

# **New Forest SAC Management Plan**

## **Part 1**

### **Description**

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# Part 1: Description

## 1.1 Summary description of the New Forest SAC

The New Forest candidate SAC is one of the most important sites for wildlife in the United Kingdom, and is widely recognised as being of exceptional importance for nature conservation throughout the European Union

It supports a complex mosaic of wildlife habitats, formerly common in lowland western Europe but now rare and fragmented. The major components are the extensive wet and dry heaths with their rich valley mires and associated wet and dry grasslands, the ancient pasture and enclosed woodlands, the network of clean rivers and streams and frequent permanent and temporary ponds. Outstanding examples of thirteen habitats of European interest are represented together with two priority habitat types, namely bog woodland and riverine woodland.

The habitats support an exceptional variety of plants and animals. This includes the richest moss and lichen flora in lowland Europe, scarce flowering plants such as slender cotton-grass, wild gladiolus, pennyroyal and small fleabane and an outstanding community of invertebrates dependent upon the ancient forest trees and other grazed habitats. In addition, the New Forest has the largest number of Dartford warbler in Britain and internationally important populations of nightjar and woodlark. The populations of southern damselfly in boggy flushes along stream sides are of particular note as well as great crested newt in the ponds and stag beetle associated with the rich dead wood resource in the New Forest.

The quality of the habitats of the New Forest, and the rich diversity of species which they support, is dependent upon the management activities of the various owners and occupiers. Of fundamental importance throughout the Crown lands and Adjacent Commons is the persistence of a pastoral economy based on the existence of Rights of Common. The commoners' stock, mainly cattle and ponies, roam freely over extensive areas of the New Forest, playing a vital role in keeping open habitats free of scrub and controlling the more aggressive species such as bracken and purple-moor grass, and maintaining the richness and variety of heathland and wood pasture habitats. This is complemented by the annual heathland burning and cutting programmes which ensure that at any one time there is an extensive range of structurally diverse habitats available for plants and animals to utilise.

## 1.2 New Forest non-technical description

### 1.2.1 Location

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The New Forest SAC is situated on the south coast of England in the counties of Hampshire and Wiltshire. It lies immediately to the north of the Solent, between the major conurbations of Bournemouth to the west and Southampton to the east. The extensive chalk landscapes of Salisbury Plain and the west Wiltshire Downs lie to the north. The SAC comprises seven SSSIs which together cover more than 29,000 hectares. The component sites are the New Forest SSSI, Roydon Woods SSSI and the Lymington River SSSI in Hampshire, and Langley Wood and Homan's Copse SSSI, Landford Bog SSSI, Loosehanger Copse and Meadows SSSI and Whiteparish Common SSSI in Wiltshire.

*(Whilst the SAC contains most of the Lymington River SSSI headwaters, the riverine features themselves have not been selected for SAC designation in their own right).*

## **1.2.2 Tenure**

Over 90% of the SAC is Crown land managed by the Forestry Commission, comprising most of the unenclosed land and the woodland Inclosures. There are however, around 55 private owners and occupiers managing significant areas of SAC habitats. Other significant landowners and managers include the National Trust (Bramshaw Commons, Rockford & Ibsley Commons, Hightown Common and Hale Purlieu), Hampshire Wildlife Trust (Roydon Woods), Hampshire County Council (Hyde & Gorley and part of Rockford and Ibsley Commons) and English Nature (Kingston Great Common, and Langley Wood). The Crown lands, Adjacent Commons and Manorial Wastes are bounded by the New Forest 'perambulation' which encloses some 37,907 hectares. Historically the perambulation was the limit of the area within which Forest Law had jurisdiction, and it was considerably larger in extent than today. Currently it delimits the area within which the New Forest Verderers apply their by-laws for the control and health of stock depastured on the Crown lands, Adjacent Commons and Manorial Wastes, and within which the animals are contained by cattle grids and fencing.

## **1.2.3 Management**

The maintenance of the habitats and species for which the New Forest is of international importance is dependent upon the management activities of the various owners and occupiers and commoners. Of fundamental importance throughout the Crown lands and Adjacent Commons is the persistence of a pastoral economy based on the existence of Rights of Common and mast. The commoners' stock, mainly cattle and ponies, roam freely over extensive areas of the New Forest unenclosed lands, playing a vital role in maintaining open habitats free of scrub and controlling the more aggressive species such as bracken and purple-moor grass, and maintaining the richness and variety of heathland and woodpasture habitats. This is complemented by the annual heathland burning and cutting programmes which ensure that at any one

time there is an extensive range of structurally diverse habitats for plants and animals to utilise.

## **1.2.4 Geology, soils & geomorphology**

The New Forest is underlain by the clays and sands of Tertiary deposits consisting of a series of marine, fluvial and estuarine deposits of clays, clay marls and sands. These are overlain by extensive sheets of more recent gravel and Brickearth. Apart from a few of the strata, including the clay marls, the series of deposits produce base poor, acidic soils.

The drainage pattern is determined largely by the three main drainage basins into which surface water flows. To the west, the broad valley of the River Avon is fed by six streams flowing westwards from the New Forest including Black Gutter/Ditchend Brook, Latchmore Brook, Dockens Water and Linford Brook. To the east, two further streams, Bartley Water and Cadnam River flow eastwards to the River Test and the upper reaches of the Southampton Water. To the south, a further three rivers flow into the Solent; the Lymington River, Beaulieu River and Avon Water. The clay strata store relatively little water and lead to very rapid run off after rainfall and only small groundwater flows to the rivers in the summer months. Consequently the New Forest streams are characterised by very high winter flood flows and very low summer flows.

The New Forest is of considerable importance in the national context for its seven Geological Conservation Review Sites, which demonstrate aspects of the terrace gravels of the former Solent River and their associated Palaeolithic archaeology, as well as illustrating the evolution of more recent fluvial systems.

## **1.2.5 Habitats and mosaics**

The SAC supports a complex mosaic of habitats formerly common in lowland western Europe but now rare and fragmented. The major components are the extensive wet and dry heathlands with their rich valley mires and associated wet and dry grasslands, the ancient pasture and enclosed woodlands, the network of clean rivers and streams and frequent permanent and temporary ponds. Outstanding examples of thirteen habitats of European interest are represented together with two priority habitat types, namely bog woodland, and riverine woodland.

The existence of these habitats on such an extensive scale, fluctuating naturally over time with each other, creates an ecosystem of unparalleled importance in north western Europe. Whilst for convenience, each habitat is described separately, the existence of this dynamic habitat mosaic is of fundamental

importance in creating enormous niche separation for exploitation by a vast suite of plants and animals of nature conservation importance.

### 1.2.6 Woodland habitats

The pasture woodlands extend to some 4,430 ha (excluding riverine and bog woodland), comprising some 3,100 ha of old growth woodland and 1,330 ha of more recent secondary expansion. The principal tree species are beech and oak in varying proportions, with holly dominating the shrub layer. A number of distinctive vegetation community types may be recognised depending both upon environmental factors such as soil nutrient and base status and human interventions both past and more recent. There is great structural diversity evident in these woodlands, with a complete range of tree age classes from saplings to mature, senile and dead standing and fallen trees, together with a wide range of tree densities from closed high canopy forest to open stands with extensive heathland glades, to a more open parkland-like structure. The oldest generation of trees still standing are oaks and beeches of early 17<sup>th</sup> century origin, many of which are pollarded. The main younger generations have arisen since about the mid 19<sup>th</sup> century, but tree regeneration is a continual process and may be frequently observed in pockets of scrub and fallen dead wood where protection from livestock grazing is secured, and in secondary spread of scrub and woodland onto adjacent heathland habitats.

Of the 3,100 ha of old-growth pasture woodland some 2,520 ha conforms to the Habitats Directive Annex 1 habitats of *Atlantic acidophilous beech* (2,000 ha), *Old acidophilous oak* (120 ha) and *Asperulo-fagetum beech woods* (400 ha). The remainder comprises more mesotrophic, herb-rich oak woodland which has no Habitats Directive equivalent.

The riverine woodlands comprise those floodplain woodland communities which, where not damaged by over-deepening of drainage channels, flood seasonally as water levels rise along meandering natural flood channels. Two communities are recognisable, the first occurring on mineral soils dominated by oak and ash with a rich shrub layer and one of the richest ground floras of all Britains lowland woods. The second is characterised by alder dominance in areas where peat accumulates in old channels, and where springs arise in the floodplain. Common associates are ash and oak over a typical wetland ground flora. Many of these alder stands have evidently been subject to former coppice management

There are around 212 ha of old-growth riverine woodland in the New Forest which may be accommodated within the Habitats Directive Annex 1 priority habitat *Alluvial forests with alder and ash*.

Bog woodland occurs on peat in which there is a significant component of bog species in the ground flora. Two main types are apparent, the *sallow carrs*, a feature of the acid headwaters and mires characterised by a significant

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sphagnum moss component in the ground flora, giving way to alder carr on richer soils in valleys on swampy ground, where sphagna are replaced by tussock sedge. There is an estimated 250 ha of bog woodland in the New Forest, of which about 33 ha is old-growth sallow carr referable to the Habitats Directive Annex 1 priority habitat *Bog woodland*.

In addition to the pasture woodlands described above the SAC contains enclosed woodlands which are not subject to livestock grazing. Principle localities are at Whiteparish Common, Loosehanger Wood, Langley Wood and Franchises Wood in the north of the SAC in Wiltshire, and Roydon Woods in the south of the Forest in Hampshire. Each support some or all of the plant communities referable to the Habitats Directive Annex 1 habitats referred to above though they may vary considerably in gross appearance and detailed species composition as a result of differing woodland management systems (coppice or high forest) in the absence of livestock grazing. Former wood pasture stands at Roydon Wood are currently being returned to livestock grazing to restore favourable condition.

The Inclosures on the Crown lands (some 8,410 ha) are relatively recent forestry plantations on former heathland or ancient woodland sites. Tree species composition varies enormously but oak and beech are favoured on richer soils and conifers on heathland soils. Extensive manipulation of the underlying soils, drainage and vegetation has occurred and remnants of semi-natural vegetation may or may not be discernable, depending upon the density of planting and other interventions.

Where recognisable remnant plant communities contribute to heathland and woodland Habitats Directive annex 1 habitats. Particularly significant in this regard are the 400 ha of pasture, riverine and bog woodland communities which were incorporated within 18<sup>th</sup> and 19<sup>th</sup> century Statutory Inclosures.

The Statutory Inclosures (7,104 ha) were enclosed under specific Acts of Parliament. They are free of Rights of Common only so long as they remain fenced, and at least 12% has to remain unenclosed at any one time. Some of the oldest broadleaved stands are beginning to develop a significant nature conservation interest particularly where they were planted on ancient woodland sites.

The Verderers Inclosures (814 ha) were enclosed by agreement with the Verderers in the late 1950's on the understanding that they would be returned to the open Forest after a limited time span. They were largely planted with conifers on heathland sites. Consequently their nature conservation value is restricted to surviving remnant heath and mire communities and the very high potential for heathland restoration following conifer removal.

In addition to the Statutory and Verderers Inclosures there are 494 ha of Crown freehold woodland, most of which derive from the old crown manor of



Lyndhurst, and a further 198 ha leased from adjoining estates. They contain a mix of broadleaf and conifer plantations.

## **1.2.7 Woodland flora and fauna**

The semi-natural woodland communities described above support an outstanding flora and fauna and the forestry Inclosures have enormous potential in this regard. Of 17 species of native bat, 11 have been recently recorded in the New Forest woodlands, including Barbastelle and Bechstein's bat. Wood pasture alone supports an exceptionally rich breeding bird fauna including species specialising in old trees rich in crevices and rot holes, such as redstart and woodland floor specialists such as wood warbler. Up to 2 pairs of honey buzzard regularly breed in woodland in the New Forest representing some 2% of the entire UK population of this Annex 1 Birds Directive species.

Amongst the invertebrates, some 276 species of conservation concern are recorded from the wealth of habitats present in the woodlands. Of these a large number are saproxylic species for which a plentiful supply of fallen and standing deadwood (often associated with living trees), of all sizes and stages of decay is essential. Beetles, flies and moths exploit a range of habitat niches within this material and may feed on the wood itself, or on fungal associations living on the deadwood, or nutrient-rich sap resulting from damage to bark or from internal damage, or be predatory on other saproxylic invertebrates living in and on the dead wood.

Of 56 species of butterfly present in the UK, 33 have been recorded in the New Forest since 1970. However, whilst some species are maintaining their populations, the woodland species in particular have experienced significant declines in recent decades. Of 17 species of conservation concern recorded in the New Forest since 1980, High Brown Fritillary is now extinct and Duke of Burgundy is now only recorded from Langley Wood, and two are failed re-introductions at Roydon Woods (Marsh Fritillary and Heath Fritillary). Of the remainder most of the woodland species are struggling. The likely reasons for this continuing decline in butterflies principally relate to the incursion of livestock into the forestry Inclosures from about 1960 onwards, together with habitat losses through intensive modern silvicultural operations, especially fragmentation of broadleaf habitats by coniferisation. However, the potential for management changes in the forestry Inclosures to lead to significant recovery of key species is very high. Those which could potentially benefit in the coming years as a result of implementation of the Forest Design Plans are White Admiral, Purple Emperor, Duke of Burgundy, Pearl-bordered Fritillary, Small Pearl-bordered Fritillary, High Brown Fritillary and Silver-washed Fritillary.

Whilst the woodlands do not support many vascular plant species of national conservation concern, they do nonetheless have rich floras of characteristic species. Of 100 species on the Ancient Woodland Vascular Plant indicator list

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(Rose 1999), 78 have been recorded from the Crown lands and 71 from Roydon Woods. These are very high totals. In the Crown lands much has been made of the supposed impoverishment of woodland plants in pasture woodlands because of livestock grazing. This is not supported by ground survey; all but 4 species are present. Indeed, floras of grazed and ungrazed woodlands are very similar when woods on similar soils are compared, though the frequency of individual species can be very different.

A total of 350 lichen species have been recorded from the pasture woodlands, of which around a third are of conservation concern. The majority are species associated with old growth (ie woodland continuity greater than 200 years), a habitat of greatly diminished distribution elsewhere in north-west Europe. The bryophyte flora (mosses and liverworts) is the richest in lowland Britain, the species of interest all highly dependent upon livestock grazing to suppress competitive vegetation growth.

Some 71 species of fungi of conservation concern have been recently recorded in the New Forest of which 62 are woodland species associated either with standing or fallen old trees or whose fruiting bodies appear on the ground, though they have mycorrhizal links to trees.

### **1.2.8 Heathland habitats**

New Forest heathland comprises extensive dry and wet heaths and associated valley mires, streams, ponds, temporary pools, dry and wet grasslands. The dry heath vegetation communities are separated by a soil moisture and nutrient gradient. Six distinctive sub-communities are recognisable along this continuum, ranging from the driest heather *Calluna vulgaris* dominated stands on the poorest soils, through those of slightly higher moisture and nutrient status to those too wet to support bell heather *Erica cinerea*, but not wet enough to support sphagnum mosses and wet heath communities. The New Forest is unique in supporting a very wide band of intermediate vegetation (commonly called humid heath) which occupies the zone between the dry heath communities and wet heath. It is characterised by the presence of heather, cross-leaved heath *Erica tetralix*, purple moor-grass *Molinia caerulea* and the moss *Leucobryum glaucum*, in the absence of both bell heather and sphagnum mosses. On heathlands elsewhere, where the clay content of soils is less, this 'humid heath' zone is much narrower and the separation between dry and wet heath is very sharp. There are around 7,600 ha of dry heath communities conforming to the Habitats Directive Annex 1 habitat *European dry heaths*.

There are three wet heath vegetation sub-communities defined by soil moisture, nutrient and base status but which are additionally profoundly influenced by burning and grazing. Soils are too dry to sustain the large peat-building sphagnum associated with mires, but too wet to support bell heather. Heather never gains the dominance that it reaches in late-successional stages following

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burning on dry heaths. Wet heath communities occur on nutrient poor mineral soils or very shallow peats that are at least seasonally waterlogged, but may be surface dry in summer.

The first wet heath sub-community is characterised by the presence of heather, cross-leaved heath and purple moor-grass in varying amounts with deergrass *Trichophorum cespitosum* and heath rush *Juncus squarrosus* with various small sphagna species. This is the most extensive form of wet heath occupying around 50% of the total coverage of 2,100 ha. The second sub-community is more tussocky and considerably more species rich as a consequence of more base-rich underlying soils. Species such as devil's-bit scabious *Succisa pratensis*, meadow thistle *Cirsium dissectum*, saw-wort *Serratula tinctoria* and the nationally scarce marsh gentian *Gentiana pneumonanthe* occur. These first two wet heath sub-communities are referable to the Habitats Directive Annex 1 habitat *Northern Atlantic wet heaths with Erica tetralix*.

The third wet heath sub community is characterised by a reduced cover of heather, cross leaved heath and purple moor-grass and a more extensive sphagnum carpet. Wetter hollows support sundews *Drosera* spp and bare peat is colonised by the local brown-beaked sedge *Rhynchospora fusca*. This sub-community is referable to the Habitats Directive Annex 1 habitat *Depressions on peat substrates (Rhynchosporion)* and comprises around 210 ha or 10% of the total wet heath vegetation.

The New Forest mires comprise a suite of communities which are described under the generic headings of 'Valley Bogs', 'Bog Pools', 'Soakways', 'Poor fen', 'Moorgrass Mires', 'Marl Flushes', and 'Marl Swamps' (after Sanderson 1998). Mire is a generic term used here to encompass the variation in vegetation which in the New Forest is really a combination of bog and fen in the classic sense. Bogs are typically rain-fed, mineral and nutrient poor and acidic. Fens are groundwater fed, have a higher nutrient status (mesotrophic to eutrophic), and are generally neutral or alkaline. New Forest mires have elements which are typical of both bogs and fens. The variation in vegetation composition in New Forest mires is attributable to a number of related factors. The most important are acidity determined by underlying soils, hydrology, nutrient status, and management particularly grazing and burning pressure. The structural variation is very wide and each mire system is unique.

Mires occur as either seepage step mires or valley mires. Valley mires form in valley bottoms with low hydraulic gradients and impermeable subsoils, allowing peat accumulation. Wide, shallow valleys with slight gradients support extensive mires; narrow, steep valleys support smaller, more localised mires. The distribution of the various plant community types is in part related to water chemistry and nutrient status, and this in turn is dependent upon the base status of the parent material from which the soil water derives in the New Forest ground water fed valley mires. Hence, the central flows of valley

mires which receive water from the Headon Beds may be neutral or slightly alkaline. Those fed from sands and gravels are acidic.

This effect is most concentrated along the axis of flow and increases downstream. In addition this produces a further gradient of declining nutrient status and increasing acidity across valley mires from the central axis. Vegetation communities develop along these gradients, classically from enriched fen and carr along the axis to increasingly acidic sphagnum bog communities peripherally.

Seepage steps form on valley sides where ground water concentrates above the junction between a permeable sandstone and an underlying impermeable clay. Subsequent erosion produces a characteristic profile in which there is a steep scarp slope above the seepage and a zone of slumped material below it, the mire forming in water retentive hollows of the undulating slope.

'Valley bogs' are the most extensive mire community type, occurring in both valley and seepage step localities on permanently waterlogged, nutrient poor acidic peats. They are typically characterised by extensive and luxuriant peat forming sphagnum mosses with accompanying bog species such as bog asphodel *Narthecium ossifragum*, cotton grass *Eriophorum angustifolium* and white-beak sedge *Rhynchospora alba*. Many of the larger valley bogs support 'bog pool' communities which may in turn support some very local species including lesser bladderwort *Utricularia minor* and the insectivorous great sundew *Drosera anglica*. A third very distinctive mire community, 'soakways' exists along natural drainage runnels of valley bogs which are dominated by marsh St John's wort *Hypericum elodes* and bog pondweed *Potamogeton polygonifolius*. 'Poor fen' communities develop where nutrient status is slightly elevated. The most acid loving species are absent and are replaced by typical poor fen associates such as star sedge *Carex echinata* and marsh willowherb *Epilobium palustre*.

Where water movement is higher and grazing pressure reduced purple moor-grass can dominate forming the fifth mire community 'moor-grass mires'. These are floristically impoverished and it should be noted that all New Forest mires with sufficient water flow have the capacity to degenerate to moor-grass mire if grazing were reduced sufficiently. Equally, moor-grass mires will revert to more floristically-rich communities if grazing levels (and maybe some controlled burning) increase. None of the above acidic mire communities have equivalents in the Corine classification and hence the Habitat Directive.

'Marl flushes' occur on seepages and highly flushed areas in valley mires with shallow peat but sufficient base enrichment to support brown mosses and the more base demanding vascular plants. The most striking are those found in seepage step mires on marl (lime-rich clay) producing water so base-rich that tuffa is deposited on the mosses. However, less strongly lime enriched

flushes (pH 6-6.5) without tuffa deposition are more frequent. The former are referable to the Habitats Directive Annex 1 habitat *Alkaline fen*.

Finally, 'marl swamps', are generally confined to areas within valley mires where artesian sources of base rich water produce very wet swampy conditions. Their total extent is generously estimated as a maximum of 9 ha. They have been particularly adversely affected by drainage and Inclosure for forestry, and carr invasion on the open Forest. Marl swamps are referable to the Habitats Directive Annex 1 habitat *Transition mires*.

The New Forest dry grasslands comprise a suite of communities which are described under the generic headings of *Parched Acid Grassland*, *Heathy Acid Grassland*, *Moist Acid Grassland*, *Neutral Greens* and *Herb-rich Bracken Grassland* (Sanderson 1998). There is no Habitats Directive equivalent to the dry grasslands. Given a high and relatively uniform grazing pressure, soil fertility and soil moisture retention are the main factors determining the distribution of the various dry grassland communities.

'Parched Acid Grassland' is dominated by fine-leaved grasses with a high cover of mosses and lichens, in an open sward which becomes parched and brown in late summer. Stands may be species-rich and the presence of sheep's sorrel *Rumex acetosella* and early hair-grass *Aira praecox* are especially diagnostic. Lime enriched stands are dominant wherever cultivation has been carried out or where broken wartime concrete survives in the soil, and these are the main swards on the dry re-seeded areas. Otherwise parched acid grasslands tend to be found as small pockets on areas of dry, brown earths, sometimes on sites of obvious prior disturbance such as gravel pits, but often simply on patches of richer soil. Associated vegetation is typically heath but the community can even occur in larger pasture woodlands.

'Heathy Acid Grasslands' are dominated by bristle bent *Agrostis curtisii* and purple moor-grass and are generally species-poor and grade into dry heath as heather cover increases.

'Moist Acid Grassland' is species poor occurring locally as small strips between parched acid grassland and wet lawns, but also a distinctive community of damp pasture woodland glades. It is characterised by the presence of fine leaved grasses in association with heath bedstraw *Galium saxatile*, tormentil *Potentilla erecta* and the moss *Rhytidiadelphus squarrosus*. The species characteristic of the more species-rich parched acid grasslands are absent.

'Neutral Greens' are dry to moist grasslands characterised by a species-poor, grass dominated sward of common bent *Agrostis canina* and red fescue *Festuca rubra*, but with crested dog's-tail *Cynosurus cristatus*, rye grass *Lolium perenne*, daisy *Bellis perenne* and red clover *Trifolium pratense* as diagnostic species. They are of note due to their distinctive mats of chamomile *Chamaemelum nobile*, a nationally scarce and declining species.

'Herb-rich Bracken Grassland' contains bracken in a distinctive community on moist soils within a species-rich mosaic of grassland and woodland herbs. It is characterised by the presence of grassland species such as devil's-bit scabious, betony *Stachys officinalis*, saw-wort, and lesser-butterfly orchid *Platanthera bifolia* in a mosaic with woodland ground flora species, particularly bluebell *Hyacinthoides non-scripta*, wood anemone *Anemone nemorosa* and common dog violet *Viola canina*. This is the principle habitat of wild gladiolus *Gladiolus illyricus* a nationally rare species listed in Schedule 8 of the Wildlife & Countryside Act, and which is confined to the New Forest in Britain.

The New Forest wet grasslands (known colloquially as wet lawns) comprise a suite of plant communities confined to impermeable or slowly permeable clays, which are waterlogged in the winter but which dry out to some extent in the summer. They occur both on flushed soils on valley slopes and on flood plains of forest rivers and streams. They are generally tightly grazed swards characterised by the presence of velvet bent *Agrostis capillaris* and sedges, along with species typical of wet acid grasslands especially purple moor-grass, devils-bit scabious, creeping willow *Salix repens* and meadow thistle. Extensive carpets of bog pimpernel *Anagallis tenella* are seasonally prominent, and where soil water retention is highest, or around flushes, marsh pennywort *Hydrocotyle vulgaris*, sharp-flowered rush *Juncus acutiflorus* and marsh St John's-wort are abundant. The more acidic sites support sphagnum lawns and an increasing heathy element with cross-leaved heath.

Wet grasslands are profoundly affected by stocking regimes, soil moisture retention and soil fertility which are key factors in defining vegetation structure, community type and distribution. There are two main types, firstly the enriched flood plain rush pasture characterised by tightly grazed swards with abundant sedges and frequent sneezewort *Achillea ptarmica*, marsh bedstraw *Galium palustre*, marsh valerian *Valeriana dioica* and cuckoo flower *Cardamine pratensis* but with little evidence of the more usual rush domination which occurs on similar less tightly grazed rush pastures off the New Forest. The second wet grassland type is the species rich fen meadow community characterised by increased purple moor-grass, meadow thistle and the presence of such wet acid grassland species as bog pimpernel, lousewort *Pedicularis sylvatica*, devil's bit scabious, and bog asphodel. Fen meadows are referable to the Habitats Directive Annex 1 habitat *Molinia meadows on chalk and clay*.

The New Forest supports a range of distinctive vegetation communities restricted to water-filled shallow depressions on poorly drained soils which dry out temporarily during the summer months. Sanderson (1998) has derived a provisional classification of these temporary ponds which describes five distinct vegetation community types; the 'spike-rush - purple moor-grass community', the 'lesser marshwort - floating club-rush - pillwort community', the 'creeping bent - marsh foxtail - knotweed community', the 'floating sweet-grass

community' and the 'pool edge assemblages'. Given a relatively high grazing pressure, the main factors in determining the distribution of the various temporary pond communities across the Forest are base status of the water (derived from the underlying soils), nutrient status and input, and length of submergence.

The 'spike-rush - purple moor-grass community' is characterised by grazed swards of spike rush *Eleocharis palustris* and purple moor-grass often with carpets of sphagnum, and is typically found in pans and runnels in wet heath where fairly acid, nutrient-poor water collects, but which is not sufficiently acidic or nutrient poor to support typical bog pool communities. The 'lesser marshwort - floating club-rush - pillwort community' supports a mixed vegetation characterised by the presence of lesser marshwort *Apium inundatum* and floating club-rush *Eleogiton fluitans* and the nationally rare, grass-like fern pillwort *Pilularia globulifera*. Typical associates of the well-grazed Forest temporary pond communities include the two nationally rare species slender marsh-bedstraw *Galium constrictum* and Hampshire purslane *Ludwigia palustris*, and shoreweed *Littorella uniflora*. Generally found in temporary ponds with less acidic but nutrient poor water, typically in depressions within wet grassland vegetation. These first two temporary pond communities are referable to the Habitats Directive Annex 1 habitat *Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae*.

The 'creeping bent - marsh foxtail - knotweed community' is a variable community ranging from grassy to herb dominated communities with the grasses creeping bent *Agrostis stolonifera*, Marsh foxtail *Alopecurus geniculatus* and occasionally Reed sweet-grass *Glyceria* spp, with the ruderal herbs marsh cudweed *Gnaphalium uliginosum*, water-pepper *Persicaria hydropiper*, small water-pepper *P. Minor*, redshank *P. maculosa*, trifid bur-marigold *Bidens tripartita* and silverweed *Potentilla anserina*. These temporary ponds are notable for the presence of the nationally scarce mudwort *Limosella aquatica*, and the three nationally rare species, pennyroyal *Mentha pulegium* and small fleabane *Pulicaria vulgaris*. These communities are associated with higher nutrient status and fairly neutral pH, in situations where heavy grazing results in poaching and the accumulation of dung. They are typically found within neutral greens and in water-retaining depressions in parched acid grasslands.

The 'floating sweet-grass community' is dominated by reed sweet-grass *Glyceria fluitans* in flood channels in flood plain wet grasslands. Whilst grazing reduces the dominance of reed sweet-grass they are relatively species poor stands compared to the other community types, though notable on occasion for the presence of the nationally rare slender marsh-bedstraw.

The 'pool edge assemblages' are communities on the edge of large temporary ponds, shallow ephemeral pools and poached damp hollows in grassland which support a number of specialist species in a zone with toad rush *Juncus*

*bufonius*. These include the two nationally scarce species coral necklace *Illecebrum verticillatum*, and yellow centaury *Cicendia filiformis*, often in association with allseed *Radiola linoides* and chaffweed *Anagallis minima*. The pool edge assemblages are referable to the Habitats Directive Annex 1 habitat *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and Nanojuncetea*.

Heavy grazing pressure is of prime importance in the maintenance of the outstanding flora of these temporary pond communities in the New Forest. It maintains an open habitat, controlling scrub ingress and stock trample the surface. Commoners animals also transport seed in their hooves from pond to pond widely across areas where suitable habitat exists.

There are a number of permanent ponds in the New Forest of varying acidity and nutrient status. Hatchet pond is notable for its extensive population of shoreweed and associated flora including the nationally scarce six-stamened waterwort *Elatine hexandra*. This together with the distinctive marginal amphibious vegetation communities are referable to the Habitats Directive Annex 1 habitat *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and Nanojuncetea*.

The New Forest streams are a geographically isolated type with no equivalent in lowland England. The largest is the Lymington River with its two contrasting tributaries the Ober Water and Highland Water. As the streams flow downstream they become progressively less acidic and nutrient poor and consequently exhibit a unique vegetation succession from acid communities at the source akin to mountainous upland regions, through richer stream floras as they pass through open grassland and woodland communities, to more typical enriched neutral river plant communities in the lower reaches.

### **1.2.9 Heathland flora and fauna**

The heathland communities described above support an outstanding flora and fauna of great diversity and importance. Of particular significance amongst a rich bird community are the species for which the Forest is designated a Special Protection Area under the EU Birds Directive. These are Dartford warbler, nightjar and woodlark all of which have breeding populations of European significance and hen harrier which overwinters in numbers of European significance. The ponds and streams support five native amphibians including great crested newt (an annexe 2 species for which the SAC is specially designated under the Habitats Directive), and all six native reptiles though only smooth snake and sand lizard are strictly confined to heathland habitats.

Around 270 invertebrate species of conservation concern are accommodated on the New Forest heathland habitats. This includes 47 species of butterfly and moth of which silver-studded blue butterfly is probably the most widespread and



*Part 1 Description*

easily recognised. Amongst the 27 species of dragonfly and damselfly which regularly breed in the Forest wet heaths, seepages, ponds, ditches and streams are 5 of conservation concern including southern damselfly an annex 2 species for which the SAC is specially designated under the Habitats Directive. Of 109 species of beetle of conservation concern a large percentage are associated with the Forest open wetland habitats whilst others are dependent upon the animal dung deposited by livestock. 40 of the 43 species of ants, wasps and bees of conservation concern are dependent upon heathland habitats, many being especially associated with dry heath containing south facing bare sandy slopes. Black bog ant has its national stronghold in the New Forest mires, maintained by the essential grazing and burning management regimes. There are 100 fly species of conservation concern associated with heathland habitats, exploiting all available niches from mires to dry heath, grassland, livestock dung and bare ground. Amongst the 22 species of grasshopper and cricket which occur in the New Forest are 12 of conservation concern, 8 of which are associated with heathland habitats, including large marsh grasshopper.

Two species of Crustacea are of conservation concern, both dependent upon predator-free temporary ponds in the grazed heathland matrix. The tadpole shrimp is restricted entirely to the New Forest in the UK where it is present in just two ephemeral ponds, and fairy shrimp which lays long-lived drought resistant eggs which remain in the pond bed during dry spells, hatching some hours after wetting.

Of 39 species of vascular plant of conservation concern recorded in the New Forest, 36 are associated with heathland habitats. Some have been referred to in the plant community descriptions above, and of particular note in this regard are the dry grasslands and temporary pond communities. Parched acid grassland is the richest dry grassland type with several nationally scarce species including mossy stonecrop *Crassula tillaea*, smooth cat's-ear *Hypochaeris glabra* and hairy bird's-foot-trefoil *Lotus subbiflorus*. Heathy acid grassland supports heath lobelia *Lobelia urens*, and pale dog-violet *Viola lactea*.

Lichens are a significant component of heathland habitats in the widest sense. A total of 72 species have been recorded from heathland habitats including five of conservation concern. The lichen flora of the dry and wet heaths is particularly well developed and includes many species such as *Cladonia strepsilis* and *Pycnothelia papillaria* which have seriously declined in the lowlands. It is undoubtedly the best preserved heathland lichen flora in the lowlands. The heathland bryophytes (mosses and liverworts) are found in a wide variety of habitats. Two species of particular importance are the nationally scarce mosses *Hypnum imponens* and *Dicranum spurium*, light demanding species which share heavily grazed humid and drier heath with rich lichen floras. The New Forest probably supports the majority of the English populations of these species.

Another distinctive group are the tiny liverworts that are epiphytic on *Sphagnum* in valley bogs. These include the nationally scarce *Cephalozia macrostachya*, *Cephalozia pleniceps* and *Cephaloziella elachista*. This epiphytic liverwort flora, including other less threatened species, is otherwise only found in undamaged blanket and raised bogs.

Another major group is annual species of liverwort of ephemeral ponds and bare seasonally wet soils that includes the nationally scarce *Fossombronia foveolata*, *Fossombronia incurva*, *Riccia subbifurca* and *Sphaerocarpos michellii*. Deeper, more base enriched, ephemeral ponds in marl pits also support a rich moss flora related to that of alkaline fens that includes the nationally scarce species *Drepanocladus sendtneri* and *Campylium elodes*. The latter flora is highly threatened by scrub invasion. Two species associated with the transition mires in the Holmsley area, *Philonotis caespitosa* and *Hamatocaulis (Drepanocladus) vernicosus*, may have been lost to the spread of scrub.

Amongst the fungi most of the species of nature conservation concern are woodland species, with only nine heathland and grassland species recorded. These include species of acid grassland and species that are mycorrhizal on creeping willow. The best known heathland species is nail fungus *Poronia punctate*, which is a specialist confined to dung from ponies grazing acidic rough pastures. It is found on dung deposited on acid grassland and heath and whilst it has been recently rediscovered in Dorset (Cox & Pickess 1999), and is also present on the north Hampshire heaths, its strongest and most extensive populations lie within the New Forest.

## 1.3 Technical description

### 1.3.1 Location

The New Forest SAC is situated on the south coast of England in the counties of Hampshire and Wiltshire. It lies immediately to the north of the Solent, between the major conurbations of Bournemouth to the west and Southampton to the east. The extensive chalk landscapes of Salisbury Plain and the west Wiltshire Downs lie to the north. The SAC comprises seven SSSIs which together cover more than 29,000 hectares. The component sites are the New Forest SSSI, Roydon Woods SSSI and the Lymington River SSSI in Hampshire, and Langley Wood and Homan's Copse SSSI, Landford Bog SSSI, Loosehanger Copse and Meadows SSSI and Whiteparish Common SSSI in Wiltshire. (*Whilst the SAC contains most of the Lymington River SSSI headwaters, the riverine features themselves have not been selected for SAC designation in their own right*).

### 1.3.2 Tenure

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Over 90% of the SAC is Crown land managed by the Forestry Commission, comprising most of the unenclosed land and the woodland Inclosures. There are however, around 55 private owners and occupiers managing significant areas of SAC habitats. Other significant landowners and managers include the National Trust (Bramshaw Commons, Rockford & Ibsley Commons, Hightown Common and Hale Purlieu), Hampshire Wildlife Trust (Roydon Woods), Hampshire County Council (Hyde & Gorley and part of Rockford and Ibsley Commons) and English Nature (Kingston Great Common, and Langley Wood). The Crown lands, Commons and Manorial Wastes are bounded by the New Forest 'perambulation' which encloses some 37,907 hectares. Historically the perambulation was the limit of the area within which Forest Law had jurisdiction, and it was considerably larger in extent than today. Currently it delimits the area within which the New Forest Verderers apply their by-laws for the control and health of stock depastured on the commons, and within which the animals are contained by cattle grids and fencing. Map 1.3.2.1 shows tenure as of 2001.

### **1.3.3 Map coverage**

Ordnance Survey Landranger Series Numbers 196, 195, 185, 184. 1:50,000 Scale

Ordnance Survey Outdoor Leisure Series Number 22 *New Forest* . 1: 25,000 Scale

Ordnance Survey 1: 10,000 series : SU22SW, SU22SE, SU11NE, SU21NW, SU21NE, SU31NW, SU11SE, SU21SW, SU21SE, SU31SW, SU10NE, SU20NW, SU20NE, SU30NW, SU30NE, SU40NW, SU10SE, SU20SW, SU20SE, SU30SW, SU30SE, SU40SW, SZ19NE, SZ29NW, SZ29NE, SZ39NW, SZ39NE, SZ29SW, SZ29SE.

Geological Maps: British Geological Survey:

1979: 1:100,000 Geological map of the UK, solid geology, south sheet.

1975: 1:50,000 Number 330 Lymington solid and drift  
 Number 315 Southampton solid and drift  
 Number 329 Bournemouth solid and drift

### 1.3.4 Aerial photograph coverage

Aerial photograph coverage for the New Forest SAC is given in Table 1.3.4.1, (compiled by R. Reeves 2000, of the Ninth Centenary Trust).

### 1.3.5 Climate

The New Forest enjoys a favourable climate by British standards of warm summers and mild winters with variable rainfall, but generally avoiding the more extreme dry and cold conditions of further east and north.

Snow fall is rare and only during the really severe winter of 1962-3 was the Forest snow and ice bound for nearly eight weeks (Tubbs 1986). Frosts are common, but seldom does the night temperature fall below -9\_C. The climate is described as temperate; westerly winds bringing a succession of low and high-pressure systems leading to frequent variations of small amplitude in the weather, characterised as wet and mild. The mean temperature of the coldest month above 0\_C but below 8\_C, and the mean temperature of the warmest month is above 19\_C but below 22\_C. Rainfall occurs throughout the year and in the driest month is rarely less than 60 mm. (Webb 1986).

**Table 1.3.4.1: Coverage of aerial photographs of the New Forest area**

Date	Origin	Scale	View	Coverage	HolderFormatNotes
1940/43	Luftwaffe	1:10,000	Plan	Majority	F.E.B&W(& negatives for 1940)
1446	R.A.F.	1:10,000	Plan	Full	F.E.B&W
1946	R.A.F.	1:10,000	Plan	Full	E.N.B&W
1960/62	Univ. of Cambridge	Medium level	Oblique	Part	E.N.B&W5"x5" prints
c.1960's		1:10,000	Plan	S.W.	F.E.B&W
1967	Meridian Air maps Ltd.	1:10,000	Plan	Full	E.N.B&W
1968/9		Low level	Oblique	Camping area	F.E.B&W5"x5" prints

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1971		1:10,000	Plan	Full	H.C.C.B&W
1972/3 F. C.		Low level	Oblique	Rec. areas	N.F.M.B&W6"x8" prints
1972/3 F. C.		Low level	Oblique	Rec. areas	F.E.B&W6"x8" prints (1 box-see N.F.M.)
1978	MAFF	1:3,950	Plan	Roundhill/ Dilton area	F.E.B&W
1982		1:10,000	Plan	Full	F.E.B&W
1984	Meridian Airmaps Ltd.	1:10,000	Plan	Full	F.E.B&W
1984	GCA	1:10,000	Plan	N.W. part	B&W
1984		1:10,000	Plan	Full	H.C.C.B&W
1987	MAFF	1:10,000	Plan	Holmesley Bog - Hur sthill l Inc.	F.E.B&W1 flight line.
1991	Geonex	1:10,000	Plan	Full	F.E.Colour
1991	Geonex	1:10,000	Plan	Full	E.N.Colour
1991	Geonex	1:10,000	Plan	Full	H.C.C.Colour
1995	BKS Survey	1:10,000	Plan	Full	F.E.Colour18"x18" prints
1996	BKG	1:20,000	Plan	Full	H.C.C.Colour

### 1.3.6 Geology

The New Forest lies in the north-central part of a broad and shallow chalk syncline, known as the Hampshire Basin, upon which sands and clays were deposited during the Tertiary period (65-1 million years ago), and subsequently overlain by a superficial covering of gravels and Brickearth deposited during the Pleistocene period (1 million years ago). More recent superficial material continues to be deposited in the form of river alluvium and peat. This sequence is summarised in the following table:

Period	Epoch	Years before present	Deposits
Quaternary	Recent	25,000	Alluvium Peat
	Pleistocene	1 million	Gravel Brickearth (50% fine sand)

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			30% silt 20% clay)
Tertiary	Pliocene	12 million	No record
	Miocene	25 million	No record
	Oligocene	40 million	Osborne Beds Headon Beds (Upper & Middle)
	Eocene	60 million	Headon Beds (Lower) Barton Sands Barton Clay Bracklesham Beds Bagshot Beds Reading Beds & London Clays
	Palaeocene	70 million	
Cretaceous		135 million	Chalk

## **Tertiary Sedimentation**

The sedimentation events occurred in a variety of Tertiary environments including shallow seas, estuaries, brackish lagoons, and freshwater marshes and river deltas. These varied conditions resulted in the deposition during the Eocene epoch of a variety of sediment types including clays, clay marls and sands. Erosion of the recent overlying Quaternary deposits (see below) has exposed these underlying rocks in wide valleys and hollows. Many of these deposits are rich in fossils including molluscs, fish, reptiles, birds and early mammals. (For example, Studley Wood contains a site of national importance for its geological interest, featuring the only complete exposure of the Huntigbridge Formation of the Bracklesham Group, remarkable for its molluscan faunas including corals, scaphoda, bivalves and gastropods).

The New Forest strata dip gently southwards at about 1-2 degrees which is slightly greater than the descent in altitude in the Forest along the north - south gradient. This results in exposure of the Lower and oldest Tertiary beds in the north, and the younger in the south. The Tertiary sequence can hence be broadly followed along a north - south gradient with the earliest Reading Beds and London Clays outcropping at the margin of the Chalk in the northern extremity of the Forest. (See Drift Map, Map 1.3.6.1). Southwards it is possible to observe successional exposures of Bagshot Sands, Bracklesham Beds, Barton Sands and Barton Clays until further south the Oligocene Headon Beds overlie the Eocene strata as a variety of clays and clay marl.

## **Quaternary sedimentation**

The Tertiary sands and clays are partially masked by sheets of flint, gravel and Brickearth laid down under tundra conditions at the transitions between interglacial and glacial episodes during the Ice Age in the Pleistocene epoch of the Quaternary Period. Though much eroded, particularly in the north, extensive remnants of the gravel deposited by ancient river systems, and Brickearth (wind deposited loess), survive as flat terraces. The gravels, derived as angular flints from the underlying chalk, can reach a maximum depth of 6.5m but are generally between 1-3m deep, whilst the Brickearth deposits may be up to 3m deep overlying gravel or infilling ancient channels (Tubbs 1986).

The older river gravels have been much disturbed by freezing and thawing (cryoturbation), solifluction (slow downslope movement following thaws) and soil forming processes eg illuviation of clay (movement of clay down through the soil and accumulation at depth) through several warm and cold periods of the Ice Ages.

### **1.3.7 Soils**

Ecologically it is the ability of the underlying rocks to transmit water and to form the basis of soils of various kinds that is important, and this depends upon the morphology and chemistry of the principle deposits. The Eocene 'Bagshot Beds', (currently regarded as several separate sandy beds of the London clay) are coarse and porous materials which leach nutrients more readily than do fine clayey sediments. Soils derived from such material are acidic and nutrient poor. The finer clay-rich marine deposits such as the glauconitic Bracklesham clays and the later Barton clays are relatively base-rich and yield better soils, (though the associated bands of sand produce impoverished soils). In the south the Oligocene Headon Beds yield base-rich clays and clay marl where not obscured by the extensive areas of Pleistocene gravel and Brickearth. Hence, the relative fertility of soils follows the same north - south gradient as the underlying strata with Forest soils generally becoming progressively less impoverished from north to south. This explains why there is a greater diversity in the flora in the south of the Forest on the more nutrient rich, less base-poor soils than on the more acid, nutrient poor sands and gravels of the north.

The soils of the New Forest are highly complex and this short summary can only be regarded as superficial. The Soil Survey of England and Wales has produced a classification of soils as *Soil Series*; distinctive individual soil types developed on specific parent materials and soil associations which are distinctive assemblages of soil series in identifiable landscape types (Jarvis et al, 1984). In the New Forest Jarvis et al (1984) have identified 9 soil associations which are summarised in Table 1.3.7.1. The main soil types found in the New Forest, their characteristics and principle vegetation / NVC community types which these support is given in Table 1.3.7.2

### **1.3.8 Geomorphology and drainage patterns**

The geomorphological history of the New Forest is described in Tubbs (1986), who also summarises Tuckfield's work on present day denudation and the contribution that artificial drainage has made to it. The New Forest is a landscape of eroded gravel terraces capped with flint gravel, Brickearth and other superficial deposits, separated by wide valleys and hollows. The terraces are highest and most fragmented by erosion in the north and west and most complete in the south.

The drainage pattern is determined largely by the three main drainage basins into which surface water flows. To the west, the broad valley of the Avon River is fed by six streams flowing westwards from the New Forest including Blackgutter/Ditchend Brook, Latchmore Brook, Dockens Water and Linford Brook. To the east, two further streams, Bartley Water and Cadnam River flow eastwards to the River Test and the upper reaches of the Southampton Water. To the south, a further three rivers flow into the Solent, The Lymington River, Beaulieu River and Avon Water.



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The clay strata store relatively little water and lead to very rapid run off after rainfall and only small groundwater flows to the rivers in the summer months. Consequently the New Forest streams are characterised by very high winter flood flows and very low summer flows. Monitoring information on groundwater flows is very limited; the Environment Agency have recently installed 3 boreholes into the unconfined Barton sands and more are planned.

**Geological Conservation Review sites**

The New Forest is of considerable importance in the national context for its seven GCR sites, which demonstrate aspects of the terrace gravels of the former Solent River and their associated Palaeolithic archaeology, as well as illustrating the evolution of more recent fluvial systems. The sites and their principle interest features is given in Table 1.3.8.1

**Table 1.3.7.1: Soil Associations within the New Forest (after Jarvis *et al* (1984))**

<b>Soil associations</b>	<b>Characteristics</b>	<b>Landscape</b>
Wickham 3	Developed in thin drift of Tertiary loams & clays. Seasonally waterlogged Stagnogleys dominate with Stagnogleyic Argillic Brown Earths in better drained areas and Typical Argillic Gley Soils where affected by ground water. Locally on driest areas & Raw Oligo-amorphous Peat Soils & associated humic soils in mires.	Dominates Pasture woodland – heathland complexes in the east and centre and heathland valleys in higher terraces.
Bolderwood	Developed on gravel terraces. Podzolic soils with seasonal water logging at depth, Stagnogley-podzols dominate with better drained Podzols (Paleo-argillic Podzols & Humo-ferric Podzols) on terrace edges small areas of Stagnogleys Typical Argillic Brown Earths & Raw Oligo-amorphous Peat Soils.	Dominates heathland on gravel terraces in north, west and south.
Holidays Hill	Developed in Tertiary sands and clays. Podzols with seasonally water logged sub-soils Stagnogley-podzols dominate with Humo-ferric Podzols on drier ground, Stagnogleys on seasonally wet clays and locally extensive Typical Humic-sandy Gley Soils on low-lying ground affected by ground water. Small areas of Raw Oligo-amorphous Peat Soils occur in mires and Typical Argillic Gley Soils in river valleys.	Dominates heathland on Tertiary sands. Mainly northern Commons and Matley area
Shirrell Heath 1	Developed in Barton Beds and terraced edges. Freely draining Humo-ferric Podzols dominate with wetter Stagnogley-podzols, Gley Podzols, Typical Humic-sandy Gley and Typical Argillic Gley Soils.	Localised dissected terrace edges in south west of Forest
Southampton	Dry Podzols with ancient red subsoils, Paleo-argillic Podzols, dominant. Humo-ferric Podzols and Stagnogley-podzols on terrace slopes	Small well drained terrace fragments on west of Forest.
Bursledon	Loamy soils developed on inter-bedded sands & clays of the	Pasture woodland and associated

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	Bracklesham and Barton Beds. Stagnogleyic Argillic Brown Earths with seasonally waterlogged sub-soils dominate with more poorly drained Stagnogleys and Typical Argillic Gley Soils. Pockets of Holidays Hill Association soils on heaths	Incllosures in Mark Ash areas
Hurst	River terrace gravel affected by high ground water. Typical Argillic Gley Soils dominate with Stagnogleys where alluvium thins over underlying clay.	Low lying alluvial terraces in pasture woodland - heathland areas NE of Brockenhurst
Isleham 1	Developed in permeable sands in valley bottoms with very high water tables. Typical Humic-sandy Gley Soils and Raw Oligo-amorphous Peat dominate with Typical Gley-podzols on the edges.	Wet sandy basins in the Cranes Moor are

**Table 1.3.7.2: The main soil types found in the New Forest, and the principle vegetation which they support**

<b>Soil type</b>	<b>Characteristics</b>	<b>Principle vegetation</b>	<b>Principle NVC type</b>
Stagnogleys	Seasonally waterlogged soils with a clay subsoil. Water logging caused by surface water	Pasture woodlands & heathlands slopes and glades, wet heaths and wet lawns	W8, W14, W15, W11/10, W16, M24c, M25
Stagnogleyic Argillic Brown Earths	Similar to Stagnogleys but better drained & water logging deeper in subsoil	Drier acid pasture woodlands, Bracken and acid grassland	W14, W15, U20, U3
Argillic Brown Sand	Well drained sandy soils without water logging but clay accumulation at depth.	Acid grasslands and Bracken	U20, U3, U1
Typical Argillic Gley Soils	Permeable soils affected by seasonally high ground water.	Wet Heaths and wet lawns and riverine woodland on alluvium	M16, M24, M25, M23, W8.
Raw Oligo-amorphous Peat	Strongly acid peat accumulation	Mire dominated by Valley Bog vegetation, & Bog Woodland	M21, M6, M29, W4
Raw Eu-amorphous Peat	Less acid peat accumulation	Mainly Carr but also some open mires & peaty riverine woodland	W5, W7, M29, M9, M10
Stagnogley-podzols & Typical Gley Podzols	Podzols with seasonal waterlogging in the subsoil.	Humid heath	H2c & H3a
Humo-ferric Podzols & Paleo-argillic Podzols	Drier Podzols.	Dry Heath	H2a & H3c
Typical Humic-sandy Gley	Sandy soils affected ground	Wet Heath	M16

Soils	water with thin peat accumulation.		
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Table 1.3.8.1: Geological Conservation Review sites within the New Forest

GCR block	Site name grid ref	Interest feature
Palaeogene	Studley Wood SU 227 158	A Tertiary locality exposing the only complete exposure of the silty Huntingbridge Formation of the Bracklesham Group, remarkable for its molluscan fauna and the number of species limited to the formation. Numerous corals, scaphoda, bivalves and gastropods make it an outstanding Eocene locality of great interest in studies of Tertiary stratigraphy and palaeontology.
Palaeogene	Shepherd's Gutter SU 263 153	Renowned since the mid-19th century for its rich Tertiary marine faunas. It shows a section through the Selsey Formation of the Bracklesham Group, of mid Eocene age, and includes several mollusc rich horizons and one kind of <i>Nummulites</i> correlatable with the Isle of Wight and Bracklesham sections. A key locality in correlations between the classic Eocene localities of the Hampshire Basin, and for its prolific molluscan fauna.
Palaeogene	Park Hill Inclosure SU 316 059	The only exposure in England outside the Isle of Wight to show upper middle Haedon Beds. The occurrence of fauna of <i>Cerithidea ventricosa</i> and other mollusca in the Headon clays here allows correlation with the type sections of the Isle of Wight. The fauna of well preserved shells and fish remains makes this one of the richest Tertiary faunal localities on the mainland. An important site for its palaeontology and for correlations within the Tertiary Hampshire Basin.

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Pleistocene / Quaternary	Mark Ash Wood (Church Moor) SU 247 069	A valley mire complex of considerable importance for palynological and palaeoecological studies. Peat growth at the site dates from the early part of the Devensian late-glacial to the sub-Atlantic period. Church Moor contains the oldest post-glacial peats in the New Forest area and is exceptional for high accumulation rates during late-glacial times. Macrofossil and pollen analyses have yielded some of the earliest British post-glacial records of bryophytes. It is also important in tracing the early post-glacial immigration and expansion of plant species, and has been used as a reference site for correlation in southern England.
Pleistocene / Quaternary	Cranes Moor SU 194 028	A large mire complex, set in a shallow basin containing significant peat accumulations dating back to Devensian late-glacial times. It is a key reference site for palynological studies in southern England. It is also unusual for the apparently rapid accumulation of peat in the Boreal period, and is therefore particularly important in the study of the early immigration and expansion of flora in post-glacial times. Several studies of vegetational history have been carried out in the post-war period at a number of sub-sites within the basin including, most recently, an integrated investigation of macrofossils, pollen and other microfossils, together with radiocarbon correlation of cores.
Pleistocene / Quaternary	Wood Green Gravel Pit SU 172 170	The pit exposes gravel, deposited by the River Avon, rich in palaeolithic artifacts. Palaeolithic assemblages provide major evidence for the subdivision of the terrace sequence in the Solent basin, where they are particularly important owing to a dearth of palaeontological sites.
Fluvial	Highland Water SU 272 073 SU 239 123	This unique area demonstrates a combination of low management and low human impact on fluvial processes. It is particularly important on two accounts. First, it provides a valuable opportunity to study the role and influence of vegetation in hydrological and fluvial

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m or ph ol og y of E ng la n d		processes. Second, it is of exceptional value for the study of debris dams which have a significant effect on channel processes, travel time of flood hydrographs channel roughness and channel processes. The hydrological and fluvial characteristics of the Highland water are typical of those that formerly occurred in much of southern England.
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### **1.3.9 Vegetation community descriptions and the use of the national vegetation classification (NVC)**

As far as possible the New Forest vegetation communities are described in terms of the National Vegetation Classification (Rodwell 1996). Whilst this may appear to be a rather technical and somewhat daunting approach, it is necessary in order to classify the Forest plant communities to a recognised standard which can form the basis of evaluation at national and European level, enables ecologists and land managers to communicate, compare and contrast similar vegetation communities across the country and discern the impacts of different management operations upon them, and to form a baseline for monitoring.

It should be recognised however that the 'fit' of some of the plant communities found in the New Forest (eg the pasture woodland communities) with the NVC is not always a close one. This is an issue related to initial limited sampling from the New Forest which has resulted in the NVC failing to pick up the full range of variation amongst UK vegetation communities. It is however more of a perceived problem than a real one if one considers the NVC as a continuum of vegetational variation with nodes (NVC classes) identified as discrete phytosociological associations. Considered in this dynamic fashion the NVC is immensely useful in enabling reliable predictions to be made about the direction in which plant communities are moving or will move if subject to different treatments. For example, decreased grazing pressure of the mire community M29 will change it over time to a *Molinia* dominated M25 community. The lack of a comfortable 'fit' of certain New Forest plant communities is simply a consequence of a lack of identified nodes (or NVC communities or more correctly sub-communities) which can be added under later revisions to the NVC following more systematic sampling of the Forest vegetation.

In compiling the NVC descriptions the expertise and quadrat data collected by Neil Sanderson has been extensively called upon. Most of what follows is based upon his work, compiled under contract to English Nature.

#### **1.3.10 New Forest pasture woodland: description**

##### **Definition**

Pasture Woodland includes all of those woodland stands which depend upon grazing by livestock to maintain the special interest features. (Whilst this definition embraces Open Forest stands of Riverine and Bog Woodland these are dealt with separately under their respective headings). The special interest features may be summarised as:

Great structural diversity with a complete range of tree age classes from saplings to mature, senile and dead standing and fallen trees. A wide range of density of trees from closed high canopy forest to open stands with heathy or grassy lawns and glades to a more parkland-like structure.

- an exceptionally rich lichen flora;
- an exceptionally rich invertebrate fauna;
- an exceptionally rich breeding bird fauna;
- an exceptionally rich bryophyte flora.
- an exceptionally rich fungal flora.

Sanderson (1998) recognises four distinctive vegetation communities (based on ground flora) comprising the New Forest pasture woodlands. This classification was validated by Sanderson in 1999 in a 50 quadrat sample across the Forest commissioned by English Nature (Sanderson 1999). The four community types are:

Type A: (*Vaccinium myrtillus* – *Dicranum majus* type) pasture woodland with ground flora (vascular plants and mosses) characteristic of very acid soils

Type B: (*Agrostis capillaris* – *Thuidium* Type, typical variant) pasture woodland with ground flora (vascular plants and mosses) characteristic of less acid soils but spring vernal species absent.

Type C: (*Agrostis capillaris* – *Thuidium* Type, *Oxalis* – *Anemone* – *Hyacinthoides* variant) pasture woodland with ground flora (vascular plants and mosses) characteristic of less acid soils but spring vernal species present. Moss mats are well developed but lack species typical of very acid soils.

Type D: (*Agrostis stolonifera* – *Viola* – *Ranunculus ficaria* type) pasture woodland with herbs typical of base rich soils present with poorer moss mats. Divided into 1.1: *Riparian Woodland* and 1.2 *Woodland above the flood plain*.

These are referable to the NVC and for the purposes of comparative evaluation are described in NVC terms below. However there are recognised difficulties in comfortably accommodating the various New Forest pasture woodland stands within the NVC, particularly the beech stands, largely as a result of the relative paucity of quadrat sampling taken from the Forest in the original compilation of the NVC, and the impact of centuries of grazing management, (or rather the collapse of grazing management in most other pasture woodland beech stands elsewhere). The grazing has resulted in a greater cover and diversity of bryophytes and a reduction in the prominence of ground flora sensitive to high grazing pressure, which gives the beech communities W15 (Type A) and W14 (Type B & C) an affinity to the western oakwood stands of W17 and W11. This is less problematic for the oak dominated stands.

Other terms used to describe the Crown lands pasture woodlands are in common use today are:

**‘Ancient & Ornamental Woodland’:** a term uniquely applied to pasture woodland communities within the Crown lands of the New Forest. It embraces both ancient woodland that has remained under woodland cover for at least the last 400 years, and the non-ancient secondary woodland that has developed in more recent times. The latter category includes the birch woods, holly groves and mixed emergent woodland mainly of oak and beech which have expanded onto open heathland communities in response to reduced deer-browsing impact as a result of the introduction of the Deer Removal Act of 1851. The term also applies to the riparian woodlands of the Open Forest.

**‘Pre-Inclosure Woodland’:** A term applied to those surviving elements of former pasture woodland which now lie within Statutory Inclosures on the Crown lands and as such are no longer subject to Open Forest grazing management.

**Habitats Directive Equivalents:** The following Annex 1 habitats are present in the New Forest pasture woodlands:

- *Asperulo-fagetum* Beech forests.
- Atlantic acidophilous beech forests with *Ilex* and sometimes *Taxus* in the shrub layer.
- Old acidophilous oak woods with *Quercus robur* on sandy plains.

NB: In comparing New Forest pasture woodland stands to Annex 1 habitat types the definition of beech woodland as opposed to oak woodland is critical. Sanderson (2000 pers comm) has suggested using an ecological definition rather than simple beech or oak dominance. The beech wood ecosystem is a dynamic one in which dominance can oscillate between different species. Beech is an efficient coloniser and has occupied virtually all the very acid soil within the old growth woodlands. Total beech dominance is more likely to be the result of planting, since more natural beech dominated stands tend to be mixed to at least some degree. In the New Forest beech woods are best defined as those woods with beech in them as a long term component in the canopy. Given the data set available in Flower & Tubbs (1982) it is reasonable to include all stands with canopy beech at more than 10% mapped by Flower & Tubbs (1982) as ecologically a beech wood. Mapped canopy classes of Beech in Flower & Tubbs (1982) are 0 – 10%, 10 – 50 %, 50 – 90% & 90 – 100%. Describing woods of 30 – 40% beech as oak woods is not practical. In the New Forest pure beech or pure oak stands are rare; most exists as a mixture. Only old growth pasture woodland is strictly referable to Annex 1 habitats.

The pasture woodland stand types and their relationship with the Habitats Directive Annex 1 habitats is presented on Tables 1.3.10.1 and 1.3.10.2. The distribution of pasture woodland in the New Forest is shown on map 1.3.10.1.

### Pasture woodland community descriptions

**Type A** (*Vaccinium – Dicranum majus* type): Pasture woodland with ground flora (vascular plants and mosses) characteristic of very acid soils, usually with *Vaccinium myrtillus* and mixed bryophyte mats, typically with the moss *Dicranum majus*. Grasses are absent or restricted largely to *Deschampsia flexuosa*. Whilst tightly grazed communities have affinities with NVC community W17 (*Quercus petraea -Betula pubescens -Dicranum majus* woodland), they are, along with less tightly grazed stands, referable to W15 and W16. In practice in the New Forest these latter two communities often exist in a complex and indefinable mosaic. An average of 19 species were recorded per quadrat, the same as the closest NVC beech stand W15c, the *Vaccinium myrtillus* sub-community.

**W15: Beech - Wavy hair-grass woodland (*Fagus sylvatica - Deschampsia flexuosa* woodland).** Further definition to sub-community level is not possible.

The New Forest communities are characterised by a mosaic of *Fagus sylvatica* and *Quercus* spp (featuring many old pollards) with occasional *Betula pubescens* over a shrub layer often dominated by *Ilex aquifolium* with occasional *Ruscus aculeatus* and *Lonicera periclymenum*. Soils are mostly strongly acid stagnogleys and stagnogleyic argillic brown earths whose extreme edaphic conditions excludes *Corylus avellana* and *Crataegus monogyna*. Large areas of ground flora are composed of moss mats featuring *Dicranum scoparium*, *Leucobryum glaucum* agg, *Dicranella heteromalla*, *Mnium hornum*, with *Polytrichum formosum*, *Plagiothecium undulatum*, *Hypnum jutlandicum*, *Isothecium myosuroides* and others. Grasses are restricted to *Deschampsia flexuosa* with occasional *Holcus mollis* and *Molinia caerulea* all heavily influenced by grazing. Associated herbs are sparse but include *Melampyrum pratense*, *Oxalis acetosella* and depending upon grazing pressure, *Vaccinium myrtillus*.

**Habitats Directive equivalent:** Old growth woodland accommodated within the Annex 1 habitat: *Atlantic acidophilous beech forests with Ilex and sometimes Taxus in the shrub layer.*

**Distribution and Extent of W15:** The Atlantic acidophilous beech is taken as including both the strongly acid W15 stands which form the bulk of the community, but also the less acidic but herb-poor W14 beech stands. No individual NVC areas are available but there is approximately 2,580 ha of W15 / W14 of which some 2,000 ha is old growth attributable to the Annex 1 habitat.

**W16: Oak species -Birch species -Wavy Hair-grass woodland (*Quercus* spp. -*Betula* spp.-*Deschampsia flexuosa* woodland)**

This exists mainly as recent stands (19<sup>th</sup> century) of oak, birch and pine, on former heathland often with young beech present indicating a long-term succession to beech woods. The flora is very poor, usually bracken dominated and lacking the distinctive moss mats of the beech – oak stands. The latter appear to be a feature of ancient woodland, which on strongly acid soils is invariably beech wood. However it is also found within the mainly beech dominated W15 stands as patches of oak dominance supporting a ground flora with a richer moss flora as described under W15.

Both W15 and W16 communities may be invaded by *Rhododendron ponticum* or support stands of planted or naturally regenerated *Pinus sylvestris*. For both of these species cover above 1% would require management intervention to restore favourable condition.

**Habitats Directive equivalent:** Old growth woodland is accommodated within the Annex 1 habitat: *Old acidophilous oak woods with *Quercus robur* on sandy plains.*

**Distribution and Extent of W16:** The acid / mesotrophic herb-poor oak woodland is a combination of W16 and W10a/W11. Of approximately 4,430 ha of pasture woodland a maximum of 120 ha is old growth referable to the Annex 1 habitat, existing largely in an intimate mosaic with W15. A further 750 ha is largely secondary emergent blocks on former heathland. No individual NVC areas are available.



**Table 1.3.10.1: Pasture Woodland Stand types and their relationship with the Habitats Directive Annex 1 habitats.**

NVC	Oak/Beech	Sanderson Type	Close Affinity with	Habitats Directive
W15	Acid lowland Beech	A	W17 north west oak	Atlantic acidophilous beech
W16	Acid lowland Oak	A	W17 north west oak	Old acidophilous oak
W14	Acid - Mesotrophic lowland Beech herb-poor	B	W11 north west oak	Atlantic acidophilous beech
W10a/11	Mesotrophic lowland Oak herb-poor	B	W11 north west oak	Old acidophilous oak
W10b/11	Mesotrophic lowland Oak herb-rich	C	W11 north west oak	No equivalent
W14	Mesotrophic lowland Beech herb-rich	C	W11 north west oak	Asperulo-Fagetum beech Woods
W8b	Base-rich Ash (but may be beech dominated)	D1.2	W14 mesotrophic lowland beech herb-rich	Asperulo-Fagetum beech Woods

**Table 1.3.10.2: Estimated areas of NVC communities, old growth pasture woodland and Habitats Directive types.**

Of a total of approximately 4,430 hectares of pasture woodland, 2,520 ha is old-growth conforming to the Habitats Directive categories. The remainder is either recent secondary on heathland or mesotrophic lowland herb-rich oak woodland (580 ha) which has no Habitats Directive equivalent. There is approximately 3,100 ha of old growth pasture woodland, excluding riverine and bog woodland.

<b>NVC</b>	<b>Area (Ha)</b>	<b>Old Growth Woodland (Ha)</b>	<b>Habitats Directive</b>
W15 / W14	2,580	2,000	Atlantic acidophilous beech (2,000 ha)
W16 W10a /11	870	120	Old acidophilous oak (120 ha)
W10b/11	580	580	No equivalent ---
W14 / W8b	400	400	Asperulo-Fagetum beech woods (400 ha)
	Total: 4,430	Total: 3,100	Total : 2,520



**Type B** (*Agrostis capillaris* – *Thuidium* Type, Typical variant): Pasture woodland with ground flora (vascular plants and mosses) characteristic of less acid soils but spring vernal species absent. Still supporting mixed moss mats but *Dicranum majus* is absent or rare, whilst *Thuidium tamariscinum* becomes prominent. *Vaccinium myrtillus* is absent and *Deschampsia flexuosa* is replaced by *Agrostis capillaris*. Tightly grazed communities are indistinguishable from the NVC community W11 (*Quercus petraea* - *Betula pubescens* - *Oxalis acetosella* woodland), but those with beech in the canopy are referred to W14. As for the W15 and W16 communities described above, in practice in the New Forest W11 and W14 communities often exist in a complex and indefinable mosaic. In ungrazed oak dominated stands the W11 communities rapidly convert to W10a. An average of 22 species per quadrat was recorded from the type B community. This is far more than W14, which has 12 species per quadrat but closer to W10a which has 18. The closest W11 sub-community, W11a has more at 27 per quadrat. Similar but now ungrazed ex-pasture woodland in The Mens, Sussex averaged 14 species (Sanderson 1997), much closer to W14 indicating that the cessation of grazing results in considerable species impoverishment at a quadrat level.

**W14: Beech - Bramble Woodland (*Fagus sylvatica* - *Rubus fruticosus* Woodland)**

Typically *Fagus sylvatica* is prominent with older stands containing magnificent old pollards, *Quercus* spp are frequent and may gain equal dominance depending upon past management, regeneration events and local edaphic variations in soil moisture. Occasional *Taxus* and *Sorbus aucuparia* are present. Gaps in the canopy are colonised initially by *Betula pubescens*, with saplings of *Quercus* and *Fagus* protected from grazing by *Ilex* scrub, bracken and / or fallen wood. *Ilex aquifolium* is dominant in the shrub layer often casting dense shade where periods of dense regeneration and growth occurred during periods of relaxed grazing particularly after the practice of holly pollarding ceased following the Deer Removal Act 1851. Indeed emergent stands of 'Holly Hats' with or without associated trees are a feature of the Forest landscape.

Soils are base-poor brown earths with some impeded drainage and typical stagnogleys and are able to support a scatter of *Crataegus monogyna*, whilst *Pteridium aquilinum* is not as abundant as in W15 stands. The field layer characteristically supports a fairly impoverished flora (due to poor soils and variable light conditions), with *Potentilla erecta*, *Agrostis capillaris* being prominent with occasional *Galium saxatile*, *Viola riviniana*, *Oxalis acetosella* and *Melampyrum arvense*. Spring vernal species such as *Hyacinthoides* and *Anemone nemorosa* are absent. Moss mats are still prevalent with *Thuidium tamariscinum*, *Polytrichum formosum*, *Dicranella heteromalla* and *Mnium hornum* all frequent but *Dicranum majus* rare or absent.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat: *Atlantic acidophilous beech forests with Ilex and sometimes Taxus in the shrub layer.*

**Distribution and Extent of W14 (acid species-poor):** See W15 above.

**W11 Oak-Birch-Oxalis woodland (*Quercus petraea*-*Betula pubescens*-*Oxalis* woodland) and/or W10a Pedunculate Oak-Bracken-Bramble woodland (*Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland - Typical sub-community)**

In the Forest this community type is species poor and rather similar to that described above, but characterised by *Quercus* spp dominance over *Fagus sylvatica*, though local tree cover dominance is dependent upon previous management and regeneration events. *Betula pendula* occurs frequently in canopy gaps and *Ilex aquifolium* may be dominant in the understory with *Crataegus* and *Corylus* present but the latter is much reduced by past coppicing in the presence of grazing. The ground layer is largely indistinguishable from that described above for W14 although bracken can be more abundant.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat: *Old acidophilous oak woods with Quercus robur on sandy plains*

**Distribution and Extent of W11/W10a:** See W16 above.

**Type C (*Agrostis capillaris* - *Thuidium* Type, *Oxalis* - *Anemone* - *Hyacinthoides* variant):** Pasture woodland with ground flora (vascular plants and mosses) characteristic of less acid soils but spring vernal species present. Moss mats are well developed but lack species typical of very acid soils. The beech stands are referred to W14 but are not typical as they are still grazed. Where the oak dominated stands are tightly grazed they are identical with NVC community W11 (*Quercus petraea* - *Betula pubescens* - *Oxalis acetosella* woodland), but reduced grazing results in stands referable to W10b. Once again, in practice in the New Forest W11 and W14 communities often exist in a complex and indefinable mosaic. An average of 25 species per quadrat was recorded from the type C samples. This is far more than the nearest lowland NVC communities; W10b that has an average of only 13 species per quadrat and W14 with 12 per quadrat. The nearest upland community, W11a has an average of 27 species per quadrat.

**W14: Beech - Bramble Woodland (*Fagus sylvatica* - *Rubus fruticosus* Woodland), W11 Oak-Birch-Oxalis woodland (*Quercus petraea*-*Betula pubescens*-*Oxalis* woodland) W10b and Pedunculate Oak-Bracken-Bramble woodland -Wood *Anemone* sub-community, (*Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland - *Anemone nemorosa* sub-community)**

These communities are very similar to those described above but distinguished by the presence of *Hyacinthoides non-scripta* and *Anemone nemorosa* and *Crataegus monogyna* being much more frequent.

**Habitats Directive equivalent:**

W14 (mesotrophic herb-rich): Accommodated within the Annex 1 habitat: *Asperulo-Fagetum beech Woods*.

W11/10b: No habitats Directive equivalent.

**Distribution and Extent of W14/ W10b :**

**W14** (mesotrophic herb-rich) / **W8b**: : around 400 ha in total.

**W11/10b**: Around 580 ha in total

**Type D (*Agrostis stolonifera* - *Viola* - *Ranunculus ficaria* type):** Pasture woodland with herbs typical of base rich soils present with poorer moss mats. Divided into 1.1: *Riparian Woodland* (described under 1.3.2 below) and 1.2 *Woodland above the flood plain*. Characterised by the presence of herbs such as *Ranunculus ficaria*, *Sanicula europaea*, *Primula vulgaris*, *Circaea lutetiana* and *Arum maculatum* on base-rich flushed soils. Attributable to NVC community W8b or herb rich forms of W14 where *Fagus sylvatica* is the dominant canopy species, but modified by grazing. These herb rich forms of W14 can also be found on former pasture woodlands in The Weald at Ebernoe Common and The Mens (Sanderson, 1997) and appear characteristic of pasture woodlands on base rich clay soils. Off pasture woodland, beech was excluded from coppices on similar soils. Type D had an average of 30 species per quadrat on stands off the flood plains somewhat higher than the average for NVC community W8b that had 26 species per quadrat recorded. The ungrazed former pasture woodland stands in The Mens, Sussex had an average of 21 species per quadrat (Sanderson, 1997), indicating that the cessation of grazing results in considerable species impoverishment at a quadrat level.

**W8b: Ash-Field Maple- Dogs Mercury Woodland - Wood Anemone sub-community (*Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland - *Anemone nemorosa* sub-community)**

In the New Forest this community lies on damp stagnogleyic, base-rich soils above the floodplain, and is strikingly rich in vascular plants in comparison with its more acid counterparts described above. Canopy composition is varied and may be locally dominated by *Fraxinus excelsior*, *Quercus robur*, *Quercus petraea* or *Fagus sylvatica*, over a shrub layer in which *Corylus avellana* features more strongly with common associates including *Crataegus monogyna*, *Prunus spinosa*, and even *Sorbus torminalis* on occasions. *Ilex aquifolium*, characteristic of less base-rich areas may also be present in Forest stands.

The ground flora is dominated seasonally by spring vernal *Hyacinthoides non-scripta* and *Anemone nemorosa*, amongst a rich flora the structure and composition of which is strongly influenced by grazing pressure and canopy density. Typical associates include *Primula vulgaris*, *Oxalis acetosella*, *Viola riviniana*, *Agrostis capillaris*, *A. stolonifera*, *Melica uniflora*, *Conopodium majus*, *Ranunculus ficaria*, *Euphorbia amygdaloides*, *Deschampsia cespitosa* and *Lysimachia nummularia*. Bryophytes are few in species compared to the more acidic communities, represented largely by *Polytrichum formosum*, *Eurhyncium striatum*, *Thuidium tamariscinum* and *Isoetes myosuroides*.

**Habitats Directive equivalent:** Stands with Beech can be accommodated within the Annex 1 habitat: *Asperulo-Fagetum beech Woods*. Oak stands have no equivalent

**Distribution and Extent of W8b:** Of approximately 4,430 ha of pasture woodland around 400 ha is herb rich W14/ W8b beech wood.



### 1.3.11 New Forest riverine woodland: description

#### Definition

New Forest Riverine Woodland comprises those woodland stands with occasional to abundant *Alnus glutinosa* and frequent *Fraxinus excelsior* on wet mineral or peaty soils along water courses. It incorporates the Habitats Directive Annex 1 habitat: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*.

In terms of the NVC Riverine Woodland is referable to either W8 or W7 and grades gradually between the two communities.

#### Riverine Woodland Community Description

Woodland stands on flood plains which, where not damaged by over deepening of drainage channels, flood seasonally as water levels rise along meandering natural flood channels containing debris dams. Species intolerant of such conditions are rare (eg beech) or confined to slightly raised areas, and rich alluvial soils with higher base status produce a very rich woodland flora, though modified by grazing animals. *Carex paniculata* is absent (characteristic of Alder carr on peat W5b) and *Molinia caerulea* is very uncommon (characteristic of Salix carr W4b). Riverine woodland communities are referable to NVC communities W8, of which two sub-communities W8b or W8f are present, and W7, of which two sub-communities W7a and W7b, are present. The Sanderson type D stands from flood plains represent the stands closest to W8b, these have some W7 ground flora species but low Alder cover. The true W7 stands, with a high Alder cover were not sampled, as these do not differ much from those described in the NVC.

#### W8: Ash-Maple-Dogs Mercury Woodland (*Fraxinus excelsior*-*Acer campestre*-*Mercurialis* Woodland)

On mineral soils *Alnus glutinosa* is absent to occasional and is confined to channel banks. Dominant species are usually *Quercus robur* and *Fraxinus excelsior* with occasional *Acer campestre*. The tree canopy can include ancient trees and most stands are old growth, except those by the Avon Water. There is also a very rich shrub layer including *Corylus avellana*, *Crataegus monogyna*, *Cornus sanguinea*, *Euonymus europaeus*, *Ligustrum vulgare* and *Prunus spinosa*, with frequent *Ilex aquifolium*, *Rubus fruticosus* and *Rosa* spp. The ground flora is generally very rich. Typical species include *Viola riviniana*, *Veronica montana*, *Lysimachia vulgaris*, *Ranunculus ficaria*, *Euphorbia amygdaloides*, *Cardamine pratensis*, and the fern *Athyrium filix-femina*. In the Avon Water *Allium ursinum* is dominant. The woodland on drier soil is closest to W8 with the *Allium ursinum* sub-community in the Avon Water and the *Anemone* sub-community in other areas. The latter was sampled as Sanderson Type D (*Agrostis stolonifera* – *Viola* – *Ranunculus ficaria* type) woodland. This was found to have an average of 40 species per quadrat and ranged from 32 to 48. This is far

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richer than W8b which had an average of 26 and ranged from 12 to 35. In fact no sub-community of W8 averages above 29 species per quadrat. Only the upland, and very different, W9 is as rich and, at a quadrat level, the flood plain W8 stands of the New Forest appear to be among the richest lowland woods in Britain.

Most stands are flooded, to as much as 1 m deep, for up to two week a year in winter or spring.

The community is prone to invasion by *Acer pseudoplatanus* which should be controlled to cover values of below 1% or eradicated.

**W7: Alder-Ash-Yellow Pimpernel woodland (*Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland)**

*Alnus glutinosa* abruptly increases its cover in areas wherever there is some peat accumulation as in old channels and where springs arise in the floodplain. Characterised by stands of *Alnus glutinosa*, often multi-stemmed from previous coppice management, with frequent *Fraxinus excelsior* and occasional *Quercus robur* The shrub layer is much poorer than in the drier floodplain woodland but *Ilex aquifolium* can be frequent around the *Alnus* stools and *Salix* is usually present.

The ground flora is characterised by a prominence of wetland species such as *Carex remota*, *Lysimachia nemorum*, *Ajuga reptans*, *Valeriana dioica*, *Mentha aquatica*, *Athyrium filix-femina*, *Galium palustre* and *Caltha palustris*. Most stands in the flood plains have *Chrysosplenium oppositifolium*, which is absent from the W7 stands in hillside flushes reflecting increased nutrient input from flooding making the former referable to W7a: Alder-Ash-Yellow Pimpernel woodland - Common Nettle sub community (*Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland - *Urtica dioica* sub-community). Species characteristic of W7b: Alder-Ash-Yellow Pimpernel woodland - Remote Sedge-Marsh Thistle sub-community (*Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland - *Carex remota*-*Cirsium palustre* sub-community) are, however, invariably present within the same stands and most are transitional or mosaics of W7a & W7b.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat: *Alluvial forests with Alnus glutinosa and Fraxinus excelsior*.

**Distribution and Extent of Riverine Woodland:** There are around 212 ha of old growth riverine woodland in the New Forest distributed on alluvial mineral soils along the various watercourses. The distribution of riverine woodland in the New Forest is shown on Map 1.3.11.1

### 1.3.12 New Forest bog woodland: description

## Definition

The term Bog Woodland is used here to define woodland communities on peat in which there is a significant component of bog species in the ground flora as opposed to riverine woodland on mineral (alluvial) soils which lack bog species. This definition incorporates the Habitats Directive Annex 1 habitat: *Bog Woodland*, but also includes alder and willow carr associated with mires and wet heath.

In terms of the National Vegetation Classification New Forest bog woodland communities are referable to W4b and W5b. The Habitats Directive Annex 1 habitat: *Bog Woodland* is referable to W4. The distribution of bog woodland in the New Forest is shown on Map 1.3.12.1.

## Bog Woodland Community Descriptions

The Bog Woodland communities in the New Forest are of two main types: the willow carrs, a feature of the acid headwaters and mires characterised by a significant *Sphagna* component in the ground flora, giving way to alder carr on richer soils in valleys on swampy ground, where *Sphagna* are replaced by *Carex paniculata*. The willow carrs are referable to NVC W4b whilst the alder carrs are referable to W5b. However in the New Forest transitions with both *Sphagna* spp and *Carex paniculata* occur.

### **W4b: Downy Birch-Purple Moor-grass woodland - Soft-rush sub community (*Betula pubescens*-*Molinia caerulea* woodland - *Juncus effusus* sub-community)**

Canopy dominated by *Betula pubescens* with varying amounts of *Salix cinerea* and occasional *Alnus glutinosa* over an open bog habitat. Whilst some is of very ancient origin and stable (eg Church Moor contains the oldest post-glacial peats in the New Forest, dating back from the early part of the Devensian late glacial), all is young growth, and some is recent woodland expansion onto valley mire. (Note that the 'Poor Fen' community M6di changes to W4b as a result of birch and willow invasion). Alder in W4b appears to be confined to ancient stands and is totally absent from stands that have colonised open mire in the last 130 years.

*Molinia caerulea* is constant though controlled by grazing and *Juncus acutiflorus* replaces *J. effusus* of the NVC community title in the New Forest communities. Where the ground layer has *Sphagnum* carpets these are dominated by *Sphagnum recurvum* with *S. palustre* with typical poor fen (M6di) associates including *Hydrocotyle vulgaris*, *Lotus pedunculatus*, *Viola palustre* and *Carex curta*.

The community occurs on peat typically along the central zone of the larger valley mires where it may be seen as the base-poor equivalent of W7. It is strongly



*Part 1 Description*

influenced by open Forest management regimes and Scots pine invasion, birch, willow and *Molinia caerulea* dominance are controlled by burning and grazing by deer and Commoners animals.

**Habitats Directive equivalent:** The ancient bog woodland stands (eg at Church Moor) are referable to Habitats Directive Annex 1 habitat: *Bog Woodland*.

**Distribution and Extent of W4b:** Bog Woodland is quite a widespread habitat within the valley mires. At least a third (about 66 ha) of the total carr area of some 200-250 ha is referable to W4b of which half (33 ha) is likely to be ancient in the Annexe 1 Habitats Directive sense.

**W5b: Alder-Tussock-sedge Woodland - Yellow Loosestrife sub-community (*Alnus glutinosa*-*Carex paniculata* woodland - *Lysimachia vulgaris* sub-community)**

Characterised by an abundance and ultimate dominance of *Alnus glutinosa*, often multi-stemmed from previous (though now abandoned) Forest coppice rotations, with occasional *Salix cinerea* and *Betula pubescens* with *Frangula alnus* in the shrub layer over shade-tolerant *Carex paniculata* tussocks.

The species complement in the ground layer is dependent upon the amount of light which can get through the canopy, but the base-rich soils are capable of supporting a rich fen woodland flora. This includes species such as *Lysimachia vulgaris*, *Mentha aquatica*, *Lythrum salicaria*, *Lycopus europaeus*, *Ranunculus flammula* and *Carex remota*. Notable amongst an often rich fern component is the presence of *Osmunda regalis*.

Soils are waterlogged, relatively base-rich and moderately eutrophic over peats along the central strips of flood plain valley mires.

**Habitats Directive equivalent:** None

**Distribution and Extent of W5b:** About two thirds (180ha) of the total bog woodland on peat (200-250 ha) is referable to W5b.

### **1.3.13 New Forest Inclosure woodland: description**

#### **Definition**

Woodlands which are not subject to open Forest livestock grazing. On the Crown lands they are fenced off from free ranging animals although frequent incursions occur. Off the Crown lands they are remote from Commoners animals and may not have been grazed by livestock for a considerable period if at all.

#### **Crown land Inclosures**

The Inclosures on the Crown lands are relatively recent forestry plantations on former heathland or ancient woodland stands. Tree species composition varies enormously but oak and beech are favoured on richer soils and conifers on heathland soils. Extensive manipulation of the underlying soils, drainage and vegetation has occurred and remnants of semi-natural vegetation may or may not be discernable, depending upon the density of planting and other interventions.

Where recognisable remnant plant communities can be referred to those heathland and woodland NVC types and Habitats Directive annex 1 habitats described elsewhere. Particularly significant in this regard are the 400 ha of pasture, riverine and bog woodland communities which were incorporated within 18<sup>th</sup> and 19<sup>th</sup> century Statutory Inclosures.

### **Extent and distribution of Crown land Inclosures**

There is a total of 8,410 ha of enclosed plantation woodland within the Crown lands. Its distribution is shown on Map 1.3.13.1.

The Statutory Inclosures (7,104 ha) were enclosed under specific Acts of Parliament. They are free of Rights of Common only so long as they remain fenced, and at least 12% has to remain unenclosed at any one time. Some of the oldest broadleaved stands are beginning to develop a significant nature conservation interest particularly where they were planted on ancient woodland sites.

The Verderers Inclosures (814 ha) were enclosed by agreement with the Verderers in the late 1950's on the understanding that they would be returned to the open Forest after a limited time span. They were largely planted with conifers on heathland sites. Consequently their nature conservation value is restricted to surviving remnant heath and mire communities and the very high potential for heathland restoration following conifer removal.

In addition to the Statutory and Verderers Inclosures there are 494 ha of crown freehold woodland, most of which derive from the old crown manor of Lyndhurst, and a further 198 ha leased from adjoining estates. They contain a mix of broadleaf and conifer plantations.

### **Enclosed woodland outside the Crown lands (outside the perambulation)**

Off the Crown lands semi-natural woodland stands are referable to those communities previously described under Pasture Woodland, Bog Woodland and Riverine Woodland though they may vary considerably in gross appearance and detailed species composition as a result of differing woodland management systems (coppice or high forest) in the absence of livestock grazing.

### **Distribution of enclosed woodland outside the perambulation**

Principle localities are at Whiteparish Common, Loosehanger Wood, Langley Wood and Franchises Wood in the north of the SAC in Wiltshire, and Roydon Woods in the south of the Forest in Hampshire.

Woodland areas and principle NVC / Habitats Directive Community types are tabulated below.

Site name	NVC community	Habitats directive annex 1 habitat
Franchises Wood	W14, W10	<i>Asperulo-fagetum</i> beech forests Atlantic acidophilous beech forests
Langley Wood	W10, W8, W7b	Old acidophilous oak woods
Loosehanger Copse	W10, W16	Old acidophilous oak woods
Roydon Woods	W10a, W10b, W8a, W8b, W7b, W14, W15	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus</i> <i>Asperulo-fagetum</i> beech forests Old acidophilous oak woods Atlantic acidophilous beech forests
Whiteparish Common	W14	<i>Asperulo-fagetum</i> beech forests

### 1.3.14 New Forest dry heath: description

#### Definition

The New Forest dry heaths comprise a suite of vegetation communities defined largely along a soil moisture gradient. The various communities are identifiable as nodes along a continuum from the driest, poorest soils through those of intermediate moisture and slightly higher nutrient status to those too wet to support *Erica cinerea* but not wet enough to support *Sphagna* and wet heath communities. This classification embraces the traditional classification of Forest dry and humid heath eg Tubbs (1986) Westerhoff & Clarke (1988), but provides greater definition and enables comparative evaluation against other heathland communities at the national and European level to be made. (In particular it avoids the difficulties and potential confusion of the inclusion of *E. cinerea* in the definition of humid heath in the Westerhoff & Clarke classification)

In terms of the NVC the driest heaths are referable to H2a and H3c, whilst increasing soil moisture brings in H2c, H3a and H3b and an additional community not described in the NVC. The latter, an extreme form of H2c, occurs on soils too wet for *Erica cinerea* but not wet enough for *Sphagna*, and which Sanderson (1992) has provisionally named *Calluna-Molinia-Erica tetralix-Leucobryum glaucum* heath. This community is the true 'humid heath' in the more widely accepted sense of the term, which in the New Forest is an extensive band between the drier communities and wet heath.

All are included within the Habitats Directive Annex 1 habitat: *European Dry heaths*.

The table below shows the relationship between earlier classification, the NVC and the Habitats Directive.

Westerhoff & Clarke (1988)	Tubbs 1986	NVC (Dry Heath Communities)	Habitats Directive
Dry Heath	Dry Heath	H2a, H3c	European Dry heaths
Humid Heath	Dry Heath Humid Heath	H2c, H3a, H3b & unclassified <i>Calluna-Molinia-Erica tetralix-Leucobryum glaucum</i> heath.	

Whilst soil moisture and probably soil nutrient status are the principle community determinants, the physical structure / appearance of the dwarf-shrubs and presence and abundance of associated species are heavily influenced by

burning and grazing. There are around 7,600 ha of dry heath in the New Forest. Its distribution is shown in Map 1.3.14.1.

### **New Forest dry heath community descriptions**

New Forest dry heath comprises two main NVC communities (and six sub-communities), H2: *Heather-Dwarf Gorse Heath (Calluna vulgaris-Ulex minor) heath* and H3: *Dwarf Gorse-Bristle Bent heath - (Ulex minor-Agrostis curtisii) heath*. H3 is differentiated from H2 by the presence of *Agrostis curtisii* which is likely to be due to a slight elevation in available plant nutrients in soils supporting H3 communities.

When in favourable condition dry heath exhibits a structural mosaic of ericaceous vegetation with at least 10% young (pioneer phase for *Calluna vulgaris*) and between 20% and 50% old (mature or degenerate phase for *Calluna vulgaris*). Cover of *Calluna vulgaris* lies between 25% and 90%. There is between 1% and 10% bare ground forming an intimate mosaic with the vegetation, but not in an extensive form as a result of intensive stock feeding or human disturbance. Cover of invasive species such as *Rhododendron ponticum* above 1%, or pine trees or seedlings above 5% would require management intervention. *Pteridium aquilinum* cover should not normally exceed 25% cover in any unit, and not more than 10% of *Ulex europaeus* should be in a degenerate condition.

#### **H2a: Heather-Dwarf Gorse Heath - Typical sub-community (*Calluna vulgaris-Ulex minor* heath - typical sub-community).**

Characterised by the dominance of *Calluna vulgaris*, with varying amounts of *Erica cinerea* and *Ulex minor*, and the absence of *Agrostis curtisii*, *Erica tetralix* and *Molinia caerulea*. This is the driest of the dry heaths occurring on highly impoverished, freely draining acid podsols. Typical associates include *Pteridium aquilinum*, and occasionally, but not always *Deschampsia flexuosa*. The relative scarcity of the palatable *Ulex minor* in some stands is probably a result of preferential grazing (Tubbs 1986).

The physical structure of the dry heath and relative abundance of *Calluna vulgaris* and *Erica cinerea* are dependent upon the time elapsed since the community was last burnt. It is notable that burning of this community does not produce a flush of palatable grasses, but stands remain substantially bare whilst first *E. cinerea* with its prolific seeding ability dominates initially, then *Calluna* gradually reestablishes over 2-4 years. Rich lichen communities are a late successional feature of canopy gaps in heaths recovering from burning. Greatest biodiversity will be found where a structural mosaic of heather is present over the community as a whole with at least 10% in the pioneer phase, and between 20% and 50% in the mature or degenerate phase and between 1% and 10% bare ground forming an intimate mosaic with the vegetation. Stands on south-facing sandy slopes may be particularly important for certain invertebrate species and reptiles.

The community appears to be susceptible to bracken and *Rhododendron* invasion. The former is a natural component but should not exceed 25% cover; the latter is an invasive alien and should be eradicated. Pine and Birch invasion is common but is largely controlled to within acceptable levels (<5% tree or tree seedling cover) by the burning programme.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

### **Distribution and Extent of H2a**

This very dry heath is very extensive on the dry acid sands of the Dorset heathlands but relatively restricted in the New Forest. No absolute area figure for this community has been assessed.

**H2c: Heather-Dwarf Gorse Heath - Purple Moor-grass sub-community (*Calluna vulgaris*-*Ulex minor* heath - *Molinia caerulea* sub-community)**

A similar community to H2a, dominated by *Calluna vulgaris*, but characteristic of moister slightly richer soils (slowly permeable gley podsols) which are wet enough to support *Molinia* and scattered *Erica tetralix*, but not wet enough to exclude *E. cinerea*. In addition, *Agrostis curtisii* and *Deschampsia flexuosa* are absent and bracken relatively uncommon.

Again the physical structure of the community and the relative abundance of *Erica cinerea* (and *E. tetralix*) is dependent upon the successional stage reached since the last burn, and as for H2a greatest biodiversity will be found where a structural mosaic of heather is present over the community as a whole. In this case however burning does result in an early flush of *Molinia* for 1-3 years followed by reestablishment of first *Erica cinerea* and *E. tetralix*, and then *Calluna*. Indeed, burning and grazing are absolutely crucial to maintaining this community which would otherwise become dominated and greatly impoverished by *Molinia*. This species is currently controlled and grazed tight by Commoners animals.

The community is less susceptible to bracken invasion due to wetter soils but *Rhododendron* invasion and spread of pine and birch are constant management issues.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

**Distribution and Extent of H2c:** No absolute area figure for this community has been assessed.

**H3c: - *Agrostis curtisii* sub-community).**

This dry heath is characterised by the presence of abundant *Agrostis curtisii* and the absence of *Erica tetralix* for which soils are too dry. *Calluna vulgaris* generally dominates mature stands with *Erica cinerea* cover dependent upon the successional stage reached since the last burn. Common associates are *Molinia* (for which soils are wet enough), *Ulex minor* (restricted by hard grazing) and *Viola lactea*, with occasional *Potentilla erecta* and *Polygala serpyllifolia*. The abundance of *Ulex europaeus*, particularly on previously disturbed ground is particularly characteristic.

This community is intermediate in soil moisture preference between the driest H2a and the moister H2c communities. It occurs on acidic slightly gleyed podsols which though impoverished are not as extreme as those soils supporting the driest heath community (H2a).

Once again burning profoundly affects the physical structure and relative abundance of the key species. In this case *Agrostis curtisii* with its prolific seeding ability rapidly spreads onto bare ground along with *Molinia* in the early stages following a burn, when the community has the outward appearance of acid grassland (U3).

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

**Distribution and Extent of H3c:** No absolute area figure for this community has been assessed though it dominates areas such as Beaulieu Heath West on drier soils.

**H3a: Dwarf Gorse-Bristle Bent heath - Typical sub-community (*Ulex minor-Agrostis curtisii* heath - Typical sub-community).**

Characterised by the presence of *Calluna vulgaris*, *Erica tetralix*, *E. cinerea*, *Molinia caerulea* and *Agrostis curtisii* in varying amounts depending upon the stage in the burning cycle. Soil moisture is sufficient to support *Erica tetralix* and *Molinia* but not wet enough to exclude *E. cinerea*. Dwarf shrubs tend to dominate over the grasses which occur as scattered clumps among the shrub canopy; *Molinia* in particular being controlled by grazing.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

**Distribution and Extent of H3a:** No absolute area figure for this community has been assessed.

**H3b: Dwarf Gorse-Bristle Bent heath - *Cladonia* sub-community (*Ulex minor-Agrostis curtisii* heath - *Cladonia* sub-community)**

This community is more open than H3a, and the mosaic of grass to dwarf-shrub is more equitable. It is notable for the abundance of common *Cladonia*-type lichens on the more exposed areas. These include *Cladonia impexa*, *C. floerkeana*, *C. coccifera* and *C. pyxidata*. However it should be noted that competition with *Agrostis curtisii* restricts bryophytes and lichens and H3 communities can be relatively poor compared to suitably managed H2 communities.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

**Distribution and Extent of H3b:** No absolute area figure for this community has been assessed.



**Additional Dry Heath Community: *Calluna vulgaris*-*Molinia caerulea*-*Erica tetralix*-*Leucobryum glaucum* heath** (After Sanderson 1988)

In the New Forest there is a fairly extensive community which occupies a zone between the dry heath communities described above and wet heath. It is characterised by the presence of *Calluna vulgaris*, *Erica tetralix*, *Molinia caerulea* and the moss *Leucobryum glaucum*, in the absence of both *Erica cinerea* for which soils are too wet, and *Sphagna* for which they are too dry. It marks the division between the drier podsoles on which communities are eventually dominated by *Calluna* in the later successional stages of the burning cycle, and the wetter humic gleys and stagnogleys on which heather is present but never achieves the same dominance. On heathlands elsewhere (and incidently where the bulk of NVC quadrat samples were taken), where the clay content of soils is less and hence soil water is less impeded, this 'humid heath' zone tends to be very narrow and much less significant, and the separation between dry and wet heath is very sharp.

In the New Forest the distinction between wet heath and this true 'humid heath' community is maintained by grazing and burning. This management effectively suppresses *Molinia* dominance which in wet heath would overwhelm and eventually kill *Sphagna* and (amongst other things) obscure the zonation of the vegetation.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *European Dry heaths*

**Distribution and Extent of *Calluna vulgaris*-*Molinia caerulea*-*Erica tetralix*-*Leucobryum glaucum* heath:** There is an estimated 4,000 ha of this community type in the New Forest.

### 1.3.15 New Forest wet heath: description

#### Definition

The New Forest wet heaths comprise a suite of vegetation communities defined by soil moisture, nutrient and base status, and profoundly influenced by burning and grazing. Soils are too dry to sustain the large peat-building *Sphagna* associated with mires (eg *Sphagnum papillosum* and *S. magellenicum*) but too wet to support *Erica cinerea*. There is no real dominance by *Calluna vulgaris* as generally occurs in the later successional stages following burning on dry heaths.

In terms of the NVC there are three main sub-communities, of M16 Wet Heath: M16a, M16b and M16c. There is also a more base-rich and extreme form of M16b occurring locally on marl in the New Forest. These embrace the 'wet heath' of the Westerhoff & Clarke vegetation survey (1998), and the 'wet

heath' (which corresponds to M16a, M16c) and 'tussock heath' (which corresponds to M16b) of Tubbs (1986).

Two Annex 1 habitats under the Habitats Directive are present:

1. Northern Atlantic wet heaths with *Erica tetralix* - incorporates M16a and M16b
2. Depressions on peat substrates (*Rhynchosporion*) - incorporates M16c.

### **Wet heath: community descriptions**

Wet heath communities occur on nutrient poor mineral soils or very shallow peats that are at least seasonally waterlogged, but may be surface dry in summer. Stands managed by burning and grazing will have the highest biodiversity and display a structural mosaic of ericaceous species, with up to 5% bare peaty soil in an intimate mosaic with the vegetation. At least 25% cover is provided by Ericoid shrubs (*Calluna vulgaris* and *Erica tetralix*) and a further minimum of 20% cover by *Sphagna*. Cover values below this for these groups will be indicative of either *Molinia* dominance (caused by a lack of burning and grazing management) or artificial drainage which has lowered the water table and excluded *Sphagnum* growth. Drainage may also encourage the spread of *Myrica gale* and even *Ulex europaeus*. *Molinia* cover will be variable depending on grazing pressure but should not exceed 50% in scattered tussocks.

Invasion by *Rhododendron*, pine and birch present management issues. *Rhododendron* should be below 1% cover and tree seedlings or tree cover should be kept below 5% cover. There is an estimated 2,100 ha of wet heath in the New Forest. Its distribution is shown on Map 1.3.15.1.

### **M16a: Cross-leaved Heath - *Sphagnum compactum* wet heath- typical sub-community (*Erica tetralix* - *Sphagnum compactum* wet heath - typical sub-community)**

Characterised by the presence of *Calluna vulgaris*, *Erica tetralix* and *Molinia caerulea* in varying amounts and degrees of dominance depending upon water levels and management regime. It is interesting to note that *Calluna* never reaches the dominance that it has on dry heath, presumably because of the competitive advantage which *Erica tetralix* has in the wetter conditions where it reaches its highest cover values, provided *Molinia* is kept in check by grazing. The principle *Sphagna* cover is provided by *Sphagnum compactum*, a relatively small species which prefers drier situations, and *Sphagnum tenellum* in wetter hollows. Other *Sphagna* eg *Sphagnum cuspidatum*, *S. auriculatum* sometimes occur in wetter situations. Lichens, particularly the wet heath specialists *Cladonia strepilis* and *Pycnothelia papillosum*, can be frequent. The most frequent vascular associates are *Trichophorum cespitosum* and *Juncus squarrosus*,

with occasional *Narthecium ossifragum* and *Eriophorum angustifolium* as the community merges into mire.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *Northern Atlantic wet heaths with Erica tetralix*

**Distribution and Extent of M16a:** The most extensive form of wet heath on the poorer soils characteristic of the northern half of the Forest, occupying around 1050 ha of the total 2,110 ha

**M16b: Cross-leaved Heath - *Sphagnum compactum* wet heath - Devil's-bit Scabious-Carnation Sedge sub-community (*Erica tetralix* - *Sphagnum compactum* wet heath - *Succisa pratensis*-*Carex panicea* sub-community)**

This community is generally of a more tussocky nature due to the steady movement of surface water and considerably more herb-rich than M16a due to the richer underlying soils which may exceed pH 5 in some cases. (There is an extreme base-rich variant of this community not described in the NVC occurring very locally in the Forest which overlies the Headon beds, which Sanderson (1988) has called 'calcareous tussock heath'). Amongst the *Molinia* tussocks, typical associates include *Potentilla erecta* and *Succisa pratensis* with *Polygala serpyllifolia*, *Carex panicea*, *Cirsium dissectum*, and *Serratula tinctoria*. Other notable species are *Genista anglica*, *Achillea ptarmica* and *Salix repens*, and the nationally scarce *Gentiana pneumonanthe*. The more acidic species (*Trichophorum cespitosum*, *Narthecium ossifragum* and *Eriophorum angustifolium*) are less frequent in this community, as are *Sphagnum compactum* and *S. tenellum*. These species tend to be replaced by *Sphagnum auriculatum* which is more frequent here than in any other M16 community.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat *Northern Atlantic wet heaths with Erica tetralix*

**Distribution and Extent of M16b:** Of the total 2,110 ha of wet heath present in the Forest it is estimated that less than 840 ha is M16b. Extensive tracts occur on slopes throughout the Forest.

**M16c: Cross-leaved Heath - *Sphagnum compactum* wet heath -White Beak-sedge-Oblong-leaved Sundew sub-community (*Erica tetralix*-*Sphagnum compactum* wet heath - *Rhynchospora alba*-*Drosera intermedia* sub-community)**

A more open community characterised by a reduced cover of *Calluna vulgaris*, *Erica tetralix* and *Molinia caerulea*, and an extensive cover of *Sphagnum compactum* and *S. tenellum* with other mosses including *Campylopus brevipilus* and *C. introflexus* amongst the vascular associates *Trichophorum cespitosum*, and *Juncus squarrosus*. Wetter hollows and runnels support *Drosera rotundifolia* and the rarer *D. intermedia* which is a particularly distinctive feature of this

community. Bare peat is colonised by the local *Rhynchospora fusca* and the club moss *Lycopodiella inundata*.

**Habitats Directive equivalent:** Accommodated within the Annex 1 habitat  
Depressions on peat substrates (*Rhynchosporion*)

**Distribution and Extent of M16c:** It is estimated that about 10% of the wet heath is M16c which gives an area of about 210 ha.

### 1.3.16 New Forest mires: description

#### Definition

The New Forest mires comprise a suite of communities which are described under the generic headings of *Valley Bogs, Bog Pools, Soakways, Poor fen, Moorgrass Mires, Marl Flushes, and Transition Mires* (after Sanderson 1998). In terms of the National Vegetation Classification the first five of these are directly referable to M21a, M1, M29, M6di, and M25a respectively. The Marl Flush communities are neither well sampled or described in the NVC but can be divided between M10a and M14. The Transition Mires are closely related to M9 but carry vegetation transitional to M29 and M1.

Mire is a generic term used here to encompass the variation in vegetation which in the New Forest is really a combination of bog and fen in the classic sense (NCC 1989 & Fojt 1994). Bogs are typically rain-fed, mineral and nutrient poor and acidic. Fens are groundwater fed, have a higher nutrient status (mesotrophic to eutrophic), and are generally neutral or alkaline. New Forest mires have elements which are typical of both bogs and fens. For example typical bog vegetation of acid *Sphagna* and associates *Narthecium ossifragum*, *Eriophorum angustifolium* and *Rhynchospora alba* occur in ground water fed mires in the New Forest.

This gives rise to difficulties in evaluating mire communities at the European level (See Part 3). The bulk of the Forest mire communities fall within NVC community M21a: *Narthecium ossifragum-Sphagnum papillosum* Valley Mire - *Rhynchospora alba-Sphagnum auriculatum* sub-community, in ground water fed situations, a vegetation type simply not recognised in the Corine classification or the Habitats Directive. However, three individual components of valley bog complexes are recognised in the Directive as follows, and clearly none of these could exist in isolation outwith the valley bogs and wet heaths in the New Forest.

#### Habitats Directive Annex 1 habitats

- Alkaline fens
- Depressions on peat substrates of the *Rhynchosporion*
- Transition mires

Historically the general pattern of variation in lowland mire vegetation was described in a pioneering account by Rose (1953) and specifically for the New Forest by Tubbs (1986). Newbould (1960) provides detailed information on the vegetation and ecology of Cranes Moor, and a Nature Conservancy Council vegetation survey of 23 valley mires (Alcock 1984) has been related to the NVC by Sanderson (1998). Wheeler (1980) mentions the base-rich seepage mires in the south-west of the Forest. Clarke (1989) provides a detailed summary of the ecology and history of the mires including the first observations on the vital importance of grazing in maintaining the richer communities (Rowell & Clarke 1988). Whilst many of these authors used inventive classifications to describe the variation in New Forest mires, this document, for clarity and to aid meaningful comparative evaluations, describes them under their generic headings by use of the NVC.

The variation in vegetation composition in New Forest mires is attributable to a number of related factors. The most important are acidity determined by underlying soils, hydrology, nutrient status, and management particularly grazing and burning pressure. The structural variation is very wide and each mire system is unique.

### **Origin and form of New Forest Valley mires and seepage step mires**

New Forest mires occur as either seepage step mires or valley mires. Tuckfield (1973) describes the distribution, form and development of New Forest seepage steps. Clarke (1988) builds upon the earlier works of Rose and Newbould to describe the origins of valley mires and the ecology of their communities. Tubbs (1986) describes the relationship of the two mire types and the surrounding heathland vegetation in a simple diagram which is reproduced below.

Valley mires form in valley bottoms with low hydraulic gradients and impermeable subsoils where springs or spring lines arise, allowing peat accumulation. Wide, shallow valleys with slight gradients support extensive mires; narrow, steep valleys support smaller, more localised mires. The distribution of the various plant community types described below is in part related to water chemistry and nutrient status, and this in turn is dependent upon the base status of the parent material from which the soil water derives in the New Forest ground water fed valley mires. Hence, the central flows of valley mires which receive water from the Headon Beds may be neutral or slightly alkaline. Those fed from sands and gravels are acidic.

This effect is most concentrated along the axis of flow and increases downstream. In addition this produces a further gradient of declining nutrient status and increasing acidity across valley mires from the central axis. Vegetation communities develop along these gradients, classically from enriched fen and

carr along the axis to increasingly acidic *Sphagnum* bog communities peripherally.

Seepage steps form on valley sides where ground water concentrates above the junction between a permeable sandstone and an underlying impermeable clay. Subsequent erosion produces a characteristic profile in which there is a steep scarp slope above the seepage and a zone of slumped material below it, the mire forming in water retentive hollows of the undulating slope.

There are around 2,020 ha of mire in the New Forest. Its distribution is shown on Map 1.3.16.1.

## Mire plant community descriptions

### ‘Valley bogs’

Mires dominated by stands of robust, peat-forming *Sphagnum* spp which can be extensive and luxuriant, especially *Sphagnum papillosum* and *S. magellanicum* with typical acid bog species such as *Narthecium ossifragum*, *Eriophorum angustifolium* and *Rhynchospora alba*. *Molinia caerulea* is a constant but is held in check by the low aeration capacity of stagnant or very slow flowing water and grazing.

National Vegetation Classification: ‘Valley Bog’ vegetation is accommodated within M21a

### **M21a Bog Asphodel-Bog Moss Valley Mire - White Beak-sedge-Bog Moss sub-community (*Narthecium ossifragum*-*Sphagnum papillosum* Valley Mire - *Rhynchospora alba*-*Sphagnum auriculatum* sub-community)**

This is the most abundant community, occurring extensively in both valley and seepage step localities, on permanently waterlogged, nutrient poor (oligotrophic) acidic peats (pH 3.5-4.5). In addition to the dominant *Sphagnum papillosum*, other frequent *Sphagna* include *Sphagnum subnitens*, *S. auriculatum*, *S. capillifolium* and *S. recurvum*. Common associated species include *Drosera rotundifolia*, *Erica tetralix*, *Menyanthes trifoliata*, *Potamogeton polygonifoliosus*, and locally *Myrica gale*. A significant proportion of the British population of *Hammarbya paludosa* is found here. In contrast to the description provided in the NVC *Schoenus nigricans* may be locally dominant in New Forest seepages which otherwise lack the brown mosses characteristic of more base-rich Marl Flush communities.

The bryophyte flora is especially rich featuring many bog specialist liverworts including *Calypogeia sphagnicola*, *Cephalozia macrostachya*, *Cladopodiella fluitans*, *Kurzia paucifonious*, *Mylia anomala*, *Odontoschisma sphagni* and *Riccardia latifrons*.

Water quality in the catchment is vital, and any significant eutrophication would change the community over time to poor fen. Well grazed mires have between 1-10% bare peaty ground in an intimate mosaic with the vegetation. Water levels are consistently high, with the mire being soft and wet all year round with natural shallow runnels, soakways and water tracks in larger systems. Another characteristic of New Forest mires is that peat development is extremely slow compared to upland bogs, typically accumulating at a rate of 20 cm per 1000 years (Clarke 1988). Consequently peat depths are shallow and rarely in excess of 2 m. This makes them particularly vulnerable to damage from artificial drainage which results in rapid headward erosion and lateral peat slumping. Changes in vegetation around such damaged areas become apparent with species indicative of drying conditions such as pine and birch, or species indicative of lower water levels and faster flows such as *Molinia* and *Myrica* becoming more abundant and creating management problems. In particularly serious cases *Sphagnum* spp. cover becomes very much reduced, to less than 10% in some cases.

**Habitat Directive equivalent:** None

**Distribution & extent:** Forms most of the coverage at around x ha.

#### **'Bog pools'**

Many of the larger Valley Bogs support bog pools, where low flows or stagnant water, high acidity (pH around 3.5-4.4) and very low nutrient levels (dystrophic conditions), support carpets of *Sphagna* with scattered vascular plants growing through or amongst them. In more accessible situations many are thought to have been derived from old peat cuttings.

National vegetation Classification: Bog Pool community is accommodated within M1.

#### **M1: *Sphagnum auriculatum* Bog pool community**

The dominant *Sphagna* are *Sphagnum auriculatum* and *S. cuspidatum*. The commonest vascular plant is *Menyanthes trifoliata*, *Rhynchospora alba* and *Eriophorum angustifolium*, but the bog pools are also localities for some very local species including *Utricularia minor*, *Drosera anglica*, *Rhynchospora fusca* and *Carex limosa*.

This is one of the very few communities in the New Forest which can sustain its botanical interest in the absence of grazing, a factor associated with the inaccessibility of many of the bog pools in the larger mires.

**Habitats Directive equivalent:** None

**Distribution and extent:** Less than 1% cover (of the New Forest SAC) distributed over M21a communities.

**'Soakways'**

Communities dominated by *Hypericum elodes* and *Potamogeton polygonifolius* associated with the natural drainage systems of valley mires, invariably marking areas of slow water movement within low fertility mires, usually less acidic than M21a (pH 4-5.5). They may be seasonally inundated or permanently wet.

**National vegetation Classification:** Soakways community is accommodated within M29 .



**M29: Marsh St John's-wort- Bog pondweed soakway (*Hypericum elodes*-*Potamogeton polygonifolius* soakway).**

The linear creeping mats of *Hypericum elodes* and *Potamogeton polygonifolius* are highly distinctive, often accompanied by *Ranunculus flammula* and *Juncus bulbosus*. Typical associates include a range of bog or poor fen plants including *Sphagnum auriculatum*, *Hydrocotyle vulgaris*, *Anagallis tenella*, *Drosera rotundifolia*, *Narthecium ossifragum*, *Carex rostrata*, *Baldellia ranunculoides*, *Pedicularis palustris* and *Galium palustre*. The presence and abundance of these species is dependent upon the degree of animal grazing and poaching, and whether the soakway is permanently or seasonally wet. For example, *Carex rostrata* and *Pedicularis palustris* are confined to permanently wet stands and *Baldellia ranunculoides* is typical of seasonally wet stands. *Utricularia intermedia* is a particularly notable species in the large (though regrettably reduced), M29 stands in Denny Bog.

The soakway community is highly dependent upon grazing and in all but the most flooded areas will be replaced by M25 if grazing is reduced to low levels.

**Habitats Directive equivalent:** The permanently wet stands in some mires could probably be included within Transition mires.

**Distribution & abundance:** Less than 1% cover (of the New Forest SAC) associated with the natural drainage systems of pristine mires. This community has been the natural focus of attempts to increase water run-off from mires and so many soakways have been damaged by drainage schemes.

**'Poor fen'**

This mire type supports *Sphagnum* dominated communities, but they are composed of species which are tolerant of higher nutrient status than the 'valley bog' situation. Soils are consistently waterlogged and acidic (pH 4.5-5.5) and water flow is modest.

**National Vegetation Classification:** 'Poor fen' vegetation is accommodated within M6di.

**M6di: Star sedge -Bog moss mire - Sharp-flowered rush sub-community (*Carex echinata*-*Sphagnum recurvum* Mire - *Juncus acutiflorus* sub-community - *Sphagnum recurvum* variant)**

*Sphagnum recurvum* is the dominant *Sphagnum* species and those associated with more acidic and nutrient poor situations are absent (eg *S. papillosum*, *S. auriculatum* and *S. cuspidatum*). *Juncus acutiflorus* is constant but controlled (like *Molinia*) by grazing. Typical poor fen associates include *Agrostis canina*, *Carex echinata*, *Epilobium palustre* and the mosses *Sphagnum palustre* and *Polytrichum commune*. Whilst the flora is less striking than other mire types the

community provides a locus for *Viola palustre* and *Carex curta* in the New Forest.

Poor fens are well grazed and as with valley bogs provide Commoners stock with an early spring bite and essential grazing in droughts. Birch and willow invasion can change the community over time to carr NVC community W4b: *Betula-Molinia* Mire. Drainage damage is apparent on the northern commons.

**Habitats Directive equivalent: None**

**Distribution & abundance:** No absolute area figure for this community has been assessed though it is typical of valley mires in the central woodland pasture complex, where leaf wash into the mire may raise the nutrient status, and on the northern commons.

### **'Moor-grass mires'**

These are mires with higher levels of water movement and reduced grazing levels producing ideal conditions for rapid *Molinia* growth and dominance. This species together with *Myrica gale* effectively suppress other less competitive species producing a rather floristically impoverished community. (The greater structural diversity created by reduced grazing may however be important for some invertebrate species less tolerant of high grazing levels). All New Forest mires with sufficient water flow have the capacity to degenerate to moor-grass mire if grazing were reduced sufficiently. Equally, moor-grass mires will revert to more floristically-rich communities if grazing levels (and maybe some controlled burning) increase.

**National Vegetation Classification:** 'Moor-grass' vegetation is accommodated within M25a.

### **M25a: Purple moor-grass-Tormentil mire - Cross-leaved heath sub-community (*Molinia caerulea*-*Potentilla erecta* mire - *Erica tetralix* sub-community).**

Dominated by *Molinia caerulea*, and when grazing levels are particularly low tussocks will form and litter build becomes significant, further impoverishing the flora. Particularly poor stands characteristic of ungrazed heathland elsewhere are rare in the New Forest as most stands, except the most inaccessible, receive at least some periodic light grazing. Associated species are restricted mainly to *Myrica gale*, *Juncus acutiflorus*, *Potentilla erecta* and *Erica tetralix*.

**Habitats Directive equivalent: None**

**Distribution & abundance:** No absolute area figure for this community has been assessed though this community dominates some of the very wet valley mires

in the south of the Forest and in under-grazed situations between Burley and Bolderwood, but otherwise is of rather local occurrence.

### **'Marl flushes'**

Seepage step communities and highly flushed areas in valley mires with shallow peat but sufficient base enrichment to support brown mosses and more base demanding vascular plants. The most striking are those found in seepage step mires on marl (lime-rich clay) producing water so base-rich (pH 7.0 or higher) that tuffa is deposited on the mosses. However, less strongly lime enriched flushes (pH 6-6.5) without tuffa deposition are more frequent. *Schoenus nigricans* may be present or absent in all variants.

**National Vegetation Classification:** Accommodation of the Forest 'Marl Flushes' within the NVC is not straightforward, probably due to a lack of sampling the full variation in Forest mire communities. The less base-rich stands with *Schoenus nigricans* can be accommodated within M14 but *Schoenus* is more often absent than present in Forest Marl Flushes. The highly lime-rich Marl Flushes have no real NVC equivalent but are closest to the upland M10a community.

The following classification suggested by Sanderson (1998) is adopted here:

**'*Eleocharis quinquefolia*-*Drepanocladus revolvens* mire'** a Lowland form of NVC Community: **M10a: *Carex dioica*-*Pinguicula vulgaris* mire - *Carex viridula oedocarpa*-*Juncus bulbosus* sub-community.**

Highly lime rich Marl Flushes, pH around 7.0 or higher, depositing tuffa, with lime loving species prominent. The presence of *Eleocharis quinquefolia*, the brown moss *Cratoneuron commutatum*, and the abundance of the brown moss *Drepanocladus revolvens* are diagnostic. Variants with and without *Schoenus nigricans* exist, those with *Schoenus* tend to be larger and wetter mires. Associated species include *Carex panicea*, *Carex hostiana*, *Anagallis tenella*, *Succisa pratensis*, *Pedicularis sylvatica*, *Scutellaria minor* and *Briza media*. *Molinia* is constant but held in check by tight grazing. These marl flushes support a very rich flora including notable species such as *Eriophorum latifolium*, *Pinguicula vulgaris* and the bryophytes *Cratoneuron commutatum*, *Philonotis calcarea* and *Preissia quadrata*. *Pinguicula lusitanica* is more abundant in these flushes than in other mire types elsewhere.

**'*Eleocharis* spp-*Campylium stellatum* mire - *Narthecium ossifragum* -*Drosera rotundifolia* sub-community'**, which incorporates the NVC community: **M14 *Schoenus nigricans* -*Narthecium ossifragum* mire.**

Less lime enriched Marl Flushes, pH around 6-6.5, non tuffa depositing with strongly lime loving species absent. The only abundant brown moss is *Campylium stellatum* with *Drepanocladus revolvens* rare and with *Eleocharis*

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*quinquefolia* replaced by *Eleocharis multicaulis*. Species characteristic of more acidic mires are more evident including *Narthecium ossifragum* and *Drosera rotundifolia*. Variants with *Schoenus nigricans* are accommodated within M14. Associated species include *Juncus acutiflorus*, *Carex panicea* and *Erica tetralix*. Again *Molinia* is constant but held in check by grazing.

**Habitats Directive equivalent:** The '*Eleocharis quinquefolia*-*Drepanocladus revolvens* mire' a lowland form of NVC Community: M10a: *Carex dioica*-*Pinguicula vulgaris* mire - *Carex viridula oedocarpa*-*Juncus bulbosus* sub-community is included within the Habitats Directive Annex 1 habitat: Alkaline Fen. The '*Eleocharis spp*-*Campylium stellatum* mire - *Narthecium ossifragum* -*Drosera rotundifolia* sub-community', which incorporates the NVC community: M14 *Schoenus nigricans* -*Narthecium ossifragum* mire is not included in the Habitats Directive.

**Distribution & abundance:** No absolute area figure for this community has been assessed. Most stands are small valley side seepage step mires scattered across the south of the Forest but Stoney Moors has an exceptionally large example which has suffered damage from drainage and consequent scrub invasion.

## 'Transition mires'

These are mires on deep, waterlogged peats which are irrigated by base-rich water, and support brown mosses and tall sedges but *Schoenus nigricans* is never present. These are particularly notable for the rare species which they support.

**National Vegetation Classification:** 'Transition mire' vegetation is closely related to M9 but there is a great degree of variation and many stands are transitional to other NVC communities as described by Sanderson (1998).

### **M9: *Carex rostrata*-*Calliergon cuspidatum* / *giganteum* mire**

A variable community characterised by the presence of *Calliergon cuspidatum* and *Carex rostrata* with various brown mosses and base tolerant mosses. *Sphagna*, apart from the more base-demanding species, are rare and in the New Forest communities *Schoenus* is absent. Communities associated with M9 provide a locus for several rare specialist mire species including *Eriophorum gracile*, *Carex limosa*, *C. lasiocarpa*, *Sphagnum contortum*, *S. teres*, *S. subsecundum*, *Pedicularis palustris*, *Drosera anglica*, *Utricularia minor*, *Pressia quadrata*, *Calliergon giganteum* and *Philonotis calcarea*. Sanderson (1998) identifies the following community stand types;

'*Carex limosa* / *C. lasiocarpa* - *Sphagnum contortum* / *teres* stands' transitional between NVC community **M9a: *Carex rostrata* - *Calliergon cuspidatum* Mire - *Campylium stellatum*-*Scorpidium scorpioides* sub-community**, and **M1 *Sphagnum auriculatum* bog pools**: Found in mildly base-enriched, very swampy areas in the south west of the Forest in places such as Wilverley, Holmsley and Burley Common moor. Characterised by the presence of one or both of *Carex limosa* and *C. lasiocarpa* along with the base demanding bog mosses *Sphagnum contortum* and *S. teres*.

'*Carex rostrata*-*eriophorum gracile* stands' transitional between NVC community **M9a** and **M29: Marsh St John's-wort- Bog pondweed soakway (*Hypericum elodes*-*Potamogeton polygonifolius* soakway)**: Found in a base enriched area in Fort Bog in the east of the Forest.

'**Marl swamps**' which are closer to NVC community **M9b: *Carex rostrata*-*Calliergon cuspidatum* Mire - *Carex diandra*-*Calliergon giganteum* sub-community** but lacks *Carex diandra*.

**Habitats Directive equivalent:** M9 stands are referable to Habitats Directive: Transition mires

**Distribution & abundance:** generally confined to areas within valley mires where artesian sources of base rich water produce very wet swampy conditions. Total extent less than 1% of the New Forest SAC, estimated as a maximum of

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9 ha given the most generous interpretation. Adversely affected by drainage and enclosure for forestry, and carr invasion on the Open Forest.

### 1.3.17 New Forest dry grassland: description

#### Definition

The New Forest dry grasslands comprise a suite of communities which are described under the generic headings of *Parched acid grassland*, *Heathy acid grassland*, *Moist acid grassland*, *Neutral greens* and *Herb-rich bracken grassland*; a classification derived by Sanderson (1998). In terms of the National Vegetation Classification the first four are referable to U1, U3, U4 and MG6 respectively, whilst U20a is the nearest NVC equivalent to *Herb-rich bracken grassland*. There is no Habitats Directive equivalent to New Forest dry grasslands.

Historically, and in the previous absence of a national classification this suite of grasslands has been variously described as acid grassland, greens, lawns, re-seeded grassland, partially improved grassland and neutral grassland. For clarity and to aid meaningful comparative evaluations, the dry grasslands are described under their generic headings by use of the NVC where possible. However, reference is made to historical definitions as they are still widely used.

Given a high and relatively uniform grazing pressure soil fertility and soil moisture retention are the main factors determining the distribution of the various dry grassland communities. There are around 282 ha of dry grassland communities in the New Forest. Its distribution is shown on map 1.3.17.1.

#### New Forest dry grassland plant community descriptions

##### 'Parched acid grasslands':

Grasslands dominated by fine-leaved grasses especially *Agrostis capillaris*, *Festuca rubra* and *F. ovina* with a high cover of mosses and lichens, in an open sward which becomes parched and brown in late summer. Stands may be species-rich and the presence of *Rumex acetosella* and *Aira praecox* are especially diagnostic.

**National Vegetation Classification:** Parched acid grasslands are largely accommodated within U1.

##### **U1: Sheep's fescue-Common bent-Sheep's sorrel grassland (*Festuca ovina*-*Agrostis capillaris*-*Rumex acetosella* Grassland)**

Parched grassland on base-poor, nutrient-poor soils dominated by fine grasses especially *Agrostis capillaris*, *Festuca rubra* and *F. ovina*, with a high cover of mosses and lichens. Species characteristic of a sward which becomes parched in late summer are prominent, especially *Rumex acetosella*, *Aira praecox*, *Ornithopus perpusillus*, *Aphanes arvensis* and *Plantago coronopus*.

High grazing pressure and shortage of water (leading to non-availability of soil nutrients) leads to die-back of the vegetation in summer and the swards may take on a characteristic dry, brown appearance. The vegetation is open providing ample opportunity for the colonisation of diminutive annuals and other less competitive species, many of which are now nationally scarce, and for which the New Forest is now a stronghold. (See Table 1.3.17.1). These swards can be very species-rich, and are of considerable nature conservation importance.

Sward heights are characteristically 1-2 cm in the New Forest but a range of between 1 cm to 5 cm maximum would be acceptable. Visible bare ground is generally between 1% and 10% in an intimate mosaic with the vegetation. Species indicative of increased nutrient status, disturbance or significantly reduced grazing pressure and whose presence would trigger concern, include *Chamerion angustifolium*, *Cirsium arvense*, *C. vulgare*, *Plantago major*, *Urtica dioica* and coarse grasses such as *Holcus lanatus* and *Dactylis glomerata*. *Pteridium aquilinum* cover should not exceed 25% cover and should not be encroaching onto grassland communities.

**Table 1.3.17.1 Vascular plants of dry grassland**

Key species either dependent upon for all or part of their life-cycle, or using the New Forest dry grassland communities are tabulated below. In the New Forest, dry grassland is particularly rich in those species adapted to constant defoliation from hard grazing pressure. This in association with nutrient poor, acid soils produces open habitats with low competition from robust and aggressive species (eg coarse grasses). Hence the grasslands may be very species-rich and particularly in diminutive annuals. Invertebrate diversity is limited to those species requiring short vegetation and bare ground, though much structural diversity is provided by accompanying scrub where it exists in an intimate mosaic with the grassland.

Species / Typical NVC Communities	U1	U1d/	U1	U3	U	MG	U20
Moonwort ( <i>Botrychium lunaria</i> )		X					X
Carlina thistle ( <i>Carlina vulgaris</i> )		X					
Field mouse-ear ( <i>Cerastium arvense</i> )			X				
Chamomile ( <i>Chamaemelum nobile</i> )*	X					X	
Mossy stonecrop ( <i>Crassula tillaea</i> )*	X						
Small cudweed ( <i>Filago minima</i> )	X	X	X				
Field gentian ( <i>Gentianella campestris</i> )		X					
Smooth cat's-ear ( <i>Hypochaeris glabra</i> )*			X				
Hairy bird's-foot trefoil ( <i>Lotus subbiflorus</i> )	X						
Upright chickweed ( <i>Moenchia erecta</i> )	X						



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Burnet rose ( <i>Rosa pimpinellifolia</i> )		X		X			X
Heath pearlwort ( <i>Sagina subulata</i> )	X						
Field madder ( <i>Sherardia arvensis</i> )		X					
Shepherd's cress ( <i>Teesdalia nudicaulis</i> )			X				
Large thyme ( <i>Thymus pulegioides</i> )		X					
Clustered clover ( <i>Trifolium glomeratum</i> )*	X						
Bird's-foot clover ( <i>T. ornithopodioides</i> )	X						
Rough clover ( <i>T. scabrum</i> )	X						
Subterranean clover ( <i>T. subterraneum</i> )	X						
Bearded fescue ( <i>Vulpia ciliata ambigua</i> )*		X					
Wild gladiolus ( <i>Gladiolus illyricus</i> )*							X
Soft-leaved sedge ( <i>Carex montana</i> )				X			X
Lesser butterfly-orchid ( <i>Platanthera bifolia</i> )				X			X
Bitter vetch ( <i>Lathyrus linifolius</i> )							X

\* = Nationally scarce species

The New Forest U1 communities can largely be encompassed within the following NVC sub-communities:

**U1f: Cat's-ear (*Hypochaeris radicata*) sub-community:** This is the typical sub-community found in the New Forest, on soils with some impedance producing some winter water-logging. It is characterised by the abundance of *Hypochaeris radicata*, *Leontodon saxatilis* and *Rumex acetosella* and is usually herb-rich. The bulk of the grass cover is comprised of *Festuca rubra* and *Agrostis capillaris*, though *Aira praecox* is frequent in the open sward. It occurs on undisturbed greens where lime enrichment has not occurred.

**U1d / f: Sweet vernal-grass-Bird's-foot trefoil (*Anthoxanthum odoratum*-*Lotus corniculatus* sub community):** A combination of U1d and U1f confined to soils which have been disturbed in ways which have increased soil lime content. Classic examples include the sites of former wartime installations where the concrete hard standings or roads have been subsequently crushed and removed, or sites which were cropped in the 1940's and 1950's, or sites which were cultivated and limed in the 1960's and have all subsequently re-vegetated. An abundance of *Lotus corniculatus* is diagnostic, in an open sward with frequent *Festuca rubra*, *Agrostis capillaris* and *Rumex acetosella*, with patches of *Pilosella officinarum*. Where broken concrete is especially abundant as on former air fields then the community begins to take on the appearance of heavily grazed chalk grassland (CG7 *Festuca ovina*-*Pilosella officinarum*-*Thymus polytrichus* / *pulegioides* grassland). Calcicoles such as *Thymus* spp, *Cirsium acaule* and *Anthyllus vulneraria* are prominent.

**Species-rich dry heath (H2 / U1d):** (Not described in NVC). Where grazing is lighter than the U1d/f sub-community tends to become invaded by *Calluna vulgaris* producing a species-rich dry heathland community. Whilst basically similar to U1d/f some species become more frequent especially the violets *Viola canina* and *V. lactea*, and the smaller, less competitive species decline in relation to the increasing *Calluna vulgaris* cover.

**U1e: Heath bedstraw-tormentil (*Galium saxatile*-*Potentilla erecta*) sub-community:** A species-poor grassland with *Galium saxatile* and *Potentilla erecta* prominent. Typically occurs as stands on disturbed soils associated with dry heath, and would be a derivative of dry heath by removal of heather if heavily sheep grazed.

**U1b Typical sub-community:** Stands lacking the characteristic species defining the other sub-communities. These include species-poor stands along paths but on freely draining sands in the west of the Forest some distinctive species-rich stands occur.

**Habitats Directive equivalent:** There is no Habitats Directive equivalent to the New Forest parched acid grasslands

**Historic description:** Parched acid grasslands are not accommodated in the Clarke and Westerhoff (1992) report, nor were their distinctive character fully appreciated or described in Tubbs (1986). Hence they have been variously referred to as acid grassland, greens, lawns, re-seeded grassland, partially improved grassland and neutral grassland. The original vegetation survey has been subsequently revised by Wright, Westerhoff and Sanderson to accommodate the parched acid grasslands.

### **Distribution of parched acid grassland**

These swards form a major component in many settlement greens mainly as U1f typically in a mosaic with *Chamaemelum nobile* greens, eg Bolton's Bench, Lyndhurst. The lime enriched U1d stands are dominant wherever cultivation has been carried out or broken wartime concrete survives in the soil, and these are the main swards on the dried re-seeded areas. Otherwise parched acid grasslands tend to be found as small pockets on areas of dry, brown earths, sometimes on sites of obvious prior disturbance such as gravel pits, but often simply on patches of richer soil. Associated vegetation is typically heath but the community can even occur in larger pasture woodlands.

**Extent of parched acid grassland:** It is estimated that there are some 860 ha of parched acid grassland in the New Forest.

### **'Heathy acid grasslands'**

Dry grasslands dominated by *Agrostis curtisii* and *Molinia caerulea*, generally species-poor and grade into dry heath as heather cover increases.

**National Vegetation Classification:** The range of variation in the heathy acid grassland is accommodated within U3. There are no sub-communities of U3 described in the NVC

**U3: Bristle bent (*Agrostis curtisii*) grassland**

Heathy acid grassland on dry to moist, base-poor soils, developed in response to burning and grazing. It is found on parched soils where soil fertility is too low for the development of parched acid grassland communities (U1). It is also found on soils which are too damp to support parched acid grassland communities, but which are too dry to carry wet grassland communities. The drier stands are dominated by *Agrostis curtisii* with varying quantities of *Aira praecox*, *Potentilla erecta*, *Rumex acetosella*, *Galium saxatile* and *Polygala serpyllifolia*. The damper stands contain more *Molinia caerulea* with species such as *Pedicularis sylvatica* and *Carex panicea*. Locally there are more species-rich stands, (more typical of the herb-rich bracken grassland), with *Succisa pratensis*, *Stachys officinalis*, *Serratula tinctoria* and *Carex montana*.

*Agrostis curtisii* is the dominant feature of this grassland, and in places may form a virtually continuous cover, particularly when derived from recently burned dry heath stands. *Calluna vulgaris*, *Ulex minor* and *U. europaeus* are often components of the sward and on poorer soils, and where it has developed as a temporary phase in the regeneration of heath communities, a steady transition of increasing *Calluna vulgaris* and decreasing grassland species can be found.

Sward heights, percentage bare ground, negative indicator species and bracken cover are all as for parched acid grassland. This community is more prone to collection of dead plant material, particularly if Bracken cover is significant. Generally plant litter should not contribute, in either discrete patches or wider blocks, to more than 25% of the sward.

**Habitats Directive equivalent:** There is no Habitats Directive equivalent of heathy acid grassland.

**Historic description:** Nearly all mapped as acid grassland in Westerhoff and Clarke (1992), based on Tubbs (1986). Subsequently revised by Wright, Westerhoff and Sanderson.

**Distribution of heathy acid grassland:** Dominates large areas of plateau and slope in the south of the Forest as at East End and Boundway Hill, as well as forming smaller patches throughout the Forest. Associated with the occurrence of acidic (generally pH 4.5-5.5) brown earths poor in phosphate and potash and acutely deficient in lime, but also occurs on soils in various

stages of podsolization with highly impoverished upper horizons (Tubbs 1986).

**Extent of heathy acid grassland:** It is estimated that there are some 1,258 ha of heathy acid grassland in the New Forest.

#### **'Moist acid grassland'**

Species poor grassland occurring locally as small strips between parched acid grassland and wet lawns, but also a distinctive community of damp pasture woodland glades. Characterised by fine leaved grasses especially *Agrostis capillaris* and *Festuca rubra* in association with *Galium saxatile*, *Potentilla erecta* and the moss *Rhytidiadelphus squarrosus*. The species characteristic of the more species-rich parched acid grasslands are absent.

**National Vegetation Classification:** Moist acid grasslands are referable to U4, the ubiquitous grassland of the north west uplands.

#### **U4: Sheep's fescue-Common bent-Heath bedstraw grassland (*Festuca ovina*-*Agrostis capillaris*-*Galium saxatile* grassland)**

In the New Forest these grasslands are rather species-poor, tightly grazed, grass dominated swards, on moist acid soils which are not as prone to desiccation as the parched acid grasslands. The only herbs of note are *Galium saxatile* and *Potentilla erecta*. *Molinia caerulea* is often present but at low cover. Sward heights, percentage bare ground, negative indicator species and bracken cover are all as for parched acid grassland. A feature of the Forest Moist Acid Grasslands where they occur as glades in the pasture woodlands, is the abundance of fungi, including some of the rarest species.

**Habitats Directive equivalent:** There is no Habitats Directive equivalent to moist acid grassland.

**Historic Description:** Various mapped as acid grassland or lawn depending on location, in the Westerhoff and Clarke survey (1992). Subsequently revised by Wright, Westerhoff and Sanderson.

**Distribution of moist acid grassland:** Substantial stands are restricted to glades within the pasture woodlands. Otherwise occurs as fairly indistinct transitions between parched acid grasslands and wet lawns.

**Extent of moist acid grassland:** It is estimated that there are some 54 ha of moist acid grassland in the New Forest.

#### **'Neutral greens'**

Dry to moist grasslands characterised by a species-poor, grass dominated sward of *Agrostis capillaris* and *Festuca rubra*, but with *Cynosurus cristatus*, *Lolium*

*perenne*, *Bellis perennis* and *Trifolium repens* as diagnostic species. Of note due to the presence of mats of *Chamaemelum nobile*.

**National Vegetation Classification:** Neutral greens are referable to MG6b sub-community of the NVC.

**MG6b: Perennial rye-grass-Crested dog's-tail-Sweet vernal-grass grassland (*Lolium perenne*-*Cynosurus cristatus*-*Anthoxanthum odoratum* sub-community)**

Species-poor grassland on moist soils usually produced by agricultural improvements such as fertilising, ploughing and re-seeding semi-natural swards. However in the New Forest this grassland type is characteristic of village greens where centuries of stock dunging concentrated near to farmsteads and small holdings, has led to the development of enriched swards, in the absence of more modern treatments. Whilst usually of low nature conservation interest many of the more ancient sites contain certain distinctive features not reflected in the NVC, the most prominent being the abundance of mats of *Chamaemelum nobile*.

Sward heights, percentage bare ground, and negative indicator species, are all as for parched acid grassland.

**Habitats Directive equivalent:** There is no Habitats Directive equivalent to Neutral greens.

**Historic description:** A core community of the 'settlement lawns' of Tubbs (1986).

**Distribution of neutral greens:** Virtually confined to settlement edge greens on moist neutral soils near villages and farms.

**'Herb-rich bracken grassland'**

Whilst *Pteridium aquilinum* can, to a greater or lesser extent, be a component of most of the dry grassland types described above (U1, U3, and U4), it forms a distinctive community on moist soils within a species-rich mosaic of grassland and woodland herbs. This herb-rich bracken grassland is characterised by the presence of grassland species such as *Succisa pratensis*, *Stachys officinalis*, *Serratula tinctoria*, *Platanthera bifolia*, *Carex caryophyllea* and *C. montana*, in a mosaic with woodland ground flora species, particularly *Hyacinthoides non-scripta*, *Anemone nemorosa* and *Viola riviniana*. This grassland forms the core habitat of *Gladiolus illyricus*.

**National Vegetation Classification:** All well grazed bracken stands are referable to the NVC community U20: Bracken-heath bedstraw community (*Pteridium aquilinum*-*Galium saxatile* community), becoming distinctive when bracken cover is between 25% cover and overwhelmingly dominant. All the grassy bracken swards (grassland communities referable to U1, U3 or U4) are best

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described as the Sweet vernal-grass sub-community, (*Pteridium aquilinum-Galium saxatile* community, *Anthoxanthum odoratum* sub-community). These have a variable cover of scattered bracken canopy but remain open allowing the grassland communities beneath to flourish under more sheltered conditions. The herb-rich bracken grassland is not definitively described in the NVC.

**Habitats Directive equivalent:** There is no Habitats Directive equivalent to herb-rich bracken grassland.

**Historic Description:** Not previously recognised as a distinctive community and mapped as acid grassland on Westerhoff & Clarke (1992). Subsequently revised by Wright, Westerhoff and Sanderson.

**Distribution of herb-rich bracken grassland:** Bracken stands are an integral part of virtually all heathland, grassland and pasture woodland stands in the New Forest, ranging from small patches to monospecific stands of tens of hectares. The latter are usually found in mosaics with parched acid grassland and heathy acid grassland and gorse.

The herb-rich bracken communities are more widespread in the south of the Forest, extending to an estimated 250 ha.

### 1.3.18 New Forest wet grasslands: description

#### Definition

The New Forest wet grasslands (known colloquially as wet lawns) comprise a suite of plant communities confined to impermeable or slowly permeable clays, or permeable soils affected by high ground water levels, which are waterlogged in the winter but which dry out to some extent in the summer. They occur both on flushed soils on valley slopes and on flood plains of forest rivers and streams. They are generally tightly grazed swards characterised by the presence of *Agrostis canina* and sedges (especially *Carex panicea*, *C. nigra*, and *C. viridula oedocarpa*, along with species typical of wet acid grasslands especially *Molinia caerulea*, *Succisa pratensis*, *Salix repens* and *Cirsium dissectum*. Extensive carpets of *Anagallis tenella* are seasonally prominent, and where soil water retention is highest, or around flushes, *Hydrocotyle vulgaris*, *Juncus acutiflorus* and *Hypericum elodes* are abundant. The more acidic sites support *Sphagnum* lawns and an increasing heathy element with *Erica tetralix*.

Whilst highly distinctive the wet grasslands of the New Forest are not well defined in the NVC. Separation between the more enriched flood plain, rush pasture type (M23a), is more apparent than the separation between the more nutrient poor flushed, fen meadow type which though generally referable to either M24c, M25b and M16b are in reality a complex mosaic which is very difficult

to separate. They are profoundly affected by stocking regimes, soil moisture retention and soil fertility which are key factors in defining vegetation structure, community type and distribution. (See Fig 1.3.18.1 after Sanderson 1999).

**National Vegetation Classification:** Classification within the NVC is not straightforward, as the high grazing pressure has produced a distinctive grassland variation which Sanderson (1999) has holistically described as *Agrostis canina-Carex panicea* grassland. However, they can generally be viewed as tightly grazed transitions of south western wet acid fen meadows comprising M23a, M24c, M25b and M16b.

**M23a: Soft rush / Sharp-flowered rush - Marsh bedstraw - Sharp-flowered rush sub- community, (*Juncus effusus / acutiflorus - Galium palustre - J acutiflorus sub-community*)**

Wet Lawns on the flood plains are generally referable to this community though in the Forest the rushes are tightly grazed giving the community little outward resemblance to typical M23a rush pasture. Soils are more enriched and contain only limited amounts of *Molinia* but abundant *Carex nigra*. Associated species which occur frequently throughout the sward include *Achillea ptarmica*, *Galium palustre*, *Lotus pedunculatus*, *Mentha aquatica*, *Succisa pratensis*, *Valeriana dioica*, *Viola palustris* and *Cardamine pratensis*.

Sward heights are characteristically less than 2 cm; and heights in excess of 40 cm over more than 25% of the unit would indicate significant under-grazing. The rush domination seen in more typical fen meadow habitats in the south west is not apparent in the tightly grazed swards in the Forest so over domination by *Juncus* species, defined by a cover of greater than 80%, is not likely to become a problem. Species indicative of increased nutrient status, disturbance or significantly reduced grazing pressure and whose presence would trigger concern include *Cirsium palustre* (when cover exceeds 20% of the unit), *Deschampsia cespitosa* (when cover exceeds 10% of the unit), and *Rumex crispus*, *R. obtusifolius*, *Urtica dioica*, *Cirsium arvense* and *C. vulgare* all of whose presence should be no more than occasional. Visible bare ground is generally between 1 and 10% in an intimate mosaic with the vegetation, plant litter is generally scarce and should never exceed 25% cover. *Myrica gale* cover should not exceed 10% of the unit.

**M24c *Molinia caerulea-Cirsium dissectum* Fen meadow - *Juncus acutiflorus -Erica tetralix* sub community**

**M25b *Molinia caerulea-Potentilla erecta* mire - *Anthoxanthum odoratum* sub-community**

**M16b *Erica tetralix-Sphagnum compactum* wet heath *Succisa pratensis-Carex panicea* sub-community**

The flushed wet lawns of the valley slopes and pasture woodland glades are generally referable to these three communities. Community separation is very difficult and for M24c and M25b in the New Forest wet lawns, it is really no more than the presence in the former, and absence in the latter, of *Cirsium dissectum*. They are characterised by increased amounts of *Molinia* over the flood plain lawns, and increased *Erica tetralix* and *Sphagnum* cover in the case of M16b. Typical associates include *Anagallis tenella*, *Galium palustre*, *Lotus pedunculatus*, *Narthecium ossifragum*, *Dactylorhiza maculata*, *Pedicularis sylvatica*, *Succisa pratensis*, *Serratula tinctoria*, *Valeriana dioica*, *Viola palustris*, *Carex hostiana*, *C. pulicaris*, *C. echinata* and *Genista anglica*.



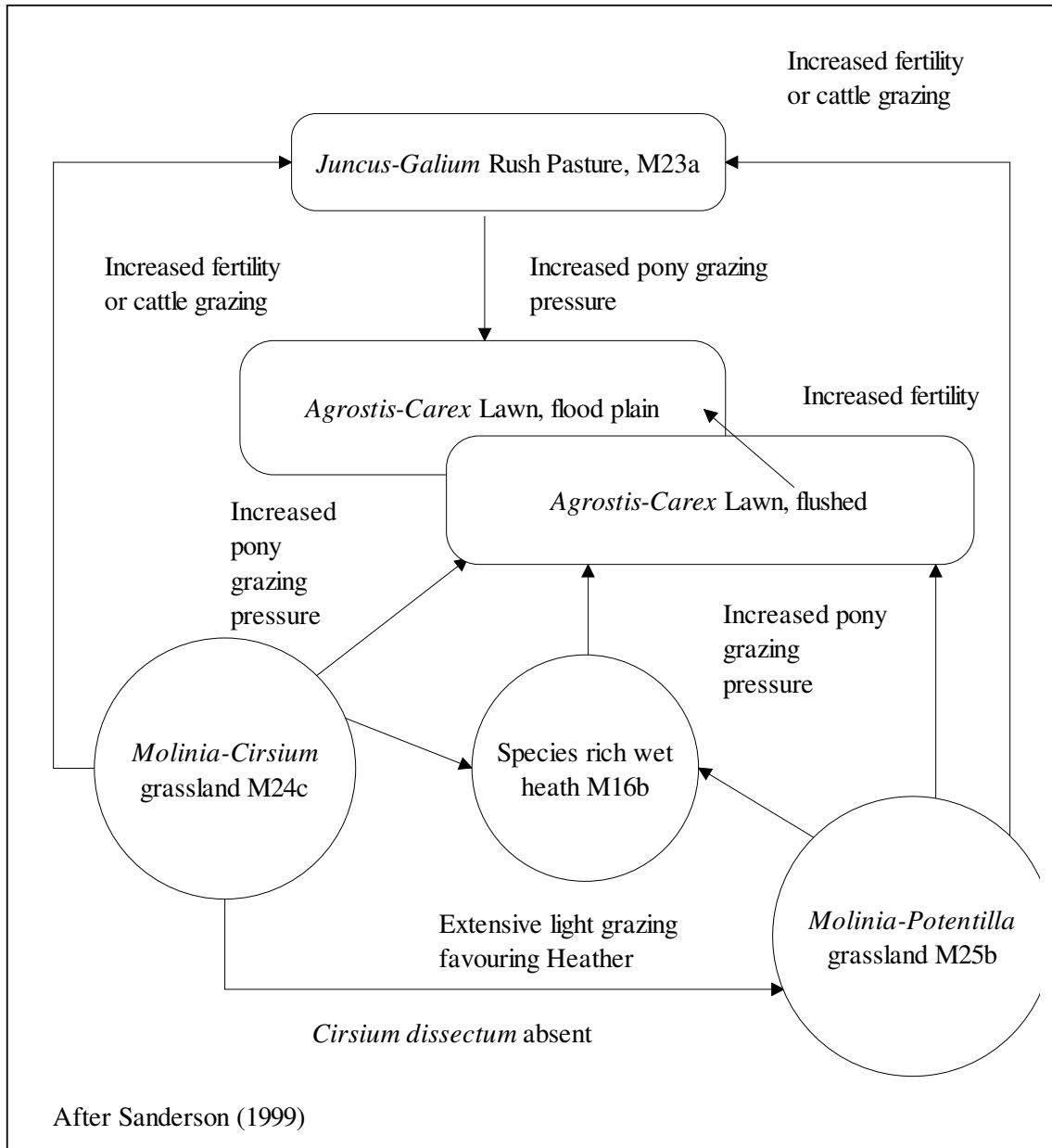


Figure 1.13.18.1 Relationships between Wet Acid Grasslands in New Forest Area

The general interrelationships of these communities in the New Forest are illustrated in Figure 1.3.18.1 (After Sanderson 1999). Low grazing pressure favours the spread and dominance of *Molinia*, while heavy cattle grazing will tend to reduce *Molinia* but maintain *Juncus acutiflorus* dominance. Heavy grazing, especially by ponies will reduce the dominance of both *Molinia* and *Juncus acutiflorus* and increase *Agrostis canina* and *Carex* dominance. Extensive moderate grazing will give heather a competitive advantage.

*Molinia* will avoid the more fertile soils while *Cirsium dissectum* prefers slight lime enrichment but avoids the most base rich calcareous soils where it is confined to tussocks. It is difficult to explain the distribution of *Cirsium dissectum* distribution on forest wet lawns, which within certain parameters, appears almost random; it typically forms dense patches in the sward and then can be absent for considerable stretches.

Sward heights are generally slightly taller than on the flood plain wet lawns and lie between 2 and 5cm. In exceptional cases sward heights may be greater but should not exceed 15cm for more than 25% of the unit. Other sward attributes are the same as for M23a.

### **Habitats Directive equivalent**

The wet grasslands of the New Forest comprise a complex and intimate mosaic of the various NVC plant communities described above. In the strictest sense the M24c *Molinia-Cirsium* fen meadows conform most closely to the annexe 1 habitat: *Eu-molinion* (*Molinia meadows on chalk and clay*) in the Habitats Directive. However, since the only significant differentiator between M25b and M24c in the New Forest context is the presence or absence of *Cirsium dissectum*, and the distribution of this species is not easy to explain, both M25b and M24c are considered to be referable to the *Eu-molinion*.

### **Distribution of wet grassland**

Large flood lawns dominate the non-wooded parts of the flood plains and flushed lawns are characteristic features of valley slopes and pasture woodland glades across the Forest. The distribution of wet grassland in the New Forest is shown on Map 1.3.18.1.

**Extent of wet grassland** It is estimated that there are some 1.063 ha of wet grassland in the New Forest.

## **1.3.19 New Forest temporary ponds: description**

### **Definition**

The New Forest supports a range of distinctive vegetation communities restricted to water-filled shallow depressions on poorly drained soils which dry out

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temporarily during the summer months. Sanderson (1999) has derived a provisional classification of these temporary (or ephemeral) ponds which describes five distinct vegetation community types, and has also attempted to refer each class to the National Vegetation Classification (NVC). These are:

1. 'Spike-rush - Purple moor-grass community' (*Eleocharis multicaulis*-*Molinia caerulea* community).
2. 'Lesser marshwort - Floating club-rush - Pillwort community' (*Apium inundatum*-*Eleogiton fluitans*-*Pilularia globulifera* community).
3. 'Creeping bent - Marsh foxtail - Knotweed community' (*Agrostis stolonifera*-*Alopecurus geniculatus*-*Persicaria* spp community).
4. 'Floating sweet-grass community' (*Glyceria fluitans* community).
5. 'Pool edge assemblages'.

In terms of the National Vegetation Classification the first four of these communities are broadly referable to M30, OV35, OV31/OV30 and S22; whilst there is not really an NVC equivalent for the pool edge assemblage. (See below for details).

The temporary ponds support two Habitat Directive Annex 1 habitats:

1. *Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae*
2. *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto - Nanojuncetea.*

They also support an outstanding flora including many nationally scarce and rare species. Table 1.3.19.1 shows the relationship between the New Forest temporary ponds, (after Sanderson), the NVC, and the Habitats Directive. It also shows the interesting and nationally scarce / rare plant species associated with each community.

**Table 1.3.19.1:** The relationship between the New Forest temporary ponds, (after Sanderson), the NVC, and the Habitats Directive and the interesting and nationally scarce/rare plant species associated with each community.

Temporary Pond Community (After Sanderson 1999)	NVC equivalent	Habitats Directive equivalent	Associated Species * = Nationally scarce **=Nationally rare
<i>Eleocharis multicaulis</i> -	M30: <i>Hydrocotylo-Baldellion</i> of	Oligotrophic waters	<i>Deschampsia setacea</i> *

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<p><i>Molinia caerulea</i> Community</p>	<p>seasonally-inundated habitats.</p>	<p>containing very few minerals of Atlantic sandy plains with amphibious vegetation.</p>	<p><i>Littorella uniflora</i></p>
<p><i>Apium inundatum- Eleogiton fluitans- Pilularia globulifera</i> Community</p>	<p>M30: <i>Hydrocotylo- Baldellion</i> of seasonally-inundated habitats, but also referable to OV35 <i>Lythrum portula - Ranunculus flammula</i> Community Grades to M29 <i>Hypericum elodes- Potamogeton polygonifolius</i> soakway where there is water movement.</p>	<p>Oligotrophic waters containing very few minerals of Atlantic sandy plains with amphibious vegetation.</p>	<p><i>Apium inundatum Baldellia ranunculoide s Galium constrictum* * Littorella uniflora Ludwigia palustris** Pilularia globulifera*</i></p>
<p><i>Agrostis stolonifera- Alopecurus geniculatus- Persicaria spp</i> Community</p>	<p>OV31 <i>Rorippa palustris- Gnaphalium uliginosa</i> Community, but also referable to <i>Bidens tripartita- Persicaria hydropiper</i> Community</p>	<p>Not included</p>	<p><i>Limosella aquatica* Ludwigia palustris** Mentha pulegium** Pulicaria vulgaris**</i></p>
<p><i>Glyceria fluitans</i> Community</p>	<p>S22 <i>Glyceria fluitans</i> Water margin</p>	<p>Not included</p>	<p><i>Galium constrictum* *</i></p>

	vegetation Community		
Pool Edge Assemblage s	No real equivalent described	<i>Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and / or of the Isoeto - Nanojuncet ea.</i>	<i>Carex viridula viridula Cicendia filiformis* Illecebrum verticillatum * Radiola linoides</i>

Given a relatively high grazing pressure, the main factors in determining the distribution of the various temporary pond communities across the Forest are base status of the water (derived from the underlying soils), nutrient status and input, and length of submergence

### Temporary pond community descriptions

#### 1. Spike-rush - Purple moor-grass community (*Eleocharis multicaulis*-*Molinia caerulea* community).

Grazed swards of *Eleocharis* spp and *Molinia caerulea*, often with carpets of *Sphagnum*, particularly *Sphagnum cuspidatum* and *S. auriculatum*. Typically found in pans and runnels in wet heath where acid, nutrient-poor water collects, but which is not sufficiently permanent for bog pool communities to develop.

Apparently referable to the un-sampled communities covered (but not described) in the NVC as M30: *Hydrocotylo-baldellion of seasonally-inundated habitats* in which it refers to stands of vegetation in which *Eleocharis multicaulis* is strongly dominant in the absence of more acidic bog pool species (eg *Potamogeton polygonifolious*). A characteristic associate is the presence of *Deschampsia setacea*, a nationally scarce species restricted to this community in the New Forest, together with *Littorella uniflora*.

### Habitats Directive equivalent

*Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae*

#### 2. Lesser marshwort - Floating club-rush - Pillwort community (*Apium inundatum*- *Eleogiton fluitans*-*Pilularia globulifera* community)

Mixed vegetation characterised by the presence of *Apium inundatum*, *Eleogiton fluitans* and the nationally rare, grass-like fern *Pilularia globulifera*, together

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with frequent *Glyceria fluitans*, *Lythrum portula*, *Juncus bulbosus*, *Baldellia ranunculoides* and *Eleocharis multicaulis*. Typical associates of the well-grazed Forest temporary pond communities include the two nationally rare species *Galium constrictum* and *Ludwigia palustris*, together with *Littorella uniflora*. Found in temporary ponds with less acidic (than 1 above) but nutrient poor water, typically found in depressions within wet grassland vegetation.

In terms of the NVC this community is referable to M30 (above) but also to OV35: *Lythrum portula-Ranunculus flammula* community. Where there is water movement, (eg in linear features) then this community grades into a less acidic version of M29: *Hypericum elodes-Potamogeton polygonifolius* soakway).

### **Habitats Directive equivalent**

*Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae.*

### **3. Creeping bent - Marsh foxtail - Knotweed community (*Agrostis stolonifera-Alopecurus geniculatus-Persicaria* spp community).**

A variable community ranging from grassy to herb dominated communities with the grasses *Agrostis stolonifera*, *Alopecurus geniculatus* and occasionally *Glyceria* spp, with the ruderal herbs *Gnaphalium uliginosum*, *Persicaria hydropiper*, *P. Minor*, *P. maculosa*, *Bidens tripartita* and *Potentilla anserina*. These temporary ponds are notable for the presence of the nationally scarce *Limosella aquatica*, and the three nationally rare species, *Mentha pulegium*, *Ludwigia palustris* and *Pulicaria vulgaris*.

These communities are associated with higher nutrient status and fairly neutral pH, in situations where heavy grazing results in poaching and the accumulation of dung. Typically found within neutral greens (MG6b) and in water-retaining depressions in parched acid grasslands (U1).

These nutrient enriched communities are most closely referable to NVC community OV31: *Rorippa palustris-Gnaphalium uliginosa* community. However there are considerable differences, and there are also strong similarities to OV30: *Bidens tripartita-Persicaria hydropiper* community.

### **Habitats Directive equivalent**

There is no Habitats Directive equivalent to this community.

### **4. Floating sweet-grass community (*Glyceria fluitans* community)**

These are stands dominated by *Glyceria fluitans* in flood channels in flood plain wet grasslands. Whilst grazing reduces the dominance of *Glyceria* they are relatively species poor stands compared to the other community types,

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though notable on occasion for the presence of the nationally rare *Galium constrictum*

This community is directly referable to the NVC community S22: *Glyceria fluitans* Water Margin Vegetation.

## 5. Pool edge assemblages

These are communities on the edge of large temporary ponds, shallow ephemeral pools and poached damp hollows in grassland which support a number of specialist species in a zone with *Juncus bufonius*. These include the two nationally scarce species *Illecebrum verticillatum*, and *Cicendia filiformis*, often in association with *Radiola linoides* and *Anagallis minima*.

There is no NVC equivalent to such plant assemblages.

### Habitats Directive equivalent

*Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and Nanojuncetea.*

### For all temporary pond communities

Heavy grazing pressure is of prime importance in the maintenance of the outstanding flora of these temporary pond communities in the New Forest. It maintains an open habitat, controlling scrub ingress and stock trample the surface. Commoners animals also transport seed in their hooves from pond to pond widely across areas where suitable habitat exists. Accordingly all temporary ponds should be grazed and at the end of the summer, when they will generally be surface dry, between 25% and 75% of the ground should be bare and trampled to some degree. Water chemistry and sediment quality should be maintained and aggressive species dependent upon very high nutrient level such as *Juncus bulbosus var fluitans* should not exceed 50% cover and algal species should not become dominant for long periods. Invasive alien species, particularly *Crassula helmsii* and *Myriophyllum aquaticum* should be absent.

### Distribution

Temporary ponds occur throughout the Forest in depressions capable of holding water for part of the year. The nutrient rich *Agrostis-Alopecurus-Persicaria* community are confined to settlement edge greens, the *Glyceria fluitans* community mainly to flood plain wet grassland, pools with *Eleocharis-Molinia* community in undrained heathland basins and the *Apium-Eleogiton-Pilularia* community and pool edge assemblages to wet grassland and acid grassland further from settlements.

**Extent of temporary ponds:** Since most temporary ponds are relatively small (between 5-10 m across) they are yet to be surveyed and mapped in detail on the SAC vegetation map. However it is likely that the *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and the Nanojuncetea communities* amount to less than 10 ha in total area though great in number.



*The Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae* Communities are widespread in wet heath, but each site is small (usually 2-5 m wide) and so are unlikely to exceed 1 ha in total extent.

### 1.3.20 New Forest permanent ponds and streams: description

The following description of the vegetation of New Forest permanent ponds and streams should be regarded as provisional in the absence of detailed survey / quadrat data.

#### **Ponds and slow moving streams: strongly acid waters**

Strongly acid ponds are local within wet heathland on the southern terraces but rare elsewhere. They can be defined by the abundance of *Juncus bulbosus* and presence of *Sphagnum*, especially *Sphagnum denticulatum (auriculatum)* or *Sphagnum cuspidatum* in very peaty water. Acid stream heads occur close to the valley bogs that can also be dominated by *Juncus bulbosus* but such dystrophic (very acid peat stained) conditions do not extend far down the streams and are replaced in the valley bogs by *Hypericum-Potamogeton Soakways* (M29).

Most stands are referable to the NVC community *Juncus bulbosus* community, *Sphagnum denticulatum* sub-community (A24b)

The community is usually dominated by *Juncus bulbosus* and *Sphagnum* mats and can consist of little else but species such as *Eleogiton fluitans Potamogeton polygonifolius*. *Hypericum elodes* can be present. The community is floristically close to M29 soakway and tends to be replaced by this where water movement is strong as *Hypericum elodes* increases in abundance.

#### **Habitats directive equivalent**

This NVC community is referred to the *Utricularietalia* order by Rodwell (2000). This implies that these acidic and peaty (dystrophic) ponds are referable to the Habitats Directive habitat 22.14: *Natural Dystrophic lakes and ponds*. These dystrophic ponds have a very south western stamp compared with upland dystrophic ponds (C. Newbold, pers. com) and may well be of SAC quality, but would require further work to establish their appropriate classification in the European sense.

#### **Faster flowing streams**

Faster flowing somewhat less acidic water of streams can be dominated by *Myriophyllum alterniflorum*. Referable to the NVC Community *Myriophyllum alterniflorum* (A14), generally species poor stands dominated by *Myriophyllum alterniflorum*.

#### **Habitats Directive equivalent**

A generally upland community referred to the *Ranunculion fluitantis* alliance by Rodwell (2000). This implies that these streams may be referable to the

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Habitats Directive habitat 24.4 : *Floating vegetation of Ranunculus of plain submountainous rivers* but further work would be required to establish their appropriate classification in the European sense.

**Acid/neutral water:** streams

The majority of the deeper streams of the New Forest support mixtures of *Ranunculus peltatus* and *Callitriche* spp, certainly including *Callitriche obtusangula* but probably other *Callitriche* species as well. Associated species include *Myriophyllum alterniflorum*, *Elodea canadensis*, *Potamogeton polygonifolius*, *Potamogeton natans*, and *Sparganium emersum*. In well lit streams with shallow margins, short mixed marginal vegetation is prominent; usually dominated by mixtures of *Apium nodiflorum*, *Glyceria* species and *Potamogeton polygonifolius*, with many other associated species. Species such as *Apium nodiflorum* can reach into the deeper water in the centre of the streams. Tufts of *Sparganium erectum* can form small stands of swamp in less accessible edges. These well vegetated streams are most typical of rivers in the south of the Forest

Woodland permanent streams are widespread and generally have a sparser cover of *Ranunculus peltatus* and *Callitriche* spp, but a distinctive bank flora with a high cover of bryophytes, ferns, especially *Athyrium filix-femina* and woodland herbs and grasses. Better lit pools in the lower reaches of the wood streams have stands of yellow water lily *Nuphar lutea* associated with a few populations of the northern *Potamogeton alpinus* on the Beaulieu and Lymington Rivers.

Many smaller streams run in winter only and tend to have bottoms consisting largely of bare gravel, especially in the north of the Forest. A specialised habitat is found in the smaller gravely woodland streams. As long as the flint gravels are not moved around too much they support a small but distinctive lichen flora on the flint pebbles. This may include two apparently undescribed species and it is not simply an impoverished upland stream flora (Glibert & Giavarini, 1997). The lichens are absent from heathland streams and appear to be a particular feature of small streams within old growth woodland.

**Habitats Directive equivalent:** The main NVC communities of the streams are the *Ranunculus peltatus* community (A20) and *Callitriche stagnalis* community *Callitriche* sub-community (A16a). Both are referred to the *Callitricho-Batrachion* alliance by Rodwell (2000). This implies that these streams may be referable to the Habitats Directive habitat 24.4 : *Floating vegetation of Ranunculus of plain submountainous rivers* but further work would be required to establish their appropriate classification in the European sense.

**Nutrient poor acid/neutral ponds**

These are exemplified by Hatchet Pond and support aquatic vegetation equivalent to the *Pilularia -Apium inundatum* ephemeral ponds. These species are absent but the pond base is dominated by *Littorella uniflora*, a species that is more scattered in ephemeral ponds. A distinctive associated aquatic species is the

nationally scarce *Elatine hexandra*. The pond margins have a distinctive amphibious community of *Eleocharis acicularis* that is lacking from the ephemeral ponds and appears to depend on a fairly constant water level.

In Hatchet Pond there are also distinctive swamp communities of emergents in the more base enriched area near the flooded marl pits. This is dominated by *Menyanthes trifoliata* and the nationally rare *Ludwigia palustris* along with *Equisetum fluviatile*.

The distribution of permanent ponds with this sort of vegetation beyond Hatchet is not clear and should probably be investigated. Sowley pond has records of *Littorella uniflora* and *Elatine hexandra* some may have, or had similar vegetation (Brewis *et al*, 1996). It does also have an area of *Ludwigia palustris* swamp.

The aquatic and amphibious communities of permanent ponds are clearly referable to the *Littorelletalia*, an order not sampled by the NVC in the lowlands. The *Littorella uniflora* dominated aquatic community is clearly referable to the *Litterellion uniflorae* alliance and closest to the upland NVC community *Littorella uniflora* - *Lobelia dortmanna* community *Littorella uniflora* sub-community (A22a) but lacking the *Lobelia dortmanna*. The *Eleocharis acicularis* amphibious community belongs to the *Eleocharition acicularis* alliance that was not sampled by the NVC.

The *Menyanthes trifoliata* - *Ludwigia palustris* swamp is a southern version of the NVC community *Equisetum fluviatile* Swamp - *Carex rostrata* sub-community (S10b). This is a mainly upland community, which interestingly is a locus of several rare upland species such as *Lysimachia thyrsiflora*. Sanderson has seen *Eriophorum gracile* in another lowland version of S10b in Surrey.

**Habitats Directive equivalent:** These *Littorelletalia* are referable to the Habitats Directive habitat: *Oligotrophic waters in medio-European and perialpine area with amphibious vegetation: Littorella or Isoetes or annual vegetation on exposed banks (Nanocyperetalia)*

### **Richer acid/neutral ponds**

More typical of the permanent ponds are communities of somewhat more nutrient rich situations lacking *Littorelletalia* species. For the most part these are small and fairly shallow with *Ranunculus peltatus* prominent with varied associates including *Glyceria fluitans*, *Glyceria declinata*, *Alisma plantago-aquatica*, *Potamogeton natans* and *Callitriche* species. Associated emergents include *Eleocharis palustre* in grazed areas and *Typha latifolia* and *Sparganium erectum* in deeper water.

Many of the deeper ephemeral *Pilularia-Apium inundatum* ponds will have *Ranunculus peltatus* prominent in the spring aquatic phase but this will be

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mixed with *Littorelletalia* species. The characteristic hybrid crowfoot *Ranunculus x novae-forestae*, which is apparently endemic to the New Forest, and confined to the aquatic phase of ephemeral ponds (Brewis *et al*, 1996).

Locally in the south of the Forest somewhat more nutrient rich shallow ponds *Ranunculus aquatilis* can replace *Ranunculus peltatus*. Associated species include *Glyceria fluitans* and *Apium nodiflorum*.

The vegetation of deeper permanent ponds of the New Forest requires further investigation *Potamogeton natans* communities certainly occur.

The widespread community of shallower ponds is referable to NVC community *Ranunculus peltatus* community A20 with associated *Typha latifolia* Swamp (S12) and *Sparganium erectum* Swamp (S14). The A20 communities is referred to the *Callitricho-Batrachion* alliance by Rodwell (2000).

The other NVC aquatic communities present are *Ranunculus aquatilis* community A19 and *Potamogeton natans* Communities A9. Both of these are referred to the *Nymphaeion* alliance.

**Habitats Directive equivalent:** None

### **1.3.21 New Forest mammals: description**

The New Forest heathland and woodland habitats support a range of mammals, including 14 species of conservation concern (see Table 1.3.21.1)

Putman & Langbein (1999) give current estimates of deer numbers across the Crown lands. Of the four established species in the Forest only Fallow are present in high numbers (2,040) and widespread. Red and Sika are localised and present in fairly low numbers (about 100 of each) and Roe (300+) are restricted (largely by suitable habitat) to the fringes of the Forest and it's more suitable surrounding wooded estates. Whilst fallow, in view of their higher population numbers and widespread distribution, have the largest potential impact on pasture woodlands, their preferential grazing habit and ability to feed over wide areas including the Inclosures and adjoining farmland, means that they are less dependent upon the Open Forest than domestic stock. Overall their relative impact on the woodland sward is minimal though they may have a more significant impact on tree regeneration. One further introduced species Muntjac is present in the Forest and is already resident in parts (eg Langley Wood).

Grey squirrels, imported from eastern North America, were introduced to the New Forest, as elsewhere in Britain, in the early 20th century. They are now widespread and common and subject to largely ineffective control. Native Red squirrel is extinct in the New Forest and will remain so whilst grey squirrel are present.

Fox, hedgehog and badger are widespread though relatively uncommon where food supply is low, and rabbits are locally common on the Forest dry grasslands / dry heath mosaics, where they contribute considerably to the botanical diversity of the sward and provide opportunities for other species dependent upon bare sandy ground for part of their life cycle (eg sand lizard and a whole host of invertebrate species). Stoats and weasels are present but their distribution and abundance is related to that of their principle prey species (rabbits and small mammals). Brown hare *Lepus capensis* are relatively scarce.

Where vegetation structural diversity is low as a result of livestock grazing, small mammal numbers are also low in comparison to ungrazed habitats (Tubbs 1986), due to an absence of suitable habitat (especially with regard to shelter and food). However, wood mice *Apodemus sylvaticus* and field vole *Microtus agrestis* are recorded but at very low densities on the grazed open heathland. Broadleaved woodlands support yellow-necked mice *Apodemus flavicollis*, bank vole *Clethrionomys glareolus*, common and pygmy shrews *Sorex araneus* and *S. minutus* and where soils are rich enough to support earthworms, mole *Talpa europeaus*. The Inclosures on the Crown lands have the capacity to support significantly higher populations of small mammals if effectively managed against livestock grazing.

**Table 1.3.21.1: Mammal Species of Conservation Concern Present in the New Forest**

SPECIES	HABITAT	DISTRIBUTION	STATUS
Water Vole <i>Arvicola terrestris</i>	streams & rivers	Rare,	Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Otter <i>Lutra lutra</i>	streams & rivers	Rare, Lymington River	Annex II & IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Dormouse <i>Muscardinus avellanarius</i>	Woodland	Rare, Lymington River woodland corridor, Langley Wood	IUCN LR/nt Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Barbastelle bat <i>Barbastella barbastellus</i>	Wood pasture	Rare	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Pipistrelle bat <i>Pipistrellus pipistrellus</i>	Trees or buildings	Common	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Grey long-eared bat <i>Plecotus austriacus</i>	Trees or buildings	Rare	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Brown long-eared bat <i>P. auritus</i>	Trees or buildings	Rare	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Seotine <i>Eptesicus serotinus</i>	Trees or buildings	Rare	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Noctule <i>Nyctalus noctula</i>	Wood pasture	Rare	Annex IV Habitats Directive Shedule 5 Wildlife & Countryside Act British Mammal Red Data Book



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Bechstein's bat <i>Myotis bechsteinii</i>	Wood pasture	Rare, restricted to New Forest in Hampshire	IUCN VU Annex II & IV Habitats Directive Schedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Daubenton's bat <i>M.daubentonii</i>	Wood pasture	Rare	Annex IV Habitats Directive Schedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Brandt's bat <i>M.brandtii</i>	Wood pasture	Rare	Annex IV Habitats Directive Schedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Whiskered bat <i>M.mystacinus</i>	Wood pasture	Rare	Annex IV Habitats Directive Schedule 5 Wildlife & Countryside Act British Mammal Red Data Book
Natterer's bat <i>M.nattereri</i>	Wood pasture	Rare	Annex IV Habitats Directive Schedule 5 Wildlife & Countryside Act British Mammal Red Data Book

## **Mammal species of conservation concern**

The broadleaved woodlands are a main focus for mammal species of conservation concern. Principle amongst those are the bats, particularly Bechstein's and the recently discovered Barbastelle, species dependent upon old trees with holes and an abundant flying insect fauna associated with the New Forest habitat mosaic of heathland and woodland. Other bat species established in the Forest include pipistrelle (both 46 and 46), grey long-eared, serotine, noctule, brown long-eared, natterer's, Daubenton's, whiskered and Brandt's.

Dormouse, a species requiring dense shrub layers is not present in pasture woodlands or plantations in the Forest, but has been recorded from the Lymington River woodland corridor and Langley Wood.

The Forest streams and rivers (particularly the Lymington River) support otter and water vole.

### **1.3.22 New Forest birds: description**

The New Forest supports an exceptionally rich bird fauna with a variety of species exploiting heathland or woodland habitats preferentially or in some cases both where feeding and nesting or roosting habitat preferences differ.

#### **Heathland birds**

Whilst the heathland habitats are of international importance for certain breeding and wintering bird species, there is a relative paucity of birds (species and numbers) on heathland. This is related to the fact that the British avifauna is largely of woodland origin coupled with the relatively uniform structure of heathland habitats and inadequate year-round food supply. For example there are no large wintering flocks of finches, starlings or other passerines on open heathland due to the shortage of insects and seed. Those species that do overwinter on heathland (eg wren, stonechat, meadow pipit and Dartford warbler) are highly dependent upon *Ulex europaeus* which provides a rich though variable, invertebrate food supply all year round, and when in suitable condition, cover, shelter and in the breeding season, nest sites. Skylark are common and wheatear breed occasionally using rabbit burrows on dry grassland sites. Other passerines such as yellowhammer, grasshopper warbler, linnet, willow warbler, chiffchaff, whitethroat, dunnoek, robin, blackbird and green woodpecker tend to be more reliant on woodland edge / scrub habitats, than directly upon heathland. Indeed the structural mosaic of heathland habitats, with birch scrub and bracken components are of much greater value to most birds than uniform tracts of heather.

Heathland and heathland / woodland-edge specialists are Dartford warbler, woodlark, and nightjar (see below), tree pipit, and formerly red-backed shrike. The latter was last recorded breeding in the Forest in 1978; its decline

possibly being related to climatic deterioration. Another species dependent upon heather but extinct in the New Forest since the 1930's is black grouse.

Amongst the raptors, hen harrier and merlin overwinter on the Forest heathland, roosting in dense heather though feeding over a much greater range of habitats including adjacent farmland. Notable summer visitors are hobby and Montagu's harrier. Hobby breed in good numbers (up to 25 pairs) using old crows nests mainly in woodland edge habitats and feed over heathland on swallows and martins and larger flying insects, particularly Odonata. One pair of Montagu's harrier generally attempts to nest and rear young in the northern heathland but is rarely successful, largely as a result of Corvid predation from an adjoining tip, despite a considerable annual wardening effort by the Forestry Commission staff and volunteers.

The wetland heathland habitats (mires, pools and wet grassland) provide a valuable locus for inshore breeding waders including redshank, snipe, curlew and lapwing, and breeding mallard and teal, and occasionally shelduck. The larger Forest rivers and streams are important for kingfisher and grey wagtail.

Those birds of recognised conservation concern are listed against their preferred habitats with an indication of status where known in Table 1.3.22.1. Of particular significance are the species for which the Forest is designated as a Special Protection Area (breeding Dartford warbler, nightjar and woodlark and overwintering hen harrier) and these are dealt with in greater depth on an individual basis below.

### **Dartford Warbler *Sylvia undata***

#### **Distribution and status**

Resident and largely restricted to heathland in the United Kingdom, the European (= global) population being at its north western extremity. New Forest census in 1994 revealed between 567 and 619 territories which represents around 33% of the total UK 1994 population, making New Forest heathland the single most important location for Dartford warbler in the UK.

#### **Ecology**

Dartford warbler typically occurs on dry heathland which supports mosaics of *Ulex europaeus* and *Calluna vulgaris* / *Erica* spp in which they nest between mid-April and early July. Birds nesting early in the season may attempt a second or even a third brood. Gorse is particularly important in providing habitat for prey items (beetles, spiders, caterpillars and bugs) and in winter provides protection from extreme weather conditions to which the population is highly susceptible. In Britain Dartford warblers are largely sedentary, although some disperse outside the breeding season. These movements (combined with recent mild winters and good breeding seasons) have enabled the population

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to expand and re-colonise many formerly occupied sites.



**TABLE 1.3.22.1: Bird Species of conservation concern regularly occurring in the New Forest**

<b>Species</b>	<b>Habitat</b>	<b>Distribution</b>	<b>Protection / status</b>
Shelduck <i>Tadorna tadorna</i>	Valley Mires / Permanent ponds	Occasional breeder, common	RSPB Amber list
Teal <i>Anas crecca</i>	Valley Mires / Permanent ponds	Regular breeder, common	RSPB Amber list
Montagu's Harrier <i>Circus pygarrus</i>	Dry Heath (breeding)	Occasional breeder, 1 pair, rarely successful, rare	W&C Act Schedule 1 RSPB Amber list
Hen Harrier <i>Circus cyaneus</i>	Dry Heath (roost), feeds over heathland, farmland	15 wintering pairs, 2% UK population, rare	W&C Act Schedule 1 RSPB Red list
Honey Buzzard <i>Pernis apivorus</i>	Woodland	2 breeding pairs, 12.5% UK population, rare	W&C Act Schedule 1 RSPB Amber list
Kestrel <i>Falco tinnunculus</i>	Woodland edge / heathland	Regular breeder, common	RSPB Amber list
Hobby <i>Falco subbuteo</i>	Heathland	25 breeding pairs, 3% of UK population, rare	W&C Act Schedule 1
Merlin <i>Falco columbarius</i>	Heathland	Overwinters, scarce	W&C Act Schedule 1 RSPB Red list
Black Grouse <i>Tetrao tetrix</i>	Heathland	Extinct in New Forest since 1930's	RSPB Red list
Ringed Plover <i>Charadrius hiaticula</i>	Dry grassland / bare stony ground	Rare breeder	RSPB Amber list
Lapwing <i>Vanellus vanellus</i>	Valley mires / Wet grassland / Permanent & temporary ponds	Regular breeder	RSPB Amber list
Curlew <i>Numenius arquata</i>	Valley mires / Wet grassland / Permanent & temporary ponds	Regular breeder	RSPB Amber list
Redshank <i>Tringa totanus</i>	Valley mires / Wet grassland / Permanent & temporary ponds	Regular breeder	RSPB Amber list

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Snipe <i>Gallinago gallinago</i>	Valley mires / Wet grassland / Permanant & temporary ponds	Regular breeder	RSPB Amber list
Nightjar <i>Caprimulgus europaeus</i>	Heathland mosaic	300 breeding pairs, 8.8% of UK population	RSPB Red list
Kingfisher <i>Alcedo atthis</i>	Rivers & streams	Up to 10 pairs, uncommon	RSPB Amber list
Wryneck <i>Jynx torquilla</i>	Woodland	Extinct, last seen in 1940's	W&C Act Schedule 1 RSPB Red list
Green Woodpecker <i>Picus viridis</i>	Woodland / grassland mosaic	Regular breeder	RSPB Amber list
Dunnock <i>Prunella modularis</i>	Woodland edge / Scrub	Regular breeder	RSPB Amber list
Skylark <i>Alauda arvensis</i>	Heathland / Grassland	Regular breeder, common	RSPB Red list
Woodlark <i>Lullula arborea</i>	Dry heath / Dry grassland	184 breeding pairs, 30.7% UK population, rare	W&C Act Schedule 1 RSPB Red list
Nightingale <i>Luscinia megarhynchos</i>	Woodland edge / dense scrub	Regular breeder, infrequent	RSPB Amber list
Redstart <i>Phoenicurus phoenicurus</i>	Woodland	Regular breeder, scarce	RSPB Amber list
Stonechat <i>Saxicola torquata</i>	Dry Heath	Regular breeder, common	RSPB Amber list
Song Thrush <i>Turdus philomelos</i>	Grassland	Regular breeder, common	RSPB Red list
Grasshopper Warbler <i>Locustella naevia</i>	Heathland	Summer breeder, frequent	RSPB Amber list
Dartford warbler <i>Sylvia undata</i>	Dry heath	538 pairs, 33.6% UK population	W&C Act Schedule 1 RSPB Red list
Firecrest <i>Regulus ignicapillus</i>	Woodland	Recent coloniser of conifer plantations	W&C Act Schedule 1 RSPB Amber list
Marsh Tit	Woodland	Regular breeder	RSPB Amber list
Willow Tit	Woodland	Regular breeder	RSPB Amber list

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Starling	Woodland / grassland	Regular breeder	RSPB Amber list
Goldfinch	Woodland / grassland	Regular breeder	RSPB Amber list
Red-backed Shrike <i>Lanius collurio</i>	Woodland edge	Extinct as breeder in Forest since 1978	W&C Act Schedule 1 RSPB Red list
Hawfinch <i>Coccothraustes coccothraustes</i>	Woodland		RSPB Amber list
Bullfinch <i>Pyrrhula pyrrhula</i>	Woodland		RSPB Red list
Linnet <i>Carduelis cannabina</i>	Heathland	Regular breeder	RSPB Red list
Crossbill	Pine Woodland	Regular breeder, common	W&C Act Schedule 1



## Habitat requirements

The optimum Dartford warbler habitat comprises extensive mature dry heath (dense heather of 10-30 years old) over 30 cm long, with scattered dense *Ulex europaeus* brakes of around 1-2 m high (6-12 years old) away from the woodland edge. The proportion of gorse to heather largely controls territory density and breeding success is highest in the average territory of some 2.13 ha, when gorse, in suitable condition, comprises 0.6 ha (or about 28%) of the cover. Minimum area of suitable habitat is around 2.5 ha but blocks of 10 ha are preferred. Whilst the bulk of the population is found in optimal habitat (89% or 402 pairs out of 454 pairs found by Westerhoff & Tubbs (1988)), sub-optimal habitats are used, such as gorse brakes on dry acid grassland (which lack the ericaceous component) or dry heath with very little gorse.

Open Forest grazing and rotational heather burning management is ideal, though periodicity and timing of burning operations is important. Heather stands need sufficient time to develop optimal structure (which can in the presence of grazing animals be between 15-30 years in the Forest), and burning must avoid the critical winter period and the start of the breeding season - thus February / March is preferred. Gorse stands should be managed on a 15-20 year rotation (depending upon grazing pressure) to avoid senescence. Tree and bracken cover in excess of the targets specified in the Condition Assessment tables for dry heath would result in sub-optimal conditions for Dartford warbler.

## Monitoring

Habitat through condition assessment monitoring.

Bird counts through 10 year National Dartford warbler survey, due 2004. Additional New Forest sample survey covering one third of suitable 1 km squares at five year intervals due 1999.

Presence and abundance of prey species; monitoring technique to be developed.

## Woodlark *Lullula arborea*

### Distribution and status

Partial migrant, majority of population supported on heathland in the United Kingdom, the European (= global) population being at its north western extremity. New Forest census in 1997 revealed between 179 and 183 territories, which represents around 12.3% of the UK 1997 population, making New Forest heathland the third most important site for woodlark in the UK after Thetford Forest and the Suffolk Sandlings.

## Ecology

Woodlark principle habitat requirement is an intimate mosaic of bare ground and short vegetation on sandy, well-drained soils. Scattered trees or shrubs are used as song perches. Spiders, weevils, caterpillars and seed bearing plants are important food sources. In the breeding season some males take up territories as early as mid-February, and breeding extends to early August; second broods are frequent. The nest is a shallow scrape, usually placed under a tuft of grass or heather, or dead vegetation from the previous season.

### **Habitat requirements**

The optimum woodlark habitat is an intimate mosaic of bare ground and short vegetation up to 10 cm in height, with occasional clumps of shrubs or trees. Due to their rather exacting habitat requirements, woodlark hold large territories of up to 4-5 ha. In the New Forest, the transition between woodland edge and heavily grazed dry grassland / dry heath habitats is a typical location. The mix of bare ground, short (5 cm) and very short (<5 cm) vegetation and bracken litter maintained at these locations by the differential and preferential grazing behaviour of Commoners livestock is ideal.

Burning and cutting also produces more ephemeral sites for woodlark but they generally become unsuitable following two years re-growth, and they are no substitute for the tight vegetation mosaic produced and maintained by grazing. Woodlark are also vulnerable from cutting and burning (and recreational disturbance) from mid-February until early August. The RSPB estimate that a safe working zone of 200 m around occupied sites is necessary to avoid disturbance.

### **Monitoring**

Habitat through condition assessment monitoring.

Bird counts through 10 year National woodlark survey, due 2007. Additional New Forest sample survey covering one third of suitable 1 km squares at five year intervals, due 2002.

Presence and abundance of prey species; monitoring technique to be developed.

### **Nightjar *Caprimulgus europaeus***

#### **Distribution and status**

Migrant, favours heathland for nesting and broadleaved woodland for feeding in the United Kingdom, the European (=50% global) population being at its north western extremity. However, unlike woodlark and Dartford warbler, nightjar has a wider UK distribution, occurring as far north as south and

south west Scotland. New Forest census in 1992 revealed an estimated 310 territories which represents around 9% of the UK 1992 population.

## **Ecology**

Nightjar are ground nesting species, requiring sparsely vegetated or bare ground on heathland, woodland edges and clearings. They will forage (largely on moths and beetles) in habitats around the nest, but can range up to 6 km utilising a wide variety of habitats. They arrive in the UK in late April / early May leaving in August / September to winter in sub-Saharan Africa. They are particularly active after dusk and before dawn when their unusual 'churring' song and wing clapping can be heard.

## **Habitat requirements**

Nightjar require a mosaic of heathland and wooded vegetation for breeding and feeding. In the New Forest they nest on sparsely vegetated or bare ground on dry heath / dry grassland with bracken mosaics, between mid-May and mid-July. There is considerable potential to cause significant disturbance to immature young birds during August, and so operations such as cutting of dense birch, bracken or tall heather stands should be avoided in known breeding sites. They are also vulnerable to recreational disturbance during this period.

Nightjar feed over a broad range of habitats including open heath, mire, pasture woodland and grassland. Hence the juxtapositions of these habitats and transitions between them, maintained by livestock grazing, burning and cutting are essential.

## **Monitoring**

Habitat through condition assessment monitoring.

Bird counts through 10 year National nightjar survey, due 2002. Additional New Forest sample survey covering one third of suitable 1 km squares at five year intervals, begin 2007.

Presence and abundance of prey species; monitoring technique to be developed.

## **Hen harrier (*Circus cyaneus*)**

### **Distribution and status**

Overwinters in the New Forest, roosting on heathland and feeding over a wide area of Forest and farmland habitats. Roosts have supported a maximum of 15 individuals representing 2% of the total UK overwintering population, though numbers are fewer in recent years maybe due to milder winters or the loss of extensive blocks of mature heather.

### **Ecology**

A ground nesting species in northern and western British Isles which migrates south arriving in the New Forest in the autumn (September onwards). Birds feed on avian prey especially pipits on heathland, but spend much feeding time off the Forest on adjacent farmland where prey is more available.

## **Habitat requirements**

Hen harrier roost in extensive deep heather. Sites may be used year after year if they remain in suitable condition. The cut and burn programme clearly has the

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ability to strongly influence condition of harrier roost sites, and it is important that sufficient deep heather remains in favoured roost areas. Prey items, include small to medium sized mammals such as voles to rabbits, and birds pipits to pigeons, though much prey is sought off the Forest.

## Monitoring

Habitat through condition assessment monitoring.

Bird counts through watching roost sites.

Presence and abundance of prey species; monitoring technique to be developed.

## Woodland birds

The New Forest supports an exceptionally rich breeding bird fauna, related to the extent and habitat diversity of the broadleaved woodland cover. In particular open wood pasture with old trees rich in crevices and rot holes provide extensive habitat for woodpeckers (great-spotted, lesser-spotted and green), tree creeper, nuthatch, tits (blue, great, coal, long-tailed), spotted flycatcher tawny owl and redstart. Woodland floor specialists include woodcock, tree pipit, willow warbler, and wood warbler. Where the shrub layer is sufficiently well developed, large numbers of common species occur including chaffinch, wren, robin, blackbird, song thrush, bullfinch, dunnock, chiffchaff, blackcap, garden warbler, greenfinch, goldfinch and linnet.

The recent introduction of coniferous forestry into the Inclosures has encouraged the arrival of firecrest and crossbill where conditions are suitable.

Raptors breeding in the Forest woodlands include buzzard, honey buzzard (see below), kestrel, sparrowhawk and an occasional goshawk. Prey items related to the paucity of heathland birds and the relative scarcity of small mammals (inturn related to a certain homogeneity of grassland sward heights) would appear to be the main limiting factors of raptor population densities (Tubbs 1986).

One woodland species wryneck, has become extinct as a breeding bird in the New Forest this century, having last bred pre-1940. Presumably its extinction is related to its overall contraction in range at a European scale.

Those birds of recognised conservation concern are listed against their preferred habitats with an indication of status where known in Table 1.3.21.1. The Forest is designated as a Special Protection Area (SPA) for certain heathland species (breeding Dartford warbler, nightjar and woodlark and overwintering hen harrier) and for honey buzzard, a species of broadleaved woodland and parkland.

## Honey buzzard (*Pernis apivorus*)

### Distribution and status

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Migratory, breeding in Europe, wintering in central-southern Africa. Up to 2 pairs regularly breed in woodland in the New Forest, representing 2% of the total UK breeding population.

## Ecology

A species of mature woodland and open glades and meadows. Birds migrate to tropical Africa during late- August to mid-September, returning in May to breed. Honey buzzard either make their own nest or develop it from old nests, favouring mature trees such as beech, oak, Scots pine, or douglas fir. They feed on bees, wasps and other insect larvae which they dig from suitable soils. Apart from wasp larvae they will take frogs, birds and other small prey, and forage over large distances (up to 10 km).

## Habitat requirements

Large blocks of woodland within a mosaic of open countryside with smaller copses and meadows are favoured. The availability of preferred prey is probably the key factor. Avoidance of disturbance during nesting, particularly from intrusive forestry operations at or near the nest site is crucial.

## Monitoring

Habitat through condition assessment monitoring.

Annual monitoring / surveillance of New Forest birds to prevent disturbance from forestry operations. A national survey was organised in 2000, but many observers are unwilling to reveal data since honey buzzard attracts the attention of egg collectors.

Presence and abundance of prey species; monitoring technique to be developed.

## 1.3.23 New Forest amphibians and reptiles: description

### Amphibians

Tubbs (1986), Clarke (1989) and Cooke (1989) review the amphibian survey data collected on the New Forest Crown lands over the past century and related distribution to pond acidity, nutrient status and vegetation cover.

Five native species regularly occur; palmate newt *Triturus helveticus*, smooth newt *T. vulgaris*, great crested newt *T. cristatus*, common frog *Rana temporaria* and common toad *Bufo bufo*. Natterjack toad *B. calamita*, never widespread in what are sub-optimal habitat conditions for this species in the Forest, appear to have become extinct (in line with the national decline) around 1950. There are no current plans for its re-introduction, and indeed the combination of suitable terrestrial and aquatic habitat would be difficult to find or create. There is at least one population of non-native tree frog *Hyla arborea*, introduced in the early part of the twentieth century.



Common frog and common toad are fairly frequent throughout the SAC, occurring in suitable pools in both woodland and heathland situations. Cooke & Frazer (1976) record that common frog has the wider tolerance of pool acidity (pH 4.2 -8.2) in the Forest, common toad preferring near neutral ponds.

Clarke (1989) records that of 139 New Forest ponds surveyed over the previous 25 years, about half supported newt colonies. Palmate newt was found in 45% of all ponds surveyed, and is evenly distributed across the Forest, reflecting the tolerance of this species to low pH (down to 3.9) and preference for metal deficient pools especially those poor in potassium, (Cooke & Frazer 1976). Smooth newt is mainly confined to the more nutrient-rich, higher base status pools (above pH 6) in the southern part of the Forest, being present in 25% of all ponds surveyed (Clarke 1989). Whilst separated by water chemistry, both occur in ponds with the same physical characteristics preferring ponds above 100m<sup>2</sup> and those with abundant aquatic plants. The requirements and distribution of the Habitats Directive annex II species great crested newt is described in greater detail below.

### **Great crested newt *Triturus cristatus***

#### **Distribution and status**

Clarke (1987) records that of 139 New Forest ponds surveyed over the previous 25 years, great crested newt was found in just 7 of them. This is a reflection of the more demanding habitat requirements of this species, which shows a marked distribution restricted along the southern edge of the Forest. More recent survey has revealed some 13 sites with an estimated population of between 500-1000 individuals (Davidson-Watts 2000 -pers comm).

#### **Ecology**

Adult male and female great crested newts spend at least half of each year on terrestrial habitats, returning to water briefly for courtship and egg laying in the years of reproductive prime. Furthermore, newly metamorphosed newts leaving a pond at the end of their first year will not return to water until sexually mature which may take up to 4 years to achieve (Macgregor 1995). Hence, the terrestrial element of the species habitat is of vital importance, and this should provide cool, moist conditions for shelter and feeding. Adults normally return to water in late March or early April and leave again at any time after mid-July, when weather conditions are favourable (not too cold or too dry). Suitable ponds should be numerous and not too far apart to prevent inbreeding. Evidence in a Leicestershire study (Arntzen 1993), suggests that adults may move considerable distances (500 m - 1.1 Km) between ponds.

#### **Habitat requirements**

Similar to smooth newt in its water chemistry tolerance (above pH 6, with a high calcium and potassium content), but favouring ponds with a high proportion of open water surface and deeper water, perhaps because the newly hatched larvae require deep water. Nutrient levels should be sufficient to produce good aquatic plant growth, but insufficient to stimulate extensive green filamentous algae. Invasion and swamping by *Crassula helmsii* is a further negative attribute. Predation by fish on larvae is critical, and this species will only thrive in ponds where fish are absent. Great crested newt may use larger temporary ponds which are unsuitable for fish, provided that they contain water over the breeding / tadpole season (February - mid-August) for at least one in every three years. Slight shading is beneficial particularly on the northern edge of the pond, but becomes unfavourable when in excess of 25% on the southern margins or 50% overall (Cooke et al 1994) Extensive structurally diverse pasture woodland or heathland habitats (particularly grassland with scrub) are required adjacent to the key breeding ponds.

### Monitoring

Determine baseline of population and key ponds, followed by 5 year counts.

Habitat by condition assessment of key ponds.

### Reptiles

All six species of native reptiles occur in both heathland and wood pasture habitats in the New Forest, namely smooth snake *Coronella austriaca*, grass snake *Natrix natrix*, adder *Vipera berus*, slow worm *Anguis fragilis*, common lizard *Lacerta vivipara*, and sand lizard *Lacerta agilis*. Of these sand lizard and smooth snake are the only species confined to heathland habitats.

Always restricted due to the lack of optimum habitat, it seems that sand lizard became extinct in the New Forest as a breeding species in the early 1970's. In the Forest, Noble (1998) surmises that the contributory factors in this decline (from 22 sites in the 1950's) may have been loss of habitat due to the planting or self-seeding of Scots pine, post-myxomatosis decline in rabbits - providers of bare sandy substrate, resulting in a lack of sufficient bare sand for egg laying. Subsequently 766 individuals have been re-introduced to five sites into the New Forest, under a release scheme beginning in 1989. Post-release monitoring has revealed that successful breeding and establishment have occurred at three sites, Markway and Dur Hill Inclosures and Hasley heath, while a fourth has yet to demonstrate this and a fifth site was destroyed by illegal fire in 1997 (Noble 1998).

Sand lizard is oviparous, laying its eggs in loose, sandy soil in early summer, and habitat in optimal condition for this species is limited in the New Forest to dry heath (NVC H2a communities) with mature (30 year old plus *Calluna vulgaris*) with plentiful dry sandy bare patches on south facing slopes. Such stands do

*Part 1 Description*

not produce a flush of *Molinia* and so regular burning to improve livestock forage is pointless, and longer rotations avoiding population centres could be implemented through appropriate planning and an element of education. In addition optimum habitat could potentially be created and preferentially managed for sand lizard and smooth snake, following conifer clearance from the Verderers Inclosures, particularly to enhance current populations at Markway and Dur Hill.

Smooth snake has less demanding habitat requirements than sand lizard, utilising the full range of dry and wet heath communities, and is far more widespread and better able to cope with open Forest heathland management regimes.

### **Amphibians and reptiles and the law**

All of the native species of amphibian and reptile receive at least some degree of protection under Section 9 of the Wildlife & Countryside Act (1981) as amended (1988 & 1991), and (for sand lizard, smooth snake and great crested newt) Section 39 of the Habitats Regulations 1994. Three levels of protection apply:

**1. Sand lizard, smooth snake and great crested newt**

Fully protected against deliberate killing, injuring or taking (capture etc), possession, disturbance and destruction of breeding, resting and sheltering places, sale, barter, exchange, transporting for sale and advertising to sell or to buy.

**2. Common lizard, slow worm, grass snake and adder**

Protected against deliberate killing, injuring and trade (ie sale, barter, exchange, transporting for sale and advertising to sell or to buy).

**3. Smooth newt, palmate newt, common frog and common toad**

Protected against trade (ie sale, barter, exchange, transporting for sale and advertising to sell or to buy).

### **Exceptions**

An important defence to any prosecution that might be brought is the exception that where the killing, injuring or taking, disturbance and destruction of breeding, resting and sheltering places, has occurred inadvertently as an incidental result of a lawful operation by an authorised person (ie the owner or occupier or any person authorised by the owner or occupier), no offence has been committed. All recognised forest and heathland management operations are lawful and although these can be carried out at times of year when reptiles (in particular) are vulnerable, the spirit of the Act is clear - **the needless and**

**deliberate destruction of protected species is unacceptable and the onus is on the owner to carry out operations in a reasonably sensitive way.** Advice on planning to avoid disturbance is given below.

### **Planning of habitat management to avoid killing, injuring or disturbance to protected species**

In the New Forest the routine management operations conducted in woodland and in heathland are unlikely to affect great crested newt or the more widespread species. (However, should operations be considered necessary in known great crested newt habitat then careful planning and survey will be required). The principle issue lies with heathland burning and hibernating reptiles.

The legally permitted burning period is 1 November - 31 March, though this can be extended for a further two weeks into April subject to the approval of MAFF in consultation with English Nature. During this period reptiles hibernating in burrows at the time may escape the effects of fire as litter and soil layers provide excellent heat insulation and the rise in temperature only a few centimetres below the surface during a well-managed fire is minimal. However in warm 'early' springs reptiles may have come out of hibernation before the end of the burning season and will be extremely vulnerable to fire.

In such cases careful preliminary searches should be made of known reptile sites to check for active animals and sensitive areas should be avoided. Burning of the driest heathland communities (NVC H2a communities) should not be countenanced in March at known sand lizard population centres.

### **1.3.24 New Forest fish: description**

Of the 42 native and 13 introduced freshwater species in the UK fish fauna, 20 have been recorded in New Forest streams and rivers (eg Lymington River) including bullhead *Cottus gobio* and brook lamprey *Lampetra planeri* (both species listed on annex II of the Habitats directive), and brown trout *Salmo trutta*.

The bullhead is a small bottom-living fish found in the upper reaches of lowland rivers. It is not present in polluted rivers. The brook lamprey is a primitive, jawless fish resembling an eel and is the smallest of the lampreys found in the UK. It lives entirely in freshwater.

### **1.3.25 New Forest invertebrates: description**

The New Forest supports an enormous diversity of invertebrate species. Tubbs (1986) estimates that roughly half of all British insects occur in the New Forest. Such diversity is supported by the extensive woodland and heathland habitats described elsewhere. However, such habitats alone could never

accommodate the wealth of invertebrate fauna present in the New Forest. It is the structural diversity and intimate mosaic with vast areas of transitional edge habitats which diversify the interest.

Only a highly superficial description possible here and that is restricted to dealing with invertebrates of conservation concern. These are listed in Tables 1.3.25.1 and 1.3.25.2 together with their habitat preferences. Some are listed as priority species in the UK BAP and may have current or planned Species Action Plans either at UK level or County level..

### **Management principles and a cautionary note**

In the context of the New Forest it is likely that the habitat needs of the bulk of the staggering diversity of invertebrate species are sufficiently accommodated by current management. The exceptions are those dependent upon more structurally diverse and flower-rich woodland habitats particularly the Lepidoptera, and those associated with wetland habitats which have suffered drainage damage. The importance of bare sandy ground in dry heathland and structurally mature / old *Calluna* stands should be emphasised here also, particularly in the context of many rare heathland Hymenoptera and Coleoptera. It is also pertinent to point out that the distribution and autecological requirements of most of the New Forest species of conservation concern are very poorly understood.

Sterling (1997) has grouped the heathland species under sandy open ground species, dry heathland species, humid and wet heathland species, heather feeders showing little preference for heathland type, mires and seepages, temporary pools and shallow ponds, scrub and heathy woodland edge, and dead wood and fungal associates. Likewise a similar grouping could be produced for woodland invertebrates which would include canopy, scrub and field layer specialists, dead standing and fallen wood and fungal associates, wet swampy woodland, glade and bare ground specialists.

The key point is that all of these habitats need to be present in a suitable condition and in sufficient quantity and distribution to enable all species access to all habitat niches at all times depending on whatever developmental stage they are at. It is important to understand that development from egg to adult may require a variety of different habitats or structural niches at different stages of the development cycle over a number of years. Whilst the New Forest is probably big enough to accommodate and maintain this range of habitat diversity, opportunities to promote further structural and floristic diversity particularly along Inclosure woodland and heathland edge habitats should be taken. In this context the Forest Design Plans which will promote vastly improved management of the Crown lands Inclosures and will provide enormous benefits for a whole range of invertebrates of conservation concern, currently disadvantaged by uniform high grazing pressure across these habitats.



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**Table 1.3.25.1: New Forest invertebrates by group and status**

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Primary Habitat	Status	Lepidoptera	Odonata	Coleoptera	Hymenoptera	Diptera	Orthoptera	Hemiptera	Araneae	Crustacea	Annelida	Mollusca
Woodland	RDB 1	4	-	5	1	1	-	1	-	-	-	-
	RDB 2	1	-	2	-	9	-	-	-	-	-	-
	RDB 3	8	-	12	-	10	-	1	-	-	-	-
	RDB K	-	-	5	-	2	-	-	-	-	-	-
	Notable A	8	-	24	1	-	1	-	-	-	-	-
	Notable B	65	-	73	1	10	3	1	-	-	-	-
	Notable	-	-	10	-	17	-	-	-	-	-	-
	Total	86	0	131	3	49	4	3	0	0	0	0
Heathland	RDB 1	3	-	11	4	6	1	-	-	1	-	-
	RDB 2	2	1	4	3	4	1	-	-	1	-	-
	RDB 3	4	-	11	17	18	1	4	1	-	1	1
	RDB K	-	-	1	1	-	-	-	-	-	-	-
	Notable A	8	-	10	5	-	2	-	-	-	-	-
	Notable B	30	4	65	7	23	3	2	-	-	-	-
	Notable	-	-	7	-	-	-	-	-	-	-	-
	Total	47	5	109	37	51	8	6	1	2	1	1
H+ W Total	133	5	240	40	100	12	9	1	2	1	1	

**Table 1.3.25.2: Significant invertebrate heathland and woodland species sorted by group and status**

Habitat	Group	Species	Requirements	European	National	BAP	SRP
Temporary Ponds	Annelida	<i>Hirudo medicinalis</i>	Temp pools used by vertebrates	IUCN LR/nt Ann ex 5	RDB 3 Sch 5	yes	yes
			1				
Dry Heath	Araneae	<i>Haplodrassus umbratilis</i>	Pioneer & mature dry heath		RDB 3		



Part 1 Description

			1				
Permanent Ponds	Coleoptera	<i>Acylophorus glaberrimus</i>	Amongst semi-aquatic vegetation		RDB 1		
Temporary / Permanent Ponds	Coleoptera	<i>Aphodius niger</i>	Dung around pond edges		RDB 1	yes	yes
Permanent Ponds	Coleoptera	<i>Bagous brevis</i>	Pool edges with <i>Ranunculus</i>		RDB1		
Permanent Ponds	Coleoptera	<i>Bagous czwalinai</i>	Heathland pools		RDB1		
Permanent Ponds	Coleoptera	<i>Gyrinus natator</i>	Acid pools		RDB 1		
Dry Grassland	Coleoptera	<i>Heptaulacus testudinarius</i>	In pony/cattle dung		RDB 1		
Temporary Ponds	Coleoptera	<i>Longitarsus nigerrimus</i>	Temp pools with <i>Utricularia</i>		RDB 1		
Mires	Coleoptera	<i>Pterostichus aterrimus</i>	Sphagnum bogs/acid pools		RDB 1	yes	
Dry Heath	Coleoptera	<i>Pterostichus kugelanni</i>	Dry sandy heathland		pRDB 1	yes	
Mires	Coleoptera	<i>Tachys edmondsi</i>	Sphagnum bogs with bare ground		RDB 1	yes	yes
Mires	Coleoptera	<i>Tachys walkerianus</i>	Sphagnum bogs with bare ground		RDB 1		
			11				
Rivers and Streams	Coleoptera	<i>Agabus brunneus</i>	Streamside		RDB 2		
Mires	Coleoptera	<i>Cryptocephalus biguttatus</i>	Wet heaths/bogs possibly associated with ant spp.		RDB 2		
Rivers and Streams / Permanent ponds	Coleoptera	<i>Graphodytes flavipes</i>	Heathland ponds and slow-flowing water		RDB 2		
Wet Heath	Coleoptera	<i>Hydroporus rufifrons</i>	Wet flush		RDB2		
			4				
Dry Heath	Coleoptera	<i>Acritus homoeopathicus</i>	Associated with the fungus <i>Pyronema confluens</i> /burnt ground		RDB 3		
Dry Heath	Coleoptera	<i>Amara famelica</i>	Dry sandy heathland		RDB 3	yes	
Permanent Ponds	Coleoptera	<i>Bagous colligensis</i>	In heathland pools		RBB 3		
Permanent Ponds	Coleoptera	<i>Bagous frit</i>	Heathland pools		RDB3		
Wet Grassland	Coleoptera	<i>Cantharis fusca</i>	Wet grassland with scrub		RDB 3		
Rivers and Streams	Coleoptera	<i>Dryops striatellus</i>	In slow-flowing or stagnant water		RDB 3		
Permanent Ponds	Coleoptera	<i>Enochrus isotae</i>	In heathland pools		RDB 3		
Permanent Ponds	Coleoptera	<i>Haliplus variegatus</i>	Ponds		RDB 3		
Wet Heath	Coleoptera	<i>Helophorus logitarsis</i>	Wet heath with Sphagnum		RDB3		
Rivers and Streams	Coleoptera	<i>Ocydromia melanopleura</i>	Larvae viviparous, unknown		RDB 3		
Mires / wet heath	Coleoptera	<i>Paederus caligatus</i>	Amongst vegetation on wet heaths		RDB 3		
			11				

Part 1 Description

Wet Grassland	Coleoptera	<i>Atheta nannion</i>	Wet places/ vegetation/ riverbanks largely unknown	RDB K		
			1			
Dry Heath	Coleoptera	<i>Anisodactylus nemorivagus</i>	Dry sandy heaths	Notable A	yes	
Dry Grassland	Coleoptera	<i>Bledius femoralis</i>	Grassland	Notable A		
Dry Heath	Coleoptera	<i>Calomicrus circumfuscus</i>	Heath with gorse	Notable A		
Dry Heath	Coleoptera	<i>Exapion genistae</i>	In <i>Genista</i> seed pods dry heath	Notable A		
Temporary Ponds	Coleoptera	<i>Helophorus alternans</i>	In heathland pools	Notable A		
Rivers and Streams	Coleoptera	<i>Hydrovatus clypealis</i>	Rivers	Notable A		
Dry Grassland	Coleoptera	<i>Longitarsus quadriguttatus</i>	In grassland	Notable A		
Wet Grassland	Coleoptera	<i>Neophytobius muricatus</i>	Wet grassland	Notable A		
Mires / wet grassland	Coleoptera	<i>Philonthus atratus</i>	Found in <i>Sphagnum</i> bogs and wet grassland	Notable A		
Rivers and Streams	Coleoptera	<i>Quedius plancus</i>	River gravels	Notable A		
			10			
Dry Grassland	Coleoptera	<i>Acrotrichis dispar</i>	In dung	Notable B		
Permanent Ponds / rivers & streams	Coleoptera	<i>Agabus chalconatus</i>	In permanent shaded pools/ streamsides in woodland	Notable B		
Temporary Ponds	Coleoptera	<i>Agabus labiatus</i>	In stagnant temp pools	Notable B		
Dry Grassland	Coleoptera	<i>Aphodius coenosus</i>	In pony/cattle dung	Notable B		
Dry Grassland	Coleoptera	<i>Aphodius conspurcatus</i>	In pony/cattle dung	Notable B		
Dry Grassland	Coleoptera	<i>Aphodius porcus</i>	In pony/cattle dung, a parasite of Geotrupe beetles	Notable B		
Dry Grassland	Coleoptera	<i>Atomaria punctithorax</i>	In grassland	Notable B		
Permanent Ponds	Coleoptera	<i>Bagous limosus</i>	In heathland pools	Notable B		
Dry Heath	Coleoptera	<i>Bembidion nigricorne</i>	Heathland with <i>Calluna</i>	Notable B		
Permanent Ponds	Coleoptera	<i>Berosus affinis</i>	In heathland pools	Notable B		
Permanent Ponds	Coleoptera	<i>Berosus luridus</i>	In ponds with rich vegetation	Notable B		
Permanent Ponds	Coleoptera	<i>Berosus signaticollis</i>	In heathland pools	Notable B		
Permanent Ponds	Coleoptera	<i>Blethisa multipunctata</i>	In marginal vegetation	Notable B		
Wet Heath	Coleoptera	<i>Carabus nitens</i>	Wet heath with <i>Sphagnum</i>	Notable B		
Permanent Ponds	Coleoptera	<i>Cercyon ustulatus</i>	At the edge of vegetated pools	Notable B		
Dry Grassland	Coleoptera	<i>Ceutorhynchus rapae</i>	Associated with Cruciferae	Notable B		
Permanent Ponds	Coleoptera	<i>Chaetarhria seminulum</i>	In marginal vegetation	Notable B		

Part 1 Description

Wet Heath/ Wet heath	Coleoptera	<i>Chaetocnema subcocerulea</i>	Wet grass/heath, probably associated with sedges and rushes		Notable B		
Permanent Ponds	Coleoptera	<i>Chlaenius nigricornis</i>	In vegetation at pond edges		Notable B		
Dry Grassland	Coleoptera	<i>Chrysolina orichalcea</i>	Associated with Umbelliferae		Notable B		
Rivers and Streams	Coleoptera	<i>Deronectes latus</i>	In running water with Frontalis		Notable B		
Rivers and Streams	Coleoptera	<i>Donacia crassipes</i>	Slow flowing water		Notable B		
Rivers and Streams	Coleoptera	<i>Dryops auriculatus</i>	In slow-flowing,or stagnant water		Notable B		
Rivers and Streams	Coleoptera	<i>Dytiscus circumflexus</i>	In rivers and streams		Notable B		
Permanent Ponds	Coleoptera	<i>Elaphrus uliginosus</i>	In marginal vegetation		Notable B		
Permanent Ponds	Coleoptera	<i>Enochrus affinis</i>	In heathland pools		Notable B		
Rivers and Streams	Coleoptera	<i>Graptodytes granularis</i>	In slow-flowing,or stagnant water		Notable B		
Dry Grassland	Coleoptera	<i>Gronops lunatus</i>	Associated with Caryophyllaceae		Notable B		
Permanent Ponds	Coleoptera	<i>Haliplus heydeni</i>	Well vegetated ponds		Notable B		
Permanent Ponds	Coleoptera	<i>Helochares livoidus</i>	In fresh water ponds		Notable B		
Mires	Coleoptera	<i>Helochares punctatus</i>	In pools in <i>Sphagnum</i> bogs		Notable B		
Temporary Ponds	Coleoptera	<i>Helophorus griseus</i>	In shallow grassy pools		Notable B		
Rivers and Streams	Coleoptera	<i>Hydraena nigrita</i>	In sluggish muddy streams		Notable B		
Rivers and Streams	Coleoptera	<i>Hydraena rufipes</i>	In slow-flowing or stagnant water		Notable B		
Permanent Ponds	Coleoptera	<i>Hydrochus angustatus</i>	In well-vegetated pools		Notable B		
Permanent Ponds / Temporary ponds	Coleoptera	<i>Hydroglyphus pusillus</i>	In acidic silt ponds		Notable B		
Mires	Coleoptera	<i>Hydroporus longicornis</i>	In spring fed bog pools		Notable B		
Mires / rivers & streams	Coleoptera	<i>Laccobius atratus</i>	Found in wet moss on bogs and in slow-flowing,or stagnant water		Notable B		
Rivers and Streams	Coleoptera	<i>Laccobius sinuatus</i>	In slow-flowing,or stagnant water		Notable B		
Rivers and Streams	Coleoptera	<i>Longitarsus parvulus</i>	Recorded from Avon Water 2000		Notable B		
Dry Grassland	Coleoptera	<i>Malachius marginellus</i>	grassland		Notable B		
Dry Grassland	Coleoptera	<i>Mecinus circulator</i>	Associated with <i>Plantago spp</i>		Notable B		
Rivers and Streams	Coleoptera	<i>Myllaena elongata</i>	Beaulieu river		Notable B		
Wet Grassland	Coleoptera	<i>Oodes helopioides</i>	Wet grasslands near standing water		Notable B		
Wet Grassland/rivers and streams	Coleoptera	<i>Paederus fucipes</i>	Margins of ditches and streams		Notable B		
Mires	Coleoptera	<i>Paracymus scutellaris</i>	In pools in <i>Sphagnum</i> bogs		Notable B		

Part 1 Description

Permanent Ponds	Coleoptera	<i>Pelenomus canaliculatus</i>	Assocaited with <i>Myriophyllum</i>		Notable B		
Wet Grassland	Coleoptera	<i>Philonthus fumaris</i>	Marshy areas/ fens		Notable B		
Rivers and Streams	Coleoptera	<i>Phtobius waltni</i>	Sandy banks adjacent to streams		Notable B		
Permanent Ponds	Coleoptera	<i>Phytobius leucogaster</i>	Assocaited with <i>Myriophyllum</i>		Notable B		
Dry Grassland	Coleoptera	<i>Platypalpus articulatus</i>	In scrubby areas		Notable B		
Mires	Coleoptera	<i>Pselaphaulax dresdensis</i>	Found in wet moss on bogs		Notable B		
Dry Heath	Coleoptera	<i>Pterostichus angustatus</i>	On sandy or peaty soils on dry heath		Notable B		
Wet Grassland	Coleoptera	<i>Pterostichus anthracinus</i>	wet grassland		Notable B		
Dry Heath	Coleoptera	<i>Pterostichus lepidus</i>	On dry sandy heathlands		Notable B		
Rivers and Streams	Coleoptera	<i>Rhantus grapii</i>	In well vegetated water-ways		Notable B		
Permanent Ponds	Coleoptera	<i>Rhantus suturalis</i>	In heathland pools		Notable B		
Wet Heath	Coleoptera	<i>Rhynchaenus iota</i>	Wet heath in association with <i>Myrica gale</i>		Notable B		
Dry Grassland	Coleoptera	<i>Sibinia primitus</i>	Dry grasslans with <i>Spergularia</i>		Notable B		
Rivers and Streams	Coleoptera	<i>Silis ruficollis</i>	River margins/lush vegetation		Notable B		
Dry Heath	Coleoptera	<i>Sirocalodes mixtus</i>	Dry heath with trees		Notable B		
Permanent Ponds	Coleoptera	<i>Stenolopus teutonius</i>	Bare ground at edges of ponds		Notable B		
Wet Grassland	Coleoptera	<i>Stenus fornicatus</i>	Along ditch edges		Notable B		
Mires	Coleoptera	<i>Stenus kiesewetteri</i>	Boggy pool edges		Notable B		
Wet Grassland	Coleoptera	<i>Stenus nitens</i>	Found in marshy places		Notable B		
			65				
Dry Heath	Coleoptera	<i>Agathidium marginatum</i>	Dry sandy heath		Notable		
Rivers and Streams	Coleoptera	<i>Atheta obfuscata</i>	In flood litter on river banks		Notable		
Rivers and Streams	Coleoptera	<i>Lathrobium ripicola</i>	In river shingle and river margins		Notable		
Mires	Coleoptera	<i>Myllaena kraatzi</i>	In <i>Sphagnum</i> moss		Notable		
Dry Grassland	Coleoptera	<i>Omalium exiguum</i>	In well-rotted grass heaps		Notable		
<b>Habitat</b>	<b>Group</b>	<b>Species</b>	<b>Requirements</b>	<b>European</b>	<b>National</b>	<b>BAP</b>	<b>SRP</b>
Mires	Coleoptera	<i>Rhopalus maculata</i>	Bogs		Notable		
Rivers and Streams	Coleoptera	<i>Rugilus similis</i>	Beaulieu river		Notable		
			7				
Temporary Ponds	Crustacea	<i>Triops cancriformis</i>	Largely unknown		RDB 1	yes	yes
			1				
Temporary Ponds	Crustacea	<i>Chirocephalus diaphanus</i>	Temporary pools		RBD 2	yes	

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			1				
Mires	Diptera	<i>Chrysops sepulchralis</i>	Heathland pools in bogs		pRDB 1		
Dry Heath	Diptera	<i>Chrysotoxum vernale</i>	Heath/broadleaf woodland edge		RDB 1		
Dry Heath	Diptera	<i>Gasterophilus nasalis</i>	No data available		RDB 1		
Mires / wet heath	Diptera	<i>Syndyas nigripes</i>	Found in bogs, habitat unknown		RDB 1		
Mires	Diptera	<i>Telmaturgus tumidulus</i>	Semi-aquatic larvae in mud		RDB 1		
Dry Heath	Diptera	<i>Villa circumdata</i>	Unknown		pRDB 1		
			6				
Dry Heath	Diptera	<i>Chrysotoxum octomaculatum</i>	On heathland probably in association with ants		RDB 2	yes	yes
Mires / wet heath	Diptera	<i>Eristalis cryptarum</i>	Wet heaths and bogs		RDB 2	yes	yes
Mires	Diptera	<i>Nematoproctus distendens</i>	Habitat unknown, found at Matley Bog in 1988		RDB 2		
Mires	Diptera	<i>Prionocera pubescens</i>	<i>Sphagnum/Juncus</i> bogs		pRDB 2		
			4				
Dry Heath	Diptera	<i>Callicera aenea</i>	Heath/broadleaf woodland edge		RDB 3		
Wet Heath	Diptera	<i>Campsicnemus pectinulatus</i>	Recorded from wet peat		RDB 3		
Dry Heath	Diptera	<i>Dioctria cothurnata</i>	Heath/ woodland edge		pRDB 3		
Mires	Diptera	<i>Dixella filicornis</i>	Found in swamps		RDB 3		
Dry Heath	Diptera	<i>Eutolmus rufibarbis</i>	Largely unknown		pRDB 3		
Dry Heath	Diptera	<i>Hippobosca equina</i>	Parasitic on horses		RDB 3		
Wet Heath	Diptera	<i>Leucostoma simplex</i>	Parasitic fly rec. from Latchmore Brook Valley 1971		RDB 3		
Wet Heath	Diptera	<i>Microdon mutabilis</i>	Ants nests on wet heath		RDB 3		
Dry Heath	Diptera	<i>Myopa fasciata</i>	Parasite of adult bees on heathland		pRDB 3		
Mires	Diptera	<i>Ocydromia melanopleura</i>	In bogs, larvae viviparous, biology unknown		RDB 3		
Rivers and Streams	Diptera	<i>Ocydromia melanopleura</i>	Larvae viviparous, biology unknown		RDB 3		
Mires	Diptera	<i>Orthonovera geniculata</i>	In boggy areas, larvae probably aquatic		RDB 3		
Wet Heath	Diptera	<i>Peleocrocer tricineta</i>	Wet heaths/bogs woodland edge		RDB 3		
Dry Heath	Diptera	<i>Physocephala nigra</i>	Parasite of the bumblebee <i>Bombus muscorum</i>		RDB 3		
Mires	Diptera	<i>Schoenophilus versutus</i>	Associated with wet flushes with <i>Juncus</i> and <i>Shoenus</i>		RDB 3		
Wet Grassland	Diptera	<i>Tetanocera freyi</i>	Wetlands, precise habitat unknown		RDB 3		
Dry Heath	Diptera	<i>Thyridanthrax fenestratus</i>	Bare ground, with hosts <i>Ammophila</i> spp.		RDB 3	yes	

Part 1 Description

Mires / Wet Heath	Diptera	<i>Tipula marginata</i>	Larvae probably in wet mud/peat		RDB 3		
			18				
Dry /wet heath/ dry / wet grassland	Diptera	<i>Asilus crabroniformis</i>	Open areas with herbivore dung		Notable B	yes	yes
Mires	Diptera	<i>Atylotus fulvus</i>	Wet bog soil, with woodland nearby		Notable B		
Wet Heath	Diptera	<i>Campsicnemus pusillus</i>	Recorded from bogs and wet heaths		Notable B		
Mires	Diptera	<i>Chrysogaster maquarta</i>	Larvae aquatic, adults on bogs		Notable B		
Rivers and Streams	Diptera	<i>Chrysotus kowarzi</i>	Near rivers and streams		Notable B		
Rivers and Streams	Diptera	<i>Chrysotus palustris</i>	Near rivers and streams		Notable B		
Wet Grassland	Diptera	<i>Dictya umbrarum</i>	Around ponds and marshes larvae aquatic		Notable B		
Mires	Diptera	<i>Erioptera nielseni</i>	Mildly acid bogs		Notable B		
Dry / wet grassland	Diptera	<i>Gasterophilus intestinalis</i>	Larvae live in horse intestines		Notable B		
Mires	Diptera	<i>Limnophila abdonimalis</i>	Exposed peat in bogs		Notable B		
Rivers and Streams	Diptera	<i>Nephrotoma dorsalis</i>	Sandy riverbanks near woodland		Notable B		
Wet Grassland	Diptera	<i>Oxycera pygmaea</i>	Base-rich seepages in wet grassland		Notable B		
Wet Grassland	Diptera	<i>Pherbellia nana</i>	In wetlands preys on snails		Notable B		
Dry Heath	Diptera	<i>Platypalpus articulatus</i>	On scrubby vegetation		Notable B		
Wet Grassland /Wet heath	Diptera	<i>Scathophaga scybalaria</i>	Larvae in cattle dung		Notable B		
Dry Heath	Diptera	<i>Sphaerophoria virgata</i>	Assoc. with heathland, larvaefeed on aphids		Notable B		
Rivers and Streams	Diptera	<i>Syntormon spicatus</i>	Found in marshy places, biology unknown		Notable B		
Rivers and Streams	Diptera	<i>Syntormon zelleri</i>	In marshy places		Notable B		
Wet Heath	Diptera	<i>Tachytrechus consobrinus</i>	Found in sandy places near water		Notable B		
Wet Grassland	Diptera	<i>Tipula holoptera</i>	Boggy flushes with <i>Juncus</i>		Notable B		
Wet Heath	Diptera	<i>Tomosvaryella palliditarsis</i>	Parasitic on Homopterans, found in bogs		Notable B		
Permanent Ponds	Diptera	<i>Dictya umbrarum</i>	Around ponds and marshes, larvae aquatic		Notable B		
Permanent Ponds	Diptera	<i>Thrypticus pollinosus</i>	Larvae stem miners, biology unknown, rec. Hatchett pond 1988		Notable B		
			23				
Mires	Hemiptera	<i>Eysarcoris aeneus</i>	Sphagnum bog		RDB 3		
Mires	Hemiptera	<i>Limotettix atricapillus</i>	Rec. from Denny Bog 1985		RDB 3		
Permanent Ponds / rivers & streams	Hemiptera	<i>Microvelia phymaea</i>	Amongst vegetation on still water		RDB 3		
Mires	Hemiptera	<i>Pachybrachius luridus</i>	Sphagnum bog		RDB 3		

Part 1 Description

			4				
Wet Grassland	Hemiptera	<i>Macrosteles frontalis</i>	Found in marshy places		Notable B		
Dry Heath	Hemiptera	<i>Megalonotus dilatatus</i>	Amongst litter in dry places		Notable B		
			2				
Dry Heath	Hymenoptera	<i>Cerolapes variegata</i>	Sandy heathland		RDB 1		
Mires	Hymenoptera	<i>Formica candida</i>	Sphagnum/Molina bogs		RDB 1	yes	yes
Wet Heath	Hymenoptera	<i>Homonotus sanguinolentus</i>	A parasite of the spider <i>Cheiracanthium erraticum</i> on largely ungrazed wet heath		RDB 1	yes	yes
Dry Heath	Hymenoptera	<i>Odynerus reniformis</i>	Bare ground, largely unknown		RDB 1		
			4				
Dry Heath	Hymenoptera	<i>Nomada signata</i>	Parasite of <i>Andrena</i> bees in opensunny situations		RDB 2		
Dry Heath	Hymenoptera	<i>Philanthus triangulum</i>	Nests in bare ground, adults prey on honey bees		RDB 2		
Dry Heath	Hymenoptera	<i>Psen bicolor</i>	Open sandy heath		pRDB 2		
			3				
Dry Heath	Hymenoptera	<i>Coelioxys quadridentata</i>	Unknown		RDB 3		
Dry Heath	Hymenoptera	<i>Diodontus insidiosus</i>	Bare sandy ground on heathland		RDB 3		
Dry Heath	Hymenoptera	<i>Halictus confusus</i>	Disturbed soil in heathland		RDB 3		
Dry Heath	Hymenoptera	<i>Hedychridium coriaceum</i>	Unknown, but a Sphecid parasite		RDB 3		
Dry Heath	Hymenoptera	<i>Hedychrum nielmelai</i>	Dry sandy heathland with bareground		RDB 3		
Dry Heath	Hymenoptera	<i>Hylaeus gibbus</i>	Scrub and dead wood on dry heathland		RDB 3		
Dry Heath	Hymenoptera	<i>Lasioglossum pauperatum</i>	Open ground on sandy heaths		RDB 3		
Dry Heath	Hymenoptera	<i>Leptothorax interruptus</i>	Dry sandy heath with young heather		RDB 3		
Dry Heath	Hymenoptera	<i>Nomada fucata</i>	Parasite of <i>Andrena</i> bees in opensunny situations		RDB 3		
Dry Heath	Hymenoptera	<i>Nomada fulvicornis</i>	Parasite of <i>Andrena</i> bees in opensunny situations		RDB 3		
Dry Heath	Hymenoptera	<i>Nomada hirtipes</i>	Parasite of <i>Andrena</i> bees in open sunny situations		RDB 3		
Dry Heath	Hymenoptera	<i>Nomada lathburiana</i>	Parasite of <i>Andrena</i> bees in open sunny situations		RDB 3		
Dry Heath	Hymenoptera	<i>Nomada robertjeotiana</i>	Parasite of <i>Andrena</i> bees in open sunny situations		RDB 3		
Dry Heath	Hymenoptera	<i>Psen spooneri</i>	Dry sandy heathland		RDB 3		

Part 1 Description

Dry Heath	Hymenoptera	<i>Sphecodes scabricollis</i>	Heathy margins of broadleaf woods with bare ground		RDB 3		
Dry Heath	Hymenoptera	<i>Stelis ornata</i>	Open heath cleptoparasite of <i>Hoplitis claviventris</i>		RDB 3		
Dry Heath	Hymenoptera	<i>Strongylognathus testaceus</i>	A parasite of <i>T. caespitum</i>		RDB 3		
			17				
Dry Heath	Hymenoptera	<i>Anergates atratulus</i>	A parasite of <i>Tetramorium caespitum</i>		pRDB K	yes	
			1				
Dry Heath	Hymenoptera	<i>Crabro scutellatus</i>	Open heaths possibly with wet areas		Notable A		
Dry Grassland	Hymenoptera	<i>Nomada fucata</i>	Parasite of Andrena bees in		Notable A		
Dry Heath	Hymenoptera	<i>Oxybelus mandibularis</i>	Open sandy heathland		Notable A		
Dry Heath	Hymenoptera	<i>Sphecodes longulus</i>	Open bare soils on heaths		Notable A		
Dry Heath	Hymenoptera	<i>Sphecodes reticulatus</i>	Open bare soils on heaths		Notable A		
			5				
Dry Heath	Hymenoptera	<i>Arachnospilosa minutula</i>	Open ground on heathland		Notable B		
Dry Heath	Hymenoptera	<i>Chesias rufata</i>	Well-established broom		Notable B		
Dry Heath	Hymenoptera	<i>Evagetes dubius</i>	Open ground on heathland		Notable B		
Dry Heath	Hymenoptera	<i>Methocha ichneumonoides</i>	On dry heathland, parasitic on <i>Cicindela</i> larvae		Notable B		
Dry Heath	Hymenoptera	<i>Mutilla europaea</i>	Open sandy heaths with bare ground		Notable B		
Dry Heath	Hymenoptera	<i>Sphecodes crassus</i>	Open ground and sandy heathland		Notable B		
Dry Heath	Hymenoptera	<i>Tiphia minuta</i>	Larvae parasitic in dung beetles		Notable B		
			7				
Dry Heath	Lepidoptera	<i>Agrochola haematidea</i>	Larvae on <i>Erica cinerea</i>		pRDB 1		
Dry Heath	Lepidoptera	<i>Scythris empetrella</i>	Larvae in sand pits amongst vegetation		pRDB 1		
Mires	Lepidoptera	<i>Stenoptilia graphodactyla</i>	Larvae on <i>Gentiana pneumonanthes</i>		pRDB 1		
			3				
Mires	Lepidoptera	<i>Coscinia cribraria ssp bivittata</i>	Bogs, but ecology unknown		RDB 2	yes	yes
Dry Heath	Lepidoptera	<i>Pachythelia villosella</i>	Mature dry heathland		RDB 2		
			2				
Mires / wet heath	Lepidoptera	<i>Buckleria paludum</i>	Larvae feed on <i>Drosera</i> leaves		RDB 3		
Mires / wet heath	Lepidoptera	<i>Crambus silvella</i>	Larvae on <i>Carex spp</i>		pRDB 3		
Wet Heath	Lepidoptera	<i>Heliothis maritima ssp.warneckeii</i>	Humid/wet heaths, larvae on <i>Erica tetralix</i>		RDB 3		
Dry Heath	Lepidoptera	<i>Lampronia fuscata</i>	In galls in <i>Betula</i> twigs		RDB 3		



Part 1 Description

			4				
Wet Heath	Lepidoptera	<i>Chlorissa viridata</i>	Damp heathlands, larvae on <i>Calluna</i> , <i>Betula</i> and <i>Salix</i>		Notable A		
Dry Heath	Lepidoptera	<i>Chloroclystis chloerata</i>	In scrubby areas, larvae on <i>Prunus spinosa</i> blossom		Notable A		
<b>Habitat</b>	<b>Group</b>	<b>Species</b>	<b>Requirements</b>	<b>European</b>	<b>National</b>	<b>BAP</b>	<b>SRP</b>
Dry Heath	Lepidoptera	<i>Cleora cinctaria</i>	Lightly wooded heathland		Notable A		
Wet Heath	Lepidoptera	<i>Idaea muricata</i>	Damp heathlands, larvae on <i>Potentilla palustris</i>		Notable A		
Wet Grassland	Lepidoptera	<i>Noctua orbona</i>	Various grasses		Notable A		
Dry Heath	Lepidoptera	<i>Pempelia genistella</i>	Gorse spp		Notable A		
Dry Heath	Lepidoptera	<i>Selidosema brunneraria</i>	On larger heaths, larvae feed on <i>Calluna</i>		Notable A		
Wet Heath	Lepidoptera	<i>Sorhagenia janiszewski</i>	Larvae feed on shoots of <i>Frangula</i>		Notable A		
			8				
Wet Heath	Lepidoptera	<i>Apomyelois bistratella</i>	<i>Daldeinia concentrica</i> on young or burnt bushes		Notable B		
Permanent Ponds /wet grassland	Lepidoptera	<i>Archanara sparganii</i>	In ponds and ditches, larvae stem feeders in <i>Typhus</i>		Notable B		
Dry Heath	Lepidoptera	<i>Bembecia scopigera</i>	Roots of <i>Lotus</i> & <i>Anthyllus</i>		Notable B		
Rivers and Streams	Lepidoptera	<i>Calamotropha paludella</i>	Larvae in <i>Typhus</i> by streams		Notable B		
Permanent Ponds	Lepidoptera	<i>Chilodes maritimus</i>	Reed beds		Notable B		
Dry Heath	Lepidoptera	<i>Coleophora vibicella</i>	Leaves of <i>Genista tinctoria</i>		Notable B		
Dry Heath	Lepidoptera	<i>Crambus hamella</i>	Grasses on dry heath		Notable B		
Dry Heath	Lepidoptera	<i>Crambus pratella</i>	Grasses on dry heath		Notable B		
Mires	Lepidoptera	<i>Crambus uliginosellus</i>	Found in wet bogs, larval biology unknown		Notable B		
Wet Grassland	Lepidoptera	<i>Dichrorampha sylvicolana</i>	Larvae in roots of <i>Achillea ptarmica</i>		Notable B		
Dry / Wet Heath	Lepidoptera	<i>Dyscia fagaria</i>	On open heathland, larvae on heathers		Notable B		
Wet Grassland	Lepidoptera	<i>Euphydryas aurinia</i> (Introd?)	Larvae on <i>Succisa pratensis</i>		Notable B		
Mires	Lepidoptera	<i>Eupocilia ambiguella</i>	Alder buckthorn berries		Notable B		
Wet Heath	Lepidoptera	<i>Eustrotia uncula</i>	In boggy areas on heaths		Notable B		
Dry Heath	Lepidoptera	<i>Evergestis extimalis</i>	Seed heads of crucifers		Notable B		
Dry Heath	Lepidoptera	<i>Hydriomena rubertata</i>	Open heathland/woodland edge		Notable B		
Wet Heath	Lepidoptera	<i>Hypenodes humidalis</i>	On boggy heathland		Notable B		
Dry / Wet Heath	Lepidoptera	<i>Idaea sylvestraria</i>	On heaths, biology unknown		Notable B		
Dry Grassland	Lepidoptera	<i>Microstega hyalinalis</i>	<i>Centaura nigra</i> leaves		Notable B		

Part 1 Description

Wet Heath	Lepidoptera	<i>Monochroa suffusella</i>	Found in fens/wet heaths,habitat unknown		Notable B		
Dry Heath	Lepidoptera	<i>Pachycnemidia hipposcatanaria</i>	Open dry heathland, on <i>Calluna</i>		Notable B		
Dry Grassland	Lepidoptera	<i>Pediasia contaminella</i>	Grasses inc <i>Festuca ovina</i>		Notable B		
Dry / Wet Heath	Lepidoptera	<i>Perconia strigillaria</i>	On heathland, larvae on herbs		Notable B		
Dry Grassland	Lepidoptera	<i>Phalonidia luridana</i>	Grassy banks with Chamomile		Notable B		
Dry Heath	Lepidoptera	<i>Plebejus argus</i>	Dry open heathland		Notable B	yes	
Mires /wet heath	Lepidoptera	<i>Scopula emutaria</i>	On edges of wet bogs		Notable B		
Mires	Lepidoptera	<i>Simyra albovenosa</i>	Common reed		Notable B		
Wet Heath	Lepidoptera	<i>Sparganothis pilleriana</i>	Found on damp heaths, larvae on various herbs		Notable B		
Dry Heath	Lepidoptera	<i>Synaphe punctalis</i>	Mosses on sandy habitats		Notable B		
Mires	Lepidoptera	<i>Xylena vetusta</i>	In bogs/marshy places		Notable B		
			30				
Temporary Ponds	Mollusca	<i>Lymnaea glabra</i>	Temp pools and ditches		RDB 3		
			1				
Mires /wet heath /rivers & streams	Odonata	<i>Coenagrion mercuriale</i>	Wet heaths / seepages / streams	Annex II HD	RDB 2	yes	yes
			1				
Mires / Wet heath	Odonata	<i>Ceragrion tenellum</i>	Wet heaths/ seepages /streams		Notable B		
Mires / Wet heath	Odonata	<i>Coenagrion pulchellum</i>	Wet heaths / seepages / streams		Notable B		
Permanent Ponds/rivers & streams	Odonata	<i>Cordulia aenea</i>	Permanent water source		Notable B		
Mires / Wet heath	Odonata	<i>Ischnura pumilio</i>	Wet heaths / seepages / streams		Notable B		
			4				
Rivers and Streams / Wet grassland	Orthoptera	<i>Gryllotalpa gryllotalpa</i>	Damp grassland on stream edges		RDB 1	yes	yes
			1				
Mires	Orthoptera	<i>Stethophyma grossum</i>	<i>Sphagnum</i> / <i>Molina</i> bogs		RDB 2	yes	yes
			1				
Dry Heath	Orthoptera	<i>Chorthippus vagans</i>	Bare ground and <i>Calluna</i>		RDB 3	yes	yes
			1				
Wet Grassland / wet heath	Orthoptera	<i>Conocephalus discolor</i>	Coarse vegetation in wetlands		Notable A		
Wet Grassland / wet heath	Orthoptera	<i>Tetrix ceperoi</i>	Wet seepages with bare ground		Notable A		
			2				

Part 1 Description

Dry Heath	Orthoptera	<i>Ectobius pallidus</i>	Scrubby heathland with deep litter		Notable B		
Dry Heath	Orthoptera	<i>Ectobius panzeri</i>	Open sunny heathland with bareground		Notable B		
Mires / Wet heath	Orthoptera	<i>Metrioptera brachyoptera</i>	Sphagnum/Molinia bogsand wet heath		Notable B		
			3				
Wood pasture	Coleoptera	<i>Eucnemis capucina</i>	Rotten wood under bark		RDB 1	yes	
Wood pasture	Coleoptera	<i>Megapenthes lugens</i>	In decaying beech and elm		RDB 1	yes	
Wood pasture	Coleoptera	<i>Melandrya barbata</i>	In decaying oak and beech		RDB 1		
Wood pasture	Coleoptera	<i>Silvanoprus fagi</i>	Under beech and pine bark		RDB 1		
Wood pasture	Coleoptera	<i>Velleius dilatatus</i>	Larvae in Hornet's nests in old trees		RDB 1		
			5				
Wood pasture	Coleoptera	<i>Gnorimus nobilis</i>	In wood mould of deciduous trees		RDB 2	yes	
Forestry Inclosures	Coleoptera	<i>Lymexylon navale</i>	Standing dead wood		RDB 2		
			2				
Bog Woodland	Coleoptera	<i>Ampedus cinnabarinus</i>	Larvae in rotten wood		RDB 3		
Wood pasture	Coleoptera	<i>Anthonomus rufus</i>	Larvae mainly in Blackthorn, usually coastal		RDB 3		
Wood pasture	Coleoptera	<i>Colydium elongatum</i>	In burrows of wood boring beetles in ancient woodland		RDB 3		
Wood pasture	Coleoptera	<i>Dirrhagus pygmaeus</i>	Dead hardwood		RDB 3		
Wood pasture	Coleoptera	<i>Grammoptera ustulata</i>	Larvae probably in dead wood		RDB 3		
Wood pasture	Coleoptera	<i>Ischnomera caerulea</i>	Dead wood usually oak		RDB 3		
Wood pasture	Coleoptera	<i>Leptura sexguttata</i>	Larvae in dead oak		RDB 3		
Wood pasture	Coleoptera	<i>Malachius aeneus</i>	Larvae probably in dead wood		RDB 3	SAP	
Wood pasture	Coleoptera	<i>Mesosa nebulosa</i>	Larvae in topmost branches of oak		RDB 3		
Wood pasture	Coleoptera	<i>Plegaderus dissectus</i>	In decaying stumps, logs and trees		RDB 3		
Bog Woodland	Coleoptera	<i>Selatosomus nigricornis</i>	Larvae in waterlogged soil in wet woodland		RDB 3		
Wood pasture	Coleoptera	<i>Triplax lacordairii</i>	Probably in fungi on trees, unknown		RDB 3		
			12				
Forestry Inclosures	Coleoptera	<i>Eutheia plicata</i>	Open areas		RDB K		
Wood pasture	Coleoptera	<i>Gyrophana pulchella</i>	Recorded from the fungus <i>Hypoloma fasciculare</i>		RDB K		
Wood pasture	Coleoptera	<i>Mordella holomelaena</i>	In dead wood or plant stems		RDB K		
Wood pasture	Coleoptera	<i>Sphinginus lobatus</i>	Dead twigs		RDB K		
Wood pasture	Coleoptera	<i>Zyras cognatus</i>	Recorded from <i>Lasius niger</i> nests in woodland		RDB K		

Part 1 Description

			5				
Wood pasture	Coleoptera	<i>Agrilus sinuatus</i>	Associated with very old hawthorn bushes		Notable A		
Wood pasture	Coleoptera	<i>Ampedus elongantulus</i>	Larvae in rotting stumps		Notable A		
Wood pasture	Coleoptera	<i>Ampedus sanguinolentus</i>	Larvae in dead wood / stumps		Notable A		
Wood pasture	Coleoptera	<i>Anisoxya fuscula</i>	In dead twigs		Notable A		
Bog Woodland	Coleoptera	<i>Atheta cribrata</i>	In mosses and leaf-litter		Notable A		
Wood pasture	Coleoptera	<i>Calosoma inquisitor</i>	On oak trees		Notable A		
Forestry Inclosures	Coleoptera	<i>Cicindela sylvatica</i>	Heathy areas in conifer wds		Notable A	yes	
Wood pasture	Coleoptera	<i>Cicones variegatus</i>	On dry, decayed bark of beech		Notable A		
Forestry Inclosures	Coleoptera	<i>Coccinella magnifica</i>	Open areas, in assoc. with <i>Formica rufa</i>		Notable A		
Wood pasture	Coleoptera	<i>Dasytes niger</i>	Larvae probably in dead wood		Notable A		
Wood pasture	Coleoptera	<i>Geotrupes pyranaeus</i>	Dead wood		Notable A		
Wood pasture	Coleoptera	<i>Ischnodes sanguinicollis</i>	On broadleaves in decaying wood		Notable A		
Wood pasture	Coleoptera	<i>Leptura scutellata</i>	In rotting wood, mainly beech		Notable A		
Wood pasture	Coleoptera	<i>Mycetochara humeralis</i>	In dead wood and under bark		Notable A		
Wood pasture/ Forestry Inclosures	Coleoptera	<i>Mycetophagus quadriguttatus</i>	On dung or bracket fungi		Notable A		
Wood pasture	Coleoptera	<i>Notolaemus unifasciatus</i>	Larvae under bark of dead beech		Notable A		
Wood pasture	Coleoptera	<i>Pediacus depressus</i>	Larvae under oak bark on sap runs		Notable A		
Wood pasture	Coleoptera	<i>Pilemostoma fastosa</i>	dead wood		Notable A		
Wood pasture	Coleoptera	<i>Prionus coriarius</i>	Tree roots		Notable A		
Riverine Woodland	Coleoptera	<i>Quedius plancus</i>	In riverine gravels/ woodland		Notable A		
Wood pasture	Coleoptera	<i>Strangalia aurulenta</i>	Probably in dead deciduous trees		Notable A		
Wood pasture	Coleoptera	<i>Strangalia nigra</i>	Probably in dead deciduous trees		Notable A		
Wood pasture	Coleoptera	<i>Tomoxia biguttata</i>	beech trunk		Notable A		
Wood pasture	Coleoptera	<i>Tomoxia bucephala</i>	In rotting beech stumps		Notable A		
			24				
Wood pasture	Coleoptera	<i>Abdera biflexuosa</i>	In dead wood and twigs		Notable B		
Wood pasture	Coleoptera	<i>Aderus oculatus</i>	Oak stumps and boughs/oak crowns		Notable B		
Bog Woodland	Coleoptera	<i>Agonum livens</i>	Alder/willow carr, wet wds		Notable B		
Wood pasture	Coleoptera	<i>Agrilus laticornis</i>	In dying branches of oak		Notable B		
Bog Woodland /Wood	Coleoptera	<i>Ampedus pomorum</i>	Larvae in decayed wood/ stumps		Notable B		

Part 1 Description

pasture							
Wood pasture	Coleoptera	<i>Ampedus quercicola</i>	Larvae in dead wood		Notable B		
Wood pasture /Forestry Inclosures	Coleoptera	<i>Anaglyptus mysticus</i>	In tree stumps		Notable B		
Wood pasture	Coleoptera	<i>Antherophagus canascens</i>	Fungus beetle		Notable B		
Wood pasture	Coleoptera	<i>Aphodius zenkeri</i>	In deer dung in woodland		Notable B		
Wood pasture	Coleoptera	<i>Aplocnemus pini</i>	Under bark in decayed wood		Notable B		
Bog Woodland	Coleoptera	<i>Aromia moschata</i>	Larvae bore into mature trees		Notable B		
Bog Woodland	Coleoptera	<i>Atheta hygrobia</i>	In mosses and leaf-litter		Notable B		
Wood pasture	Coleoptera	<i>Atomaria fimetarii</i>	Rotting wood		Notable B		
Forestry Inclosures	Coleoptera	<i>Ceuthorhynchus viduatus</i>	Roydon		Notable B		
Forestry Inclosures	Coleoptera	<i>Cionus tuberculatus</i>	Roydon		Notable B		
Wood pasture	Coleoptera	<i>Cis festivus</i>	Rotting wood		Notable B		
Wood pasture	Coleoptera	<i>Cis lineatocribratus</i>	In the fungus <i>Polyporus nigrinus</i> on trees		Notable B		
Wood pasture	Coleoptera	<i>Conopalpus testaceus</i>	In dead boughs and small branches		Notable B		
Wood pasture	Coleoptera	<i>Cryptarcha strigata</i>	On sap runs caused by <i>Cossus</i>		Notable B		
Wood pasture	Coleoptera	<i>Cryptarcha undata</i>	On sap runs caused by <i>Cossus</i>		Notable B		
Wood pasture /Forestry Inclosures	Coleoptera	<i>Cryptocephalus bipunctatus</i>	Larvae free-living on foliage		Notable B		
Wood pasture Forestry Inclosures	Coleoptera	<i>Cryptocephalus parvulus</i>	Larvae on birch leaves		Notable B		
Wood pasture	Coleoptera	<i>Ctesias serra</i>	Larvae under loose bark of broadleaves		Notable B		
Wood pasture	Coleoptera	<i>Dendroxena quadrimaculata</i>	Oak canopy		Notable B		
Wood pasture	Coleoptera	<i>Diplocoelus fagi</i>	Under bark in decayed wood		Notable B		
Wood pasture	Coleoptera	<i>Eledona agricola</i>	On the bracket fungus <i>Laetiporus sulphureus</i> on oak		Notable B		
Wood pasture	Coleoptera	<i>Epuraea fuscicollis</i>	On sap runs caused by <i>Cossus</i>		Notable B		
Wood pasture	Coleoptera	<i>Epuraea guttata</i>	On sap runs caused by <i>Cossus</i>		Notable B		
Wood pasture	Coleoptera	<i>Euplectus kirbyi</i>	Under bark and in dead wood		Notable B		
Wood pasture	Coleoptera	<i>Gabrius velox</i>	Wet woodland		Notable B		
Wood pasture	Coleoptera	<i>Hallomenus binotatus</i>	In fungus infected wood and in fungi on wood		Notable B		
Wood pasture	Coleoptera	<i>Helops caeruleus</i>	In dead/dying trees usually oak		Notable B		
Wood pasture	Coleoptera	<i>Ischnomera cyanea</i>	In rotten wood of broadleaves		Notable B		
Wood pasture	Coleoptera	<i>Ischnomera sanguinicollis</i>	In dead/rotting wood		Notable B		

Part 1 Description

Wood pasture	Coleoptera	<i>Korynetes caeruleus</i>	Predatory on beetle larvae in dead wood		Notable B		
Forestry Inclosures	Coleoptera	<i>Larinus planus</i>	Thistles		Notable B		
Wood pasture	Coleoptera	<i>Lissodema quadripustulata</i>	In dead and decaying trees		Notable B		
Forestry Inclosures	Coleoptera	<i>Longitarsus obliteratus</i>	Roydon deadwood		Notable B		
Forestry Inclosures	Coleoptera	<i>Longitarsus ochroleucus</i>	Roydon deadwood		Notable B		
Forestry Inclosures	Coleoptera	<i>Longitarsus tabidus</i>	Roydon deadwood		Notable B		
Wood pasture	Coleoptera	<i>Lucanus cervus</i>	Rotting timber/mature trees	Annex II HD	Notable B	yes	yes
Wood pasture	Coleoptera	<i>Luperus flavipes</i>	Associated with broadleaves, grass root feeders		Notable B		
Wood pasture	Coleoptera	<i>Magdalis cerasi</i>	Associated with broadleaves, larvae feed in twigs		Notable B		
Wood pasture	Coleoptera	<i>Malachius cyanea</i>	Rotting wood		Notable B		
Wood pasture	Coleoptera	<i>Malthodes fibulatus</i>	In dead twigs and branches		Notable B		
Riverine Woodland	Coleoptera	<i>Melandrya caraboides</i>	In rotting stumps, possibly Willow		Notable B		
Wood pasture	Coleoptera	<i>Melasis buprestoides</i>	Larvae in standing dead wood		Notable B		
Wood pasture	Coleoptera	<i>Mycetophagus piceus</i>	In rotting heartwood of oaks		Notable B		
Wood pasture	Coleoptera	<i>Mycetophagus populi</i>	Fungus on beech stump		Notable B		
Forestry Inclosures	Coleoptera	<i>Onthophagus vacca</i>	Roydon on fox dung 2000		Notable B		
Wood pasture	Coleoptera	<i>Opilo mollis</i>	Predatory on beetle larvae in dead wood		Notable B		
Wood pasture	Coleoptera	<i>Phloiotrya vaudoueri</i>	In dead sap wood, usually oak		Notable B		
Forestry Inclosures	Coleoptera	<i>Phytobius waltonii</i>	Deadwood		Notable B		
Wood pasture	Coleoptera	<i>Polydrusus flavipes</i>	Old woodland, dead wood		Notable B		
Wood pasture	Coleoptera	<i>Prionocyphon serricornis</i>	In rot holes feeding on fly larvae		Notable B		
Wood pasture	Coleoptera	<i>Prionychus ater</i>	In dead/dying broadleaves		Notable B		
Wood pasture	Coleoptera	<i>Pseudocistella ceramboides</i>	Decaying beech		Notable B		
Wood pasture	Coleoptera	<i>Ptinus subpilosus</i>	In hollow trees and under bark usually on oak		Notable B		
Wood pasture	Coleoptera	<i>Pyrochroa coccinea</i>	In dead wood and under bark		Notable B		
Wood pasture	Coleoptera	<i>Quedius scitus</i>	Under bark and in dead wood		Notable B		
Wood pasture	Coleoptera	<i>Rabocerus gabrieli</i>	In dead wood and under bark		Notable B		
Wood pasture	Coleoptera	<i>Selatosomus bipustulatus</i>	Larvae in dead wood		Notable B		
Forestry Inclosures	Coleoptera	<i>Sibinia arenaria</i>	Roydon		Notable B		
Wood pasture	Coleoptera	<i>Silvanus bidentatus</i>	Under bark of trees		Notable B		
Wood pasture	Coleoptera	<i>Snychita humeralis</i>	Under fungus infected bark		Notable B		

Part 1 Description

Wood pasture	Coleoptera	<i>Sphindus dubius</i>	On slime moulds on bark		Notable B		
Wood pasture	Coleoptera	<i>Sulacis bicornis</i>	Bracket fungus, beech		Notable B		
Wood pasture	Coleoptera	<i>Thymalus limbatus</i>	Under bark of broad-leaved trees		Notable B		
Wood pasture	Coleoptera	<i>Tillus elongatus</i>	Predatory on beetle larvae in dead wood		Notable B		
Wood pasture	Coleoptera	<i>Trachyphloeus aristatus</i>	Leaf litter		Notable B		
Bog Woodland	Coleoptera	<i>Trichophya pilicornis</i>	Sawdust, wood mould in Bog woodland		Notable B		
Wood pasture /Forestry Inclosures	Coleoptera	<i>Xyleborus dispar</i>	Larvae tunnel feeders in broadleaves		Notable B		
Wood pasture/ Forestry inclosures	Coleoptera	<i>Xyleborus dryographus</i>	Larvae tunnel-feeders in broadleaves		Notable B		
			73				
Riverine Woodland	Coleoptera	<i>Atheta cribrata</i>	In mosses and leaf-litter		Notable		
Riverine Woodland	Coleoptera	<i>Atheta hygrobia</i>	In mosses and leaf-litter		Notable		
Wood pasture	Coleoptera	<i>Dropephylla gracilicornis</i>	Under bark and in rotten oak		Notable		
Wood pasture	Coleoptera	<i>Gyrophana angustata</i>	dead wood		Notable		
Wood pasture	Coleoptera	<i>Gyrophana congrua</i>	dead wood		Notable		
Wood pasture	Coleoptera	<i>Gyrophana hanseni</i>	In Russula and Boletus fungi		Notable		
Wood pasture	Coleoptera	<i>Neuraphes plicicollis</i>	In dead wood and under bark		Notable		
Wood pasture	Coleoptera	<i>Placusa depressa</i>	In burrows of bark beetles		Notable		
Wood pasture	Coleoptera	<i>Sepedophilus testaceus</i>	In rotting / fungoid wood especially beech and <i>Salix</i>		Notable		
Wood pasture	Coleoptera	<i>Thamaraea hospita</i>	On sap runs of oak, and those of <i>Cossus</i>		Notable		
			10				
Wood pasture	Diptera	<i>Caliprobola speciosa</i>	Rotting stumps in woodland		RDB 1		
			1				
Wood pasture	Diptera	<i>Brachpeza armata</i>	In fungus on trees		RDB 2		
Wood pasture	Diptera	<i>Ctenophora flaveolata</i>	Larvae in dead trees especially beech		RDB 2		
Wood pasture	Diptera	<i>Dirhagus pygmaeus</i>	Larvae in rotten wood		RDB 2		
Wood pasture	Diptera	<i>Exorista glossatorum</i>	Parasitic fly, larvae in Lepidoptera		RDB 2		
Wood pasture	Diptera	<i>Limonia quadrimaculata</i>	Larvae in bracket fungi on beech		RDB 2		
Wood pasture	Diptera	<i>Lymexylon navale</i>	Standing dead wood		RDB 2		
Wood pasture	Diptera	<i>Microdon devius</i>	Larvae in ant nests in rotten wood		RDB 2		
Wood pasture	Diptera	<i>Pocota personata</i>	Rot holes in trees		RDB 2		

Part 1 Description

Wood pasture	Diptera	<i>Psilota anthracina</i>	In woodland biology unknown		RDB 2		
			9				
Wood pasture	Diptera	<i>Brachyopa bicolor</i>	Rotten beech trees		RDB 3		
<b>Habitat</b>	<b>Group</b>	<b>Species</b>	<b>Requirements</b>	<b>European</b>	<b>National</b>	<b>BAP</b>	<b>SRP</b>
Wood pasture	Diptera	<i>Brachypalpus laphriformis</i>	Standing hollow trunks, especially beech and ash		RDB 3		
Wood pasture	Diptera	<i>Callicera aenea</i>	Possibly dead wood on heathland edge		RDB 3		
Bog Woodland	Diptera	<i>Dixella filicornis</i>	In swamps/bog woodland larvae stem feeders		RDB 3		
Bog Woodland/Riverine woodland	Diptera	<i>Dolichopus andalusiacus</i>	Larvae develop in mud		RDB 3		
Wood pasture	Diptera	<i>Oedalea apicalis</i>	In decaying trees, in association with <i>Cossus</i>		RDB 3		
Riverine Woodland	Diptera	<i>Peleocrocera tricincta</i>	Larvae possibly in mud		RDB 3		
Wood pasture	Diptera	<i>Systemus pallipes</i>	Probably associated with Elm, dead woodfeeders, adults at sap runs		RDB 3		
Bog Woodland	Diptera	<i>Tabanus miki</i>	Wet woodlands		RDB 3		
Bog Woodland	Diptera	<i>Tipula marginata</i>	Largely unknown		RDB 3		
			10				
Riverine Woodland	Diptera	<i>Tabanus bovinus</i>	Wet woodlands		pRDB K		
Riverine Woodland	Diptera	<i>Tabanus miki</i>	Wet woodlands		pRDB K		
			2				
Riverine Woodland	Diptera	<i>Atylotus fulvus</i>	Wet boggy soil near woodland		Notable B		
Wood pasture	Diptera	<i>Conops vesicularis</i>	In old broad-leaved woodland, parasitoid on Hymenoptera		Notable B		
Wood pasture	Diptera	<i>Ctenophora pectinicornis</i>	Larvae develop in decaying wood of old trees		Notable B		
Wood pasture	Diptera	<i>Ditomyia fasciata</i>	In bracket fungus on old trees		Notable B		
Wood pasture	Diptera	<i>Dryodromia testacea</i>	Habitat requirements unknown		Notable B		
Bog Woodland	Diptera	<i>Limnophila pulchella</i>	Boggy ground in woodland with <i>Sphagnum</i>		Notable B		
Wood pasture	Diptera	<i>Metasyrphus nitens</i>	Ancient deciduous woodland		Notable B		
Riverine Woodland	Diptera	<i>Nephrotoma dorsalis</i>	Sandy riverbanks by woodland		Notable B		
Wood pasture	Diptera	<i>Ogcodes gibbosus</i>	Heathy areas in woodland		Notable B		
Riverine Woodland	Diptera	<i>Tetanocera punctifrons</i>	In woodland with running water		Notable B		
			10				
Wood pasture	Diptera	<i>Brachyopa pilosa</i>	Rotten stumps especially beech		Notable		



Part 1 Description

Wood pasture	Diptera	<i>Criorhina ranunculi</i>	Standing dead wood		Notable		
Wood pasture	Diptera	<i>Didea fasciata</i>	Broad-leaved woodland		Notable		
Pasture woodland/Forestry Inclosures	Diptera	<i>Dioctria oelandica</i>	Oak woods with small trees present		Notable		
Wood pasture	Diptera	<i>Ferdinandea ruficornis</i>	Old standing wood possibly associated with <i>Cossus</i>		Notable		
Wood pasture	Diptera	<i>Laphria marginata</i>	Ancient oak forests		Notable		
Wood pasture	Diptera	<i>Metasyrphus latilunulatus</i>	Woods and heathland edge		Notable		
Wood pasture	Diptera	<i>Microdon eggeri</i>	Larvae in ant nests in rotten wood		Notable		
Wood pasture	Diptera	<i>Microdon mutabilis</i>	Larvae in ant nests in rotten wood		Notable		
Wood pasture	Diptera	<i>Myolepta luteola</i>	Rot holes in broadleaf trees		Notable		
Riverine Woodland / Wood pasture	Diptera	<i>Platycheirus sticticus</i>	Damp woodland		Notable		
Bog Woodland / Riverine woodland	Diptera	<i>Tabanus cordiger</i>	Wet broadleaf woodland with streams		Notable		
Wood pasture	Diptera	<i>Volucella inflata</i>	Sap runs on trees, associated with <i>Cossus</i>		Notable		
Riverine Woodland / Wood pasture	Diptera	<i>Xylota abiens</i>	Dead wood in damp woodland		Notable		
<b>Habitat</b>	<b>Group</b>	<b>Species</b>	<b>Requirements</b>	<b>European</b>	<b>National</b>	<b>BAP</b>	<b>SRP</b>
Riverine Woodland / Wood pasture	Diptera	<i>Xylota florum</i>	Dead wood in damp woodland		Notable		
Riverine Woodland / Wood pasture	Diptera	<i>Xylota tarda</i>	Dead wood in damp woodland		Notable		
Wood pasture	Diptera	<i>Xylota xanthocnema</i>	Dead wood		Notable		
		17					
Wood pasture /Forestry Inclosures	Hemiptera	<i>Cicadetta montana</i>	Dry sunny glades / woodland edge		RDB 1	yes	yes
		1					
Wood pasture	Hemiptera	<i>Empicoris baerensprungi</i>	On trunks and branches of broadleaves		RDB 3		
		1					
Wood pasture	Hemiptera	<i>Sehirus biguttatus</i>	A ground-dweller on <i>Melampyrum pratense</i>		Notable B		
		1					
Wood pasture	Hymenoptera	<i>Crossocerus vagabundus</i>	Dead wood in sunny glades and damp woods		RDB 1		
		1					
Wood pasture/ Forestry Inclosures	Hymenoptera	<i>Omalus puncticollis</i>	Wooded habitats, probably requires dead wood		Notable A		