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Biodiversity: linking the Habitat Action Plan for wood-pasture and parkland with the requirements of priority and other species

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Biodiversity: Linking the Habitat Action Plan for wood pasture and parkland with the requirements of priority and other parkland species

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"I fear . . . grey, gnarled, low-browed, knock-kneed, bowed, bent, huge, strange, long-armed, deformed, hunch-backed, mis-shapen oak men [of Moccas Park]"

Rev Francis Kilvert, 1876

Summary

ESL (Ecological Services) Ltd has been commissioned by English Nature to undertake the collation and summary of information on the ecological and management requirements of priority and other species which are characteristic of the wood pasture/parkland habitat, and to relate these to the Action Plan for this habitat.

Information on the ecology, distribution, habitat requirements, research requirements and management requirements is given for a range of priority and other flora and fauna, some of which are characteristic of veteran trees and others which are characteristic of the unimproved grassland element of parklands. The information is provided for individual species, or small groups of species, as Level 1 species data sheets and these are given for the New Forest cicada, two priority hoverflies, five priority moths, five priority wood pasture fungi plus the threatened tooth fungi, seven priority lichens, three priority mosses, four non-priority fungi plus a group of local waxcaps, three priority grassland fungi, nine non-priority epiphytic lichens and seven non-priority epiphytic mosses. Overviews of taxonomic groups are given as Level 2 summary documents for priority hoverflies, moths, bats, fungi, lichens, mosses and grassland fungi, and for non-priority saprophytic fungi, grassland fungi, lichens and mosses. These draw together common threads from the often disparate requirements of species in each group and present information in terms of generic ecological wood pasture/parkland habitat requirements, generic research needs and generic beneficial management. Higher level overviews, which pull together common data from priority and non-priority species are given as Level 3 summary documents for grassland fungi, mycorrhizal fungi, saprophytic fungi, lichens and mosses. At this level, information distilled from the previous two levels is presented for generic research needs and generic beneficial management. Finally, at the Level 4 overview, all species data is drawn together and at this stage preliminary work on saproxylic beetles, undertake by CABI is included.

The rationale for selection of priority or other parkland species for use in this project is given and the methods of collecting data are described. At the Level 4 stage where all data for wood pasture/parkland species are combined, discussion is provided to highlight common themes, potential conflicts and implications for the wood pasture/parkland HAP Steering Group. Common themes are identified as provision of new habitat, the need to accept "deformity", the creation of "deformity", retention of existing appropriate habitat, tree management and the parkland soil. Potential conflicts are identified as ivy, (re) pollarding, provision of fallen timber, accelerated rot-hole formation and tree regeneration. Tables are provided to show which species benefit from which parkland habitat attributes, which management activity could benefit or be detrimental to certain species, and to show how the HAP can be linked to the requirements of priority or other species.

Contents

1. Introduction

ESL (Ecological Services) Ltd has been commissioned by English Nature to undertake the collation and summary of information on the requirements of priority and other species which are characteristic of wood pasture and parkland, and relate these to the Action Plan for this habitat. Some elements of the biodiversity of the wood pasture and parkland habitat, such as particular invertebrates of dead wood (saproxylic invertebrates) and epiphytic mosses and lichens, have merited inclusion within the UK Biodiversity Action Plan in their own right and consequently have their own Species Action Plan (SAP). With the wood pasture and parkland Habitat Action Plan (HAP) and SAPs operating in the same general sphere of interest, it is clear that an integrated approach between the two systems is needed for both to work to maximum effect. For example, detailed information contained in one or more SAPs can inform and direct work programmes on the HAP, through prioritising sites for enhancement; developing management and restoration guidelines; avoidance of potential conflicts; and directing research to fill gaps in knowledge. For wood pasture and parkland, a stage had been reached whereby the identification of lists of priority or other characteristic plant and animals associated with these habitats, together with their ecology, was needed and this required synthesis with information on beneficial management which could impact these species. This report presents the summarisation of information for the wood pasture and parkland habitats and their constituent priority and other plant and animal species.

In this report a distinction is made virtually throughout, except in the latter stages where all information becomes drawn together, between wood pasture/parkland BAP species, and non-BAP parkland species and non-parkland (ie grassland) BAP species. This distinction is apparent in the individual species accounts and in the first level taxonomic summaries.

The rationale for distinguishing between the parkland BAP and all other species lies in the earlier work undertaken by the UK Biodiversity Group. In 1995 this group published a report (Anon, 1995) which listed the UK's most threatened species (and habitats). Inclusion of any species on this list followed an examination of the species attributes such as distribution, abundance, endemism, etc in national and global terms, against various criteria. Following a review in 1997 of species which qualified for this list, it was revised to produce a shorter list of Priority Species, with the remainder placed into a renamed longer list of Species of Conservation Concern.

Priority Species which are characteristic of wood pasture/parkland are the subject of this project and are termed BAP species throughout this report. Since, by definition, they are often very rare, have undergone a recent very rapid decline (and are thus scarce but may still be widespread), have very restricted ecological niches and/or limited distribution patterns and abundance, their wider applicability to wood pasture/parkland in the UK is somewhat limited. Also, their ecological requirements, where fully known, can be very precise and cannot always be potentially provided by management at every parkland site. Therefore it was felt necessary to include in this project a number of other species which could be deemed to be characteristic of the broad parkland habitat. These are the non-BAP species or non-parkland BAP species (eg species of grasslands). These species are generally of wider distribution and abundance, and have broader ecological niches. They are more likely to respond to broader management activities than the BAP species, making their applicability to some or most

parkland sites all the more likely. The distinction between parkland BAP species and others is therefore made on ecological and management grounds.

2. How to use this document

The information in this document can be used at one of four levels and the relationship between the different levels of information on species and taxonomic groups is shown diagrammatically in Figure 1 (page 26), which uses mosses as an example.

i) Level 1: this presents information on individual species (occasionally a small group of species)

ii) Level 2: this presents an overview of taxonomic groups (eg BAP mosses) and is a distillation of the information of the constituent species with the data presented in generic terms. The provision of appropriate generic wood pasture/parkland habitat and habitat management should ensure that such BAP mosses as are present would be conserved and the site made or kept suitable for others should they colonise or otherwise arrive.

iii) Level 3: this presents a higher level overview wherein data are distilled from all constituent BAP and non-BAP species in a similar manner to, and for a similar purpose as the Level 2 data sheets. Thus, to continue the example given above, the Level 3 data sheet for parkland mosses could be referred to in order to ascertain the current and future potential value of a site for this group as a whole.

iv) Level 4: this presents data on all significant species characteristic of wood pasture/parkland.

3. Identification of priority and other parkland species

3.1 Priority parkland species

The list of Priority Species (other than saproxylic Coleoptera) associated with wood pasture and parkland has been derived from Simonson and Thomas (1999) and is given in Appendix 1. Saproxylic Coleoptera are excluded from this project at Levels 1-3 since the group is being covered by work undertaken by CABI, but the general wood pasture/parkland requirements of this group are built in at Level 4.

3.2 Other parkland species

The list of other species included in this project is also given in Appendix 1, and this includes non-Priority Species and non-parkland Priority Species.

Mosses

Whereas many mosses are epiphytic, probably none are exclusively found on old parkland or wood pasture trees. The closest candidate is *Zygodon rupestris* since it is preferentially found on such habitats although occasional records are made from shaded base-rich rocks. In broad terms, *Zygodon rupestris* can be considered as a species of conservation concern and thereby suitable for this project, since although it is not a Nationally Rare or Scarce Plant (Hodgetts, 1992), it has a locally restricted British distribution (Hill *et al*, 1994) and is sometimes seen as an ancient woodland indicator plant (eg Hodgetts, 1992; Ron Porley *in litt*; Dorset Environmental Records Centre, unpublished report).

Other moss species which are epiphytic to some extent on old isolated trees, although found on other microhabitats such as rock, hedgerow shrubs, coastal turf and walls, and which may be considered of conservation concern in broad terms are as follows: *Tortula laevipila*, *Pterogonium gracile*, *Orthotrichum lyellii*, *Leucodon sciuroides*, *Leptodon smithii* and *Habrodon perpusillus*. *Leptodon* is formerly Nationally Scarce (Hodgetts, 1992) and is restricted to central southern England with a few outliers elsewhere. *Habrodon* is Endangered (Church *et al*, 2001), one of the recent IUCN categories to which species previously termed Nationally Rare (Hodgetts, 1992) have been assigned. *Orthotrichum lyellii* is an ancient woodland indicator for eastern, south-eastern and Midland lowland areas according to Hodgetts (1992), and this species and *Tortula laevipila*, *Pterogonium* and *Leucodon* have a restricted British distribution, being rare to absent in some regions whilst more widespread in others (Hill *et al*, 1992, 1994). Further, some species have exhibited declines mainly due to air pollution. Therefore, these species are considered suitable for this project.

Liverworts

Many liverworts are epiphytic, but none is exclusively found on old parkland or wood pasture trees, with species found as epiphytes also growing on rotting logs, scrub, tree stumps, rock, peaty soil, etc. Many of the epiphytic liverworts are strongly oceanic with a consequent very western distribution, centred on north Wales and western Scotland, including some of the Inner Hebrides, and are rare or absent elsewhere. Therefore their general applicability to the wood pasture/parkland HAP as it currently stands (Anon, 1998), is limited: upland and western oak woodlands were specifically excluded from the HAP, but the plan is being expanded to cover some stands in the uplands and in upland margins.

Two liverworts with a wider distribution considered potentially suitable for this project were *Microlejeunea ulicina* and *Metzgeria temperata*. The former is widespread in southern England from Cornwall to Kent, in Wales and in Cumbria (Hill *et al*, 1991) but is deemed only to be a generally epiphytic species of humid places (Hodgetts, *in litt*) and was therefore discounted; the latter has a strong south-westerly bias to its distribution (Wales, south-west

peninsula and along the south coast as far as Sussex; Hill *et al*, 1991) and is also a general epiphyte of humid places and was similarly discounted. Therefore no non-BAP liverworts have been selected for this project.

Lichens

According to the British Lichen Society (Sanderson, *in litt*), the lichen flora of parklands has in part been derived from the lichen flora characteristic of trees in an open field landscape, whereas that of wood pastures has been derived from a woodland lichen flora descended from the original Atlantic 'wildwood'. The wood pasture lichen flora is generally richer in rare and threatened lichen species than that of parklands.

The lichen communities of different habitats have been described by James, Hawksworth & Rose (1977). A community which is a specialist assemblage of old trees and which unites the parkland and wood pasture elements is the *Lecanactidetum premneae.* The community characteristic of trees in open field areas is the *Xanthorion*, and species-rich versions of this are under threat due to intensive farming raising ammonia levels, with good examples becoming scarce and species-poor versions becoming more common place. Some members of each of these communities (all non-BAP species) have been selected as appropriate for this project, as follows: *Schismatomma decolorans*, *Opegrapha prosodea*, *Lecanactis lyncea*, *L. premnea*, *Arthonia impolita* (all members of the *Lecanactidetum premneae*), *Parmelia tiliacea*, *P. acetabulum*, *Teloschistes flavicans* and *Anaptychia ciliaris* (members of the *Xanthorion*).

Fungi

Fungi selected for this project in the category of other species are those typical of either damaged mature trees or of unimproved grassland. In the former group are two saprophytic tooth fungi, *Hericium coralloides* and *H. cirrhatum*. In the latter category are the following species: *Hygrocybe calyptriformis*, *H. spadicea* and *Microglossum olivaceum* (all are grassland BAP species); *Boletus impolitus* and *B. luridus* (non-BAP species of grasslands); and the meadow or wax-cap grassland species which have only a local British distribution (the commonest and most widespread being excluded): *Hygrocybe punicea*, *H. citrinovirens*, *H. splendidissima*, *H. aurantiosplendens*, *H. intermedia*, *H mucronella*, *H. laeta*, *H. lacmus* and *H. flavipes*. Mature trees with some damage, such as missing limbs, tracks of lighting strikes, etc are typical of wood pastures and parklands, hence the inclusion of the two *Hericium* species, and the presence of unimproved grassland adds much to the quality of the parkland habitat, hence the inclusion of the *Boletus* and *Hygrocybe* species.

Bats

Whilst it is very likely that every bat species in Britain makes some use of parklands and wood pastures for feeding (eg serotines are associated with permanent pasture), for most, the nature of the association between animal and these habitats goes no deeper, and feeding could and does equally take place in a range of other, widely different, habitats. Similarly, noctules utilise tree cavities for roosting, and these equally could be in parkland or other habitat.

Therefore it was decided that little value would be gained by including bat species other than the BAP species in this project.

4. Collection and synthesis of information on priority and other parkland species

Information on the priority and other species was obtained from the literature and from discussion with individuals with expertise in the species and/or groups. Data on the same subject areas, such as ecology and distribution, were grouped together and drafted into a short coherent passage of text and used in the Species Data Sheets.

5. Species data sheets

In this section of the report, Level 1 data sheets for the selected species are given. The information for BAP species is presented in a standard format as follows: species names (common, if one exists, and scientific); key references; key contacts; distribution; wood pasture/parkland microhabitats; other microhabitats; ecology; main research needs; elements of SRP/SAP which relate to wood pasture/parkland; elements of wood pasture/parkland HAP relevant to the species, and beneficial management requirements. For non-BAP species research needs are often not as pressing or obvious as for BAP species and there is no SAP but the other elements of the data sheets are covered. Data sheets for Priority Species are given first, with those of other species following.

6. Taxonomic group summary sheets

At Level 2 and Level 3, these data sheets highlight common ecologies, research needs, habitat requirements as provided by wood pasture/parkland, and management requirements for each taxonomic group. Level 2 summary sheets are provided for BAP hoverflies, BAP moths, BAP bats, BAP wood pasture/parkland fungi, BAP lichens, BAP mosses, grassland BAP fungi, grassland non-BAP lichens and non-BAP mosses. Level 3 summary sheets are provided for lichens, mosses, grassland fungi, mycorrhizal fungi and saprophytic fungi. The Level 4 summary sheet draws all species information together and a further discussion of this level is provided below.

7. Summary for wood pasture and parkland

The Level 4 Summary

The Level 4 summary sheet presents the condensation of data on all significant species associated with, or characteristic of, wood pasture and parkland. The species which contribute to this single data sheet are very varied, with representatives from the Plant, Fungi and Animal Kingdoms, and even within the latter Kingdom, the species are as diverse as hoverflies, moths, beetles and bats. Therefore it is not surprising that in generic terms, nothing can be said about the ecology of the constituent species. Nor is it surprising that the text under the headings of generic parkland habitat requirements or beneficial management

describes anything other than typical parkland attributes, as could be found in the first paragraph of the HAP (Anon, 1998). Therefore, it is probably much more appropriate to look at the Level 2 and Level 3 Summary Documents in order to tease out common themes and potential conflicts across and between the taxonomic groups, and to make recommendations to the Steering Group for wood pasture/parkland for future directions of work, etc. Such common themes and potential conflicts are discussed below.

Saproxylic Coleoptera

A summary of CABI's work on saproxylic coleoptera (from Annex 1 of the 2000 report by CABI under English Nature Species Recovery Programme) shows that for the 12 BAP species under consideration, there is a generic requirement for old, over-mature broad-leaved trees which have been damaged in some way and previously attacked by a range of fungi, each fungus exploiting the wood resource in a different way.

Common Themes

i) Provision of potential new habitat

The constituent species of every taxonomic group would benefit from the provision of new habitat which they could potentially occupy or utilise. This is especially and universally true of the provision of new generations of parkland and wood pasture trees, since these are the basis of the habitat itself. The provision of more precisely defined potential new habitat has the result that increasingly smaller groups of species are the beneficiaries. Where water-filled rot-holes could be provided, apparently only the BAP hoverflies may benefit, yet if these same rot-holes allow a rain-track to form below when they are full after rain, then habitat could be provided for some BAP lichens and the BAP moss *Zygodon forsteri* (where the rot-hole is in beech) and possibly be attractive to at least one BAP beetle. In a similar manner, small scale coppicing where oak is in the underwood could benefit the orange upperwing BAP moth and also be responsible for helping to maintain a habitat mosaic suitable for the cicada.

ii) Accept "deformity"

Over-zealous and unnecessary 'tidying-up' and tree surgery for example are perceived to be inimical to nature conservation in broad terms. In the case of wood pasture and parkland such unwanted activities can severely curtail the level of interest through removing valuable habitat where it occurs and by not providing the potential for further habitat to develop. The solution is to abandon the mind-set which craves tidiness and to therefore accept "deformity". For wood pasture and parkland certain species and taxonomic groups would benefit from the acceptance of "deformity" in trees, since "deformity" in the shape of cracks and holes in trunks, branches torn off by gales leaving ragged ripped ends, lightning strike scars, etc, can provide habitat for some mosses, lichens (inhabiting bark crevices, or occurring below wounds), saprophytic fungi, bats (roosting behind flaking bark, in cracks, in holes), hoverflies (breeding in water-filled rot-holes) and saproxylic beetles.

iii) Create "deformity"

This is a common theme associated with the previous one, and is a natural progression of it, since once "deformity" is accepted and its benefits for parkland species becomes apparent, the provision of more "deformity" becomes desirable. Hence, the causing of deliberate damage to trees in order to provide habitat, or to accelerate the formation of correct habitat. Some lichens could benefit from the presence of wounds and rain tracks; but can a rain-track be created? Saprophytic fungi such as *Buglossoporus* and *Hericium* spp may benefit from extra provision of wounds for spores to gain entry into a new host tree which is otherwise intact on account of an unbroken bark 'skin' (by analogy to pathogens having the opportunity to attack a person). The BAP hoverflies would benefit from the provision of more water-filled rot-holes but since the formation of these features from the broken end of a branch may be a lengthy process (is any information available?) the formation could be accelerated by excavating out the junction between branch and trunk. The BAP moss *Zygodon forsteri* may benefit from trial work damaging potential beech host trees close to existing colonies, but which are 'clean' and lack the necessary seepage track, wounds, calluses, reservoirs of rain water, etc. Bats may benefit from deliberate damage where this again results in the accelerated formation of holes or cracks or flaking bark which could be exploited as roosts. An extreme case of creation of "deformity" would be the deliberate provision of large pieces of timber or whole trees on the ground in order to benefit saprophytic fungi. Deliberate felling of trees in parks to benefit fungi would be a radical approach! BAP saproxylic beetles would benefit from "deformity".

iv) Retention of existing appropriate habitat

Just as the provision of potential new habitat would benefit the constituent species of every taxonomic group (see above), the retention of existing appropriate habitat obviously has benefits for all wood pasture/parkland species. The retention of mature trees benefits all flora and fauna; the retention of dead trees benefits bats and saprophytic fungi; the retention of fallen sizeable pieces of timber or whole trees benefits saprophytic fungi; and the retention of agriculturally unimproved, low-intensity managed parkland grassland benefits mycorrhizal fungi, grassland fungi, hoverflies dependant on flowers for nectar, bats since there may be a greater invertebrate fauna in the grassland and soil available as prey; and lichens since there would be minimal eutrophication due to lack of input of inorganic fertilizers.

v) Management of individual trees

This is a common theme for at least saprophytic fungi, mycorrhizal fungi, beetles, lichens, mosses and bats. Typically, the management of individual parkland trees has been (and in some cases still is) pollarding. As a fortuitous by-product of the original purpose of pollarding (to provide a continuous, sustainable crop of small poles for various purposes in areas where stock and/or deer were present) the tree has its life extended and in time the trunk (the bolling) becomes very ancient and full of niches for parkland species, including bats, lichens, mosses, mycorhizal and saprophytic fungi. Where the pollards are being actively managed, the crop of poles atop the bolling is typically young, clean and devoid of much interest. Where the pollards have not been worked for a considerable time, the mature poles themselves become valuable in their own right.

vi) The parkland soil

A neglected and hidden issue, but the subject of a common theme for mycorrhizal and grassland fungi, since undue disturbance would be inimical to these taxonomic groups, yet it seems that more (light?) compaction may promote the fruiting of *Boletus* spp and the presence and provision of well-drained banks with sparse plant and moss cover could benefit some tooth fungi.

Potential conflicts

i) Ivy

The BAP hoverfly *Callicera spinolae* requires vertically-growing ivy (since in this form the plant will flower) for the adult insects to feed upon, to search for females and to perform ritual courtship flights. The expansion of ivy on a tree which also supports epiphytic lichens and mosses is an obvious conflict, since the ivy would rapidly outgrow and smother the lower plants.

ii) (Re-)pollarding

Where the mature poles of a pollard tree due to be re-worked support epiphytic lichens and mosses there is a clear conflict, since the lower plants would be lost as the poles are removed. Even if these plants were retained on the now dead poles, if they were stacked up, the poles themselves would not be in an identical micro-climate and the mosses and lichens consequently may not survive for long.

iii) Provision of fallen timber for saprophytic fungi

A clear conflict would emerge if it were proposed to provide large pieces of timber, or whole trees, on the ground to benefit saprophytic fungi, since members of taxonomic groups reliant upon extant trees and large branches would lose their habitat.

iv) Accelerated rot-hole formation

This potential management operation to benefit hoverflies would lead to a conflict similar to that described above for (re-)pollarding if the starting point were the removal of a branch supporting epiphytes. There would be less or no conflict of the starting point were an already partly rotted small stub of a branch, which it was intended to dig out, and which supported epiphytes.

v) Tree regeneration

This is correctly perceived to be a vital component of restoration and conservation of parkland and wood pasture, since in many cases, the lack of several generations of new trees has led to a highly skewed tree age structure and breaks in continuity of habitat. Even large numbers of new trees cannot provide the same niches for specialised parkland flora and fauna as do a few, or even one, veteran specimen, since there is the time-gap which must be bridged before rot-holes, gnarled bosses, dead wood, cracks, etc appear. Therefore, the temptation is to engage in a head-long rush to provide potential new habitat, yet perversely this can cause conflict with some parkland species. Examples are as follows. Particularly dense tree regeneration in close proximity to existing mature specimens may increase shading of the trunk and lower branches which could be inimical to those epiphytic mosses and lichens which require high light levels. Conversion of grassland to scrubby regenerating trees and woodland may result in local loss of grassland fungi. The heart moth, with its requirement for solitary veteran pedunculate oak trees, may find a former solitary tree now surrounded by swarms of saplings no longer suitable.

Implications for the Wood Pasture/Parkland HAP Steering Group

i) Integration of HAP with species requirements

This integration is one of the actions in the wood pasture/parkland HAP (see paras 1.2.1 and 5.2.8 in Anon, 1998) and the subject has been addressed by Table 3 of this project. In order to compile this table, the proposed actions with lead agencies (plan section 5) have been read and compared with the findings of this study. Those actions which are relevant have been placed in the table and appropriate comments added. Most of the relevant actions are under the HAP headings of Site Safeguard and Management, and Monitoring and Research. This shows that much of the HAP work, even in broad terms, would benefit a wide range of species.

ii) Research Needs

As part of the encouragement of research (action point 5.5.6 in the HAP), the Steering Group could recommend work directed towards determining the natural rate of rot-hole formation; means of accelerated rot-hole formation; colonisation by saprophytic fungi of wounded areas on trees which are located next to existing host trees; tolerance of lichens characteristic of elm to the bark of other now more widespread trees with base-rich bark; tolerance of lichens to eutrophication; and tolerance of grassland fungi to agricultural improvement.

Table 1 is a quick reference source for parkland habitat attributes and the species which could or would benefit from the presence of these attributes. Some habitat attributes would be definitely detrimental to some species/species groups and these are shown in the third column of the Table. Site managers can use the habitat attributes as a check-list to determine which flora and fauna their wood pasture/parkland site could support. Table 2 is a quick reference source for parkland/tree management and the species which could or would benefit from or be harmed by the management. Site managers can use this as a check-list to determine which

management activity could benefit the flora and fauna known to be present at their wood pasture/parkland site.

Table 1 Parkland Habitat Attributes and Species

Parkland Habitat Attribute	Beneficial for:	Detrimental to:
Trees with (wet) rot-holes	*Callicera spinolae* *Myolepta potens*	-
Trees with ivy cover	*Callicera spinolae*	Epiphytic mosses and lichens
Nectar sources in parkland grassland	*Callicera spinolae*	-
Mature broad-leaved trees in open locations	BAP bats BAP hoverflies *Orthotrichum lyellii* *Parmelia tiliacea* *Tortula laevipila* *Zygodon rupestris*	-
Habitat mosaics of trees, scrub and tall herbaceous vegetation ("woodland edges")	BAP bats *Cicadetta montana*	-
Purple moor-grass *Molinia caerulea*	*Cicadetta montana*	*Boletus regius* Grassland *Boletus* spp Grassland wax-caps
Mature pedunculate oak trees in open situations	*Arthonia impolita* BAP bats *Buglossoporus pulvinus* *Dicycla oo* *Enterographa sorediata* *Jodia croceago* *Lecanactis lyncea* *Lecanactis premnea* *Opegrapha prosodea* *Pechipogo strigilata* *Schismatomma decolorans*	-
Mature pedunculate oak trees in moderately dense stands with woodland ground flora	*Paracolax tristalis* BAP bats	-
Mature English and wych elm trees	*Anaptychia ciliaris* *Bacida incompta* *Caloplaca luteoabla* *Cosmia diffinis* *Gyalecta ulmi* *Habrodon perpusillus* *Leucodon sciuroides* *Leptodon smithii* *Orthotrichum obtusifolium* *O. pallens* *Parmelia acetabulum* *Pterogonium gracile* *Teloschistes flavicans*	-
Small-scale coppicing of pedunculate oak	*Jodia croceago*	Lichens Mosses
Pedunculate oak regeneration	*Jodia croceago* Lichens Mosses	-
Dead mature pedunculate oak trees, with holes, cracks, fissures	BAP bats *Buglossoporus pulvinus*	-
Cattle grazed unimproved parkland	Locally distributed wax-cap fungus	-

Parkland Habitat Attribute	Beneficial for:	Detrimental to:
grassland	*Boletus* spp of grasslands *Hygrocybe calyptriformis* *Microglossum olivaceum* *Rhinolophus ferrumequinum*	
Hollow trees	*Battarraea phalloides*	-
Grassland under ancient deciduous (oak and/or beech)	*Boletus regius* *B. satanus*	-
Standing mature and wounded beech trees	*Bacidia incompta* *Enterographa elaborata* *Hericium cirrhatum* *H. corraloides* *H. erinaceum* *Pterogonium gracile* *Zygodon foresteri*	-
Fallen beech trees and felled beech trunks	*Hericium cirrhatum* *H. corraloides* *H. erinaceum*	-
Wood banks or similar earthworks including ditch-sides	Threatened tooth fungi	-
Ash trees in well-lit locations	*Anaptychia ciliaris* *Habrodon perpusillus* *Leptodon smithii* *Leucodon sciuroides* *Orthotrichum obtusifolium* *O. pallens* *Parmelia acetabulum* *Pterogonium gracile* *Teloschistes flavicans*	-
Mature holly trees	*Lecanactis premnea*	-

Table 2 Parkland Management and Species

Management Activity	Beneficial for:	Detrimental to:
Accelerated rot-hole formation by removing limbs and excavating out junction with trunks	*Callicera spinolae* *Myolepta potens* Saprophytic fungi	Mosses, lichens and fungi on the limbs removed
Retention of ivy-clad trees	*Callicera spinolae*	Epiphytic lichens and mosses (if ivy expands over whole tree)
Retention of agriculturally unimproved herb-rich parkland grassland	BAP lichens (since this prevents the invasion of scrub which shades trees) *Boletus regius* *Callicera spinolae* *Cicadetta montana* Grassland *Boletus* spp *Hygrocybe spadicea* *H. calyptriformis* *Microglossum olivaceum* *Myolepta potens*	-
Retention of mosaic areas of trees, scrub and tall herbaceous vegetation	*Cicadetta montana*	-

Management Activity	Beneficial for:	Detrimental to:
Retention of mature and over-mature trees, especially pedunculate oak, elm and beech	BAP bats BAP fungi BAP hoverflies BAP lichens BAP mosses BAP moths Non-BAP fungi Non-BAP lichens Non-BAP mosses	-
Small scale coppicing in woodlands/maintenance of open glade/clearings	*Cicadetta montana* *Jodia croceago* *Paracolax tristalis* *Pechipogo strigilata*	Epiphytic lichens and mosses
Retention of English and wych elm trees	*Cosmia diffinis* BAP lichens BAP mosses Non-BAP lichens Non-BAP mosses	-
Provision of new generations of parkland trees	BAP fungi BAP hoverflies BAP lichens BAP moths Non-BAP fungi Non-BAP lichens Non-BAP mosses	-
Cattle grazing of parkland grassland	*Rhinolophus ferrumequinum*	-
Accelerated hollowing-out of old trees and opening out of one side to the sun	*Battarraea phalloides*	BAP hoverflies Epiphytic lichens and mosses
Tree pollarding	*Boletus regius* *B. satanus* *Buglossoporous pulvinus* *Enterographa elaborata*	Epiphytic lichens and mosses (unless present on tree bole)
Deliberate damage to mature trees, especially pedunculate oak, beech and elm	*Bacidia incompta* *Buglossoporus pulvinus* *Hericium cirrhatum* *H. coralloides* *H. erinaceum* *Zygodon forsteri*	Epiphytic lichens and mosses
Control of invasive alien shrubs	BAP lichens BAP mosses Non-BAP lichens Non-BAP mosses Threatened tooth fungi	-
Retention of banks and other earthworks	Threatened tooth fungi	-
Deliberate provision of large pieces of fallen timber or trunks of beech trees by felling existing standing trees	*Hericium cirrhatum* *H. coralloides* *H. erinaceum*	BAP fungi (other than *H. erinaceum*) BAP hoverflies BAP lichens BAP mosses

Table 3 Wood Pasture/Parkland HAP Actions linked to the Requirements of Priority and other Parkland Species

Original para no and summary of action point	Comments
5.2.1 Ensure SSSI coverage of wood pasture/parkland sites is adequate through reviews of series.	This has as a pre-requisite a need to undertake further surveys/monitoring in order to identify those sites with particularly important features, and to enable the features to be assessed and ranked. Relevant to: all woodpasture/parkland (WP/P) species where up-to-date distributional data is lacking.
5.2.4 Encourage development of long-term integrated management plans.	This has as a pre-requisite the need to determine the presence and location of important WP/P species at each site such that broad management prescriptions for whole sites can be refined and therefore cater for particular requirements in order to avoid conflicts. Relevant to: all WP/P species.
5.2.5 Promote appropriate re-establishment of grazing and encourage tree regeneration.	This has as a pre-requisite the need to determine the presence and location of important WP/P species at each site such that broad management prescriptions for whole sites can be refined and therefore cater for particular requirements in order to avoid conflicts. Relevant to: all WP/P species.
5.2.6 Promote restoration of degraded wood pasture/parkland sites.	This has as a pre-requisite the need to determine the presence and location of important WP/P species at each site such that broad management prescriptions for whole sites can be refined and therefore cater for particular requirements in order to avoid conflicts. Relevant to: all WP/P species
5.2.7 Promote targeted expansion of wood pasture/parkland sites.	Expansion of parkland habitat *de novo* can ensure that features of importance for WP/P species can be "built-in" at the start. Relevant to: all WP/P species.
5.2.8 Integrate HAPs with SAPs to promote work on the latter.	This is partly addressed by this project
5.2.9 Consider trans-location to (re)establish key species.	Translocation, or at least the feasibility of translocation, has been suggested for some WP/P species where for example there have been severe declines in present hosts with consequent declines in the species itself. Relevant to: *Hericium erinaceum*, *Gyalecta ulmi*, *Chaenotheca phaeocephala*, *Enterographa elaborata*, *Enterographa sorediata*, *Caloplaca luteoalba*, *Thelenella modesta*.
5.3.1 Produce best-practice wood pasture/ parkland management guidelines.	Ensure that the need to accept "deformity" and the need for low intensity use of parkland grassland are included. Relevant to: all WP/P species.
Original para no and summary of action point	Comments
5.3.2 Develop guidance on safety matters for veteran trees.	Ensure that if tree surgery work is undertaken it is the minimum only, that it takes place only after an examination of the branches etc to be removed, and that cut material is used to best ecological effect. Relevant to: mosses, lichens, saprophytic fungi, bats, hoverflies.
5.3.3 Encourage training in best-practice management.	Ensure that if tree surgery work is undertaken it is the minimum only, that it takes place only after an examination of the branches etc to be removed, and that cut material is used to best ecological effect. Relevant to: mosses, lichens, saprophytic fungi, bats, hoverflies.

Original para no and summary of action point	Comments
5.5.1 Produce comprehensive directory of wood pasture/parkland sites.	This may prompt work at under-recorded sites, which in turn could generate new distributional data, confirm old records, etc. Relevant to: all under-recorded WP/P species or those whose current distribution is unknown due to rapid decline.
5.5.2 Develop and implement methods to assess, record and monitor wood pastures/ parklands and trees.	Ensure that the standard recording system for tree condition includes reference to damage, wounds, fungi, etc to act as pointers for tree and site potential to support characteristic WP/P species. Relevant to: all WP/P species.
5.5.3 At under-recorded sites undertake targeted biological surveys to inform management.	This may prompt work at under-recorded sites, which in turn could generate new distributional data, confirm old records, etc. Relevant to: all under-recorded WP/P species or those whose current distribution is unknown due to rapid decline.
5.5.4 Undertake veteran tree recording.	Ensure that the standard recording system for tree condition includes reference to damage, wounds, fungi, etc to act as pointers for tree and site potential to support characteristic WP/P species. Relevant to: all WP/P species.
5.5.6 Undertake research into wood pasture/ parkland habitat, fauna and flora.	This is directly relevant to WP/P species, since for many little is known about certain aspects of ecology, habitat preference, reproduction, management needs, etc. Relevant to: all WP/P species.
5.6.1 Promote awareness of the wood pasture/ parkland habitat.	Literature could include reference to some of the more bizarre lifecycles and ecology of WP/P species in order to engender wonder at the mostly unseen life teeming within a single veteran oak tree. Relevant to: all WP/P species.
5.6.2 Promote awareness of the value of veteran trees.	Literature could include reference to some of the more bizarre lifecycles and ecology of WP/P species in order to engender wonder at the mostly unseen life teeming within a single veteran oak tree. Relevant to: all WP/P species.

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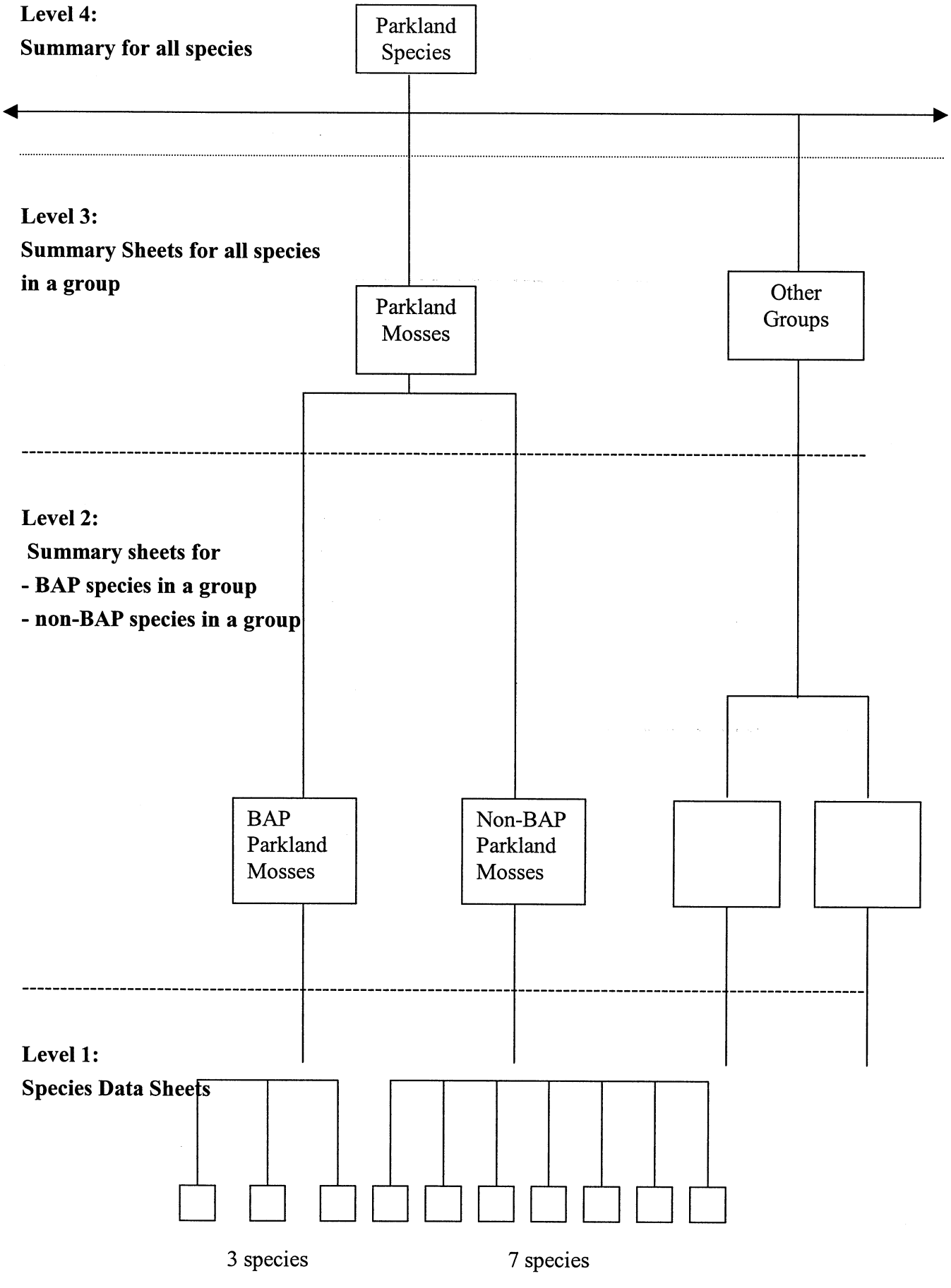
FIGURE 1 Hierarchy of Wood Pasture/Parkland Species Data



Species data sheets (level 1)

BAP Cicada
BAP Hoverflies
BAP Moths
BAP Bats
BAP Fungi
BAP Lichens
BAP Mosses
Grassland BAP Fungi
Non-BAP Fungi
Non-BAP Lichens
Non-BAP Mosses

BAP cicada

SPECIES New Forest Cicada **SCIENTIFIC NAME** *Cicadetta montana*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates.* English Nature, Peterborough. pp 441-443

2 KEY CONTACTS

David Sheppard, English Nature.

Jonathan Spencer, Forestry Commission.

3 DISTRIBUTION

Restricted to The New Forest.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Warm, south-facing open scrub and woodland-edge areas, in a mosaic with grassland.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

The New Forest Cicada occurs in hot and sheltered areas in open scrub, woodland edge and grassland mosaic habitats. This species has a long larval stage of 6-8 years during which the larvae live in the ground and feed on the roots of various woody plant species and purple moor-grass. Adults emerge in May and June, live only three weeks and lay eggs in the stems of bracken and woody plants, and after hatching the small larvae burrow into the soil.

6 MAIN RESEARCH NEEDS

Surveys and monitoring at extant, historic and potential sites.

Species' ecology.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The species' requirement of mosaic sites, including grassland, scrub, bracken and tree cover, makes it vulnerable to successional changes in the vegetation due to neglect leading to conversion to closed woodland, dense scrub or dense bracken. It is also vulnerable to conversion to woodland by afforestation with broad-leaves or conifers, and loss of scrub and bracken by clearance, over-grazing and agricultural intensification.

SPECIES New Forest Cicada **SCIENTIFIC NAME** *Cicadetta montana*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors which have operated, or which still operate, to cause the loss of the parkland habitat or the decline in the value of the habitat and which are relevant to the conservation of The New Forest Cicada include neglect, damage to tree roots and soil, pasture loss, intensification of management of grassland, and under-grazing and over-grazing of grassland.

9 BENEFICIAL MANAGEMENT

Retention of open grassland, bracken, scrub, tree and woodland edge mosaic areas, elimination or reduction of trampling by stock in the period March to October (when larvae are close to the surface), retention of agriculturally unimproved grassland, reduction in general high grazing pressure to which the New Forest is subject, grazing to take place with appropriate stock.

BAP hoverflies

SPECIES Large or golden hoverfly **SCIENTIFIC NAME** *Callicera spinolae*

1 KEY REFERENCES

Anon. 1995. *Biodiversity: The UK Steering Group Report.* HMSO, London. p128.

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Rotheray, G.E. 1999. Restoration of golden hoverfly (*Callicera spinolae*) in East Anglia, interim report 1999. Unpublished interim report to English Nature.

2 KEY CONTACTS

Martin Drake, English Nature.

3 DISTRIBUTION

Believed to be on the verge of extinction in UK. There are historical records from seven sites in East Anglia, but a survey carried out in 1997 in Norfolk, Suffolk and Cambridgeshire failed to find a single larva or pupa. However, recent work has recorded this species in rot holes in ash and field maple, at three sites in East Anglia and one in Cambridgeshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trees with rot holes and with ivy cover. Plants which flower in September and October to provide nectar sources.

4.2 OTHER MICROHABITAT(S)

None.

SPECIES Large or golden hoverfly **SCIENTIFIC NAME** *Callicera spinolae*

5 ECOLOGY

The adult large hoverfly appears in September or October and visits flowering plants, particularly ivy, to feed. The males also visit flowering plants in order to seek out females and perform ritual courtship flights. After mating the females search out suitable rot holes in standing, living, broad-leaved trees such as ash, field maple and beech in which to lay their eggs. Studies indicate that the presence of ivy in close proximity is important to the female when selecting a site. Little is known about the larval and pupa stages of the large hoverfly, but in common with most hoverfly species it may over-winter as a grub and pupate in the spring. The larva filter feeds in the water-filled rot hole. It takes two or more years to develop and only a proportion of the total larval population become adults each year.

6 MAIN RESEARCH NEEDS

Preferences in selection of egg-laying sites.

Larval taxonomy.

Investigations into the larva/pupa stage of the large hoverfly's life cycle.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of old parkland trees due to old age, windblow or felling is the major factor contributing to the loss or decline of this species. Actions within the plan include monitoring its one remaining breeding site and providing artificial breeding sites in areas where it was historically present.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors affecting the parkland habitat which relate to the large or golden hoverfly are loss of veteran trees (and therefore of breeding sites) due to disease, physiological stress and felling for safety reasons. Mis-guided tree surgery and clearance or killing of ivy from trees will also have an impact. However, since this species has an extremely restricted distribution, a very site-specific approach to its conservation is needed; generalisations from the HAP may be applicable to nearby or historic sites, in order to keep them in the right general state should this species spread naturally or be introduced.

9 BENEFICIAL MANAGEMENT

Retention of wet and water-filled rot holes, accelerated formation of rot holes by removing tree limbs and excavating out junction with trunk, retention of ivy (on trees, walls and in hedgerows), retention of herb-rich grassland, retention of mature trees, acceptance of broken tree limbs and stumps of limbs.

SPECIES A hoverfly **SCIENTIFIC NAME** *Myolepta potens*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates.* English Nature, Peterborough. p192.

Stubbs, A.E. 1997. Draft Species Action Plan. Unpublished Document to English Nature.

Stubbs, A.E. & Falk, S.F. 1983. *British Hoverflies: an illustrated identification guide.* British Entomological and Natural History Society.

2 KEY CONTACTS

Alan Stubbs, Biodiversity Challenge.

Simon Damant, National Trust, Wimpole Hall, Cambs.

Graham Rotheray, Scottish Natural Heritage, Edinburgh.

Ivan Perry, Lode, Cambs.

3 DISTRIBUTION

Only recorded from parts of Somerset (Coombe Dingle near Bristol, Eddington, and Loxley Wood) between 1945 and 1949, however this should not be taken as an indication of extinction since other saproxylic hoverflies thought to be (nearly) extinct have been rediscovered following specific searches for larvae. Recent surveys of adult hoverflies in Somerset have failed to record this species but no searches for larvae have been undertaken.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Wet rot holes in mature deciduous trees in open habitats.

4.2 OTHER MICROHABITAT(S)

As above but with trees located in more closed woodland.

5 ECOLOGY

A large black hoverfly with partially orange flanks. The adult has a very short emergence period. This species probably breeds in wet rot holes in mature deciduous trees.

SPECIES A hoverfly **SCIENTIFIC NAME** *Myolepta potens*

6 MAIN RESEARCH NEEDS

Surveys for the larvae in historic and adjacent (and potential other) localities, followed by collection and rearing to adult stage to confirm identification.

Larval taxonomy.

Species' ecology.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of old trees bearing water-filled rot holes has contributed to the loss and decline of this hoverfly.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees, the lack of new generations of trees and mis-guided or over-zealous tree surgery, 'tidying-up' and cleaning/treating of scars left by fallen branches (which if left alone could rot back to form holes) are factors affecting the parkland habitat which are relevant to the conservation of this hoverfly. Beyond the obvious need to retain mature trees, action could be taken to accelerate the formation of rot holes eg by removing branches and excavating out the stump to provide a hole, as part of research into integrated habitat and management techniques.

9 BENEFICIAL MANAGEMENT

Retention of wet rot holes, accelerated formation of rot holes by removing tree limbs and excavating out junction with trunk, retention of herb-rich grassland, retention of mature trees, acceptance of broken tree limbs and stumps of limbs.

BAP moths

SPECIES White-spotted pinion **SCIENTIFIC NAME** *Cosmia diffinis*

1 KEY REFERENCES

Anon. 1999. UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates. English Nature, Peterborough. pp 319-321.

2 KEY CONTACTS

Butterfly Conservation.

David Sheppard, English Nature.

3 DISTRIBUTION

Pre 1970s this species was widespread in central and southern England and parts of Wales. Since then it has suffered a massive decline and Huntingdonshire is now the only area where it is reported to be frequent. There are occasional records from elsewhere in the country however which suggests that the moth is present at low densities in a few other places within its former range.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Foliage and side-shoots (epicormic growth) of English and wych elm are consumed by the larvae, especially trees on damp ground. The epicormic growth may be caused and/or facilitated by the presence of a fungus.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

Little is known about this species. The food plants of the larvae are English elm and wych elm, with the side-shoots (epicormics) thought to be favoured. There also appears to be a preference for trees growing on damp ground.

6 MAIN RESEARCH NEEDS

Habitat requirements of the adult moth.

Feeding preference of larvae.

Role of fungal attack on elm in producing epicormic shoots.

SPECIES White-spotted pinion **SCIENTIFIC NAME** *Cosmia diffinis*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of mature elm trees due to Dutch elm disease has certainly contributed to the decline of this species since the 1970s. Actions within the plan designed to aid its recovery which relate to wood pasture/parkland habitat include restricting any tree felling in habitat currently or formerly occupied by the moth, planting disease resistant elms in areas where it was formerly widespread, and ensuring that suitable habitats are linked and populations do not become fragmented.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing elm trees and the lack of new generations of elm trees are factors involved in the loss and decline of wood pasture/parkland sites with this tree species and these factors are directly relevant to this species. Re-establishment of disease resistant elms as part of parkland restoration under the HAP could benefit this species (but see below).

9 BENEFICIAL MANAGEMENT

Planting of disease-resistant elms on damp ground and retention of damp woodland which supports elm. However if the formation of the favoured epicormic elm shoots is caused and/or facilitated by fungal attack, even disease-resistant elms may not provide the correct larval habitat.

SPECIES Heart moth **SCIENTIFIC NAME** *Dicycla oo*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates.* English Nature, Peterborough. pp 331-333.

2 KEY CONTACTS

Butterfly Conservation.

David Sheppard, English Nature.

3 DISTRIBUTION

Seen in numbers only now in parts of Surrey, but this moth also survives at low density in north-west Kent, Berkshire and Northamptonshire. It has been lost from Buckinghamshire, Essex, Middlesex, Hertfordshire and Hampshire in recent decades. The main population is on Ashtead Commons SSSI.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Solitary veteran/over mature pedunculate oak trees.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

The heart moth larvae feed on the foliage of pedunculate oak and seem to prefer over-mature trees which stand alone and which are therefore in full sunshine. The pupa occurs in the soil below the tree on which the larva fed.

6 MAIN RESEARCH NEEDS

Factors affecting population dynamics.

Preferred soil conditions for pupation.

SPECIES Heart moth **SCIENTIFIC NAME** *Dicycla oo*

SPECIES Heart moth **SCIENTIFIC NAME** *Dicycla oo*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Factors causing the loss and decline of this species which are related to wood pasture/parkland include the felling of over-mature oak trees. Actions within the plan designed to help conserve this species include the retention of suitable trees, ensuring habitat is available for the future (ie new generations of oaks) and linking fragmented existing populations.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing veteran trees and the lack of new generations are significant causes of wood pasture/parkland decline and loss which relate directly to this species. Actions to restore degraded wood pasture/parkland habitats by providing new tree generations and preventing further tree loss should therefore benefit the species, by retaining habitat and providing new potential habitat.

9 BENEFICIAL MANAGEMENT

Retention of single and well-spread over-mature and veteran pedunculate oak trees in open sunny parkland situations. Provision of new pedunculate oak trees, but in open situations such that existing veteran trees are not shaded nor linked up so that they are no longer isolated.

SPECIES Orange upperwing moth **SCIENTIFIC NAME** *Jodia croceago*

1 KEY REFERENCES

Anon. 1999. UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates. English Nature, Peterborough. pp 355-357.

2 KEY CONTACTS

Butterfly Conservation.

David Sheppard, English Nature.

3 DISTRIBUTION

This species was formerly frequently recorded from central, southern and south-western England with occasional records from Wales but by approximately 1980 it was apparently restricted to parts of Cornwall, Devon, Sussex, Surrey, Shropshire and south Wales. However, the last confirmed record was from Sussex in 1984 and it seems to have also disappeared from its main locality in Surrey.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Oak trees, particularly small trees or coppiced trees which retain dead leaves over the winter.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

The larvae feed on the leaves of pedunculate and sessile oak and they have a preference for small and coppice trees and also for woodland with some willow and ivy. The adults are on the wing from October and November to late-March and early-May. Adults over-winter in withered oak leaves which remain on the tree.

6 MAIN RESEARCH NEEDS

Exact habitat preferences of adults.

The life cycle of this moth.

SPECIES Orange upperwing moth **SCIENTIFIC NAME** *Jodia croceago*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The decline of coppice management and inappropriate woodland management have probably contributed to the loss or decline of this species. Actions within the plan aimed to assist the recovery of this moth and which are related to parklands include ensuring the appropriate management of woodlands.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The absence of younger generations of oak trees is a major factor responsible for a decline in the quality of wood pasture/parkland habitat and is directly relevant to this species. Actions which relate to the restoration and re-establishment of the wood pasture/parkland habitat, in particular the provision of new generations of trees, would benefit this moth,

9 BENEFICIAL MANAGEMENT

Retain small/coppiced oak trees, undertake traditional small scale coppicing in broad-leaved woodland where oak is included in the underwood.

SPECIES Clay fan-foot moth **SCIENTIFIC NAME** *Paracolax tristalis*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates.* English Nature, Peterborough. pp 417.

2 KEY CONTACTS

Butterfly Conservation.

3 DISTRIBUTION

Formerly widespread in south-east England, this species has experienced a rapid decline and now occurs only locally in a few woodlands in Kent, Sussex and Surrey. There are historic records from north Wales and Cheshire but there are considered erroneous.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Oak trees in dense-ish stands where there is some woodland-type herbaceous ground flora, as opposed to grassland species.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

Little is known about this species. The larva feed on the foliage of oak trees initially and continue to feed on them, and the leaves of other tree species, when they fall and form leaf litter. They are also thought to feed on herbaceous plants in the ground flora during the spring. Adults fly in July and early August and sheltered clearings and coppiced areas in woodland appear to be favoured.

6 MAIN RESEARCH NEEDS

Feeding preferences of the larva.

Preferred substrata for egg laying.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The cessation of traditional woodland management and the loss of woodland clearings are given as important current factors contributing to the loss and decline of this moth. Actions within the plan which will benefit the moth include restoration of suitable habitat through traditional coppice management and ensuring that all existing sites and former sites are managed appropriately and are linked.

SPECIES Clay fan-foot moth **SCIENTIFIC NAME** *Paracolax tristalis*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Lack of younger generations of trees due to neglect and loss of traditional small-scale coppice management techniques are a major cause of decline and loss of parkland habitat suitable for this species. Appropriate management in the HAP to ensure that new generations of trees are established would benefit this species.

9 BENEFICIAL MANAGEMENT

Perpetuation of traditional small-scale coppice management in broad-leaved woodlands giving rise to and maintaining open glades and clearings with a rich ground flora, which is not or only lightly grazed.

SPECIES Common fan-foot **SCIENTIFIC NAME** *Pechipogo strigilata*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 4: Invertebrates.* English Nature, Peterborough. pp 375-377.

2 KEY CONTACTS

Butterfly Conservation.

David Sheppard, English Nature.

3 DISTRIBUTION

This nationally scarce moth formerly occurred throughout most of southern England and Wales. It has however experienced serious decline and now only occurs in a small number of oakwoods on heavy clay soils in the Midlands and south-central England.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Oak trees; occasionally birch, alder and hazel.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

The larvae start their development on fresh or wilting foliage of mainly oak but also other trees and shrubs such as birch, alder and hazel. Later they over-winter in decaying or withered leaves which either remain on the tree or lie on the ground.

6 MAIN RESEARCH NEEDS

Habitat requirements of adults.

Feeding preferences of larvae.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of oak and other trees. Actions within the plan designed to assist the conservation of this moth and which are relevant to parklands include adoption of appropriate tree and woodland management.

SPECIES Common fan-foot **SCIENTIFIC NAME** *Pechipogo strigilata*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing veteran trees and the lack of new generations are significant causes of wood pasture/parkland loss which relate directly to this species.

9 BENEFICIAL MANAGEMENT

Retention of oak trees, small-scale coppicing in broad-leaved woodland, provision of new oak generations.

BAP bats

SPECIES Barbastelle bat **SCIENTIFIC NAME** *Barbastella barbastellus*

1 KEY REFERENCES

Anon. 1998. *UK Biodiversity Group Tranche 2 Action Plans. Volume 1: Vertebrates and Vascular Plants.* English Nature, Peterborough. pp35-37.

Greenaway, F. Undated. *Roost use and Ranging in West Sussex Barbastelles.* The Vincent Wildlife Trust.

Greenaway, F. 2001. The Barbastelle in Britain. *British Wildlife,* **12**:5 pp 327-334.

Parsons, S. & Goldsmith, J. Undated. *Norfolk Barbastelles.* The Norfolk Bat Group and the BCT.

Rydell, *et al.* 1996. Food Habitats of the barbastelle bat, *Barbastella barbastellus. Ecography,* **19,** pp. 62-66.

Schober, W. & Grimmberger, E. 1997. *The Bats of Europe and North Amer*ica. TFH publications, Waterlooville.

Vaughan, N. 1997. The Diets of British Bats, Chiroptera. *Mammal Review,* **27**, 2 77-94.

2 KEY CONTACTS

Bat Conservation Trust.

Geoff Billington, Westmorland & Furness Bat Group.

F Greenaway, Natural History Museum, London.

3 DISTRIBUTION

Widely distributed but very rare throughout England. Population centres appear to be in the south-west, the mid-west and Norfolk. There have only been 340 records of this bat since 1802; only three maternity roosts and fewer than 30 hibernation sites are known. The population is estimated at approximately 5000 individuals.

SPECIES Barbastelle bat **SCIENTIFIC NAME** *Barbastella barbastellus*

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Mature or dead trees in close proximity to each other, with medium sized holes and cracks; used for roosting, maternity sites and hibernation.

Hedgerows and tree lines; used for feeding.

4.2 OTHER MICROHABITAT(S)

Woodlands with dead oak and beech stumps and a dense understorey used for roosting, hibernation and feeding.

Buildings possibly with large entry and exit points; used as maternity roosts.

Caves, mines and cellars; used as hibernation sites.

5 ECOLOGY

Mating occurs in the autumn and also in the hibernaculum in winter. The females become sexually mature in their second year but it is not known whether they then produce young every year. It is not known when males reach sexual maturity. Maternity roosts are known in old buildings and trees and usually support 10-20 females. A single young is produced in mid-June but the period of dependence, and timing of break-up of maternity roosts is not known. Males appear to live in small groups away from the females at this time.

Information from the study of one population in Sussex shows these bats to exist at low population densities and show a slow population growth. They occupy a large territory and often cover a considerate distance in the course of a night to feed. They emerge to feed at early dusk, foraging along woodland edges, in gardens, parks, and churchyards. They fly fast and hunt mainly Lepidoptera, which are taken in flight and also gleaned from surfaces.

Little is known about their roosting preferences but they appear to switch roost sites quite frequently, while remaining loyal to a particular (large) area. When trees are the favoured roosting sites, dead stumps of oak and beech in woodland with a high canopy and dense understorey are selected. When buildings are used, those with large entry and exit holes may be favoured. Hibernation site are usually hollow trees, but occasionally underground sites are used.

6 MAIN RESEARCH NEEDS

The preferred conditions in hibernation sites and maternity roosts.

Feeding habitat requirements.

Breeding biology: age at which males reach sexual maturity, interval between young, period of dependence.

SPECIES Barbastelle bat **SCIENTIFIC NAME** *Barbastella barbastellus*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Factors causing loss and decline of this species include the loss and fragmentation of habitat; loss, destruction and disturbance of tree roosts and habitat degredation leading to a loss in invertebrate prey. Actions in the plan to safeguard and protect the species include the retention of hollow, veteran, dying and dead trees, advising foresters and other personnel operating in the vicinity of barbastelle sites on tree management practices that will assist the conservation of this species; and ensuring the long-term protection of maternity roosts, key hibernation roosts and the habitat surrounding these sites and consider notifying such areas as SSSIs.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors affecting the wood pasture/parkland habitat and which have a direct effect on barbastelle bats are the decline in traditional tree management techniques leading to trees collapsing or being felled for safety reasons; loss and removal of veteran trees through disease, physical stress, competition, and through perceptions of safety and tidiness; and pasture loss and degradation through inappropriate grazing regimes and conversion to arable which affects levels of Lepidopteran prey available. Actions in the HAP include the protection and maintenance of existing wood-pasture and parkland, and programmes to restore derelict wood pasture/parkland to favourable ecological conditions; success of these actions could benefit barbastelle bats.

9 BENEFICIAL MANAGEMENT

Retention of mature or dead trees with damage to trunk and branches, retention of tree groups and tree-lines. Maintenance of areas with dense understorey where this is shown to be important to the bats.

SPECIES Bechstein's bat **SCIENTIFIC NAME** *Myotis bechsteini*

1 KEY REFERENCES

Anon. 1998. *UK Biodiversity Group Tranche 2 Action Plans. Volume 1: Vertebrates and Vascular Plants*. English Nature, Peterborough. pp39-41.

Altringham, J.D. 1998. *Bats, Biology and Behaviour*. Oxford University Press, Oxford.

Schober, W. & Grimmberger, E. 1989. *A guide to bats of Britain and Europe*. Hamlyn, London.

Schober, W. & Grimmberger, E. 1997. *The bats of Europe and North America*. TFH publications, Waterlooville.

Vaughan, N. 1997. The diets of British bats. (Chiroptera). *Mammal review,* **27**, pp. 77-94.

2 KEY CONTACTS

Bat Conservation Trust.

3 DISTRIBUTION

Bechstein's bat has a restricted distribution across southern England with population centres in Devon, Dorset, Gloucestershire, Isle of Wight, Hampshire, Somerset and Wiltshire. There have been two recent records from Wales and several roosts have been identified in Surrey. Only one maternity roost and fewer than 20 hibernation sites have been identified in the whole of the UK. A recent estimate of the UK population is 1500 individuals.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Mature or dead trees with large to medium sized holes, fissures and cracks used for roosting, maternity sites and hibernation.

Woodland next to open pasture; used for feeding and roosting.

4.2 OTHER MICROHABITAT(S)

Damp cellars, mines and caves; used as hibernation sites.

SPECIES Bechstein's bat **SCIENTIFIC NAME** *Myotis bechsteini*

5 ECOLOGY

Little is known about this species. Mating occurs between autumn and spring. The age of sexual maturity is unknown and this bat (like all other species in the UK) has a comparatively low rate of reproduction. Maternity roosts of up to 30 females begin to assemble in late May/early April. The maternity roosts are usually in tree holes and are frequently changed. One young is born at the end of June or beginning of July and it is able to fly by mid-August. Males are not included in the maternity roosts and are usually found living singly in the summer. Known hibernation sites are mainly in trees but some underground sites have been found including cellars, mines and caves. The bats are often free hanging and the site often has a comparatively high humidity.

Bechstein's bats hunt very low, after nightfall, along woodland edges, and in gardens and parks. They catch woodland families of Diptera and Lepidoptera and often pick spiders and day-flying insects off branches and leaves.

6 MAIN RESEARCH NEEDS

The preferred conditions in hibernation sites and maternity roosts.

Use of mating roosts.

Foraging habitat requirements.

The age at which sexual maturity is reached and the underlying reasons for the low reproductive rate of this species.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Factors causing the loss and decline of this bat are poorly understood. The action plan states that current factors include the loss of potential roost sites (particularly old trees) and the loss and fragmentation of open ancient deciduous woodland habitat. Actions within the plan which relate to wood pasture/parkland are the retention of hollow, veteran, dead and dying trees and the retention of woodland in the vicinity of known roost sites; ensuring the long-term protection of known maternity roosts, key hibernation sites and the habitats surrounding them; and advising foresters and other relevant personnel operating in the vicinity of Bechstein's bat sites on tree management practices which will assist the conservation of this species.

SPECIES Bechstein's bat **SCIENTIFIC NAME** *Myotis bechsteini*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors affecting the wood pasture/parkland habitat and which have a direct effect on Bechstein's bat are neglect and the decline of traditional tree management techniques leading to trees collapsing or being felled for safety reasons; loss and removal of veteran trees through disease, physical stress, competition, and through perceptions of safety and tidiness; and pasture loss and degradation through inappropriate grazing regimes and conversion to arable which affects levels of invertebrate prey. Actions in the HAP include the protection and maintenance of existing wood pasture and parkland, and programmes to restore derelict wood pasture/parkland to favourable ecological conditions; success of these actions could benefit Bechstein's bats.

9 BENEFICIAL MANAGEMENT

Retention of mature or dead trees with damage to trunks and branches, retention of tree groups and tree-lines.

SPECIES Pipistrelle bat **SCIENTIFIC NAME** *Pipistrellus* agg

1 KEY REFERENCES

Altringham, J.D. 1998. *Bats, biology and behaviour.* Oxford University Press, Oxford.

Anon. 1995. *Biodiversity: The UK Steering Group Report.* HMSO, London. p89.

Beck, A. 1995. Fecal analysis of European bat species. *Myotis*, pp. 109-119.

Schober, W. & Grimmberger, E. 1989. *A guide to bats of Britain and Europe.* Hamlyn, London.

Schober, W. & Grimmberger, E. 1997. *The bats of Europe and North America.* TFH publications, Waterlooville.

Speakman, J.R. *et al.*. 1989. Hibernal ecology and the pipistrelle bat. *Journal of Animal Ecology,* **58**, pp. 797-813.

2 KEY CONTACTS

Bat Conservation Trust.

3 DISTRIBUTION

The most abundant and widespread bat in Britain. The most recent population estimate is 2,000,000 animals. However the species has decreased significantly and one estimate suggests the population has declined by 70% between 1978 and 1993. Recent research has demonstrated that the pipistrelle is actually two species: *Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*. Research is currently underway to determine ecological (and distributional) differences between the two.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trees with holes, cracks and fissures of varying sizes; used as hibernation sites and for feeding.

Hedgerows, treelines, woodland edges; used for feeding.

4.2 OTHER MICROHABITAT(S)

Recently constructed buildings; used as maternity roosts.

Standing water; used for feeding.

SPECIES Pipistrelle bat **SCIENTIFIC NAME** *Pipistrellus* agg

5 ECOLOGY

Mating occurs during the autumn (occasionally in spring) at well established mating roosts. The males defend established territories and emit special social calls and a strong smell of musk at this time. One male may have a harem of up to 10 females but females only visit the mating roost temporarily. A female can breed in her first year and usually does so every year thereafter. Males generally become sexually active in their second year.

Maternity colonies consisting almost exclusively of female bats are formed between April/May and August, and very occasionally into September. The single young is born between early June and mid-July and females leave the young in the roost in a group or creche whilst they go out to forage. By six weeks of age the young are fully weaned and maternity roosts are abandoned once all the young are weaned. Buildings are favoured maternity roosts and most known sites are in buildings under thirty years of age.

Comparatively few hibernation sites are known for this species. Most winter records are of isolated individuals or small groups in buildings or trees. The species is known to emerge during the winter and it was commonly thought that the primary reason for this was to feed. More recent studies indicate that thirst is the primary reason for winter emergence and that the need to drink is more important than the need to eat.

Pipistrelles emerge to feed relatively early, sometimes before sunset. They feed in sheltered habitats such as along woodland edges, gardens, hedgerows, etc and avoid feeding over large open fields. Insects which appear in swarms, particularly those associated with aquatic habitats, are the favoured prey. Studies show that Diptera less than 5mm in length form the bulk of the diet, although small Lepidoptera and Coleoptera will be taken.

6 MAIN RESEARCH NEEDS

Foraging behaviour.

The preferred conditions in hibernation sites.

Ecological separation of *Pipistrellus pipistrellus* from *Pipistrellus pygmaeus*.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Factors causing the loss and decline of this species which are related to wood pasture/parkland are a reduction in feeding opportunities due to inappropriate management of grassland; the loss of flyways such as hedgerows and woodland edges; and the loss of old trees as winter roost sites. Actions within the plan relating to the wood pasture/parkland habitat which will benefit pipistrelle bats include encouraging favourable management of land adjacent to roost sites for feeding.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors affecting the wood pasture/parkland habitat and which have a direct affect on the pipistrelle bat are neglect, and the decline of traditional tree management techniques leading to trees collapsing or being felled for safety reasons; loss and removal of veteran trees through disease, physical stress, competition, and through perceptions of safety and tidiness; and pasture loss and degradation through inappropriate grazing regimes and conversion to arable which affects levels of invertebrate prey available. Actions in the HAP include the protection and maintenance of existing wood-pasture and parkland, and programmes to restore derelict wood pasture/parkland to favourable ecological conditions; success of these actions could benefit pipistrelle bats.

9 BENEFICIAL MANAGEMENT

Retention of mature and damaged trees, retention and appropriate management of herb-rich grassland, marshes, ponds and streams, retention of hedgerows and tree groups/tree-lines.

SPECIES Greater horseshoe bat **SCIENTIFIC NAME** *Rhinolophus ferrumequinum*

1 KEY REFERENCES

Altringham, J.D. 1998. Bats, biology and behaviour, Oxford University Press, Oxford

Anon. 1995. Biodiversity: *The UK Steering Group Report.* HMSO, London. p90.

Beck, A. 1995. Fecal analyses of European bat species. *Myotis,* **32-33**, 109-119.

Jones, G.C. 1990. Prey selection by the greater horseshoe bat: Optimal forging by Echolation. *Journal of Animal Ecology,* **59**, 587-602.

Ransome, R.D. 1990. *The natural history of hibernating bats.* Christopher Helm, London.

Schober, W. & Grimmberger, E. 1989. *A guide to bats of britain and Europe.* Hamlyn, London

Vaughan, N. 1997. The diets of British bats, (Chiroptera). *Mammal Review*, **27**, 77-94

Walsh C L. and Harris S. 1996. Foraging habitat preferences of Vespertilionid bats in Britain. *Journal of Applied Ecology,* **33**, 508-518.

2 KEY CONTACTS

Bat Conservation Trust.

Roger Ransome, Bristol University.

EN (Devon) have appointed a project officer for this species under the SRP.

3 DISTRIBUTION

Restricted to south-west England and South Wales with vagrants recorded elsewhere. There are currently less than 20 known maternity and 369 known hibernation roost sites. There has been 98% population decline in the last 100 years and the current U.K. population is estimated at 4,000-6,000 individuals.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Cattle grazed pasture; used for feeding.

A network of treelines, hedgerows and mature trees; used for feeding and perch hunting.

SPECIES Greater horseshoe bat **SCIENTIFIC NAME** *Rhinolophus ferrumequinum*

4.2 OTHER MICROHABITAT(S)

Buildings with large entry and exit points; used for maternity roosts.

Manure heaps; used for feeding.

Sheltered caves, mines and cellars in close proximity to similar sites; used for hibernation.

5 ECOLOGY

Mating usually occurs during autumn, but has been known to take place in late winter and even spring. Females do not breed until they are 3-4 years old and they do not produce young every year. Maternity colonies begin to assemble in May and peak numbers occur by early July. Males are also found in the maternity roosts. Greater horseshoe bats were originally cave dwellers but few now use caves in the summer. Most breeding females choose buildings with large entrance holes such as churches or barns. Few maternity sites are known for this species. A single young is usually born between late June and mid-July and is fully weaned by the time it is seven weeks old. Males are sexually mature at the end of their second year. Rates of population growth are very slow.

Hibernation sites can be up to 30 miles from breeding sites. Caves, mines and cellars are favoured locations. Their hibernation sites are often much warmer than those of other bats. Males tend to change hibernation sites frequently.

Greater horseshoe bats feed over old pasture with frequent flyways and hunt mainly Lepidoptera and Coleoptera by hawking, gleaning and perch hunting. They do not hunt opportunistically but conform to optimal foraging models and select prey according to size, only taking smaller prey when more profitable prey is scarce. Their diet is more diverse in spring and autumn when the preferred Lepidoptera are in short supply. Studies show that a significant proportion of the prey taken are associated with cow dung.

6 MAIN RESEARCH NEEDS

The preferred conditions in hibernation sites.

Mating roost use.

Foraging behaviour.

Feeding studies.

Social structure.

SPECIES Greater horseshoe bat **SCIENTIFIC NAME** *Rhinolophus ferrumequinum*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Factors responsible for the loss or decline of this species which are related to parkland include a reduction in insect prey abundance due to loss of old pasture to intensive agriculture and a loss of feeding ground and flyways due to hedgerow removal and conversion of permanent pasture to arable. Actions within the plan relating to wood pasture/parkland include preparing and distributing advice on the best practice management of foraging habitat ie the parkland grassland.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Factors affecting the wood pasture/parkland habitat and which have a direct affect on greater horseshoe bat are neglect and the decline of traditional tree management techniques leading to trees collapsing or being felled for safety reasons; loss and removal of veteran trees through disease, physical stress, competition, and through perceptions of safety and tidiness; and pasture loss and degradation through inappropriate grazing regimes and conversion to arable which affects levels of invertebrate prey available to the bats. Actions in the HAP include the protection and maintenance of existing wood pasture and parkland, and programmes to restore derelict wood pasture/parkland to favourable ecological conditions; success of these actions could benefit greater horeshoe bats.

9 BENEFICIAL MANAGEMENT

Retention and appropriate management (cattle grazing) of unimproved grassland, retention of trees, tree groups and tree-lines.

BAP fungi

SPECIES Sandy stilt puffball **SCIENTIFIC NAME** *Battarraea phalloides*

1 KEY REFERENCES

Anon. 1995. Biodiversity: The UK Steering Group Report. HMSO, London. p200.

Lawson, P. 1999. Sandy Stilt Puffball. British Wildlife Vol 10 (5). p361.

Watling, R. *et al.* 1995. *Nova Hedwigia* 60.

2 KEY CONTACTS

Peter Lawson, The Suffolk Wildlife Trust.

Tony Gibbs, Essex Wildlife Trust.

British Mycological Society.

3 DISTRIBUTION

Formerly scattered throughout Britain, this species has seen a contraction in its range to southern and eastern England, ie Avon, Cambs, Essex, Kent, Norfolk, Oxon, Somerset, Suffolk and Surrey. It is now limited to a few sites and only reliably appears at one, in Suffolk, although there have been recent records from Essex.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Inside hollow trees and probably on the face with most light, where conditions are dry and sunny.

4.2 OTHER MICROHABITAT(S)

Dry sandy roadside banks with sparse vegetation, sometimes associated with elm.

5 ECOLOGY

Poorly known, presumably a saprophyte.

6 MAIN RESEARCH NEEDS

Species' ecology, including relationship with elm.

Re-survey of former sites.

Survey of potential sites.

SPECIES Sandy stilt puffball **SCIENTIFIC NAME** *Battarraea phalloides*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of hollow trees is believed to have caused the loss and decline of this species. Retention of hollow trees is therefore important in order to provide the correct habitat and experimentation is needed to create hollow trees from sound specimens. The provision of new generations of suitable host trees is required in order to ensure continuity of habitat.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing ancient, hollowed-out trees, either completely or partially (by tree surgery) is a factor which has contributed to the loss or decline in quality of parklands and is directly relevant to the conservation of sandy stilt puffball. Actions in the HAP relate to the need to retain existing trees and to re-establish young generations of trees. Success of these actions could benefit sandy stilt puffball, since any extant populations in trees would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of host hollow tree and its well-lit conditions, provision of potential new host trees, hollowing-out of nearby trees.

SPECIES Royal bolete **SCIENTIFIC NAME** *Boletus regius*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and fungi.* English Nature, Peterborough. pp25-27.

Marren, P. 2000. Surveying the royal and devil's boletes. *Field Mycology,* **1** (3), pp. 94-98.

Plantlife. 1998. *Back from the Brink Project 111*: *Boletus regius* and *Boletus pseudoregius.*

2 KEY CONTACTS

Jenny Duckworth, Plantlife.

Alan Hills, British Mycological Society.

Ted Green, Windsor Great Park

3 DISTRIBUTION

Records of a fungus believed to be this species have come from the Suffolk-Essex border, Surrey, Berkshire, Hampshire and Warwickshire, but latterly (1970 onwards) records have only been made from the New Forest, Windsor Great Park and Ash Green in Surrey. However recent taxonomic revision has resulted in the assignment of all but one of these to another species, *B. pseudoregius.*

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Grassland under open ancient deciduous tree cover, especially that composed of old oak pollards, but also beech and hornbeam, on warm acidic soils.

4.2 OTHER MICROHABITAT(S)

Grassland under broad-leaved woodland, where the tree canopy is denser than in parkland. Hazel coppice.

5 ECOLOGY

An ectomycorrhizal species of toadstool fungus which is dependent on old host trees. Fruiting bodies are reddish and 6-20cm in diameter and are produced between May and September, although perhaps not annually at every site.

6 MAIN RESEARCH NEEDS

Resolution of taxonomic confusion between *B. regius, B. pseudoregius* and *B. speciosus.*

Species' ecology.

SPECIES Royal bolete **SCIENTIFIC NAME** *Boletus regius*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of mature oak pollards, and those of beech and hornbeam, may have contributed to the loss or decline of this species of fungus, although there seems to be no definitive evidence that a decline has taken place due to irregular fruiting and taxonomic confusion. Actions within the plan designed to help conserve this species and which are relevant to parklands are the need to ensure the retention of host trees and the provision of new generations of trees to become future hosts.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees, the lack of new generations of trees and the loss of or damage to the pasture element of parks (including agricultural improvement, and over- and under-grazing) are major factors causing loss of the parkland habitat or a decline in the value of the habitat and these are relevant to the conservation of Royal bolete. Among actions in the HAP the need to retain existing trees, to re-establish young generations of trees, and to obtain and maintain favourable pasture conditions feature prominently. Success of these actions could benefit Royal bolete, since appropriate tree and grassland habitat conditions would be maintained and new trees available for mycorrhizal associations would be provided.

9 BENEFICIAL MANAGEMENT

Retention and low-intensity management of grassland under and around trees, retention of oak, beech and hornbeam pollards, pollarding/re-pollarding of trees, provision of new tree generations.

SPECIES Devil's bolete **SCIENTIFIC NAME** *Boletus satanus*

1 KEY REFERENCES

Anon. 1995. Biodiversity: *The UK Steering Group Report.* HMSO, London. p201.

Marren, P. 1998. On the trail of the Devil's own toadstool. *Plantlife Magazine,* pp. 6-7.

Marren, P. 2000. Surveying the royal and Devil's boletes. *Field Mycology,* 1 (3), pp. 94-98.

Plantlife. 1997. *Back From the Brink Project 88: The Devil's bolete.*

Plantlife. 1998. *Back From the Brink Project 111* (Appendix 2).

2 KEY CONTACTS

Peter Marren, Plantlife 'Back from the Brink' Project Officer for *B. satanus.*

Alan Hills, British Mycological Society.

Jenny Duckworth, Plantlife.

3 DISTRIBUTION

Rare and scattered throughout southern England from Somerset and Dorset to Kent, and north to Gloucestershire, Somerset, Oxfordshire and Hertfordshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Under mature beech trees (occasionally oak, yew), but in light or dappled shade, on chalk or limestone, ideally on warm south-facing slopes with loose soil.

4.2 OTHER MICROHABITAT(S)

On the edges of beech woodland in similar places to the parkland habitat. Trampled recreation areas, car parks and road verges.

5 ECOLOGY

A mycorrhizal toadstool fungus. Soil compaction may induce the species to fruit.

6 MAIN RESEARCH NEEDS

Species' ecology.

Monitoring of past sites in order to determine presence of this species, given its irregular fruiting.

SPECIES Devil's bolete **SCIENTIFIC NAME** *Boletus satanus*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of mature beech trees has been implicated in causing the loss or decline of this species and excessive trampling has been believed to have the same effect, but recent observation may suggest that this is not the case. Actions within the plan designed to help the conservation of this species and which are relevant to parklands include the need to achieve suitable tree/woodland management.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or a decline in the value of the habitat and these are relevant to the conservation of Devil's bolete. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit Devil's bolete, since appropriate habitat conditions (i.e. existing host trees) would be maintained and new habitat provided (i.e. future host trees with which the species can form a mycorrhizal association).

9 BENEFICIAL MANAGEMENT

Retention of beech trees, provision of new generations of beech trees, pollarding/re-pollarding of trees to prolong the life of mature specimens.

SPECIES Oak polypore **SCIENTIFIC NAME** *Buglossoporus pulvinus*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 29-31.

2 KEY CONTACTS

Ted Green, Windsor Great Park.

British Mycological Society.

Royal Parks Authority.

3 DISTRIBUTION

Scattered throughout the southern half of England from Nottinghamshire and Derbyshire, south to Essex, Suffolk, Herefordshire, Berkshire and Oxfordshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

This fungus occurs on mature or recently dead oak trees.

4.2 OTHER MICROHABITAT(S)

Similar oak trees to the above but in more enclosed areas of woodland.

5 ECOLOGY

A brown rot-causing bracket fungus of oak (a lignicolous saprophyte). Fruiting bodies appear between May and December.

6 MAIN RESEARCH NEEDS

Surveys to determine distribution.

Species' ecology.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of mature oak trees has contributed to the loss or decline of this fungus and the lack of younger generations of suitable oaks has caused a break in continuity of host trees. Actions within the plan designed to help the conservation of this species and which are relevant to parkland include a need to maintain populations (ie prevent loss of host trees and manage host trees as appropriate) and to provide a continuity of host trees.

SPECIES Oak polypore **SCIENTIFIC NAME** *Buglossoporus pulvinus*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of mature oak trees and the lack of new generations of oak trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where oak is a major feature and these are relevant to the conservation of oak polypore. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit oak polypore, since existing host trees would be retained and future potential host trees provided.

9 BENEFICIAL MANAGEMENT

Retention of host trees, pollarding/re-pollarding of host and potential host trees, provision of potential new host trees, deliberate damage to oaks adjacent to existing host trees including part or whole killing, acceptance of broken and damaged trunks and branches.

SPECIES Hedgehog fungus **SCIENTIFIC NAME** *Hericium erinaceum*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 33-35.

Hants and IoW Wildlife Trust. *New Forest Tooth Fungi Project 1999.*

Marren, P. & Dickson, G. 2000. British tooth-fungi and their conservation. *British Wildlife.* pp 401-409.

2 KEY CONTACTS

Gordon Dickson, British Mycological Society.

3 DISTRIBUTION

Scattered in south and south-east England from Suffolk to Kent and Hampshire, north to Essex and Oxfordshire, with outliers in Herefordshire, Cornwall, Somerset and Cheshire. The New Forest is a stronghold for this species and other recent records have arisen from Windsor Great Park.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

This species occurs on live standing old beech trees (occasionally on oak) and is mainly associated with wounds on the trunks or branches, often appearing high in the canopy. It is also present on naturally fallen beech trees and on the ends of felled beech trunks.

4.2 OTHER MICROHABITAT(S)

As above but in more closed woodland.

5 ECOLOGY

A saprophytic, bracket-like tooth fungus with fruiting bodies appearing in late summer to autumn.

6 MAIN RESEARCH NEEDS

Continued survey and monitoring.

Species' ecology.

SPECIES Hedgehog fungus **SCIENTIFIC NAME** *Hericium erinaceum*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Felling of host trees has been known to cause the loss of this species, a continuity of potential new host trees is required in order to perpetuate the species, and appropriate management of old trees (such as pollarding) is needed to maintain present host trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing beech trees and the lack of new generations of beech trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where beech is a major feature and these are relevant to the conservation of the hedgehog fungus. To a lesser extent, unnecessary tree surgery, general 'tidying-up' and the cessation of traditional tree management can also impact hedgehog fungus. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit hedgehog fungus, since any extant populations would be retained and potential new habitat (host trees) provided.

9 BENEFICIAL MANAGEMENT

Retention of host trees, provision of potential new host trees, pollarding/re-pollarding of host and potential host trees, deliberate damage to beech trees adjacent to existing host trees followed possibly by inoculation, acceptance of damaged trees and branches.

SPECIES Threatened Hydnoid (tooth or stipitate) Fungi

SCIENTIFIC NAMES *Bankera fuligineoalba, Hydnellum auranticum, H. caeruleum, H.concrescens, H. ferugineum, H. peckii, H. scrobiculatum, H. spongiospies, Phellodon confluens, P. melaleucus, P. tomentosus, Sarcodon imbricatus, S. scabrosus, S. glaucopus.*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 37-42.

Hants and IoW Wildlife Trust. *Report of Survey of the New Forest for 2 species of Tooth Fungi.*

Marren, P. & Dickson, G. 2000. British tooth-fungi and their conservation. *British Wildlife.* pp 401-409.

2 KEY CONTACTS

Gordon Dickson, British Mycological Society.

3 DISTRIBUTION

The Caledonian pine forests of Scotland are strongholds for *Bankera*, all three *Phellodon* spp, *Sarcodon glaucopus* and *Hydnellum ferugineum, H. caeruleum, H. peckii* and *H. auranticum.* The New Forest – Windsor areas are important for *H. concrescens, H. scrobiculatum, H. spongiospies, Phellodon confluens, P. melaleucus, Sarcodon imbricatus* and *S. scabrosus.*

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Banks of ditches or wood banks with some bare ground and/or moss dominance under long established oak and sometimes sweet chestnut trees.

4.2 OTHER MICROHABITAT(S)

Native and plantation Scots pine woodlands, Douglas fir plantations, mature oak woodlands (Scotland), under heather alongside tracks, eroding gravelly banks, tracks and road cuttings.

5 ECOLOGY

Mycorrhizal fungi (*Hydnellum scrobiculatum* may also be humicolous) associated with oak, pine, sweet chestnut and some other conifers.

SPECIES Threatened Hydnoid (tooth or stipitate) Fungi

SCIENTIFIC NAMES *Bankera fuligineoalba, Hydnellum auranticum, H. caeruleum, H.concrescens, H. ferugineum, H. peckii, H. scrobiculatum, H. spongiospies, Phellodon confluens, P. melaleucus, P. tomentosus, Sarcodon imbricatus, S. scabrosus, S. glaucopus.*

6 MAIN RESEARCH NEEDS

Survey and monitoring, of extant and potential sites.

Species' ecology.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of mature trees and breaks in ecological continuity have caused the loss or decline of threatened tooth fungi. Actions within the plan designed to help conserve these species and which are relevant to parklands are the need to ensure appropriate tree/tree group/woodland management and to provide continuity of possible host trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THESE SPECIES

The loss of existing trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of threatened tooth fungi. Also important may be the destruction of banks and ditches or other earthworks especially where they define or border groups of trees. Actions in the HAP such as the need to retain existing trees and to re-establish young generations of trees could benefit threatened tooth fungi, since any extant populations would be retained and new habitat provided (trees with which the fungi can form mycorrhizal associations).

9 BENEFICIAL MANAGEMENT

Retention of tree cover of appropriate species, retention of banks and other earthworks, control of invasive alien shrubs, construction of new banks and ditches adjacent to stands of oak and sweet chestnut.

BAP lichens

SPECIES A lichen **SCIENTIFIC NAME** *Bacidia incompta*

1 KEY REFERENCES

Church J.M., Coppins B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Watson, M.F., Hawksworth, D.L. & Rose, F. 1988. Lichens on elms in the British Isles and the effects of Dutch elm disease on their status. *Lichenologist*, **20**: 327-352.

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp73-75.

2 KEY CONTACTS

Stephen Ward, Scottish Natural Heritage.

Ray Woods, Countryside Council for Wales.

Jenny Duckworth, Plantlife.

Natural History Museum.

3 DISTRIBUTION

Formerly widespread throughout England, Wales and Scotland north to Aberdeen (and once especially common in south-east England), this lichen has suffered a severe decline on account of the loss of elm to Dutch Elm Disease. The current distribution of this epiphytic lichen is not clear but there is likely to be a concentration of relict populations in southern England, including the New Forest, with scattered outliers in Wales and Scotland where there may be surviving populations of elm.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trunks of mature trees with basic bark, especially elm, but also known from ash, beech, holly, hornbeam and sycamore. Usually present as uneven vertical streaks along nutrient-rich rain tracks or below bark wounds.

4.2 OTHER MICROHABITAT(S)

Trunks of trees as above but along roadsides; on exposed roots of elm on cliffs.

SPECIES A lichen **SCIENTIFIC NAME** *Bacidia incompta*

5 ECOLOGY

An epiphytic crustose lichen of whitish-fawn to grey-green colour, with a mealy and granular thallus.

6 MAIN RESEARCH NEEDS

Surveys to determine current distribution and abundance.

Monitoring.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of mature elm trees especially, and to a lesser extent loss of ash and other host tree species, has been responsible for the loss or decline of this lichen. The non-replacement of felled or fallen trees is also a contributary factor to the decline since potential new host trees have been unavailable. Actions within the plan designed to help the conservation of this species and which are relevant to parkland include the retention of mature trees and the provision of further suitable habitat (ie new trees).

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of elm trees are factors causing loss of the parkland habitat or decline in the value of the habitat where elm is a major feature and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions where elm and ash are concerned could begin to benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature elm trees and other species with base-rich bark, provision of potential new host trees, provision of artificial bark wounds.

SPECIES Orange-fruited elm-lichen **SCIENTIFIC NAME** *Caloplaca luteoalba*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert O L, James P W and Stewart N F. 1996. Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain. JNCC, Peterborough.

Purvis O W, Coppins B J, Hawksworth D L, James P W and Moore D M. 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum, London.

Watson, M F, Hawksworth D L and Rose F. 1988. Lichens on elms in the British Isles and the effects of Dutch elm disease on their status. Lichenologist, 20: 327-352.

Anon. 1995. Biodiversity: The UK Steering Group Report. HMSO, London. p207.

2 KEY CONTACTS

William Purves, Natural History Museum.

3 DISTRIBUTION

Formerly widespread in the UK, especially in the eastern lowlands of England and Scotland, this species suffered a severe decline and is now largely restricted to a few sites in particularly dry (ie low rainfall) localities.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

The dry bark of mature elm trees (occasionally other species including ash, field maple, poplar, horse-chestnut and sycamore) in well-lit locations.

4.2 OTHER MICROHABITAT(S)

Soft calcareous rock (eg chalk pebbles, walls, gravestones).

5 ECOLOGY

A largely epiphytic crustose lichen, of grey-white colour.

6 MAIN RESEARCH NEEDS

Surveys to establish current distribution and abundance.

Monitoring.

Suitability of other host tree species.

SPECIES Orange-fruited elm-lichen **SCIENTIFIC NAME** *Caloplaca luteoalba*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of mature elm trees and the pollution arising from intensive agriculture are the chief causes of the loss and decline of this lichen. The non-replacement of felled or fallen trees is also a contributary factor to the decline since potential new host trees have been unavailable. Actions within the plan designed to help the conservation of this species and which are related to parkland include the retention of mature trees, provision of new host trees and the need to avoid or control the agricultural intensification of land surrounding host trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees, the lack of new generations of trees and the loss or agricultural improvement of the pasture element are major factors causing loss of the parkland habitat or decline in the value of the habitat where elm is a major feature and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees, to re-establish young generations of trees and to maintain favourable pasture conditions feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained, potential new habitat provided and excessive agricultural pollution avoided.

9 BENEFICIAL MANAGEMENT

Retention of mature elm trees, provision of potential new host elm trees, perpetuation of well-lit conditions for host trees, by ensuring adjacent grassland is appropriately grazed.

SPECIES A lichen **SCIENTIFIC NAME** *Chaenotheca phaeocephala*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain. JNCC, Peterborough.

2 KEY CONTACTS

Ray Woods, Countryside Commission for Wales

3 DISTRIBUTION

Formerly scattered in England from Shropshire to Sussex and north to Norfolk and Suffolk, but recently only known from West Sussex and mid-Wales.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Mature oak trees.

4.2 OTHER MICROHABITAT(S)

Timber clad barns and fence-posts.

5 ECOLOGY

A dark grey to greenish brown thalloid lichen epiphytic on untreated worked wood, such as wooden buildings and fence-posts.

6 MAIN RESEARCH NEEDS

Tolerance to eutrophication from agricultural sources.

Tolerance to timber preservatives.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of mature oak trees has contributed to the decline of this species, but this decline is probably dwarfed by the losses due to timber treatment and replacement of timber fence-posts and other structures by non-wood materials.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Yet to be determined.

SPECIES A lichen **SCIENTIFIC NAME** *Chaenotheca phaeocephala*

9 BENEFICIAL MANAGEMENT

Retention of mature oak trees, provision of parkland fences constructed from untreated timber, especially oak.

SPECIES A lichen **SCIENTIFIC NAME** *Enterographa elaborata*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M.. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp113-115.

2 KEY CONTACTS

Yet to be determined.

3 DISTRIBUTION

Restricted to the New Forest, although there is an old record from the Isle of Wight (and recently it has been recorded from County Fermanagh).

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Rain tracks on shaded bases and trunks of over-mature beech trees (on ash in Ireland).

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

An epiphytic crustose lichen with a finely cracked, pinkish-brown, mosaic-forming thallus.

6 MAIN RESEARCH NEEDS

Survey to establish current distribution and abundance.

Monitoring.

Possibilities of translocation.

SPECIES A lichen **SCIENTIFIC NAME** *Enterographa elaborata*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of old beech trees and the decline in traditional pollarding management of trees are factors responsible for the loss and decline of this lichen. Actions within the plan to retain existing host trees, to provide future host trees, and to appropriately manage host (and potential future host) trees are relevant to parklands.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where beech is a major feature and these are relevant to the conservation of this lichen. Among broad actions in the HAP the need to retain and manage existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since the extant population would be retained, potential new mature host trees also retained, and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature beech trees, provision of potential new host trees, pollarding/re-pollarding of host and potential host trees, retention of other trees and scrub which give rise to shade on host and potential host trees.

SPECIES A lichen **SCIENTIFIC NAME** *Enterographa sorediata*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp117-119.

2 KEY CONTACTS

Yet to be determined.

3 DISTRIBUTION

Restricted to the New Forest, one site in Wiltshire and to one site (a single tree) in Norfolk. Other records (now old?) are from Dorset and north Devon.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Dry bark of mature oak trees in well-lit locations (plants are in locations not directly wetted by rain).

4.2 OTHER MICROHABITAT(S)

Similar trees but on roadsides and in ancient woodland.

5 ECOLOGY

An epiphytic crustose lichen.

6 MAIN RESEARCH NEEDS

Surveys to establish current distribution and abundance.

Monitoring.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of host trees and the lack of suitable new host trees are factors responsible for the loss and decline of this lichen. Actions within the plan to retain host trees, to provide future host trees and to manage host (and potential future host) trees appropriately are relevant to parklands.

SPECIES A lichen **SCIENTIFIC NAME** *Enterographa sorediata*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where oak is a major feature and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and new potential habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oaks, provision of potential new host oaks, perpetuation of well-lit conditions for host trees by appropriate grazing of adjacent grassland.

SPECIES Elm gyalecta or Elm tree lichen **SCIENTIFIC NAME** *Gyalecta ulmi*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M.. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Watson, M.F., Hawksworth, D.L. & Rose, F. 1988. Lichens on elms in the British Isles and the effects of Dutch elm disease on their status. *Lichenologist*, 20: 327-352.

Anon. 1995. *Biodiversity: The UK Steering Group Report.* HMSO, London. p209.

Gilbert, O. 1999. Survey to Assess the Status of *Gyalecta ulmi*. Unpublished report to English Nature Species Recovery Programme.

2 KEY CONTACTS

David Rae, Royal Botanic Gardens, Edinburgh.

Oliver Gilbert, British Lichen Society.

3 DISTRIBUTION

Formerly scattered in England from Devon and Sussex north to north Yorkshire and Northumberland with outliers in the Welsh Marches; Scotland near Edinburgh and scattered in the Highlands. Now limited to the Scottish sites (South Aberdeen, Angus, Perth) and to two in England: Northumberland and Herefordshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Bases of mature elm trees where sheltered and humid and moss-covered. There is one record for oak.

4.2 OTHER MICROHABITAT(S)

Sheltered and shaded calcareous rocks, growing over moss, with a possible preference for overhangs hence rarely or not directly wetted by rain.

5 ECOLOGY

A large grey-white thalloid lichen growing either as an epiphyte on trees with bark of high pH (preferentially on elm) or with moss (especially *Neckera* spp) on calcareous rocks (eg Carboniferous limestone) and walls. Probably now extinct as an epiphyte in Britain.

SPECIES Elm gyalecta or Elm tree lichen **SCIENTIFIC NAME** *Gyalecta ulmi*

6 MAIN RESEARCH NEEDS

Surveys to determine distribution and abundance.

Monitoring.

Tolerance of shading by trees and shrubs of populations on rock.

Likely success of transplantation to other tree species with a high pH bark, such as ash.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of mature elm trees, lack of potential new host elm trees and pollution from intensive agriculture are factors responsible for the loss and decline of this species. Actions within the plan to attempt to restore the species as an epiphyte and to expand saxicolous populations by planting suitable potential host trees are relevant to parklands.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of elm trees are factors causing loss of the parkland habitat or decline in the value of the habitat where elm is a major feature and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions where elm or possibly ash (if shown to be a successful transplant host) are involved could benefit this lichen, since any extant populations would be retained and new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature elm trees in suitable sheltered and humid locations, provision of potential new host elms in similar locations, protection of trees from pollution from intensive agricultural use of adjacent grassland.

SPECIES Warty wax-lichen **SCIENTIFIC NAME** *Thelenella modesta*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis,O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp145-147.

2 KEY CONTACTS

Stephen Ward, Scottish Natural Heritage.

Jenny Duckworth, Plantlife.

3 DISTRIBUTION

Restricted to one tree at Glamis in Angus; formerly known from sites in Gloucestershire and Oxfordshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Base-rich bark of a trees in open well-lit locations (the Glamis site is on an ash tree).

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

An epiphytic crustose lichen, with a warty yellow-grey to pink or red-brown thallus which has a waxy texture.

6 MAIN RESEARCH NEEDS

Surveys to determine distribution and abundance.

Monitoring

Reproductive potential.

Transplanting potential.

SPECIES Warty wax-lichen **SCIENTIFIC NAME** *Thelenella modesta*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of suitable host trees in open situations has probably been a factor causing loss and decline of this species, and pollution of tree trunks from intensive agriculture may also be contributary. Actions within the plan to retain the host tree, to provide suitable future host trees and to judiciously manage (rather than fell) the host tree if necessary are relevant to parklands.

ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees with base-rich bark and the lack of new generations of such trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where these trees, as opposed to acid-barked oak, are major features, and these are relevant to the conservation of this lichen. Broad actions in the HAP relate to the need to retain existing trees and to re-establish young generations of trees. Success of these actions could begin to benefit this lichen, since suitable potential new habitat would be provided should it be able to expand. However, the most pressing need is to perpetuate the life of the single existing host tree, eg by pollarding, by prevention of undue shade from nearby growth, etc, as appropriate.

9 BENEFICIAL MANAGEMENT

Retention of trees with base-rich bark, provision of potential new host trees, protection of potential host trees from pollution from intensive agricultural use of adjacent grassland.

BAP mosses

SPECIES Blunt-leaved bristle moss **SCIENTIFIC NAME** *Orthotrichum obtusifolium*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. p 247-249.

Church, J.M., Hodgetts, N.G., Preston, C.D. & Stewart N.F. 2001. *British Red Data Books: Mosses*. JNCC, Peterborough.

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3.* p185.

2 KEY CONTACTS

Jenny Duckworth, Plantlife.

Chris Preston: author of species account in the Hill *et al* reference.

Ron Porley: British Bryological Society referee for the genus *Orthotrichum*.

3 DISTRIBUTION

Formerly widespread in England and Scotland, with concentrations of records for north-east Scotland and central southern Midland England, but recent records (1970 onwards) are only from Norfolk (one site), and Aberdeenshire and Moray.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Exposed and well-illuminated trunks, roots and twigs of ash and elm especially (therefore favouring base-rich bark) but also known from other tree and shrub species including oak, willow, sycamore and elder. Trees in parkland and on roadsides are favoured due to good illumination, and records from woodland are probably from well-lit trees on the edges of such sites.

4.2 OTHER MICROHABITAT(S)

Rotting logs (at one Scottish site).

5 ECOLOGY

A pioneering epiphytic moss. Reproduces asexually by production of gemmae. Very rarely found on rotting wood.

6 MAIN RESEARCH NEEDS

Surveys (in NE Scotland) to determine distribution.

Dispersal and establishment of gemmae.

SPECIES Blunt-leaved bristle moss **SCIENTIFIC NAME** *Orthotrichum obtusifolium*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of trees is a factor which has contributed to the loss or decline of this moss. Actions within the plan designed to help the conservation of this species and which are relevant to parklands are the maintenance of existing trees, the establishment of new trees, and the need for the importance of trees for epiphytic moss communities in general to be recognised further and more widely.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

Major factors causing decline in the value of the parkland habitat for blunt-leaved bristle-moss are the loss of existing trees and the lack of new generations of trees of species with base-rich bark where such trees are a major feature as opposed to acid-barked oak. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for tree species with base-rich bark could benefit blunt-leaved bristle-moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees and shrubs with base-rich bark, provision of new generations of trees and shrubs with base-rich bark, perpetuation of well-lit conditions.

SPECIES Pale bristle-moss **SCIENTIFIC NAME** *Orthotrichum pallens*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 251-253.

Church, J.M., Hodgetts, N.G., Preston, C.D. & Stewart, N.F. 2001. *British Red Data Books: Mosses.* JNCC, Peterborough.

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3.* p197.

2 KEY CONTACTS

Jenny Duckworth, Plantlife.

Chris Preston: author of species account in the Hill *et al* reference.

Ron Porley: British Bryological Society referee for the genus *Orthotrichum*.

3 DISTRIBUTION

Formerly scattered from Yorkshire north to Ross-shire and most frequently recorded from north and west Yorkshire. Now known only from Moray and Westerness in Scotland and Co. Durham in England.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

The base-rich bark of trunks and branches of well-lit trees and shrubs including ash, hazel, elder, sycamore, willow and wych elm.

4.2 OTHER MICROHABITAT(S)

Dry acid and basic rocks (in Europe).

5 ECOLOGY

An epiphytic moss. Reproduces by spores and capsules are common.

6 MAIN RESEARCH NEEDS

Surveys (in vicinity of extant sites) in order to locate further populations.

SPECIES Pale bristle-moss **SCIENTIFIC NAME** *Orthotrichum pallens*

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The felling of trees is a factor which has contributed to the loss or decline of this moss. Actions within the plan designed to help the conservation of this species and which are relevant to parklands are the maintenance of existing trees and the establishment of new trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees of species with base-rich bark are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of pale bristle-moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for tree species with base-rich bark could benefit pale bristle-moss, since any extant populations would be retained and new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees and shrubs with base-rich bark, provision of new generations of trees and shrubs, perpetuation of well-lit conditions.

SPECIES Knothole moss **SCIENTIFIC NAME** *Zygodon forsteri*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 283-285.

Church, J.M., Hodgetts,N.G., Preston, C.D. & Stewart, N.F. 2001. *British Red Data Books: Mosses.* JNCC, Peterborough.

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3.* p183.

Rumsey, F.J. 2000. The Knothole Moss *Zygodon forsteri* at Burnham Beeches. Unpublished EN report.

2 KEY CONTACTS

Michael Proctor: author of species account in the Hill *et al* reference.

F Rumsey (BBS).

K J Adams (BBS).

Ron Porley: British Bryological Society referee for the genus *Zygodon.*

3 DISTRIBUTION

Only ever recorded from a few sites in southern England from Somerset to Essex, and currently known only from the New Forest, Epping Forest in South Essex and Burnham Beeches in Buckinghamshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

A species with very exacting and complex microhabitat requirements. Almost all known colonies are on sickly beech trees where the moss grows in raintracks on the surface of the bole or branches. These raintracks are not fed by canopy drip-down but by a reservoir held in a trunk cavity. Such trees are extremely rare and a survey of an area of Epping Forest in 1988 found only three, all of which supported colonies of knothole moss. Much less often the species occurs in hollows and crevices on exposed roosts of old trees. The moss also seems to have a preference for well-lit situations. Protonemal mats with gemmae are often conspicuous in the immediate vicinity of cushions of this moss and, together with capsule production, may explain its persistence at its known sites. Recorded only once from each of a maple species and silver birch trees.

4.2 OTHER MICROHABITAT(S)

None.

SPECIES Knothole moss **SCIENTIFIC NAME** *Zygodon forsteri*

5 ECOLOGY

An epiphytic moss. Reproduces by spores and by gemmae.

6 MAIN RESEARCH NEEDS

Surveys to determine distribution (currently underway at Burnham Beeches).

Species' ecology.

Mechanisms of creation of artificial water-falled wounds in beech trees.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of mature beech trees has contributed to the loss or decline of this moss. Actions within the plan designed to help the conservation of this species and which are relevant to parklands include a need to provide continuity of suitable host trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing beech trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of knothole moss. Broad actions in the HAP relate the need to retain existing trees and to re-establish young generations of trees and while success of these actions could benefit knothole moss, since existing colonies would be retained and potential new habitat provided, the very exacting habitat requirements dictate that a precise management approach is needed.

9 BENEFICIAL MANAGEMENT

Retention of mature beech trees, pollarding/re-pollarding of trees, perpetuation of well-lit conditions for mature trees, creation of artificial wounds in host and potential host trees to expand habitat available for knothole moss, acceptance of damaged tree trunks and branches.

Grassland BAP fungi

SPECIES Pink meadow cap **SCIENTIFIC NAME** *Hygrocybe calyptriformis*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp43-45

Marren, P. 1998. Fungal Flowers: The Waxcaps and their World. *British Wildlife,* 9 (3) pp 164-172.

2 KEY CONTACTS

British Mycological Society

Maurice Rotheroe, Cambrian Institute of Mycology.

3 DISTRIBUTION

Scattered throughout Britain from Somerset, Dorset and Kent north to Edinburgh and Wester Ross, including mid and north Wales, although records are sparse from Midland England and East Anglia.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Unimproved grassland (acid and calcareous) and margins of woodlands.

4.2 OTHER MICROHABITAT(S)

Lawns, churchyards, grasslands in the montane to sub-alpine zone.

5 ECOLOGY

A wax-cap fungus of unimproved grasslands. This species grows to 15-17cm tall with the fruiting bodies appearing between August and October.

6 MAIN RESEARCH NEEDS

Survey to determine distribution, monitoring of populations, habitat requirements, methods of spread of populations, tolerance of agricultural improvement of grasslands.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of unimproved grassland by conversion to arable, to agricultural intensification and/or to scrub/sapling invasion by neglect, may have resulted in the local loss or decline of this species.

SPECIES Pink meadow cap **SCIENTIFIC NAME** *Hygrocybe calyptriformis*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of the pasture element of wood pastures/parklands to arable, to forestry, to agricultural improvement or to scrub, saplings and rank herbaceous growth (eg bracken) due to neglect, are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of pink meadow cap. Actions in the HAP include the need to appropriately manage existing sites and to re-establish appropriate grazing at sites where this has fallen to sub-optimal levels and these actions could benefit pink meadow cap.

9 BENEFICIAL MANAGEMENT

Retention of agriculturally unimproved, suitably grazed, grassland.

SPECIES Date-coloured wax-cap **SCIENTIFIC NAME** *Hygrocybe spadicea*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 47-49

Marren, P. 1998. Fungal Flowers: The Waxcaps and their World. *British Wildlife,* 9 (3) pp 164-172.

2 KEY CONTACTS

British Mycological Society

Maurice Rotheroe, Cambrian Institute of Mycology.

3 DISTRIBUTION

Widely scattered in western Britain only from Devon north to Colonsay with several stations in Wales (on the south coast, in mid-Wales and on the north coast).

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Unimproved neutral or base-rich grassland, which can be mown and/or dry in summer.

4.2 OTHER MICROHABITAT(S)

Sand-dunes, road verges, limestone grassland in sub-montane areas.

5 ECOLOGY

A wax-cap fungus of unimproved grasslands, which produces fruiting bodies in summer and early-autumn especially after heavy rain. The fruiting body cap is 5-7cm in diameter and is coloured dark-brown with yellow gills.

6 MAIN RESEARCH NEEDS

Survey to determine distribution, monitoring of populations, habitat requirements, methods of spread of populations, tolerance of agricultural improvement of grasslands.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of unimproved grassland by conversion to arable, to agricultural intensification and/or to scrub/sapling invasion by neglect, may have resulted in the local loss or decline of this species.

SPECIES Date-coloured wax-cap **SCIENTIFIC NAME** *Hygrocybe spadicea*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of the pasture element of wood pastures/parklands to arable, to forestry, to agricultural improvement or to scrub, saplings and rank herbaceous growth (eg bracken) due to neglect, are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of date-coloured wax-cap. Actions in the HAP include the appropriate management of existing sites and the re-establishment of appropriate grazing at sites where this has fallen to sub-optimal levels and these actions could benefit date-coloured wax-cap.

9 BENEFICIAL MANAGEMENT

Retention of agriculturally unimproved, suitably grazed, grassland.

SPECIES An earth-tongue **SCIENTIFIC NAME** *Microglossum olivaceum*

1 KEY REFERENCES

Anon. 1999. *UK Biodiversity Group Tranche 2 Action Plans. Volume 3: Plants and Fungi.* English Nature, Peterborough. pp 55-57

2 KEY CONTACTS

British Mycological Society

Maurice Rotheroe, Cambrian Institute of Mycology.

3 DISTRIBUTION

Scattered throughout Britain, but with a westerly bias since the most recent records have been made from mid and south Wales, Devon, south Lake District and Mull, with outliers, often old, from The New Forest, north Yorkshire, Derbyshire and the Home Counties.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Unimproved grassland, woodland with yew trees.

4.2 OTHER MICROHABITAT(S)

Lawns, grassland on limestone sea cliffs.

5 ECOLOGY

A fungus which may be saprophytic on mosses in grassland or woodland. Fruiting bodies appear between September and November.

6 MAIN RESEARCH NEEDS

General ecology of this species, survey to establish distribution, monitoring, tolerance of agricultural improvement of grasslands.

7 ELEMENTS OF SRP/SAP WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of unimproved grassland by conversion to arable, to agricultural intensification and/or to scrub/sapling invasion by neglect, may have resulted in the local loss or decline of this species.

SPECIES An earth-tongue **SCIENTIFIC NAME** *Microglossum olivaceum*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of the pasture element of wood pastures/parklands to arable, to forestry, to agricultural improvement or to scrub, saplings and rank herbaceous growth (eg bracken) due to neglect, are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this earth-tongue. Actions in the HAP include the need to appropriately manage existing sites and to re-establish appropriate grazing at sites where this has fallen to sub-optimal levels and these actions could benefit this earth-tongue.

9 BENEFICIAL MANAGEMENT

Retention of agriculturally unimproved, suitably grazed, grassland.

Non-BAP fungi

SPECIES Grassland *Boletus* spp fungi

SCIENTIFIC NAMES *B. impolitus*, *B. luridus*

1 KEY REFERENCES

Not yet determined.

2 KEY CONTACTS

Alan Hills, British Mycological Society

3 DISTRIBUTION

B. luridus is concentrated in the Welsh Marches and in south and south central England, and is scattered further north to Scotland. *B. impolitus* is concentrated in south and south central England and is scattered north to Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Unimproved (calcareous) grasslands.

4.2 OTHER MICROHABITAT(S)

Broad-leaved woodlands on base-rich and/or clay soils. Hedgebanks. Grass-heaths. Limestone pavement.

5 ECOLOGY

Terrestrial fungi; fruiting bodies appear in the period late summer to late autumn.

6 MAIN RESEARCH NEEDS

Surveys to determine distribution, monitoring, tolerance of agricultural improvement of grasslands.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of unimproved grassland by conversion to arable, to agricultural intensification and/or to scrub/sapling invasion by neglect, may have resulted in the local loss or decline of these species.

SPECIES Grassland *Boletus* spp fungi

SCIENTIFIC NAMES *B. impolitus*, *B. luridus*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of the pasture element of wood pastures/parklands, by conversion to arable or to forestry, by agricultural improvement or by neglect, allowing development of scrub, saplings and rank herbaceous growth (eg bracken), are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of these fungi. Among actions in the HAP the need to appropriately manage existing sites and to re-establish appropriate grazing at sites where this has fallen to sub-optimal levels could benefit these fungi.

9 BENEFICIAL MANAGEMENT

Retention of agriculturally unimproved, suitably grazed, grassland.

SPECIES A tooth fungus **SCIENTIFIC NAME** *Hericium cirrhatum*

1 KEY REFERENCES

Hants and IoW Wildlife Trust. 1999. New Forest Tooth Fungi Project.

Marren P and Dickson G. 2000. British tooth-fungi and their conservation. British Wildlife pp 401-409.

2 KEY CONTACTS

Gordon Dickson, British Mycological Society

3 DISTRIBUTION

Southern and eastern England.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Mature standing or fallen beech trees, rarely on other hardwoods (oak). Preferentially the fruiting bodies occur on cut faces of logs.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

A saprophytic, bracket-like tooth fungus with fruiting bodies appearing in late autumn.

6 MAIN RESEARCH NEEDS

Survey and monitoring.

Species' ecology.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Felling of mature beech trees and disposal of the resulting large pieces of timber would reduce the amount of potential habitat for this species. A continuity of new beech trees is required in order to provide future mature trees which can then shed large branches, or fall over, to provide habitat for this species. Since beech logs which host this species apparently rot away comparatively quickly a continual supply of suitable beech logs is needed.

SPECIES A tooth fungus **SCIENTIFIC NAME** *Hericium cirrhatum*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of beech trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where beech is a major feature and these are relevant to the conservation of this fungus. To a lesser extent, unnecessary tree surgery, general 'tidying-up' and the cessation of traditional tree management can also have an impact. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this fungus where beech is concerned, since any extant populations would be retained and potential new habitat (host trees) provided.

9 BENEFICIAL MANAGEMENT

Retention of host trees, provision of potential new host trees, pollarding/re-pollarding of host and potential host trees, deliberate damage to beech trees adjacent to existing host trees, provision of suitable habitat eg by removing branches which are not yet ready to break off naturally and/or felling trees not yet ready to fall naturally, retention of fallen timber, acceptance of damaged trees and branches.

SPECIES A tooth fungus **SCIENTIFIC NAME** *Hericium coralloides*

1 KEY REFERENCES

Hants and IoW Wildlife Trust. 1999. New Forest Tooth Fungi Project.

Marren, P. & Dickson, G. 2000. British tooth-fungi and their conservation. *British Wildlife,* pp 401-409.

2 KEY CONTACTS

Gordon Dickson, British Mycological Society

3 DISTRIBUTION

Southern and eastern England, especially the New Forest.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Large fallen logs, trunks or branches of beech.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

A saprophytic, bracket-like tooth fungus with fruiting bodies appearing in late autumn.

6 MAIN RESEARCH NEEDS

Survey and monitoring.

Species' ecology.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Felling of mature beech trees and disposal of the resulting large pieces of timber would reduce the amount of potential habitat for this species. A continuity of new beech trees is required in order to provide future mature trees which can then shed large branches, or fall over, to provide habitat for this species. Since beech logs which host this species apparently rot away comparatively quickly a continual supply of suitable beech logs is needed.

SPECIES A tooth fungus **SCIENTIFIC NAME** *Hericium coralloides*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing beech trees and the lack of new generations of beech trees are major factors causing loss of the parkland habitat or decline in the value of the habitat where beech is a major feature and these are relevant to the conservation of this fungus. To a lesser extent, unnecessary tree surgery, general 'tidying-up' and the cessation of traditional tree management can also have an impact. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions as far as beech is concerned could benefit this fungus, since any extant populations would be retained and new potential habitat (host trees) provided.

9 BENEFICIAL MANAGEMENT

Retention of host trees, provision of potential new host trees, pollarding/re-pollarding of host and potential host trees, deliberate damage to beech trees adjacent to existing host trees, provision of suitable habitat eg by removing branches which are not yet ready to break off naturally and/or felling trees not yet ready to fall naturally.

SPECIES Grassland wax-cap fungi of Local distribution

SCIENTIFIC NAME *Hygrocybe punicea, H. citrinovirens, H. splendidissima, H. aurantiosplendens, H. intermedia, H. mucronella, H. laeta, H. lacmus, H. flavipes.*

1 KEY REFERENCES

Marren, P. 1998. Fungal Flowers: The Waxcaps and their World. *British Wildlife,* 9 (3) pp 164-172.

2 KEY CONTACTS

British Mycological Society

3 DISTRIBUTION

H. punicea and *H. laeta* are widely scattered through Britain; *H. intermedia* is recorded from Wales, Northern England and Scotland with a local concentration in Sussex; and *H. aurantiosplendens* is concentrated in central south England with outliers in the West Country, Wales, northern England and Scotland; *H. citrinovicens, H. splendidissima, H. lacmus* and *H. flavipes* are scattered in England and Wales.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Unimproved grasslands, open woodland (*H. citrinovirens*)

4.2 OTHER MICROHABITAT(S)

Lawns, sand-dunes, moorland, heaths.

5 ECOLOGY

Wax-cap fungi of unimproved grasslands and a few other habitats.

6 MAIN RESEARCH NEEDS

Survey and monitoring, tolerance of agricultural improvement of grasslands.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of unimproved grassland by conversion to arable, to agricultural intensification and/or to scrub/sapling invasion by neglect, may have resulted in the local loss or decline of these species.

SPECIES Grassland wax-cap fungi of Local distribution

SCIENTIFIC NAME *Hygrocybe punicea, H. citrinovirens, H. splendidissima, H. aurantiosplendens, H. intermedia, H. mucronella, H. laeta, H. lacmus, H. flavipes.*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of the pasture element of wood pastures/parklands to arable, to forestry, to agricultural improvement or to scrub, saplings and rank herbaceous growth (eg bracken) due to neglect, are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of these wax-cap fungi. Actions in the HAP include the need to appropriately manage existing sites and to re-establish appropriate grazing at sites where this has fallen to sub-optimal levels and these could benefit these fungi.

9 BENEFICIAL MANAGEMENT

Retention of agriculturally unimproved, suitably grazed, grassland.

Non-BAP lichens

SPECIES A lichen **SCIENTIFIC NAME** *Anaptychia ciliaris*

1 KEY REFERENCES

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Concentrated in south, south-east and central England, with scattered records from East Anglia, Welsh Marches and north to Cumbria in the west, and Aberdeen/Moray in the east.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trees with base-rich bark in well-lit locations.

4.2 OTHER MICROHABITAT(S)

On rock or moss-covered rock.

5 ECOLOGY

A fruticose corticolous and saxicolous lichen of predominantly grey colour. A member of the *Physcietum ascendentis* assocation of the *Xanthorion* lichen community which is a community of high (>6) pH bark of mature trees of elm, oak and sycamore in open locations, including parks.

6 MAIN RESEARCH NEEDS

Distribution and abundance post-Dutch Elm Disease.

Tolerance of bark acidification or eutrophication.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees with base-rich bark has caused a local decline in this species.

SPECIES A lichen **SCIENTIFIC NAME** *Anaptychia ciliaris*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees with base-rich bark are major factors causing the loss of the parkland habitat or decline in the value of the habitat which are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for trees with suitable bark could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees with base-rich bark, provision of new generations of trees with base-rich bark, perpetuation of well-lit conditions, avoidance of excessive eutrophication or acidification of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Arthonia impolita*

1 KEY REFERENCES

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

2 KEY CONTACTS

Brian Coppins, RBGE, Edinburgh.

3 DISTRIBUTION

North Wales, south-west Wales, east Wales and Welsh Marches, East Anglia and southern England from Devon, Somerset and Gloucestershire to Kent. Scattered records from Home Counties, Yorkshire, Cumbria and Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

On the bark of mature oak trees, especially on the dry side of the trunk.

4.2 OTHER MICROHABITAT(S)

Similar trees in non-parkland situations eg in hedgerows.

5 ECOLOGY

A crustose corticolous lichen which has a light-grey coloured thallus. A member of the *Lecanactidetum premneae* lichen community which is an old tree specialist community more or less confined to the dry acid bark of old oaks, which thrives on trees grown in the open, and is believed to take c.400 years to become fully established.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees, with a trunk girth large enough for the tree to have a 'dry side' ie not directly wetted by rain, would cause a local decline in this species.

SPECIES A lichen **SCIENTIFIC NAME** *Arthonia impolita*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of oak trees are major factors causing the loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oaks, provision of new host oaks, perpetuation of well-lit conditions, avoidance of excessive eutrophication of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Lecanactis lyncea*

1 KEY REFERENCES

Purvis O W, Coppins B J, Hawksworth D L, James P W and Moore D M. 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Scattered in England and Wales north to North Yorkshire; one station in Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Virtually restricted to dry recesses and branch underhangs on ancient oak trees in well lit locations.

4.2 OTHER MICROHABITAT(S)

Similar trees in non-parkland situations eg in hedgerows.

5 ECOLOGY

A crustose corticolous lichen with a glaucous white to white thallus. A member of the *Lecanactidetum premneae* lichen community which is an old tree specialist community more or less confined to the dry acid bark of old oaks, which thrives on trees grown in the open, and is believed to take c.400 years to become fully established.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature oak trees would cause a local decline in this species.

SPECIES A lichen **SCIENTIFIC NAME** *Lecanactis lyncea*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of oak trees are major factors causing the loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this lichen. Among actions in the HAP, the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oaks, provision of new host oaks, perpetuation of well-lit conditions, avoidance of excessive eutrophication of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Lecanactis premnea*

1 KEY REFERENCES

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Wales, East Anglia and southern England from Cornwall to Kent and north to Gloucestershire and Surrey. Scattered stations in Cumbria and North Yorkshire.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

On the bark of old lightly shaded broad-leaved trees, especially oak and holly, and usually on the north side of the trunk.

4.2 OTHER MICROHABITAT(S)

Similar trees in non-parkland situations eg in hedgerows.

5 ECOLOGY

A crustose corticolous lichen with a greenish-grey to grey thallus. A member of the *Lecanactidetum premneae* lichen community which is an old tree specialist community more or less confined to the dry acid bark of old oaks, which thrives on trees grown in the open, and is believed to take c.400 years to become fully established.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees of oak and holly would cause a local decline in this species, as would an increase in shading due to unchecked growth of scrub, etc.

SPECIES A lichen **SCIENTIFIC NAME** *Lecanactis premnea*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of oak trees are major factors causing the loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this lichen. Among actions in the HAP, the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oak and holly trees, provision of new host trees, perpetuation of appropriate shade conditions (not open, not excessively shaded), avoidance of excessive eutrophication of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Opegrapha prosodea*

1 KEY REFERENCES

Purvis O W, Coppins B J, Hawksworth D L, James P W and Moore D M. 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Southern England from Devon and Somerset to Kent, with one old station in north Wales.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

The sides of vertical cracks in the bark of old oak and yew trees in well-lit locations.

4.2 OTHER MICROHABITAT(S)

Similar trees in non-parkland locations eg roadsides and churchyards.

5 ECOLOGY

A crustose corticolous lichen with a grey to dark greenish-grey thallus. A member of the *Lecanactidetum premneae* lichen community which is an old tree specialist community more or less confined to the dry acid bark of old oaks, which thrives on trees grown in the open, and is believed to take c.400 years to become fully established.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees of oak and yew would cause a local decline in this species, as would an increase in shading due to unchecked growth of scrub, etc.

SPECIES A lichen **SCIENTIFIC NAME** *Opegrapha prosodea*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of oak trees are major factors causing the loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oak and yew trees, provision of new host trees, perpetuation of well-lit conditions, avoidance of excessive eutrophication of bark through use of only low-intensity agriculture on grassland.

SPECIES A lichen **SCIENTIFIC NAME** *Parmelia acetabulum*

1 KEY REFERENCES

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M.. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Concentrated in East Anglia, south-east England and south Midland England, with scattered records from the Welsh coast, north Yorkshire and eastern Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trees with base-rich bark in well-lit locations.

4.2 OTHER MICROHABITAT(S)

None.

5 ECOLOGY

A foliose corticolous lichen which has a leaden brown colour when dry, changing to more greenish when wet. A member of the *Physcietum ascendentis* assocation of the *Xanthorion* lichen community which is a community of high (>6) pH bark of mature trees of elm, oak and sycamore in open locations, including parks.

6 MAIN RESEARCH NEEDS

Distribution and abundance post-Dutch Elm Disease.

Tolerance of bark acidification or eutrophication.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees with base-rich bark has caused a local decline in this species.

SPECIES A lichen **SCIENTIFIC NAME** *Parmelia acetabulum*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees with base-rich bark are major factors causing the loss of the parkland habitat or decline in the value of the habitat where these trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for trees with base-rich bark could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees, provision of new generations of trees, perpetuation of well-lit conditions, avoidance of excessive eutrophication or acidification of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Parmelia tiliacea*

1 KEY REFERENCES

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M.. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Scattered throughout Britain north to Glasgow-Edinburgh, and mainly in the eastern half of the country.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trees with base-rich bark in well-lit locations.

4.2 OTHER MICROHABITAT(S)

Walls composed of acid rocks in the shade of trees, tarmac of old airfields, rock.

5 ECOLOGY

A foliose corticolous and saxicolous lichen which has a blue-grey coloured thallus. A member of the *Physcietum ascendentis* assocation of the *Xanthorion* lichen community which is a community of high (>6) pH bark of mature trees of elm, oak and sycamore in open locations, including parks.

6 MAIN RESEARCH NEEDS

Distribution and abundance post-Dutch Elm Disease.

Tolerance of bark acidification or eutrophication.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of trees in general may have resulted in a local decline of this species.

SPECIES A lichen **SCIENTIFIC NAME** *Parmelia tiliacea*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees with base-rich bark are major factors causing the loss of the parkland habitat or decline in the value of the habitat where these trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for trees with base-rich bark could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees with base-rich bark, provision of new generations of trees with base-rich bark, perpetuation of well-lit conditions, avoidance of excessive acidification or eutrophication of bark by use only of low intensity agriculture on grasslands.

SPECIES A lichen **SCIENTIFIC NAME** *Schismatomma decolorans*

1 KEY REFERENCES

Purvis O W, Coppins B J, Hawksworth D L, James P W and Moore D M. 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum, London.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

East Anglia, Wales and southern England from Gloucestershire and Herefordshire to Devon, Somerset and Kent; scattered in Yorkshire, Cumbria, the Southern Uplands and eastern Highlands.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

On dry bark, in sheltered and shaded recesses of old, rough-barked broad-leaved trees (eg oak) in well-lit situations.

4.2 OTHER MICROHABITAT(S)

Similar trees in non-parkland situations eg in hedgerows.

5 ECOLOGY

A crustose corticolous lichen with a mauve-grey to brown-grey thallus. A member of the *Lecanactidetum premneae* lichen community which is an old tree specialist community more or less confined to the dry acid bark of old oaks, which thrives on trees grown in the open, and is believed to take c.400 years to become fully established.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature broad-leaved trees, especially oak, would cause a local decline in this species.

SPECIES A lichen **SCIENTIFIC NAME** *Schismatomma decolorans*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature oak trees and the lack of new generations of oak trees are major factors causing the loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature oaks, provision of new host oaks, perpetuation of well-lit conditions, avoidance of excessive eutrophication of bark of host trees eg by appropriate low-intensity agricultural use of grassland.

SPECIES Golden-hair lichen **SCIENTIFIC NAME** *Teloschistes flavicans*

1 KEY REFERENCES

Church, J.M., Coppins, B.J., Gilbert, O.L., James, P.W. & Stewart, N.F. 1996. *Red Data Books of Britain and Ireland: Lichens. Volume 1: Britain.* JNCC, Peterborough.

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. 1992. *The Lichen Flora of Great Britain and Ireland.* Natural History Museum, London.

Purvis, O.W. & James, P.W. 1994. An assessment of *Teloschistes falvicans* in Pembrokeshire, 1994. Unpublished CCW Report.

2 KEY CONTACTS

British Lichen Society.

3 DISTRIBUTION

Concentrated in the south-west peninsula, with scattered outlying (but often old) stations along the south coast as far east as Kent, around the Welsh coast and inland in south-central England.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Old trees with base-rich bark in well-lit locations.

4.2 OTHER MICROHABITAT(S)

Maritime rocks.

5 ECOLOGY

A fruticose saxicolous and corticolous lichen which has a green-orange to deep orange colour. Has declined from being a widespread species to one now rare and very local. A member of the *Teloschistetum flavicantis* association of the *Xanthorion* lichen community which is a community of high (>6) pH bark of mature trees of elm, oak and sycamore in open locations, including parks, orchards and hedgerows.

SPECIES Golden-hair lichen **SCIENTIFIC NAME** *Teloschistes flavicans*

6 MAIN RESEARCH NEEDS

Surveys to establish distribution and abundance (currently underway through EN's Species Recovery Programme).

Monitoring.

Colonisation of trees other than elm.

Tolerance of bark acidification or eutrophication.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

The loss of mature trees with base-rich bark, especially elm, has caused a decline in this species.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees with base-rich bark are major factors causing the loss of the parkland habitat or decline in the value of the habitat where such trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this lichen. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for trees with base-rich bark could benefit this lichen, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees with base-rich bark, provision of new generations of trees with base-rich bark, perpetuation of well-lit conditions, avoidance of excessive eutrophication or acidification of bark by use only of low intensity agriculture on grasslands.

Non-BAP mosses

SPECIES A moss **SCIENTIFIC NAME** *Habrodon perpusillus*

1 KEY REFERENCES

Church, J.M., Hodgetts, N.G., Preston, C.D. & Stewart, N. F. 2001. *British Red Data Books: Mosses.* JNCC, Peterborough.

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3. Mosses.* p234

2 KEY CONTACTS

Chris Preston: author of the species account in the Hill *et al* reference.

Ron Porley: British Bryological Society referee for the genus *Habrodon.*

3 DISTRIBUTION

Very rare and scattered in Britain with records from Dorset, Somerset, south Wales, the Lake District (where there are many old stations), Southern Uplands and the Highlands. Old records also from Devon and Cornwall. This species may now be absent from many of these areas.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Well-lit trunks and branches of trees with base-rich bark.

4.2 OTHER MICROHABITAT(S)

Shrubs.

5 ECOLOGY

An epiphytic moss reproducing by gemmae and present on trunks and branches of broad-leaved trees and shrubs. Recorded most often from species with base-rich bark such as sycamore, also from ash and elm, and to a lesser extent from aspen, birch, blackthorn, elder, hawthorn, lime, oak and willow. Suspected to have declined due to SO_2 pollution.

6 MAIN RESEARCH NEEDS

Recovery from SO_2 pollution in areas where formerly widespread.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of trees with base-rich bark, especially ash and elm, may have caused a decline of this species in the past and could contribute to further loss, if allowed to take place.

SPECIES A moss **SCIENTIFIC NAME** *Habrodon perpusillus*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees with base-rich bark are major factors causing loss of the parkland habitat or decline in the value of the habitat where these trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this moss. Among actions in the HAP, the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could for trees with base-rich bark benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of ash and elm trees, provision of new generations of trees, perpetuation of well-lit conditions, prevention of eutrophication from agricultural sources.

SPECIES A moss **SCIENTIFIC NAME** *Leptodon smithii*

1 KEY REFERENCES

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain & Ireland. Vol 3. Mosses.* p 218.

Rose, F. 1992. Temperate forest management: its effects on bryophyte and lichen floras and habitats. *In*: J W Bates & A M Farmer, eds. *Bryophytes & lichens in a changing environment.* Oxford University Press

2 KEY CONTACTS

Ron Porley: British Bryological Society referee for the genus *Leptodon.*

Chris Preston: author of species account in the Hill *et al* reference.

3 DISTRIBUTION

Most records are from the central area of southern England, Dorset to Sussex and north to Somerset and Berkshire. There are outliers in Kent, and the north and south coasts of Devon and Cornwall, in south Wales, the Lleyn Peninsula and Anglesey, with one old record from the Lake District but none further north.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Tree boles of species with basic bark; also in dry shade on the underside of leaning trees.

4.2 OTHER MICROHABITAT(S)

Hedgerow shrubs along the south coast; concrete, flint and calcareous rock; trees in woods, churchyards, roadsides, hedgerows.

5 ECOLOGY

An epiphytic moss, on elm particularly, also on ash, sycamore, beech, elder, field maple, hawthorn, lime, oak, poplar, rhododendron, willow and spindle. Reproduces by spores.

6 MAIN RESEARCH NEEDS

Frequency of occurrence on tree species other than elm.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of elm may have caused a local decline in this species.

SPECIES A moss **SCIENTIFIC NAME** *Leptodon smithii*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees with base-rich bark, especially elm, are major factors causing loss of the parkland habitat or decline in the value of the habitat where these trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for trees with base-rich bark could benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of elm trees, provision of new generation of elm trees, provision of some leaning trees to provide dry underside of trunks for colonisation.

SPECIES A moss **SCIENTIFIC NAME** *Leucodon sciuroides*

1 KEY REFERENCES

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain & Ireland. Vol 3. Mosses.* p 214.

Bates, J.W. *et al.* 1997. Occurrence of epiphytic bryophytes in a tetrad transect across southern Britain. *J Bryol.* 19, pp685-714

Rose, F. 1974. The Epiphytes of Oak. *In*: M G Morris and F H Perring, eds. *The British Oak.*

2 KEY CONTACTS

Ron Porley: British Bryological Society referee for the genus *Leucodon.*

Chris Preston: author of the species account in the Hill *et al* reference.

3 DISTRIBUTION

Centred on southern England from Devon to Kent, and including Wiltshire and Oxfordshire with another centre of records in Cumbria. Scattered outliers in East Anglia, Home Counties and Lincolnshire; scattered in Scotland and well recorded from east Wales.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Base-rich tree boles.

4.2 OTHER MICROHABITAT(S)

Base-rich trunks of trees on roadsides, in hedges and by streams; on walls and natural and artificial rock exposures.

5 ECOLOGY

A primarily epiphytic moss (obligate epiphyte according to Bates *et al*, 1997), most often on ash, also known from apple, beech, elder, elm, field maple, oak, poplar, sycamore and willow.

6 MAIN RESEARCH NEEDS

Monitoring recovery (generally and as an epiphyte where only now present on stonework) in areas with formerly high SO_2 pollution.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of (ash) trees may cause a further decline in this moss.

SPECIES A moss **SCIENTIFIC NAME** *Leucodon sciuroides*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing ash trees and the lack of new generations of ash trees and other species with base-rich bark are major factors causing loss of the parkland habitat or decline in the value of the habitat where these trees are a major feature as opposed to acid-barked oak and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for ash and other trees with base-rich bark could benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature ash trees, provision of new generations of trees, perpetuation of well-lit conditions.

SPECIES A moss **SCIENTIFIC NAME** *Orthotrichum lyellii*

1 KEY REFERENCES

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3. Mosses.* p188

Bates, J.W. *et al.* 1997. Occurrence of epiphytic bryophytes in a tetrad transect across southern Britain. *J Bryol.* 19 pp685-714

Rose F. 1974. The Epiphytes of Oak. In: The British Oak ed M G Morris and F H Perring.

Rose, F. 1992. Temperate forest management: its effects on bryophyte and lichen floras and habitats. *In*: J.W. Bates & A.M. Farmer, eds. *Bryophytes & lichens in a changing environment.* Oxford University Press

2 KEY CONTACTS

Ron Porley. British Bryological Society referee for the genus *Orthotrichum*.

Chris Preston: author of the species account in the Hill *et al* reference.

3 DISTRIBUTION

Southern, south-west and south-east England and southern Midland England, with another concentration of records from Cumbria; scattered in East Anglia, Lincolnshire and East Midlands; north and mid-Wales; scattered in Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Tree trunks; occasionally on twigs of shrubs in sheltered and humid locations.

4.2 OTHER MICROHABITAT(S)

Stonework; trees and shrubs in woods, by rivers and roads.

5. ECOLOGY

A predominantly epiphytic moss (obligate epipihyte according to Bates *et al*, 1997), growing on ash, elm, oak and sycamore, but also known from elder, willows and hazel.

6 MAIN RESEARCH NEEDS

Monitoring recovery in areas with formerly high SO_2 pollution.

SPECIES A moss **SCIENTIFIC NAME** *Orthotrichum lyellii*

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/ PARKLAND

Loss of trees may cause a decline in this moss.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this moss, since any extant populations would be retained and new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature trees, provision of new generations of trees.

SPECIES A moss **SCIENTIFIC NAME** *Pterogonium gracile*

1 KEY REFERENCES

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3. Mosses* p216.

Rose, F. 1974. The Epiphytes of Oak. *In*: M.G. Morris and F.H. Perring, eds. *The British Oak.*

Rose, F. 1992. Temperate forest management: its effects on bryophyte and lichen floras and habitats. *In*: J.W. Bates & A.M. Farmer, eds. *Bryophytes & lichens in a changing environment.* Oxford University Press

2 KEY CONTACTS

Ron Porley: British Bryological Society referee for the genus *Pterogonium.*

Chris Preston: author of the species account in the Hill *et al* reference.

3 DISTRIBUTION

Concentrated in England in Cumbria, Devon and Cornwall, the New Forest and its hinterland and the Welsh Marches. Scattered outlying (and often old) records from Dorset, Somerset, Gloucestershire, Wiltshire, Suffolk, Sussex and north and mid-Wales. Common in western Scotland but scattered further east.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Tree trunks or tree bases of species with base-rich bark, but also on oak and frequent on old beech in the New Forest.

4.2 OTHER MICROHABITAT(S)

Rock, boulders, and in turf on calcareous sand.

5 ECOLOGY

An epiphytic and saxicolous moss; epiphytic on ash, elm, elder, poplar, sycamore, beech and oak.

6 MAIN RESEARCH NEEDS

Colonisation of new host trees.

SPECIES A moss **SCIENTIFIC NAME** *Pterogonium gracile*

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of trees.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees with base-rich bark and of beech in the New Forest are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions for beech in the New Forest and for trees with base-rich bark elsewhere could benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of ash trees, provision of new generations of ash trees.

SPECIES A moss **SCIENTIFIC NAME** *Tortula laevipila*

1 KEY REFERENCES

Hill, M.O. *et al.* 1992. *Atlas of the Bryophytes of Britain and Ireland. Vol 2. Mo*sses. p218.

Bates, J.W. *et al.* 1997. Occurrence of epiphytic bryophytes in a tetrad transect across southern Britain. *J Bryol.* 19, pp685-714

Rose, F. 1974. The Epiphytes of Oak. In: M.G. Morris and F.H. Perring, eds. *The British Oak.*

2 KEY CONTACTS

David Chamberlain: British Bryological Society referee for the genus *Tortula.*

Tom Blockeel: author of the species account in the Hill *et al* reference.

3 DISTRIBUTION

Southern England from East Anglia and Oxfordshire south to Kent and Cornwall; Welsh Marches; Cumbria and adjacent Pennines; scattered in Lincolnshire, East Midlands and NorthYorkshire; most of north and mid-Wales; scattered in (mainly east) Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Trunks and branches of trees (ideally with base-rich bark) in well-lit situations.

4.2 OTHER MICROHABITAT(S)

Walls, non-acidic rock, tree roots by streams and rivers.

5 ECOLOGY

A predominantly epiphytic moss (obligate epiphyte according to Bates *et al*, 1997), on ash, elm, willow and elder especially, but also oak, alder, beech and other tree species. Reproducing by spores and gemmae.

6 MAIN RESEARCH NEEDS

Tolerance of shade.

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/PARKLAND

Loss of trees.

SPECIES A moss **SCIENTIFIC NAME** *Tortula laevipila*

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of trees and shrubs with base-rich bark, perpetuation of well-lit conditions.

SPECIES A moss **SCIENTIFIC NAME** *Zygodon rupestris*

1 KEY REFERENCES

Hill, M.O. *et al.* 1994. *Atlas of the Bryophytes of Britain and Ireland. Volume 3. Mosses.* p180.

Bates, J.W. *et al.* 1997. Occurrence of epiphytic bryophytes in a tetrad transect across southern Britain. *J Bryol.* 19, pp685-714

Rose, F. 1992. Temperate forest management: its effects on bryophyte and lichen floras and habitats. *In*: J W Bates & A M Farmer, eds. *Bryophytes & lichens in a changing environment* Oxford University Press

2 KEY CONTACTS

Ron Porley: British Bryological Society referee for the genus *Zygodon.*

Michael Proctor: author of the species account in the Hill *et al* reference.

3 DISTRIBUTION

Centred in southern England from Devon to Sussex, north to Somerset and Wiltshire; scattered outliers in Cumbria, Gloucestershire, East Midlands and the Dark Peak; most of Wales; scattered in Scotland.

4 MICROHABITAT(S)

4.1 WOOD PASTURE/PARKLAND MICROHABITAT(S)

Old trees but avoiding deep shade and very acid bark.

4.2 OTHER MICROHABITAT(S)

Shaded base-rich rock.

5 ECOLOGY

An epiphytic moss (an obligate epiphyte according to Bates *et al*, 1997), on oak, beech, ash, sycamore and other species.

6 MAIN RESEARCH NEEDS

Tolerance of shade.

Tolerance of acidification of bark.

Colonisation of new host trees.

SPECIES A moss **SCIENTIFIC NAME** *Zygodon rupestris*

7 ELEMENTS OF SPECIES ECOLOGY WHICH RELATE TO WOOD PASTURE/PARKLAND

The loss of old trees would cause a decline of this moss.

8 ELEMENTS OF WOOD PASTURE/PARKLAND HAP RELEVANT TO THIS SPECIES

The loss of existing mature trees and the lack of new generations of trees are major factors causing loss of the parkland habitat or decline in the value of the habitat and these are relevant to the conservation of this moss. Among actions in the HAP the need to retain existing trees and to re-establish young generations of trees feature prominently. Success of these actions could benefit this moss, since any extant populations would be retained and potential new habitat provided.

9 BENEFICIAL MANAGEMENT

Retention of mature trees, provision of new generations of trees, perpetuation of well-lit conditions.

Summary documents: levels 2-4

Level 2 summary documents

BAP Hoverflies
BAP Moths
BAP Bats
BAP Fungi
BAP Lichens
BAP Mosses
Grassland BAP Fungi
Grassland Non-BAP Fungi
Saprophytic Non-BAP Fungi
Non-Bap Lichens
Non-BAP Mosses

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP hoverflies

CONSTITUENT SPECIES large hoverfly *Callicera spinolae*
a hoverfly *Myolepta potens*

1 GENERIC ECOLOGY

These species share the generic ecology of filter-feeding larvae living in water-filled rot holes in standing, live, mature broad-leaved trees and a short period of emergence of adults. There may be a generic requirement for flowers in bloom in late summer to early autumn to provide nectar sources and to have a function in mating.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The continued presence of standing, live mature and over-mature broad-leaved trees with water-filled rot holes, the provision of flowering plants in late summer to early autumn (specifically ivy in the case of *Callicera*) as could be found in the unimproved grassland element of a parkland habitat, the provision of younger generations of trees which can develop rot holes in the future, and formation/creation of new rot holes (naturally or man-induced).

3 GENERIC RESEARCH NEEDS

Species' ecology including selection of rot holes by females for egg-laying and role of flowering plants.

Further surveys to establish distribution, extent and population sites, with work targetted towards surveys for larvae.

Larval taxonomy

4 GENERIC BENEFICIAL MANAGEMENT

Retention of wet and water-filled rot holes, retention of mature trees, accelerated formation of rot holes, retention of ivy, retention of and appropriate management of herb-rich grassland, acceptance of damaged trees and branches.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP moths

CONSTITUENT SPECIES heart moth *Dicycla oo*
clay fan-foot moth *Paracolax tristalis*
white-spotted pinion *Cosmia diffinis*
orange upperwing *Jodia croceago*
common fan-foot *Pechipogo strigilata*

1 GENERIC ECOLOGY

All these moths with the exception of the white-spotted pinion require oak for their larvae to feed upon, and for adults to use in some manner eg those of the orange upperwing over-winter amongst withered unfallen leaves. The white-spotted pinion requires elm with epicormic growth. The oaks for the heart moth should be solitary and over-mature/veteran, whereas those required by the orange upperwing are at the other end of the scale; they need to be small (ie saplings) or coppiced (which could imply they need to be in a more closed, wooded environment rather than an open parkland). The common fan foot can also utilise birch, alder and hazel.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Provision of oak trees, which need to be present in a full range of growth forms, ages and densities. Elm trees on damp ground ~~(by streams or flushes?)~~ are needed by the white-spotted pinion. heavy, ~~clay~~

3 GENERIC RESEARCH NEEDS

Habitat preferences at all stages of the lifecycle.

4 GENERIC BENEFICIAL MANAGEMENT

Retention and provision of oaks in a range of growth forms (including coppice), ages and densities, retention and provision of elm with epicormic growth on damp ground for white-spotted pinion, provision of new generations of trees.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP bats

CONSTITUENT SPECIES Pipistrelle *Pipistrellus* agg
Barbastelle *Barbastella barbastellus*
Bechstein's *Myotis bechsteini*
Greater Horseshoe *Rhinolophus ferrumeqinum*

1 GENERIC ECOLOGY

Mating usually occurs during the autumn or winter. Females of the smaller species such as pipistrelle may breed in their first year and every year thereafter whilst the larger species delay reproduction until they are 3-4 years old and even then may not produce young every year. Maternity colonies are occupied between April/May and July/August. Most species produce one young which is fully weaned after approximately six weeks. Maternity roosts are usually warm, stable environments within a suitable tree, building or underground whereas hibernation sites are very cool and usually away from sources of heat. Trees, certain buildings, caves and underground tunnels and mines are often used. Bats emerge to feed around dusk although each species has its own foraging pattern. Unimproved pasture, frequent flyways and woodland edge habitats are preferred foraging habitats and invertebrate prey are taken in flight or gleaned off the surfaces of leaves, twigs, etc. Some species have been observed to forage on the ground.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The bats require dead, dying or veteran trees, either solitary or as part of a larger group and which have fissures in the bark for use as roosting sites and for feeding. Sites with a network of tall hedgerows or tree-lines and woodland edges are valuable for feeding, as are areas of unimproved pasture, appropriately grazed and managed, since these supply abundant invertebrates.

3 GENERIC RESEARCH NEEDS

Summer and winter roosting requirements including preferred temperatures and humidity levels, patterns of roost use and winter emergence.

Breeding biology and reproductive success including factors influencing when a female commences breeding.

Foraging patterns and feeding habitat requirements.

Effects of habitat degradation on populations.

Social structure.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature and dead trees, retention of grassland and wetland habitats and their appropriate management, acceptance of damaged trees and branches.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP fungi

CONSTITUENT SPECIES Devil's bolete *Boletus satanus* (m)
Royal bolete *Boletus regius* (m)
s = saprophytic
m = mycorrhizal
Sandy stilt puffball *Battarraea phalloides* (S)
Oak polypore *Buglossoporus pulvinus* (s)
Hedgehog fungus *Hericium erinaceum* (s)
14 species of threatened tooth-fungi (m)

1 GENERIC ECOLOGY

Sub-Group of Saprophytic Species

These species require mature or over-mature trees which ideally have some form of damage: wounds or in extreme cases (for *Battarraea*) a hollow centre. There is no generic host species since *Hericium* prefers beech (rarely on oak) and *Buglossoporus* is restricted to oak.

Sub-Group of Mycorrhizal Species

These species require mature host trees; oak is a generic host to some extent, although *Boletus satanus* is most commonly found under beech, but is known from under oak. *Boletus regius* differs from *B. satanus* and the threatened tooth-fungi since it appears to be associated with trees in grassland rather than in woodland or of woodland edges.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Mature and over-mature trees, either beech or oak, in an open arrangement over grassland or grading imperceptibly via denser stands to woodland edge and woodland interior locations. An undisturbed or only very lightly (and naturally) disturbed, possibly uneven, surface under and between the trees to provide banks of well drained soil.

3 GENERIC RESEARCH NEEDS

The ecology of each species.

Surveys to establish distribution/abundance, and monitoring of populations.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature trees, provision of new generations of trees, pollarding/re-pollarding of trees, deliberate damage to trees to cause stress to facilitate fungal invasion, acceptance of damage to trees and branches, retention of agriculturally unimproved grassland. Some form of soil compaction possibly to prompt *Boletus satanus* and *Boletus regius* to produce fruiting bodies.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP lichens

CONSTITUENT SPECIES A lichen *Bacidia incompta*
Orange-fruited elm-lichen *Caloplaca luteoalba*
A lichen *Chaenotheca phaeocephala*
A lichen *Enterographa elaborata*
A lichen *Enterographa sorediata*
Elm tree lichen *Gyalecta ulmi*
Warty wax-lichen *Thelenella modesta*

1 GENERIC ECOLOGY

The species in this taxonomic group are crustose lichens, largely or exclusively epiphytic. The only generic feature regarding host trees is that they should be mature, since different species require elm, ash or oak, or beech, with other host species known but uncommon. Similarly, there is no generic requirement for host trees with either acid or basic-rich bark. Generally these species require good illumination; *Enterographa elaborata* is said to occur on shaded trees but it is not known if the shade cast by a mature beech's own canopy would be sufficient even if the tree were standing in a well-lit position in a parkland. *Gyalecta ulmi* requires shelter and humidity since as an epiphyte it grows over moss which is itself epiphytic on the tree trunk.

There is no generic requirement for any form of damage to the host trees, since intact bark is needed by these lichens, although some association between the location of *Bacidia* and bark wounds has been noted (the lichen occurs below the wound), but it is not known if this is related to materials/substances from the wound being carried down the trunk and required by the lichen or whether it is mechanical with the wound helping to create and direct a rain track. *Enterographa elaborata* occurs in rain tracks but not in association with wounds, but there is not a generic need for rain tracks; quite the opposite for *Enterographa sorediata* since it occurs on the sides of trees not directly wetted by rain. The generic requirement for mature trees will however ensure, due to the tree growth form, size and architecture, that rain tracks are created and some dry bark remains. There is probably a generic requirement for no or only minimal pollution arising from agricultural use of any grassland surrounding the trees, since pollution due to intensive farming would be inimical to the lichens.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The continued presence of mature trees (of oak, beech, elm) in open well-lit to lightly shaded locations, the provision of young generations of trees which would grow to be potential new hosts, and low-intensity agricultural use of the grassland element of parklands.

3 GENERIC RESEARCH NEEDS

Tolerance to shading.

Tolerance to eutrophication.

Surveys to determine current distribution and abundance, with subsequent monitoring.

Suitability of host trees other than elm and feasibility of translocation.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature trees in appropriate locations, provision of potential new host trees, perpetuation of appropriate conditions of light and shade, pollarding/re-pollarding, protection of trees from pollution from intensive agricultural use of grasslands through use only of low intensity farming.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP BAP mosses

CONSTITUENT SPECIES blunt-leaved bristle-moss *Orthotrichum obtusifolium*
pale bristle-moss *O. pallens*
knothole moss *Zygodon forsteri*

1 GENERIC ECOLOGY

In Britain, the *Orthotrichum* species are epiphytic on trees and shrubs with base-rich bark in well illuminated situations. Ash is most favoured and elm, sycamore and willow also act as hosts, and to a lesser extent so do trees with acid bark (eg oak). Reproduction is by spores or gemmae. Knothole moss is very different on account of its restriction to a very specialised niche, only provided by mature beech trees.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Generic habitat requirements for the two *Orthotrichum* species are the continued presence of mature, well-lit ash trees and the provision of younger generations of ash. The knothole moss has very specific habitat requirements but even when translated into generic terms these mostly differ from the needs of the two bristle-mosses, since they state a need for the continued presence of mature beech trees, often pollards or damaged in some way to enable the retention of water which can then steadily drain down the trunk. Where the two sets of generic habitat requirements do overlap is the need in each to provide future generations of trees upon which the mosses can grow, since ultimately every old host tree will become unsuitable.

3 GENERIC RESEARCH NEEDS

Further surveys to establish distribution, extent and population sizes.

Means of dispersal and establishment of propagules.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of host trees and shrubs, perpetuation of well-lit conditions, provision of new potential host trees and shrubs (knothole moss alone requires appropriate tree management and creation of wounds in suitable mature beech trees).

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP Grassland BAP fungi

CONSTITUENT SPECIES pink meadow cap *Hygrocybe calyptriformis*
date-coloured wax-cap *H. spadicea*
an earth-tongue *Microglossum olivaceum*

1 GENERIC ECOLOGY

Fungi which occur in unimproved grassland, and to a lesser extent at woodland margins, in lawns, on sand-dunes, road verges and under trees. Fruiting bodies appear in the period late summer to autumn, sometimes after heavy rain.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The provision of unimproved grassland which is appropriately grazed.

3 GENERIC RESEARCH NEEDS

Surveys to determine distribution, monitoring, habitat requirements, methods of spread of populations, tolerance of agricultural improvement of grasslands.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of the unimproved grassland element of wood pastures/parklands, and appropriate grazing management.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP Grassland non-BAP fungi

CONSTITUENT SPECIES *Hygrocybe punicea, H. citrinovirens, H. splendidissima, H. aurantiosplendens, H. intermedia, H. mucronella, H. laeta, H. lacmus, H. flavipes, Boletus impolitus, B. luridus*

1 GENERIC ECOLOGY

Fungi which occur in unimproved grasslands; fruiting bodies appear in late summer to autumn.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The provision of unimproved grassland which is grazed appropriately.

3 GENERIC RESEARCH NEEDS

Surveys to determine distribution, monitoring, habitat requirements, tolerance of agricultural improvement of grasslands.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of the unimproved grassland element of wood pastures/parkland, and appropriate grazing management.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP Saprophytic non-BAP fungi

CONSTITUENT SPECIES The tooth fungi *Hericium coralloides* and *H. cirrhatum*

1 GENERIC ECOLOGY

Saprophytic species of live damaged mature beech trees or fallen beech logs, trunks, large branches, trees.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Mature and over-mature beech trees, fallen beech trees or other sizeable pieces of beech timber.

3 GENERIC RESEARCH NEEDS

Survey and monitoring, species' ecology.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature beech trees, provision of new generations of beech trees, deliberate damage to trees to cause stress to facilitate fungal invasion, retention of fallen beech timber, provision of beech timber by removing branches etc or felling trees before this may happen naturally.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP Non-BAP lichens

CONSTITUENT SPECIES *Arthonia impolita, Lecanactis premnea, Lecanactis lyncea, Opegrapha prosodea, Sohismatomma decolorans, Teloschistes flavicans, Anaptychia ciliaris, Parmelia acetabulum, Parmelia tiliacea.*

1 GENERIC ECOLOGY

The species in this taxonomic group are crustose, fruticose or foliose lichens, largely or exclusively epiphytic (corticolous). There is a generic requirement for large mature old trees, since these possess the rough bark with recesses and cracks, the large spreading branches to provide sheltered under-hangs, and the large diameter trunks to provide some shelter or areas of bark which are mostly dry. The first five species have a generic requirement for oak and its acid bark, and the last four species have a generic requirement for trees with nutrient-rich bark, such as elm, ash and sycamore. There is a generic requirement for well-lit trees, even though some species (eg *Opegrapha prosodea*) occupy cracks in bark which may be shaded by the bark itself to some degree. There is no generic requirement for any form of damage to the host trees. There is probably a generic requirement for no or only minimal pollution arising from agricultural use of any grassland surrounding the trees, since the acid-barked oak species may be vulnerable to eutrophication and those favouring nutrient-rich bark may be vulnerable to hyper-trophication and dominance by algae.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The continued presence of mature trees (of oak, ash, elm, sycamore, holly, yew) in open well-lit locations, the provision of young generations of trees to grow on to be potential new hosts, low intensity agricultural use of grassland element of parklands.

3 GENERIC RESEARCH NEEDS

Tolerance to eutrophication/acidification of bark.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature trees in appropriate locations, provision of potential new host trees, perpetuation of well-lit conditions of mature trees, protection of trees from pollution by intensive agricultural use of grasslands through use only of low intensity farming, acceptance of damaged trees and branches.

LEVEL 2 SUMMARY DOCUMENT

TAXONOMIC GROUP Non-BAP mosses

CONSTITUENT SPECIES A moss *Habrodon perpusillus*
A moss *Leptodon smithii*
A moss *Leucodon sciuroides*
A moss *Orthotrichum lyellii*
A moss *Pterogonium gracile*
A moss *Tortula laevipila*
A moss *Zygodon rupestris*

1 GENERIC ECOLOGY

Epiphytic mosses occurring on trunks and branches of trees and shrubs with base-rich bark. To a small extent, some species also occur on other substrates such as base-rich rock. The most favoured tree and shrub species are ash, elm, elder, sycamore, willow and beech, and to a lesser extent, oak, hazel, lime and birch. Well-illuminated trees are preferred. Reproduction is by spores or gemmae. *Zygodon* has a preference for old trees; *Leptodon* can occur in the dry shade of the underside of leaning trees but not exclusively; otherwise the simple presence of trees with suitable bark appears to be a generic ecological need.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The provision of trees with base-rich bark in well-lit locations. Trees can be of all ages but some must be mature or over-mature, and some can be leaning, although this is not essential.

3 GENERIC RESEARCH NEEDS

Monitoring of recovery of populations which have shown declines due to SO_2 pollution.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of trees and shrubs with base-rich bark, perpetuation of well-lit conditions, provision of new potential host trees and shrubs, prevention of eutrophication from agricultural sources.

Level 3 summary documents

Grassland Fungi
Mycorrhizal Fungi
Saprophytic Fungi
Lichens
Mosses

LEVEL 3 SUMMARY DOCUMENT

TAXONOMIC GROUP Grassland Fungi

CONSTITUENT SPECIES *Boletus impolitus, B. luridus, Microglossum olivaceum, Hygrocybe calyptriformis, H. spadicea, H. punicea, H. citrinovirens, H. splendidissima, H. aurantiosplendens, H. intermedia, H. mucronella, H. laeta, H. lacmus, H. flavipes*

1 GENERIC ECOLOGY

Fungi of unimproved grasslands.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The provision of unimproved grassland which is appropriately grazed.

3 GENERIC RESEARCH NEEDS

Surveys to determine distribution, monitoring, species' ecology, tolerance of agricultural improvement of grasslands.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of the unimproved grassland element of wood pastures/parkland and appropriate grazing management.

LEVEL 3 SUMMARY DOCUMENT

TAXONOMIC GROUP Mycorrhizal Fungi

CONSTITUENT SPECIES *Boletus satanus, B. regius, Hydnellum concrescens, H. scrobiculatum, H. spongiospies, Phellodon confluens, P. melaleucus, Sarcodon imbricatus, S. scabrosus.*

1 GENERIC ECOLOGY

Mycorrhizal fungi of broad-leaved woodland, composed of mature trees, especially oak but also beech and sweet chestnut.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Mature and over-mature trees in an open arrangement over grassland grading into denser stands and well drained soils (possibly provided by banks or other earthworks).

3 GENERIC RESEARCH NEEDS

Species' ecology. Surveys to establish distribution and abundance, and monitoring of populations.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature trees, provision of new generations of trees.

LEVEL 3 SUMMARY DOCUMENT

TAXONOMIC GROUP Saprophytic Fungi

CONSTITUENT SPECIES *Battarraea phalloides*, *Buglossoporus pulvinus*, *Hericium erinaceum*, *H. coralloides*, *H. cirrhatum*

1 GENERIC ECOLOGY

Saprophytic fungi of live mature and over-mature trees with some form of damage or of fallen trees, logs, trunks and large branches. There is no generic host tree species.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

Mature and over-mature trees and sizeable pieces of fallen timber.

3 GENERIC RESEARCH NEEDS

Species' ecology, surveys to establish distribution and abundance, and monitoring of populations.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature and over-mature trees, provision of new generations of trees, deliberate damage to trees to cause stress to facilitate fungal invasion, provision and retention of sizeable pieces of fallen timber, retention of damaged trees and branches.

LEVEL 3 SUMMARY DOCUMENT

TAXONOMIC GROUP Lichens

CONSTITUENT SPECIES *Anaptychia ciliaris, Arthonia impolita, Bacidia incompta, Caloplaca luteoalba, Chaenotheca phaeocephala, Enterographa elaborata, E. sorediata, Gyalecta ulmi, Lecanactis lyncea, L. premnea, Opegrapha prosodea, Parmelia acetabulum, P. tiliacea, Schismatomma decolorans, Teloschistes flavicans, Thelenella modesta*

1 GENERIC ECOLOGY

Crustose, fruticose or foliose lichens which are largely or exclusively epiphytic (corticolous). There is a generic requirement for old, mature host trees, in well-lit locations (but different requirements for host tree species). There are no generic requirements for any form of damage to host trees or for the presence of rain-tracks. There is probably a generic requirement for no or only minimal pollution of tree trunks arising from agricultural use of parkland grassland, since this would avoid eutrophication and the subsequent dominance by algae.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The continued presence of mature trees in open well-lit locations, the provision of young generations of trees to grow to be potential new hosts, low intensity agricultural use of the grassland element of parklands.

3 GENERIC RESEARCH NEEDS

There are no generic research needs for this group.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature trees in appropriate locations, provision of potential new host trees, perpetuation of well-lit conditions, protection of trees from pollution from intensive agricultural use of grasslands through use only of low intensity farming.

LEVEL 3 SUMMARY DOCUMENT

TAXONOMIC GROUP Mosses

CONSTITUENT SPECIES *Habrodon perpusillus*, *Leptodon smithii*, *Leucodon sciuroides*, *Orthotrichum lyellii*, *O. obtusifolium*, *O. pallens*, *Ptergonium gracile*, *Tortula laevipila*, *Zygodon forsteri*, *Z. rupestris*.

1 GENERIC ECOLOGY

Epiphytic mosses occurring on trees and shrubs with base-rich bark in well-illuminated locations. The most favoured species of tree and shrub are ash, elm, sycamore, willow and beech, with, to a lesser extent, oak also acting as a common host. Reproduction is by spores or gemmae. The simple presence of trees with suitable bark is a generic ecological need; beyond this *Zygodon forsteri* has a restriction to a very specialised niche which is only provided by mature damaged beech trees.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The provision of trees with base-rich bark (especially ash) in well-illuminated locations, and the provision of younger generations of such trees, since ultimately every older and mature host tree will become unsuitable (*Zygodon forsteri* requires the continued presence of mature beech trees which are damaged in some way).

3 GENERIC RESEARCH NEEDS

There are no generic research needs for this group.

4 GENERIC BENEFICIAL MANAGEMENT

Retention of host trees and shrubs with base-rich bark, perpetuation of well-lit conditions, provision of new potential host trees and shrubs with base-rich bark.

Level 4 summary document

LEVEL 4 SUMMARY DOCUMENT

TAXONOMIC GROUPS Lichens, Mosses, Grassland Fungi, Mycorrhizal Fungi, Saprophytic Fungi, Bats, Invertebrates (including saproxylic beetles)

CONSTITUENT SPECIES See Level 2 and 3 Summary Documents and also *Ampedus nigerrimus, A. ruficeps, A. rufipennis, Elater ferrugineus, Lacon quercus, Limoniscus violaceus, Megapenthes lugens, Dryophthorus corticalis, Eucnemis capucina, Gnorimus variabilis, Hypebaeus flavipes* and *Gastralus immarginatus.*

1 GENERIC ECOLOGY

Not applicable since the constituent taxonomic groups range from plants and fungi, to invertebrates and mammals.

2 GENERIC WOOD PASTURE/PARKLAND HABITAT REQUIREMENTS

The presence of mature and veteran broad-leaved trees of a range of species, present at a range of densities and accompanied by a full spectrum of new recruitment, set in agriculturally unimproved, low intensity managed grassland.

3 GENERIC RESEARCH NEEDS

Surveys and monitoring, and species' ecology (including reproductive strategies and habitat preferences).

4 GENERIC BENEFICIAL MANAGEMENT

Retention of mature and veteran trees, provision of new generations of trees, acceptance of or the deliberate causing of damage to trees to induce stress and provide micro-habitat diversity, retention of and appropriate low intensity agricultural management of parkland grassland.

Appendix 1: List of parkland/wood pasture species used in this project

Scientific name	English name	Page ref
INVERTEBRATES		
Cicada		
Cicadetta montana	New Forest cicada*	8, 10, 11, 20, 21
Hoverflies		
Callicera spinolae	large hoverfly*	7, 8, 10, 15, 23, 24, 135
Myolepta potens	a hoverfly*	8, 10, 16, 25, 26, 135
Moths		
Cosmia diffinis	white-spotted pinion*	9, 11, 28, 29, 136
Dicycla oo	heart moth*	9, 30, 31, 136
Jodia croceago	orange upperwing*	9, 11, 32, 33, 136
Paracolax tristalis	clay fan-foot moth*	9, 11, 34, 35, 136
Pechipogo strigilata	common fan-foot*	9, 11, 36, 37, 136
BATS		
Barbastella barbestellus	Barbastelle bat*	16, 39, 40, 41, 137
Myotis bechsteinii	Bechstein's bat*	42, 43, 137
Pipistrellus pipistrellus	Pipistrelle bat*	44, 45, 137
Rhinolophus ferrumequinum	greater horseshoe bat*	9, 11, 46, 47, 48, 137
FUNGI		
Battarraea phalloides	sandy stilt puffball*	9, 11, 50, 51, 138, 150
Boletus impolitus	a bolete fungus**	4, 91, 92, 143, 148
Boletus luridus	a bolete fungus**	4, 91, 92, 143, 148
Boletus regius	royal bolete*	8, 9, 10, 11, 15, 52, 53, 138, 149
Boletus satanus	Devil's bolete*	9, 11, 54, 55, 138, 149
Buglossoporus pulvinus	oak polypore*	9, 11, 56, 57, 138, 150
Hericium cirrhatum	a tooth fungus**	3, 10, 11, 93, 94, 144, 150
Hericium coralloides	a tooth fungus**	3, 11, 95, 96, 144, 150
Hericium erinaceum	hedgehog fungus*	10, 11, 12, 58, 59, 138, 150
Hygrocybe calyptriformis	pink meadow cap*	3, 9, 10, 84, 85, 142, 148
Hygrocybe spadicea	date-coloured wax cap*	3, 10, 86, 87, 142, 148
Microglossum olivaceum	an earth-tongue*	3, 9, 10, 88, 89, 142, 148
9 species of local wax-cap fungi**		97, 98
14 species of threatened hydnoid fungi*		60, 61

Scientific name	English name	Page ref
LICHENS		
Anaptychia ciliaris	a lichen**	3, 9, 10, 100, 101, 145, 151
Arthonia impolita	a lichen**	3, 9, 102, 103, 145, 151
Bacidia incompta	a lichen*	9, 10, 11, 63, 64, 139, 151
Caloplaca luteoalba	orange-fruited elm-lichen*	12, 65, 66, 139, 151
Chaenotheca phaeocephala	a lichen*	12, 67, 139, 151
Enterographa elaborata	a lichen*	10, 11, 12, 68, 69, 139, 151
Enterographa sorediata	a lichen*	12, 70, 71, 139, 151
Gyalecta ulmi	elm gyalecta*	9, 12, 14, 72, 73, 139, 151
Lecanactis lyncea	a lichen**	3, 9, 104, 105, 145, 151
Lecanactis premnea	a lichen**	3, 9, 10, 106, 107, 145, 151
Opegrapha prosodea	a lichen**	3, 9, 108, 109, 145, 151
Parmelia acetabulum	a lichen**	3, 9, 10, 110, 111, 145, 151
Parmelia tiliacea	a lichen**	3, 8, 112, 113, 145, 151
Schismatomma decolorans	a lichen**	3, 9, 114, 115, 145, 151
Teloschistes flavicans	a lichen**	3, 9, 10, 15, 116, 117, 145, 151
Thelenella modesta	warty wax-lichen*	12, 74, 75, 139, 151
MOSSES		
Habrodon perpusillus	a moss**	2, 9, 10, 119, 120, 146, 152
Leptodon smithii	a moss**	2, 9, 10, 121, 122, 146, 152
Leucodon sciuroides	a moss**	2, 9, 10, 123, 124, 146, 152
Orthotrichum lyellii	a moss**	2, 3, 8, 125, 126, 146, 152
Orthotrichum obtusifolium	blunt-leaved bristle moss*	9, 10, 77, 78, 141, 152
Orthotrichum pallens	pale bristle moss*	9, 10, 79, 80, 141, 152
Ptergonium gracile	a moss**	2, 9, 10, 127, 128, 146, 152
Tortula laevipila	a moss**	2, 3, 8, 129, 130, 146, 152
Zygodon forsteri	knothole moss*	5, 6, 11, 15, 81, 82, 141, 152
Zygodon rupestris	a moss**	2, 8, 131, 132, 146, 152

* Priority Species

** Other Species