6. Nature conservation interest of lowland acid grasslands: fauna

6.1 Birds

6.1.1 Introduction

The structure and moisture status of grassland is more important than floristic species composition in determining use of the habitat by birds. In the case of dry acid grasslands, the bird fauna is similar to that of other dry grasslands including calcareous grasslands and grass heaths.

Dry grasslands once supported a diverse and abundant avifauna but this drastically diminished in the 19th and 20th centuries. Early losses included the Great Bustard which became extinct due to habitat fragmentation and excessive hunting early in the 19th century. More recently, the dramatic decline of the Stone Curlew, from over 1,000 pairs in the 1940's to just 160 pairs in the mid 1980's, has coincided with the continued decline in both the quality and quantity of dry grassland habitats. Indeed, in those areas where dry grassland survives, the decline in both livestock and rabbit grazing has led to the loss of short grassland which in turn has led to declines of dry grassland birds which require short turf.

In 1992 the JNCC has commissioned a detailed review of the importance of dry grassland for bird conservation in lowland Britain (Dolman, 1992a). A summary of the findings is presented below and up-dated with information supplied by Philip Grice, Ornithologist in English Nature. It should be noted that the importance and extent of acid grasslands which are part of heathland landscapes, especially those in the New Forest, were over-looked, and the report's description of the types and extent of lowland acid grassland in the New Forest needs up-dating. Grassland occupies about 40% of the unwooded, dryer soils on the open heathlands in the New Forest (see **Volume II**, Hampshire county account). As is the case with many plants, the split between a "heathland" bird fauna and a "dry grassland" bird fauna is somewhat artificial. The perception that there are two distinct faunas may have been encouraged by the differentially severe loss of acid grasslands on ungrazed heathlands, thus making them now appear to be a more uniform habitat, whereas in the past they were a mosaic of heathland and grassland. In the following section the term "heathland" refers to this mosaic.

6.1.2 Consevation status and habitats of dry grassland birds

Dolman (1992a) categorised species according to the significance of dry lowland grassland for the maintenance of their population size and range. The summaries below have been divided into the categories described by Dolman and, in addition, the current conservation status of each species according to the Red, Amber and Green Lists of *Birds of Conservation Concern in the UK* (Anon 1996) is given. Species on the Red List have suffered severe declines in population size or range, or are species of global conservation concern. Amber List species are those that have undergone moderate declines, have small population sizes, occupy few sites, or have an unfavourable conservation status in Europe. The Green list covers all the remaining species (Anon 1996).

Species for which lowland dry grassland is critical, or potentially critical, for the future of the British population

- **Stone Curlew** Red List

  The Stone Curlew is a steppic species which reaches the northern limit of its range in England. It is a classic breeding species of extensive acid and calcicolous dry grasslands, especially areas interspersed with arable farmland. The Stone Curlew is the only species considered by Dolman (1992a) to be critically dependent on lowland dry grassland for its survival as a

British breeding bird. Breckland, which includes acid grassland, and the Wessex chalk downlands are the strongholds for this historically declining bird, which has been recovering in recent years. Past records of summer birds on the Greenham Common air base suggests that other extensive acid grasslands could also be used if human disturbance was lower (EPR, 1995). The species has been part of English Nature's Species Recovery Programme since 1995. In 1997 the population was estimated at 192 breeding pairs. Lack of grazing and habitat loss were responsible for a serious decline in birds which nested on grasslands. Arable land is now more widely used than grasslands, but successful nesting is dependent upon the modification of normal farming practices. Birds using tightly grazed, grass heath or downland nest at the highest densities but can suffer from high predation rates in some situations. Preferred nest sites are very short, open swards on stony ground. As well as producing a suitable vegetation structure, grazing animals provide an important food source for dung invertebrates, which in turn are a significant food supply for the Stone Curlew. The recovery has resulted from a combinaton of intensive species protection and management work by project teams funded by English Nature and the Royal Society for the Protection of Birds in the two strongholds of the species, together with improved management of Breckland grass heaths in Environmentally Sensitive Area agreements.

- **Woodlark** Red List

This declining species breeds in areas of bare ground and short grass mixed with long grass, bracken or heather. Historically, acid grassland was used as part of this mosaic but the proportion of Woodlarks breeding on heathland has declined. As is the case for the Nightjar it has been largely lost from the Breckland grass heaths but survives in clear felled and replanted conifer plantations. However, it survives as a grassland species in some areas, including the New Forest, where most pairs breed on acid grasslands. The New Forest population does not use clear fell areas. In the New Forest Woodlark may be negatively affected by recreation pressure but the population has increased from 60-100 pairs in the early 1990's (Clark & Eyre, 1993) to between 177-181 in 1997. A national survey in 1997 conducted by the RSPB, the British Trust for Ornithology and EN, found that the breeding Woodlark population had increased dramatically from around 250 territories in 1986 to as many as 1,550 in 1997. Improved heathland management, as well as habitat availability in plantations has contributed to the increase. Dry grassland may again become critical for the survival of the national population when conifer plantations mature into unsuitable habitat.

Species for which lowland dry grassland is critical, or potentially critical, for the maintenance of the size or range of the British breeding population or wintering numbers

- **Cirl Bunting** Red List

This species is now virtually restricted to south Devon and Cornwall. It uses a variety of habitats including coastal scrub, unimproved grasslands and arable land. Coastal acid grassland forms a minor component of this mosaic. Historically the species bred more widely in lowland England and declines may be due to changing agricultural practice, such as reduction of winter stubble, and habitat loss.

- **Short-eared Owl** Amber List

In lowland England this species is virtually restricted as a breeding bird to eastern counties. It sporadically bred in Breckland in the late 19th and early 20th centuries. It currently breeds in small numbers in upland plantations and on wet grassland and feeds and winters over dry grassland, where it favours long grass, in Breckland, the Suffolk Sandlings and elsewhere. Winter numbers are supplemented by continental birds. The relative importance of dry grassland to the size of the British population is not known.

- **Rough-legged Buzzard** Green List

  A wintering migrant only, the short dry grasslands in the Breckland were historically important wintering areas. The wintering populations have declined and now occur mainly in eastern coastal areas.

- **Wheatear** Green List

  The Wheatear was previously widespread in rabbit grazed dry grassland in the lowlands, nesting in rabbit burrows adjacent to insect-rich, bare patches or short swards. It is now an irregular breeder in the lowlands away from the coast, except for rapidly declining populations in Breckland and the New Forest, where it is associated with acid grassland. It has died out as a breeder in the Malvern Hills (Gibbons *et al*, 1993). It still nests in acid grassland on coastal shingle in the Dungeness area (James, 1996).

Species for which lowland dry grassland contributes to the maintenance of the size or range of the British breeding bird population or wintering numbers.

- **Hen Harrier** Red List

  The Hen Harrier originally bred in diverse habitats including lowland dry grasslands, but breeding is now restricted to the uplands. Continental birds still winter in grass heath and heathland in southern and eastern England. Occasional summer records in these areas may imply that lowland breeding sites could possibly be re-established if extensive dry grassland and heath were re-created and colonists were free from human persecution.

- **Merlin** Red List

  A declining species that probably historically bred on extensive lowland grasslands but it now only breeds in the uplands. Significant numbers still winter on lowland dry grasslands and heathlands, with concentrations in Breckland and the New Forest.

- **Nightjar** Red List

  The Nightjar has suffered a severe historical population decline. Currently, birds are mostly found breeding among Bracken and Heather on heathland and in recently felled and re-stocked conifer plantations. These plantations mimic its traditional semi-natural habitats. In the past it was widely found in a range of habitats including dry grassland and working coppice woodlands. In the early 20th century, when it was abundant in Breckland and the Sandlings, it often nested in open, stony ground away from any cover such as Bracken and Gorse. A national survey in 1992 found that numbers of Nightjars breeding in Britain has increased to an estimated 3,400 pairs from half that number in 1981. This increase seems to have reversed a long-term decline (Cresswell 1996). Significant numbers still breed in the heath and acid grassland of the Sandlings, while populations in Breckland declined after myxamotosis. The largest populations here are now found in re-stocked conifer plantations. However the bird feeds over acid grassland and heath, as well as other invertebrate-rich habitats. The large New Forest population nests purely within heathland (Clark & Eyre, 1993).

- **Skylark** Red List

  The skylark population has been suffering a very severe population decline in recent years. Whilst lowland farmland provides the main habitats, the Skylark does breed on dry grassland, including acid grassland. Re-creation of large areas of dry grassland could significantly increase local populations.

- **Peregrine** Amber List

  Historically, wintering populations used dry grassland and heathland in Breckland. There are now only occasional records of wintering birds in southern England. Coastal grassland, of which acid grassland forms a minor component, contributes to the habitat of prey species of breeding Peregrine in the south-west.

- **Lapwing** Amber List

  Lapwing breed on acid grassland as well as a variety of other habitats that have short vegetation or bare ground for feeding. Large numbers used to breed in Breckland but now the bird is rarely found breeding on dry grassland except in the New Forest, where a population of between 250-450 pairs nests in heathland, especially on grasslands created by war-time disturbance (Clark & Eye, 1993). Most inland lapwings now breed in the lowlands on arable land but productivity is much lower in this habitat and the population has been steadily declining.

- **Curlew** Amber List

  This species is more typical of upland habitats but has expanded its range into lowland areas, particularly wet heath, mire and wet grassland. It has also colonised the Breckland grass heaths as lack of grazing has led to the growth of taller grass swards, which the bird favours for nesting. However, overall in Europe, populations appear to be declining.

- **Green Woodpecker** Amber List

  The Green Woodpecker is a specialist ant-feeder. It has high population concentrations in acid grassland areas such as the New Forest and Breckland. It nests in trees but feeds largely on the ground. It prefers short, grazed, turf which supports high biomass and varied species of ants. Populations have declined in recent years, probably due to the loss of unimproved permanent pasture.

- **Hobby** Green List

  Population trends are generally stable and perhaps increasing in places. It is a summer visitor and significant populations breed in heathland areas, particularly in the New Forest. Dry heathland and acid grassland are less preferred hunting territory compared to wet heath, mire, river valleys and other wetlands. However if the latter are not available, they can be important, for example, in Breckland birds breeding in plantations hunt over dry grassland.

- **Meadow Pipit** Green List

  There have been no marked changes in populations of this species. It breeds in a variety of habitats including acid grassland, where this is not heavily grazed. Most birds breeds in the uplands but Breckland has high concentrations.

- **Whinchat** Green List

  This species was formerly widespread in the lowlands in fairly structured rough grazing, including dry acid grassland with gorse and bracken and mixture of these habitats with heath. This species has declined drastically in these habitats in recent decades, but still breeds locally in areas such as Breckland, the Hampshire/Surrey heaths and the New Forest (Clark & Eyre, 1993).

Other dry grassland species

- **Grey Partridge** Red List

  This species pricipally breeds on lowland farmland and it is still undergoing a severe, long-term population decline. Heath and acid grassland are secondary habitats and have lower breeding densities than the best farmland habitats.

- **Montagu's Harrier** Amber List

  Probably always a rare bird, this declining species historically bred on calcareous and acid grassland and heath. Since the late 1960s these habitats ceased to be used and most now breed in arable crops. However, recently Montagu's Harrier has resumed breeding on heathland in the New Forest and breeds sporadically on other semi-natural grassland sites.

- **Ringed Plover** Amber List

  The species once bred abundantly on rabbit warrens, fallow fields and grass heath in Breckland. The species was finally lost from grass heaths following the decline in rabbit numbers due to myxamotosis but still breeds very locally on arable fields in Breckland . The only inland breeding population surviving on dry grassland is that on the extensive acid grasslands created by war-time disturbance in the New Forest (Clark & Eye, 1993).

- **Stock Dove** Amber List

  This species has undergone some declines in Europe, though in Britain, populations have partially recovered following sharp declines in the 1950s and 1960s, attributed to the direct effects of organochlorine seed dressings. It was probably a woodland edge species originally but now is a farmland bird which makes minor use of dry grassland. Historically, large numbers bred in rabbit holes in heavily grazed warrens in Breckland and Lincolnshire. They probably benefited here from intensive control of rabbit predators.

- **Stonechat** Amber List

  This species is not mentioned by Dolman (1992a) but it certainly uses Gorse in acid grassland in the New Forest as well as Gorse in heath. It was once regarded as one of the most typical Breckland birds but breeding has been sporadic since the severe winters of the 1940's (Dolman, 1994).

- **Ring Ouzel** Amber List

  Ring Ouzel is restricted to the uplands as a breeding bird but acid grassland in Breckland forms part of spring and autumn passage habitats. The reasons for its recent population decline are unclear.

Species lost from lowland dry grassland

- **Wryneck** Red List

  Now extinct as a breeding species in England, this species primarily feeds on ants, located on warm bare ground or short grasslands. It formerly used acid grassland in Breckland. The loss of short grassland may have been a significant factor in its extinction as a breeding bird.

- **Red-backed Shrike** Red List

  Before its extinction in England, this species bred in habitat mosaics which included acid grassland and scrub. The reasons for its extinction are not clear. Factors that may be responsible include climate change, factors operating outside Britain, and the reduced availability of large invertebrates, as a result of change in agricultural practices.

- **Chough** Amber List

  This species is extinct in England and successful re-establishment, for instance in the south-west, will critically depend on availability of suitable coastal dry grassland and maritime heath habitats and productive donor populations within a suitable colonization distance.

- **Great Bustard** Extinct

  The species formerly bred on extensive dry grasslands and in open country with a mix of grassland and arable, including Breckland and Newmarket and Royston Heaths. Its requirement for unrestricted views of a kilometre or more suggests that habitat fragmentation, through, for example, shelter belt planting, was a strong factor responsible for its early extinction. Habitat loss and hunting pressure also contributed to its extinction.

6.1.3 Management requirements

The management requirements of dry grassland birds can be summarised under two broad headings that describe favoured vegetation structure.

Species that depend on or use closely grazed swards

Breeding Woodlark	Breeding Nightjar
Breeding Ringed Plover	Breeding Stone Curlew
Breeding Wheatear	Breeding Lapwing
Feeding Montagu's Harrier	

Species that depend on or use lightly grazed or ungrazed swards

Breeding Skylark	Breeding Curlew
Breeding Meadow Pipit	Breeding Whinchat
Feeding Short-eared Owl	Wintering Hen Harrier

Management to provide a range of vegetation structure across the dry grassland habitat is therefore critical to conserve the full suite of birds which depend on it. The scale of the mosaic of varied structure will relate to the species under consideration. For instance Woodlark requires a small-scale mosaic within its breeding territory, with open areas with little vegetation cover for foraging, as well as longer vegetation for nesting. In contrast, Stone Curlew require landscape scale mosaics of suitable habitat to satisfy their nesting and foraging requirements.

Freedom from disturbance is another important factor in conservation management for some species, such as Stone Curlew. In addition, other habitats in a dry grassland landscape may be required, in particular arable land managed in a low intensity way, particularly with spring sown cereals and winter stubble.

Restoration of both low intensity arable regimes and re-creation of dry grassland in a mixed farming landscape are likely to be important if viable populations of dry grassland birds are to be conserved in the long term. The role of restoration of acid grassland in heathland landscapes thus deserves attention.

6.1.4 Key areas for dry grassland birds in England

Dolman (1992a) identified several key areas for priority action to conserve dry grassland birds. Key areas with existing acid grassland are Breckland, the Suffolk Sandlings, coastal grassland in south-west England, north Norfolk and the Lincolnshire Coversand heathlands. Dolman did not recognise the importance of acid grassland in the New Forest and other heathland areas. Areas likely to have potential or existing interest are the New Forest, the west Wealden heaths, the Thames Basin heaths and the Dorset heaths.

Several areas that include acid grassland as a major or minor component have been designated as Special Protection Areas under the EC Directive on the Conservation of Wild Birds or are proposed as SPAs. These areas are:

SPA: The New Forest; Minsmere-Walberswick

Proposed SPA: Breckland Heaths; Wealden Heaths; Dorset Heathlands

6.2 Reptiles and amphibians

All native British reptiles and amphibians can be found in habitats which include acid grassland. The following section summarizes the role of acid grassland in the requirements of each species. Further information can be found in the references given below.

6.2.1 Widespread species

The widespread species considered here are:

Adder	Common Frog
Grass Snake	Common Toad
Common Lizard	Smooth Newt
Slow-worm	Great Crested Newt
	Palmate Newt

These species use acid grassland where it is adjacent to habitats that have a greater degree of structure , or form part of a mosaic of habitats that have this structure. It is the physical structure of the vegetation, rather than plant species composition, that generally determines whether these animals will be present. Reptiles need warm, open, or short areas of vegetation in close juxtaposition to areas that provide cover and shade so the animals can avoid extremes of temperature. Short acid grasslands close to taller vegetation such as heath are used for thermo-regulation. Where heavy grazing destroys this mosaic of structure, the habitat becomes unsuitable for the majority of reptile and amphibian species.

Adders and Grass Snakes are mobile species whose ranges may incorporate different habitats throughout the year. As a general rule these snakes occupy drier areas over the winter and early and late in the activity season, while occupying wetter habitats during the summer. Dry acid grassland can

form part of these ranges. Physical structure is important and the effects of loss of structure through grazing, and to a lesser degree the disturbance that results from grazing, can make the habitat less suitable. Intensive grazing can cause the local loss of snake populations. Cover is also important for the prey species; for Adders these are usually lizards or small mammals while Grass Snakes tend to favour amphibian prey.

Common (viviparous) Lizards are ubiquitous, though again their distribution will be affected by the need for a varied vegetation structure. Slow-worms are a widespread species, and often over-looked. They will use acid grassland that offers sufficient cover or vegetation depth in which they can burrow and that provides a habitat sufficient to sustain their invertebrate prey (notably slugs and snails).

Amphibians require suitable land and water habitats. Acid grassland is a suitable habitat for all British native species, though generally only where it provides a good physical structure that offers cover and higher humidity levels. It also needs to be in reasonably close proximity to breeding ponds. Frogs and toads are particularly dependent on cover; they tend to sit and wait to capture invertebrate prey and therefore require safe, humid areas in which to live. All three native newt species are found in acid grasslands, though generally it is the Palmate Newt that is associated with the more acidic soils. Smooth Newts and Great Crested Newts are more often found in more nutrient-rich ponds than the ponds usually associated with acid grasslands. Again there is a need for sufficient vegetation structure, or alternatives, such as stone slabs, to provide cover and invertebrate food.

For further information see Corbett (1989), Beebee (1996), Madsen (1984), Prestt (1971), Smith (1990), and Stafford (1987, 1989).

6.2.2 Rare species

Three rare species are found in habitats that include acid grassland. All three species are specially protected under Schedule 5 of the Wildlife and Countryside Act 1981. A useful reference covering these species is Nature Conservancy Council (1983).

Smooth Snake

Smooth Snakes are restricted to the southern heathland areas of England, presumably limited by the need for a warm climate and microclimate. While the species is most frequently associated with mature dry heathland, Smooth Snakes are found in the full range of associated and adjacent habitats, including bogs and acid grassland. Areas with a very varied structure and ground cover (eg. with mosses, lichens and Bristle Bent Grass *Agrostis curtisii*) in which the snake can bury itself are ideal; these conditions are usually found in the drier areas of Heather-dominated heathland. However, snakes will make use of grassland patches and even make limited use of areas with very short, parched acid grasslands (U1); but probably only for transitory periods. The coarser Agrostis curtisii grasslands (U3) are important when they form part of a heathland mosaic. They are frequently used for basking out of sight, and the snake can lie deep in the grass sward without being obvious to predators. For further information see Gent (1988) and Goddard (1981).

Sand Lizard

Like the Smooth Snake the Sand Lizard is associated with mature heathlands in southern England, although this species is also found on dunes in southern England, north-west England and north Wales. The species needs warm habitats which have a mosaic of warm, open areas or short vegetation in which the animal can bask, in close association with dense vegetation that provides cover from extremes of weather and predators. Sand Lizards also need areas of open bare sand, or similar soils, in which they can dig burrows to lay their eggs. Adult animals also tend to live in burrows excavated in soft soil. Where acid grassland is located in close proximity to some form of cover, then it can form

part of the core habitat of Sand Lizards. In the absence of any heather cover, Agrostis curtisii grassland (U3), with Gorse bushes providing the cover, has been recorded as supporting Sand Lizards in Dorset (Corbett, 1994). For further information see Corbett and Tamarind (1979), House and Spellerberg (1983) and Nicholson (1980).

Natterjack Toad

Among the native amphibians and reptiles found in Britain the Natterjack Toad has probably the closest relationship with acid grassland. The species was once widespread in heathland habitats in southern England and East Anglia. The last surviving native heathland site for this species in east Hampshire includes a mosaic of dry heath, species-rich parched acid grasslands, sand sedge communities and ephemeral ponds (H1, H2, U1a, U1b, U1c, SD10, SD11 & M30) and has a nationally important acid grassland flora. The Natterjack Toad is now generally confined to a range of coastal sites, mostly sand dunes or grazing marshes in north-west England and south-west Scotland and eastern England.

Natterjacks like open, early successional habitats or places where the vegetation is kept open, for example by grazing. These open habitats, which include short acid grasslands, are preferred for two reasons. Firstly they provide suitable habitats for foraging because the natterjack actively hunts its invertebrate prey rather than ambushing it from cover. Secondly such habitats are inhospitable to the common amphibians which will out-compete the natterjack in habitats where they are able to become established. Natterjacks are burrowers, and can thus avoid extremes of day-time temperatures and desiccation. Common Frogs and Common Toads are unable to do this and, in the absence of vegetation cover, will not survive. However, it appears that a major reason for the common amphibians ousting the Natterjack is the fact that they breed earlier. The tadpoles from these earlier spawnings grow and inhibit the growth of later hatchlings, apparently through a mechanism involving a single-celled alga which passes through the gut of the tadpoles (Griffiths et al 1991).

Natterjacks require breeding pools that are warm and are circum-neutral in pH. Acidity below pH 5.0 tends to inhibit growth and development. The ideal pond is shallow, with few if any plants growing in it. It will also dry up in late summer and refill the following year. These characters make the pond less suitable for invertebrate predators which can eat large numbers of Natterjack tadpoles. Often the ponds on podzolic soils of heath and acid grassland are too acidic to support Natterjack breeding; however there are areas where change in soil type, for instance soils associated with U1 (Festuca ovina-Agrostis capillaris-Rumex acetosella) grassland, or areas with enriched or disturbed soils, where ponds with a suitably high pH can be found that allow breeding.

For futher information see Beebee and Denton (1996) and Denton *et al* (1995).

6.3 Invertebrates

The ecology of invertebrate assemblages in acid grasslands has not been extensively studied in Britain. There have been a few broad-scale classifications of particular groups in grasslands, which have included dry, sandy habitats. These may have been akin to lowland acid grassland in character although no plant species lists are given (Eyre and Luff 1990, Luff et al 1992, Rushton et al 1987). In what appears to be one of the few studies of its kind, Cherrill et al (1997) compared classifications based on plant bugs, leaf hoppers, ground beetles, spiders and plants sampled from upland moorland. The closest agreement was found between the classifications based on plants and the pooled invertebrate data. The assemblages based on all invertebrate species showed a closer relationship with the vegetation than might be expected from analyses of any one invertebrate group. It would be useful to examine lowland grassland faunas and plant communities in a similar way.

Several invertebrate groups have been well studied at Silwood Park, which contains areas of acid grassland. The Park was once part of Windsor Great Park and the acid grassland areas appear to be somewhat similar to U4 (Festuca ovina- Agrostis capillaris-Galium saxatile grassland) among the NVC acid grassland types, apart from the anthills which support species such as *Ornithopus perpusillus* and *Aira praecox*, which are more characteristic of U1 (Festuca ovina-Agrostis capillaris-Rumex acetosella grassland) (Waloff and Blackith 1962, Waloff and Solomon 1973, Waloff and Hassell 1982).

The spider fauna of the acid grassland at Silwood was found to be similar in numbers of species to limestone grassland at Wytham Wood near Oxford, with 60% of the species being common to both grassland types (Waloff and Hassell 1982). Vegetation structure rather than composition is of greater importance for many invertebrate groups such as spiders, as perhaps is the case for the assemblage of rare spiders in U2 (Deschampsia flexuosa grassland) in the Sherwood Natural Area (NA 32), Nottinghamshire (see **Volume II** county account). However Kirby (1992) points out that many of the invertebrates which occur in acid grassland are specialist species that are not found in calcareous or neutral grassland. It is also possible that acid grassland species have been lumped in a more general "heathland" category in descriptions of habitat preferences of particular invertebrates. Many plant-feeding invertebrates require the presence of particular plant species. Examples among scarce species of acid grasslands are the nationally scarce beetle, *Ceutorhynchus pumilio*, found on *Teesdalia nudicaulis*, and the nationally rare moth *Neofriseria singula* on *Rumex acetosella* (Dr Martin Drake, EN, pers comm).

Acid grasslands are often associated with loose, sandy soils which are important for a considerable number of burrowing invertebrates and their predators, parasites and scavengers. The majority of solitary bees and wasps nest in the ground and prefer dry, light and often sandy soils. South-facing banks and unstable slopes are favoured, especially when only sparsely vegetated or where the sward is short (Falk 1991). The importance of dry bare ground to such invertebrates means that parched acid grasslands (U1), where bare ground can comprise 30% or more of the area occupied by the community (Rodwell 1992), are usually likely to be of greater interest than U2, U3 (*Agrostis curtisii* grassland) or U4, where swards may often be closed, taller and occur on moister soils. Invertebrate diversity is increased if flower-rich habitats occur in the vicinity of patches of open ground. Many acid grasslands have a rather low abundance of flowers and provide a lower supply of pollen and nectar than some other semi-natural grasslands. An exception is the parched acid grassland type U1f (Hypochaeris radicata sub-community), which can be rich in mid- to late-summer flowers of the Asteraceae, including *Hypochaeris radicata* and *Leontodon saxatilis*.

Acid grasslands provide habitats for a number of rare and scarce invertebrates. The last Large Blue (*Maculinea arion*) butterfly colony that existed in Britain before the species became extinct in the 1970s was located on an acid grassland (Elmes and Wardlaw 1982a). Vegetation samples show *Agrostis curtisii* to be the most abundant species, but growing with quite a wide range of other calcifuges, including the nationally scarce *Viola lactea*, as well as more catholic herbs such as *Pilosella officinarum* and, of course, *Thymus polytrichus*, which is the food plant of the butterfly (Elmes and Wardlaw 1982b). The ant species on which the butterfly depends for rearing its larvae is *Myrmica sabuleti*, which also occurs elsewhere in association with *Agrostis curtisii* grassland (Brian et al 1976). The Large Blue was re-introduced into its last native site in 1985 (Thomas 1989).

Other rare and scarce invertebrates occur in acid grassland and heathland mosaics as shown by an analysis of Natural Areas being prepared by Dr Martin Drake. For example in Breckland (NA 46), the nationally scarce Lunar yellow underwing moth (*Noctua orbona*) and the nationally rare ground beetle *Harpalus froelichi* occur on the grass heath areas. On the dry heathland of the Wealden Greensand (NA 70), the very rare Field Cricket (*Gryllus campestris*) is found. This species favours steep south facing banks or areas of sparsely vegetated sandy ground (Edwards et al 1996). The Heath Grasshopper (*Chorthippus vagans*), is another nationally rare representative of the Orthoptera that occurs on the Wealden heaths. The acid grasslands of the New Forest (NA 77) also support this

species, as well as the nationally scarce Hornet Robberfly (*Asilus crabroniformis*). The latter two species also occur on the acid grassland and chalk heath of the Isles of Portland and Purbeck (NA 82) and in several other Natural Areas.

Bracken habitats associated with acid grasslands (see section 2.3.10 above) can be important for fritillary butterflies, in particular the High Brown Fritillary *Argynnis addipe*, which breeds on *Viola* spp (Warren and Oates 1995). The High Brown has declined severely in the last 40 years and is now one of Britain's most endangered butterflies (Warren and Oates 1995).

Where management of acid grassland is intended to maximize diversity of invertebrate species, the aim should be to produce a dynamic successional mosaic with structural variety ranging from bare ground to mature tussocky swards and sparse scrub. Grazing is generally the preferred type of management as it can prevent the build up of litter and it results in additional dung and carrion habitats. In general the decomposer faunas associated with dung and carrion are much more important on dry, friable soils than on heavy water-logged substrates (Dr David Sheppard, EN, pers comm). Mowing is likely to be much less favourable for maintaing a rich invertebrate fauna as it usually results in a sward which has a more uniform structure than a grazed sward and which lacks significant areas of bare ground. Disturbance and grazing by rabbits can produce good invertebrate habitats.

7. Management of lowland acid grassland

7.1 Introduction

A good summary of grassland management for nature conservation, including acid grassland, is given in Crofts & Jefferson (1994) and readers are referred to this document for technical detail, including animal welfare issues. In the following chapter, an outline of the management requirements of acid grasslands is given together with an assessment of the current management condition of acid grassland in the lowlands. Grazing is the main management tool on acid grasslands in England. However, it should be noted that safeguarding acid grasslands from particular agricultural inputs is very important, ie organic and inorganic fertilisers and lime. These will raise the productivity and nutrient status of the soil and will damage or destroy acid grassland. In some cases, existing Environmental Land Management Schemes, particularly ESAs, which offer incentive payments for the conservation management of habitats, do not have prescriptions specifically aimed at acid grasslands. Their conservation requirements need to form part of scheme review and be included in information supplied to Project Officers.

7.2 The role of grazing

Lowland acid grassland has historically always been grazed. Cattle, sheep, ponies, rabbits and deer are all current grazers of acid grassland. In the east of England, rabbits and sheep, eg in Breckland (Lambley, 1994), have been especially typical but other mixtures occur elsewhere, as for example, the cattle and pony system of the New Forest (Tubbs, 1987 & 1991) and fallow deer in parkland. (Hatch Park, see **Appendix 1**).

Historically, acid grassland formed part of a series of grazed habitats, that formed extensive grazing systems. The acid grassland present was usually grazed very short as can be seen in the best remaining example of an extensive grazing ecosystem, the New Forest. (Tubbs 1991 and Sanderson 1995b). Here the grasslands are more productive for forage than other parts of the system, such as heaths or Bracken stands. As a consequence, the grasslands are heavily grazed in contrast to the less palatable vegetation elsewhere, which is allowed to grow taller.

In the past, the habitat was often regarded as grossly over-grazed by contemporary commentators. On sandy soils this level of grazing could even lead to mobile dune formation as in Breckland. Even in recent times the New Forest acid grasslands have often been described as over-grazed (Putman, 1986). However much of the diversity of acid grassland depends on heavy grazing (Winship 1993 and 1994, Byfield & Pearman 1995 and 1996 and Chatters 1996).

A requirement for areas of short vegetation, usually 2cm or less, and often patches of bare or near bare ground is a common feature of many declining rare and local species of lowland acid grassland. For example:

- The loss of nationally and locally scarce vascular plant species which are characteristic of short, acid grasslands in the Dorset Heaths is more than twice as high (88%) as the actual physical loss of heathland as demonstrated by Byfield & Pearman (1996).

- On a wider scale the decline of many of the characteristic flora and fauna of the Breckland is related to loss of short grassland. (Dolman 1994, Duffey 1994, Haggett 1994 & Lambley 1994a, 1994b and 1994c).

Some species have requirements for vegetation with a greater degree of structure as well as, or instead of, short grassland, but these requirements have usually been provided by less palatable species such as Heather, Bracken, Gorse, Birch and unpalatable herbs, rather than by taller grassland.

There appear to be few rare or local species which have benefited from the decreased levels of grazing that have produced taller grass swards. Those that have benefited seem to be recent opportunists for which there may be alternative, existing or potential, habitats. Examples are the Curlews of Breckland which have colonised the area as sward heights have increased, and which could find alternative habitats in restored valley fens or wet grasslands. Similarly, Skylarks are more productive in taller grasslands but survive in shorter acid grasslands and could perhaps benefit more from the provision of better habitat on more mesic grasslands rather than a greater area of under-grazed dry grassland (Dolman, 1992a). The short-sward specialists, however, often have fewer, poorer, alternatives, such as arable crops for Stone Curlew, where their productivity is lower than on short dry grassland.

In the past the effects of grazing in producing open swards was augmented by other forms of disturbance, many of which are no longer operational. This disturbance included mineral exploitation, military activities and temporary arable cropping. The latter was typical of Breckland and probably other areas of eastern England but its last large scale application was in the New Forest where significant areas of heath and acid grassland were cultivated during the 1940's and 1950's. They were then abandoned after being sown with pasture grasses. These have now reverted to acid grassland and herb-rich heath.

Consultations with local conservation officers across English counties (see **Volume II**), found a regional difference in the decline in grazing management. The abandonment and fragmentation of extensive pastoral ecosystems is greatest in the south and east. Grazing is more frequent in the west and into the upland fringe. Traditional grazing has been maintained on the common grazings of the New Forest which includes a large area of acid grassland. Small patches of good quality acid grassland have survived elsewhere where they have been located within more productive grazed grasslands. Fragments are also found in areas where the rabbit population has recovered, and in the open conditions produced by abandoned mineral workings.

In the last decade, however, grazing management has increased once more, due mainly to incentive schemes such as Countryside Stewardship, Environmentally Sensitive Areas, Wildlife Enhancement Schemes and various heathland initiatives. In areas such as the Breckland ESA, significant areas of the surviving grass heath is now being grazed, and sites in the Coversands WES scheme have dramatically improved in habitat quality (see **Appendix 1**).

7.3 Types of grazing animals

As long as suitable combinations of hardy animals are used, there is no one type of grazing regime which can be particularly recommended as being correct. Local tradition and history are probably as important as biodiversity considerations. A mix of grazers is often more beneficial than a single type. Traditional breeds of cattle and sheep are usually more suitable than modern, more productive, types. The following characteristics of the different grazers should also be considered:

- **Sheep**

  These are traditional in many areas in the east but were hardly ever used in parts of the south and were never turned out in significant numbers in the New Forest in the last five hundred years. Soft mouthed breeds are especially poor at eating coarse grasses such as *Molinia* and *Deschampsia flexuosa* and their light weight means that they are poor at creating open ground. Rabbit grazing, where it occurs, can help to counteract this problem. Sheep are also more likely to damage Heather stands by over-grazing than ponies or cattle, and are not very suitable for heathland sites with mires.

- **Cattle**

  Cattle are significant grazers of acid grassland in the New Forest but animals grazing here need special skills to be able to cope with grazing very short swards. According to New Forest commoners the cattle achieve this by using their gums like teeth but outside stock can find this difficult if they have been brought up on longer swards. Cattle are very good at grazing mixed sites with wet areas and coarse grasses, and are less likely to damage Heather than sheep. Most beef breeds or crosses can be used.

- **Ponies**

  Hardy native breeds are very versatile and are especially efficient at grazing extensive heathland sites and eat little Heather. They are the most important grazing animals in the New Forest. Ponies can graze acid grassland swards very short and produce swards with a low grass cover but with a high diversity and cover of lower plants and specialist vascular plants. Ponies often need to be combined with at least some cattle which graze the coarse grassland of pony dunging areas, but this problem is much less significant in extensive grazings than within small fields.

- **Rabbits**

  These were farmed in warrens, especially in sandy grass heaths in the east until the middle of this century. Before myxomatosis, rabbits were the major grazer that maintained relic acid grassland in heathlands and grass heaths. Locally they are still important, and maintain many small areas in good condition as well as larger areas such as Weeting Heath in Breckland (Dolman 1992b and Grice 1994). They create short, very high quality, swards and patches of bare ground. However, their grazing tends to be patchy, and they have difficulty reclaiming areas allowed to go rank. They avoid several species such as Roseby Willowherb and really need to be combined with at least some stock grazing. Combination with occasional mowing can be very effective but rabbit populations can crash. It is therefore advisable to have the ability to graze with livestock if required.

- **Deer**

  Fallow deer graze some acid grasslands in parks. Observation suggests they are rather inefficient on their own and can allow a thatch of fescues and bents to build up (Sanderson, 1994b). They are possibly best combined with cattle or ponies as grazing by sheep can have similar effects as deer.

7.4 Stock management and grazing levels

In managing stock, the experience of the New Forest indicates that the most effective and efficient method is to make the grazing units as extensive as possible and allow the animals to behave as naturally as possible (Putman 1986, Gill 1987 and 1994 Tubbs, 1987 and 1991, and Sanderson 1995b). The natural development of a varied vegetation structure is less likely to occur in small enclosures.

It is also essential, for reasons of animal welfare, to allow the animals to use their instincts to the full, to cope with low quality grazing. Animals in extensive grazings are constantly shifting for one habitat to another and this sequential exploitation of habitats is the key to their survival on poor grazings. Extensive grazing areas also allow the formation of coherent social herds for instance, the home range of ponies on the New Forest can be between 80ha to 1000ha (Tubbs, 1987). Ideally, management

units would be at least hundreds of hectares in size. However much smaller areas can be satisfactorily managed.

Obtaining suitable stock is a major constraint in some parts of the county, especially the east, where much of the stock rearing that survives uses productive modern breeds which are not suitable for rough grazing. Solutions to this problem are not yet clear, but in the east of the country conservation bodies are acquiring their own livestock. In the long term, restoration of entire pastoral systems is likely to be a more satisfactory answer than attempts to graze heathlands and grass heaths in isolation, especially as some additional, more productive land is usually essential anyway.

Grazing levels are difficult to summarise in a national review, but grazing pressures are likely to be in the range of one pony, one store cattle beast or two sheep per 1-4ha per year, depending on the mix of grassland with lower productivity vegetation and the nature conservation objectives of the management. Grazing levels will need to be set by reference to the actual effect on the vegetation. General guide lines for acid grassland are:

- The dry U1 Festuca ovina - Agrostis capillaris - Rumex acetosella grasslands should be generally grazed to less than 2cm in height, with at least some very short areas and bare ground.

- Wavy hairgrass, *Deschampsia flexuosa*, swards (U2) generally will be changed by grazing and approach U1 and U4 in composition, as *Deschampsia* is very sensitive to grazing by all but sheep and deer. Sometimes retaining some structure may be desirable for invertebrates such as spiders.

- Dense Bristle Bent *Agrostis curtisii*, swards (U3) can be opened up by grazing to allow a greater diversity of species to thrive but taller swards may need to be retained for example, for Smooth Snake (see Chapter 6).

- In the uplands, U4 (Festuca ovina - Agrostis capillaris - Galium saxatile) grassland is usually heavily grazed (Rodwell 1992). The impact of different levels of grazing on species diversity of this community are not clear but bryophytes are favoured by heavy grazing. Conversely, it is likely that more herb-rich examples of U4 (eg U4c, containing species such as *Succisa pratensis*) may be adversely affected as is the case for herb-rich stands of MG5 (Gibson 1997). Recommended sward heights for these grasslands are at least 5 cms through most of the grazing period and not less than 2-5 cm at the end of the grazing period (English Nature and British Horse Society 1997). There is a growing realisation that the fungi flora of U4 may be nationally or even internationally important (see Chapter 5) but as yet there is no information on the impact of grazing management on this flora.

- Sufficient grazing should be carried out to control the spread of invasive plants, such as Bracken and scrub and manage existing scrub (see below).

The interpretation of these guidelines must be flexible and adjusted to local conditions and special species interests.