneer communities over an extended period, demonstrating arrested succession;
5. Sites which are the last remaining examples in former industrial or urban areas where the habitat was formerly widespread or extensive;
6. Sites with a high scientific interest because of historical records or the nature of particular substrates or properties which may be especially rare.

Geographic distribution and extent
Sites are concentrated in lowland urban and former industrial areas. However, the proposed priority habitat covers post-industrial sites in many locations across the UK, including more remote rural situations and railway sidings no longer in active use.

As this habitat has not been consistently described or mapped previously, it is difficult to quantify extent and hence losses. However, for example, all the Widnes and most of the St. Helens Leblanc heaps have been lost, as have most of Wigan's colliery tips and five out of six London Sites of Metropolitan Importance (*Urban Wildlife News 1997*).

Reasons for recommendation
Habitat for which the UK has international obligations
None (Calaminarian grasslands would fall under the proposed Rock Outcrops, River Shingle and Mine Spoil Rich in Heavy Metals Priority Habitat).

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 natural colonisation and 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 by disposal methods that are no longer used (Solvay), and which today would be unlikely survive long enough to acquire a valuable flora or fauna before intervention.

Extant sites are at risk from redevelopment, landfill, industrial and commercial use, or housing, the latter being targeted toward brownfield land. The reclamation of post-industrial land of high nature conservation value for greenspace uses can be just as damaging as it commonly involves the re-grading of landforms, the burial of existing substrates with the import of fertile soils, and inappropriate sowing of amenity grass mixes and planting of shrubs and trees, usually with the intention of 'greening' sites quickly.

The adoption of a priority habitat of post-industrial land of high nature conservation value would help inform the application of government policy. In England, government has set a target of 60% of new housing to be built on previously developed land by 2008 in order to help contain urban sprawl. But Planning Policy Guidance on housing in England (PPG 3 Housing) provides a definition of previously developed land which excludes sites where 'there is a clear reason that could outweigh the re-use of the site - such as its contribution to nature conservation'. Planning Policy Statement 9, Biodiversity and Geological Conservation also includes reference to previously developed land and states that 'where such sites have significant biodiversity or geological interest of recognised local importance, local planning authorities, together with developers, should aim to retain this interest or incorporate it into any development of the site'. PPG 17 Planning for Open Space, Sport and Recreation includes in its types of open spaces that may be of public value ... 'natural and semi-natural urban greenspaces – including, … wastelands and derelict open land and rock areas (eg. cliffs, quarries and pits)'. The functions that such sites provide may be 'havens and habitats for flora and fauna', 'corridors or stepping stones from one habitat to another' and 'may contribute towards achieving objectives set out in local biodiversity action plans.' PPG 17 requires local planning authorities to carry out open space audits that should reflect the nature conservation and biodiversity value of brownfield land.

Identification of post-industrial sites of high nature conservation value as a priority habitat type would also ensure that it is listed as of principle importance for the safeguarding of biodiversity (e.g. as per section 74(2) of the Countryside and Rights of Way Act 2000 in England). Paragraph 11 of Planning Policy Statement 9 on biodiversity and geological conservation states that "Through policies in plans, local authorities should also conserve other important natural habitat types that have been identified in the *Countryside and Rights of Way Act 2000* section 74 list, as being of principal importance for the conservation of biodiversity in England and identify opportunities to enhance and add to them.".

Although planning in Scotland, Wales and Northern Ireland operates under separate guidance to England, the situation and caveats in guidance are similar, so the adoption of this new priority habitat would be equally useful.

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), but most are afforded little recognition and protection as local Wildlife Sites or otherwise. 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 post-industrial land of highest nature conservation value remain largely unrecognised, their early successional communities and sparsely vegetated areas being commonly mistaken as of no nature conservation interest.

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 which is particularly 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 widely leading to a decline in conservation value.

Habitat important for key species
These post-industrial habitats can be exceptionally important for invertebrate communities more generally, with very rich faunas and large numbers of rare species notably of Hymenoptera and Coleoptera (Eyre and others 2002, 2004), but also including other taxonomic groups with requirements for bare substrate, sandy burrowing or nesting sites, and nectar sources (Falk 2000). This fauna includes a high proportion of Red Data Book, Nationally Scarce and some UKBAP priority species. The latter category include heat-loving (thermophilic) species such as the solitary wasp *Cerceris quadricincta*; sand-loving (sabulicolous) species such as the cuckoo bee *Nomad ferruginata* and those species living under stones (lapidicolous), such as the ground beetle *Harpalus obscurus*. Other UK BAP species strongly associated with this site include the orchid *Epipactis youngiana*, the liverwort *Petallophylum ralfsii* , and the toadflax brocade moth *Calophasia lunula*

Functional Importance
Post-industrial sites are often sources 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.

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*).

References

Note: The rationale and text for this new proposal has been prepared with particular reference to Tucker G, Ash H and Plant C (2005) *Review of the coverage of urban habitats and species within the UK Biodiversity Action Plan* English Nature Research Report 651 English Nature, Peterborough.

ASH, H.J., GEMMELL, R.P., & BRADSHAW, A.D. 1991. The introduction of native plant species on industrial waste heaps: a test of immigration and other factors affecting primary succession. *Journal of Applied Ecology* 31, 74-78.
BODSWORTH, E., SHEPHERD, P., & PLANT, C., (2005) Exotic plant species on brownfield land: their value to invertebrates of nature conservation importance. Peterborough, English Nature.
Brown, A. and Grice, P. 2005 Birds in England, London, T & A D Poyser
EYRE, M.D., LUFF, M.L., & WOODWARD, J.C. 2002. Rare and notable Coleoptera from post-industrial and urban sites in England. *Coleopterist*, 11, 91-101.
EYRE, M.D., LUFF, M.L., & WOODWARD, J.C. 2004. Beetles (Coleoptera) on brownfield sites in England: an important conservation resource? *Journal of Insect Conservation*, 7, 223-231.
FALK, S. 2000. Characteristics of 'recombinant' urban sites in the Warwickshire subregion, with discussion of their conservation. *In*: G. M. BARKER, editor. *Ecological recombination in urban areas: Implications for nature conservation*, 18-21. URGENT, MaB, English Nature
FRITH, M. 2003. On the front line: from the urban eye of the voluntary sector. *In Practice*, 40, 1-5.
GIBSON, C.W.D. 1998. *Brownfield: red data. The values of artificial habitats have for uncommon*

invertebrates. Peterborough: English Nature.
GILBERT, O.L. 1991. *The ecology of urban habitats.* London: Chapman & Hall.
HARVEY, P. 2000. The East Thames Corridor: a nationally important invertebrate fauna under threat. *British Wildlife*, 12, 91-98.
JONES, R. 2002. Brown can be beautiful. *Urbio*, 2, 12-13.
KIRBY, P. 1992. *Habitat management for invertebrates*. Sandy: RSPB.
LUNN, J. 2001. Wildlife and mining in the Yorkshire coalfield. *British* Wildlife, 12, 318-326.
MIDDLETON, P. 2000. The wildlife significance of a former colliery site in Yorkshire. *British Wildlife*, 11, 333-339.
PRESTON, C.D., AND OTHERS. 2002. *The changing flora of the UK*. London: DEFRA.
SHAW, P. 1994. Orchid woods and floating islands - the ecology of fly ash. *British Wildlife* 6, 149-157.
RODWELL, J. S., DRING, J .C., AVERIS, A. B. G., PROCTOR, M. C. F., MALLOCH, A. J .C., SCHAMINÉE, J .N .J. & DARGIE, T. C. D. (2000) Review of coverage of the National Vegetation Classification. *JNCC Report*, No. **302**. Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/page-2312
SHIMWELL, D.W. 1983. *A conspectus of urban vegetation types*. Manchester: School of Geography, University of Manchester.

Additional Journal editorials
Urban Nature Magazine (1996). Coventry: Back form the Brink. Vol 2: p133
Urban Wildlife News (1991). Nature reserve opened in Walsall. V 8: no4 p8
Urban Wildlife News (1992). New nature on industrial sites. Vol 9: no 1, p5
Urban Wildlife News (1994). All change in Bebington Vol 11: no3,p10
Urban Wildlife News (1994). There are too many trees! Vol 11: no4, p1-2
Urban Wildlife News (1997). The Land was Flowers. Vol 14: no1, p5.
Urban Wildlife news (1999). Pit victims remembered in Coventry nature reserve. Vol 16: no2, p12
Urban Wildlife News (1999). Pwll fly-ash lagoon - unique in Britain? Vol 16: no.4, p8.
Urbio (2002) High-rise habitats. Issue 3, pp 12-13
Urbio (2004). Brown jewels. Issue 5: p8.

Name of proposer/organisation(s)
D. Knight, English Nature; Pete Frost, Countryside Council for Wales; Peter Cush, DoE (NI); Ian Angus, SNH; Mark Crick, Joint Nature Conservation Committee for the Urban Inter-agency Working Group
Revised submission received 9th March 2006

See also supporting material at : http://www.ukbap.org.uk/GenPageText.aspx?id=103
– English Nature Report No: 651 - Review of the coverage of urban habitats and species within the UK BAP (Format: Adobe Acrobat, Size: 647 Kb)

Proposed new terrestrial priority habitats: 2j. Traditional orchards

Suggested habitat name: Traditional orchards
This name has wide currency among organisations involved in conservation of the habitat including LBAP 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 LBAP Habitat Action Plans in England and Wales.

Correspondence with existing habitat/s
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 in habitat complex eg MG5, MG6, W24, and priority BAP habitats, especially Lowland Meadow and Ancient and / or Species-rich Hedgerow.
Annex I: Incorporates lowland calcareous grassland in some sites within Annex 1 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 around 3 m between trees, for example in some plum orchards and traditional cobnut (hazel) plats, to over 20 m between trees in orchards of large perry pears and cherries. 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.

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.

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.

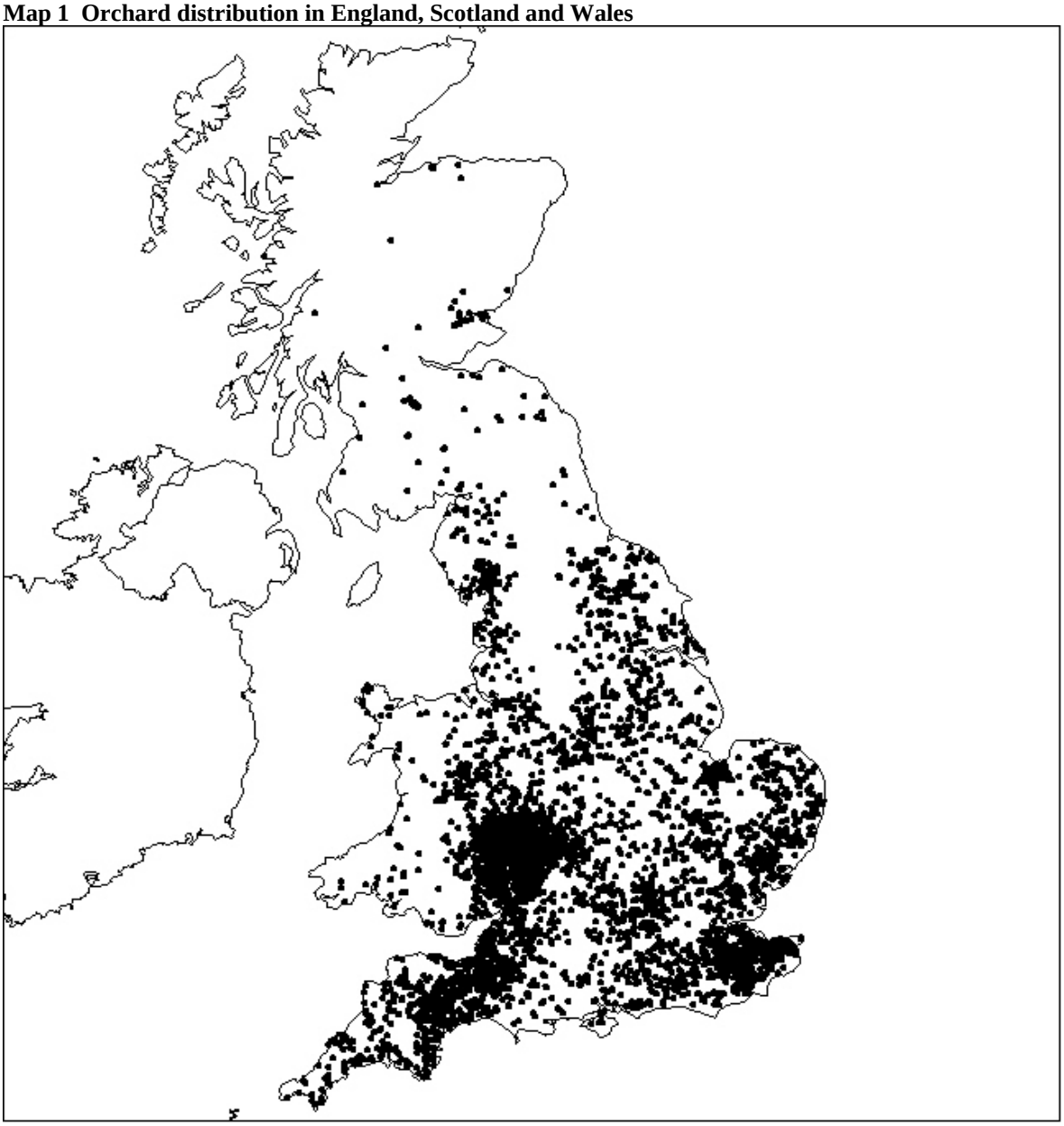
** England = Ordnance Survey area minus area of commercial orchards in census of 2000 defined as intensive (84%) by lack of fully grassed orchard floor (Central Science Laboratory data). Scotland and Wales = Ordnance Survey area minus area of commercial orchards in agricultural censuses of 2003 and 2002 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 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).

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.

The Master Map data, and the 2003 aerial photograph coverage of England held by English Nature, 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.

Map 1 Orchard distribution in England, Scotland and Wales



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 important for key species

Overview

Orchards are hotspots for biodiversity in the countryside, supporting a wide range of wildlife and containing 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 (Annex 1). The overall total of 403 species includes 102 Red Data Book or Nationally Scarce species (see Annex 1). 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 (see Annex 1). The list includes 4 priority 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 (see Annex 2) 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 BAP lichen species now extinct in the UK (2002 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 (Annex 2).

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 (Annex 2). 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 2004 surveys (see Annex 2), 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 BAP species, or, as a spine fungus, be within a possible "Spine Fungi 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 (Annex 2 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 (Annex 2, 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 (Annex

2, Hollier and Briggs 1999), and *Celypha woodiana*, the Red Data Book 2 mistletoe tortrix moth (Andrew 2004). The latter species is a proposed priority 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 (Annex 2).

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 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 BAP waxcap, *Hygrocybe calyptriformis*, was among the fungi found in 2004 (Annex 2, 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 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 BAP species) have been found in cobnut plats (hazel) in Kent (Game 1995).

A wide variety of birds have been recorded in traditional orchards (see Annex 3), including 14 Red List birds, 8 of which are priority 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 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 BAP species, specially protected under the Habitats and Species Directive (English Nature 2000). Pipistrelles, priority 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.

References

ANDREW, R. 2004. Searching for the noble chafer in Herefordshire. *Flycatcher,* 72, 40-45.
ALEXANDER, K.N.A. 2002. The invertebrates of living & decaying timber in Britain and Ireland – a provisional annotated checklist. *English Nature Research Reports*, No. 467.
ALEXANDER, K.N.A. 2004. Revision of the Index of Ecological Continuity as used for saproxylic beetles. Peterborough: *English Nature Research Reports,* No. 574.
BALSTON, R. J., SHEPHERD, C. W. AND BARTLETT, E. 1907. *Notes on the birds of Kent*. London: R. H. Porter.
BATES, J. W., PROCTOR, M. C. F., PRESTON, C. D., HODGETTS, N. G. & PERRY, A. R. 1997. Occurrence of epiphytic bryophytes in a 'tetrad' transect across southern Britain 1. Geographical trends in abundance and evidence of recent change. *Journal of Bryology*, 19, 685-714.
BAUTZ, C. 1998. Vegetation complexes of the extensively managed orchard meadows of the Eberstadt area with special reference to the habitat requirements of the wryneck. *Collurio* (*Zeitschrift für Vogel- und Naturschutz in Südhessen*), No 16, 29-35. Translated from the German for English Nature by Malcolm Rush.
CHEFFINGS, C., HARPER, M. & JACKSON, A. 2004. *Plant diversity challenge: the UK's response to the Global Strategy for Plant Conservation*. Peterborough: Joint Nature Conservation Committee.
ENGLISH NATURE. 2000. *Managing landscapes for the greater horseshoe bat*. Peterborough: English Nature.
ENGLAND FIELD UNIT. 1990. *Handbook for Phase 1 habitat survey*. Peterborough: Nature Conservancy Council.
FALK, S. 1991. A review of the scarce and threatened flies of Great Britain. Peterborough: *Nature*

Conservancy Council Report, 39.
GAME, M. 1995. Cobnuts and conservation. *British Wildlife,* 6 (6), 380-383.
HOLLIER, J. & BRIGGS, J. 1999. The specialist Hemiptera associated with mistletoe. *British Journal of Entomology and Natural History*, 12, 237-238.
IRONSIDE FARRER (2001). A Clyde Valley orchards survey. Lanark: *Scottish Natural Heritage Commissioned Report F00 L106.*
JAMES, P.W., HAWKSWORTH, D.L. & ROSE, F. 1977. Lichen communities in the British Isles: a preliminary conspectus. *In*: M.R.D. SEAWARD, ed. *Lichen Ecology,* 295-413. London: Academic Press.
JONES, P. S., STEVENS, D. P., BLACKSTOCK, T. H., BURROWS, C. R. & HOWE, E. A. 2003. *Priority habitats of Wales: a technical guide*. Bangor: Countryside Council for Wales.
LANGTON, T., BECKETT, C. AND FOSTER, J. 2001. *Great crested newt conservation handbook.* Halesworth: Froglife.
LUCKWILL, L. C. & POLLARD, A. 1963. *Perry pears*. Bristol: Published for the National Fruit and Cider Institute by the University of Bristol.
ROSE, F. 1992. Temperate forest management: its effects on bryophyte and lichen floras and habitats. *In*: BATES, J.W. & FARMER, A.M., eds. *Bryophytes and lichens in a changing environment*. Oxford: Clarendon Press.
TACP. 1994. Orchards in Wales. Bangor: *Countryside Council for Wales Policy Research Report* No 94/5.
WHITEHEAD, P. F. & WHITEHEAD, J. 2002. Preliminary survey for the Noble Chafer *Aleurosticus (Gnorimus) nobilis* (Coleoptera, Scarabaeidae) in the orchards of Gwent. Unpublished report for the Countryside Council for Wales.
WINNALL, R. A. & SMART, M. J. eds. 2005. *Wyre Forest orchard survey*. Wyre Forest Study Group report commissioned by English Nature.
WOODS, R & COPPINS, B.J. 2003. *Conservation evaluation of British lichens*. London: British Lichen Society.

Name of proposer/organisation(s)
Dr Heather Robertson, lowland farmland ecologist, English Nature, Northminster House, Peterborough, PE8 6RL. email heather.robertson@english-nature.org.uk Tel: 01733-455252.
Revised version 30th January 2006

See also supporting material at: http://www.ukbap.org.uk/GenPageText.aspx?id=103
– Annex 1 Orchard Saproxylic Invertebrates, as defined by Alexander 2002 (ENRR 467), version date 17/10/05 (Format: MS Excel Spreadsheet: Size 108 Kb)
– Annex 2 Traditional Orchards Proposal (Format: Adobe Acrobat, Size 1,421 Kb)
– Annex 3 Birds in Traditional Orchards (Format: Adobe Acrobat, Size 53 Kb}
– Responses to English Nature's proposal to add traditional orchards to the national priority habitat list (Format: Adobe Acrobat, Size 89 Kb)
– List of organisations consulted about the proposal to include traditional orchards as a UK priority habitat (Format: Adobe Acrobat, Size: 15 Kb)
– Traditional orchards: a separate HAP to lowland wood-pasture and parkland? (Format: Adobe Acrobat, Size: 19 Kb)

Annex 3. Proposals for changes to existing habitats

Proposed changes to existing habitat: 3a. Ancient and/or species-rich hedgerows

Name of habitat/HAP	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 all hedgerows consisting predominantly of at least one woody native species. *Types of hedgerow covered by new definition:* The main change to the detail of the existing definition is the removal of qualifying criteria of ancient or species-rich and the substitution by the qualifying criterion of hedgerows consisting predominantly of at least one woody native species. Other aspects of the existing definition are retained, for example lines of trees are still included, with further clarifications detailed in the *notes i)-iii) below. The new definition would cover 99% of hedgerows in the countryside in Great Britain, see *note iv) below. Banks without woody vegetation would remain a separate habitat and would not be included in the Hedgerow HAP. [However, it was proposed that a greater attention to conservation of banks should be encouraged by local and regional HAPs.]
Which groups and/or individuals have been involved in this proposal?	Members of the Steering Group, including representatives from English Nature, 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 LBAPS 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 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 & Mason 1997, Macdonald & 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 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 BAP bats, which fly and hunt along hedgerow networks, (English Nature 2000, Limpens & Kapteyn 1991), often favouring tall hedgerows, apparently irrespective of their other characteristics. Scotland and 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 LBAPS* 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 & 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 BAP reporting round, 41 LBAPS 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 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 HAP, 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) The reference to *woody native species* in the existing HAP includes those species recorded by the New Atlas of the British Flora (Preston *et al* 2002) as native somewhere in the UK, and archeophytes (ie plants naturalised before AD 1500) identified by the Atlas. Native or introduced status can vary within

	the British Isles, but the Atlas does not distinguish these distributions for several important woody species, such as beech and hornbeam. The Atlas also points to the difficulties of defining boundaries of such distributions where they are mapped for species such as wych elm and field maple. Consequently, if a species is native / archeophyte somewhere in its range in the UK, it will be treated as native everywhere. For example, beech hedges in Scotland will therefore be covered by the HAP. Sycamore is a borderline case for inclusion, being present in the 16th century and possibly earlier. It is proposed that sycamore be included. 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 of woody species for the purposes of the HAP. ii) *"Predominantly"* means more than 50% cover of native woody species in the hedgerow. iii) *Habitat structure and composition.* The existing HAP 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 HAP, 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. iv) *Extent of non-native hedgerows.* Data from Countryside Survey 1978 and 1990 (Cummins and others 1992) indicate that hedgerows with an abundance of non-native species, as defined above, are very scarce in Great Britain's countryside (1% of total extent of hedgerows).
References	Barr, C.J., Firbank, L. G. & Howard, D. C. eds. 2003. Countryside Survey 2000, Module 17 – Finding out causes and understanding significance (CS2000 FOCUS): Final report. Contract ref. CR0264, for Defra and other statutory countryside organisations. Merlewood: Centre for Ecology and Hydrology. Bickmore, C. J. 2002. Hedgerow survey handbook: a standard procedure for local surveys in the UK. London: DEFRA. Cummins, R., French, D., Bunce, R., Howard, D. & Barr, C. 1992. Diversity in British hedgerows. Natural Environment Research Council, Institute of Terrestrial Ecology Project T02071a1. Banchory: Institute of Terrestrial Ecology. English Nature 2000. Managing landscapes for the greater horseshoe bat. Peterborough: English Nature. Green, R .E., Osborne, P. E. & Sears, E. J. 1994. The distribution of passerine birds in hedgerows during the breeding season in relation to the characteristics of the hedgerow and adjacent farmland. Journal of Applied Ecology 31: 677-692. Kotzageorgis, G. C. & Mason, C. F. 1997. Small mammal populations in relation to hedgerow structure in an arable landscape. J. Zool., Lond. 242: 425-434.

Limpens, H. J. G. A. and Kapteyn, K. 1991. Bats, their behaviour and linear landscape elements. Myotis 29: 39-47.
Macdonald, D. W. & Johnson, P. J. 1995. The relationship between bird distribution and the botanical and structural characteristics of hedges. Journal of Applied Ecology 32: 492-505.
Parish, T., Lakhani, K. H. & Sparks, T. H. 1994. Modelling the relationship between bird population variables and hedgerow and other field margin attributes. I. Species richness of winter, summer and breeding birds. Journal of Applied Ecology. 31: 764-775.
Preston, C. D., Pearman, D. A. & Dines, T. D. 2002. New Atlas of the British and Irish Flora. Oxford: Oxford University Press.

Received 22nd December 2005

Proposed changes to existing habitat: 3b. Cereal field margins

Name of habitat/HAP	Cereal Field Margins
Nature of recommended change	*Name change* From Cereal Field Margins to Arable Field Margins *Definition change to following text:* 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. *The following margin types are included in this definition:* 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 English Nature, 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 following division is suggested for distinguishing the two habitats as follows: 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, while any herbaceous vegetation on the margins of arable fields beyond a distance of 2 m from the centre of a hedgerow is considered part of the Arable Field Margin habitat.
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.

Revised version received 1st February 2006

Proposed changes to existing habitat: 3c. Lowland wood pasture and parkland

Name of habitat/HAP	Lowland wood-pasture and parkland
Nature of recommended change	Proposed name change of priority habitat to 'Wood-pasture and parkland' and extend priority habitat to include sites in upland areas. 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.
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 Parkland and Wood Pasture 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.

Received 23rd November 2005

Proposed changes to existing habitat: 3d. Lowland calcareous grassland

Name of habitat/HAP	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, 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.

Received 21st Feb 2006

Proposed changes to existing habitat: 3e. Lowland heathland

Name of habitat/HAP	Lowland Heathland
Nature of recommended change	*Refine the definition of priority habitat as follows:* 'Lowland heathland is characterised by the presence of plants such as heather, dwarf gorses, and cross-leaved heath and is generally found below 300 metres in altitude. Areas of good quality heathland should consist of an ericaceous layer of varying heights and structures, plus some or all of the following additional features: scattered trees and scrub; areas of bare ground; areas of acid grassland; on rare occasions calcareous grassland with limestone or chalk heath; gorse; wet heaths, bogs and/or open water. 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 (English Nature) on behalf of the Lowland Heathland HAP Group. Information sent to the whole HAP group, but no responses received.
What would be the benefits of such a change?	It would include within the lowland heathland 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.

Received 7th September 2005