36. Staffordshire

36.1 Physical

Geology

The lowlands of Staffordshire are dominated by Permian and Triassic sandstones and mudstones but there are outcrops of Coal Measures at Cannock and the Potteries. The uplands of the north west are formed from Millstone Grit and some Carboniferous Limestone.

Soils

Staffordshire has extensive patches of brown sands and podzols in the south west and at Cannock Chase, with smaller patches in the upland fringes to the north (**Maps 1c** & **1e**).

36.2 Landscape history

19th Century

The 1830's 1 inch OS maps show the extensive heathlands of Cannock Chase and a scatter of unenclosed heathlands. There are also signs of enclosed, former, heathlands in the west and south west.

Current landscapes and Natural Areas

The south of the county is part of the Midlands Plateau Natural Area (NA43) which, in spite of considerable urban development, still has significant areas of heathland. The lowlands to the north of this Natural Area are dominated by the Needwood and South Derbyshire Claylands Natural Area (NA40), but also include parts of the Mosses and Meres Natural Area (NA27) and the Trent Valley and Rises Natural Area (NA33), to the west and east respectively. These appear to have lost most of the heathlands which were once scattered throughout the area. To the north of the county, the uplands are divided between the upland fringe Potteries and Churnet Valley, the South West Peak, and the White Peak Natural Areas (NA28, NA29 & NA30 respectively), which occur on the Millstone Grit and Carboniferous Limestone.

36.3 Existing information

Flora

The coincidence maps (**Maps 2-4**) of lowland acid grassland species listed in **Table 1** show concentrations in the south west, in the Kinver Edge area, and Cannock Chase. A notable concentration remains in the Kinver Edge area, which is part of the rich heathland area around Kidderminster, although few post-1970 records occur from Cannock Chase. The acid grassland species recorded from the Midlands Plateau, including records from beyond Staffordshire, are listed in **Table 6** with the relevant extracts given below. Fourteen species have been recorded from the west of the Midlands Plateau Natural Area, of which two are apparently extinct. Of these *Silene conica* is definitely absent from the county.

The Flora of Staffordshire describes the sandy soils of Kinver Edge and Highgate Common as supporting a flora reminiscent of the Breckland, with species such as *Cerastium arvense*, *Echium vulgare*, *Teesdalia nudicaulis*, *Viola canina*, *Myosotis ramosissima* and *Thymus polytrichus* (Edees, 1972). In contrast, Cannock Chase and Hanchurch Hills are described as having a poor flora. The general impression of Cannock Chase is of a heathland which is much more transitional to the uplands

than that of the Kinver Edge area. A special feature of the southern Staffordshire acid grasslands was *Erodium maritimum*, which occurred in both areas, but is apparently now extinct.

Habitat surveys

The Grassland Inventory includes many upland fringe sites in the Staffordshire Uplands, with very little recorded from the lowlands. The Heathland Inventory indicates that sizeable areas of heathland have survived in the Midlands Plateau, mainly in Cannock Chase but also at Kinver Edge.

Summary of consultations with Local Team Conservation Officers

A fair amount of acid grassland, dominated by U4, occurs in the north of the county, especially in the Potteries and Churnet Valley Natural Area but this is very upland in character. The Needwood and South Derbyshire Claylands Natural Area has very little acid grassland, but there are significant areas in the Midlands Plateau. Cannock Chase has much *Deschampsia flexuosa* grass heath (U2) in mosaic with heathland, and this grassland probably extends to over 100ha. In the Kinver Edge area, more parched acid grassland (U1) occurs but is probably less than 50ha in total. At Kinver Edge, a rotavated area with abundant *Erodium cicutarium* exists, and may form the rare Erodium-Teesdalia sub-community (U1c) (Chris Walker, pers. comm. 1996). Little of the lowland acid grassland is grazed.

36.4 Summary of resource

Extent and composition

If the upland fringe acid grassland is excluded, then the extent of acid grassland in Staffordshire probably occurs at the lower end of the 100-500ha class. Species-poor U2 grassland dominates, but species-rich U1 exists in the south east.

Conservation value

The Kinver Edge area is an integral part of the very important acid grasslands of the Kiddiminster area. Other, rather poorer, acid grasslands are an integral part of the extensive surviving heathland ecosystem of Cannock Chase.

36.5 Future requirements for survey and conservation

Survey

For acid grasslands the main regional priority is to survey and assess the condition of the Kidderminster/Kinver Edge area in Staffordshire and neighbouring counties. The Potteries and Churnet Valley is an area mentioned by Chris Walker (English Nature) as requiring survey, presumably for a general grassland survey which would include acid grassland.

Conservation

The Kidderminster/Kinver Edge is a clear priority for restoration and extension of acid grassland and associated heathland communities. Cannock Chase is under-grazed and the restoration of extensive pastoralism here would undoubtedly increase the diversity of the acid grasslands.

36.6 References

EDEES, E.S. 1972. *The flora of Staffordshire.* Newton Abbot: David & Charles.

Extract from Table 6 for Staffordshire: occurrence of plant species generally faithful to lowland acid grassland

County: South Staffordshire & adjacent areas	
Natural Area:	**43**
Grasses	
Corynephorus canescens	1
Other Vascular Plants	
Chamaemelum nobile	0
Dianthus deltoides	1
Erodium maritimum	0
Filigo minima	1
Hypochaeris glabra	1
Moenchia erecta	1
Ornithopus perpusillus	1
Potentilla argentea	1
Silene conica	1
Stellaria pallida	1
Teesdalia nudicaulis	1
Trifolium striatum	1
Vicia lathyroides	1
Total no. of species extant	**12**
Total no. of species extinct	**2**
Total no. of species recorded	**14**

43 = Midlands Plateau

1 = Recent record
0 = Apparently extinct

Staffordshire acid grassland surveys

Survey Name	GR	Date	Landscape Types	Comments	No Sites	Site Area	Gr Area	AG Area	H Area	LHA
Grassland Inventory		1972-91	Field, Common, Enc relic, Dift calc	Includes many upland fringe sites	32	649.0	6.2	NI		
Heathland Inventory		1983-93	Heath, Enc relict, Common, Field	Mostly in NA43, fragments beyond	52	2456.0			975.1	
Estimates, classes		1996		Chris Walker, English Nature				C		

Survey Name	U1	U1a	U1b	U1c	U1d	U1e	U1f	U2	U2a	U2b	U3	U4	U4a	U4b	U4c	U4d	U4e	U5	U6	SD10	SD11	U20r
Grassland Inv.																						
Heathland Inv.																						
Estimates, class	A		A	?		?		C				A										

Key

Column headings
GR = Grid reference if relevant
No Sites = Number of sites
Site Area = Area of sites
GR Area = Area of grassland
A G Area = Area of acid grassland
H Area = Area of dry heath
LHA = Area of lichen heath
NI = No information
NA = Natural Area
U1-U20r = NVC communities/sub-communities

Area estimates
A = Less than 50 ha
B = 50-100 ha
C = 100-500 ha
D = 500-1,000 ha,
E = 1,000-5,000 ha
F = 5,000-10,000 ha
G = Greater than 10,000 ha
+ = Present but no area given
? = Possibly present

37. Suffolk

37.1 Physical

Geology

The solid geology of Suffolk is relatively simple. Chalk occurs to the west, Pleistocene Crag deposits in the east, and Tertiary clays lie in a small area to the south east. These deposits are, however, mostly obscured by drift deposits of glacial or fluvio-glacial origin, including wind blown sand in Breckland. Other sand areas occur, including extensive areas along the coast in the Sandlings, and on river terraces, but much of the glacial material is dominated by boulder clay with Chalk (chalk till).

Soils

Much of Suffolk is dominated by stagnogley soils and calcareous pedosols developed in chalky till, but brown sands are locally dominant in Breckland and in the Sandlings. Smaller areas dominated by brown sands also occur on river terraces, especially along the River Waveney (**Map 1d**). In Breckland, complex mixtures of acidic soils with calcareous soils are characteristic, reflecting the depth of the sand deposits over the underlying Chalk. These mixtures can occur as small stripes and in polygonal patterns, which the fossilised remains of periglacial processes. Blown sand and sand dunes have historically made an to be important contribution to the ecology of the area. The Sandlings are also dominated by brown sands with associated podzols, but lack the calcareous sands that give such a special ecological character to Breckland.

37.2 Landscape history

19th Century

The 1800's (south) and 1830's (north) 1 inch OS maps show extensive unenclosed heathland in the Sandlings and even more extensive rabbit warrens and rough grazings in Breckland. A few commons are recorded along the south bank of the river Waveney. In both the Sandlings and Breckland, large areas of heathland survived into the 20th century. In Breckland, the area of grass heath in 1900 was nearly double that of 1824. It should be remembered that recolonisation of arable by grass heath has been much more of a integral feature of Breckland than on other heathlands. In the 1930's 34% of the then existing heath was 'new' heath (Lambley, 1994c). Since then, there have been large scale losses to agriculture and forestry in both Breckland and the Sandlings.

Current landscapes and Natural Areas

English Nature picks out the two main heathland areas as the Breckland Natural Area (NA46) and the Suffolk Coast and Heaths Natural Area (NA49). The land between is included within the East Anglian Plain (NA50), where the potential for acid grasslands is limited.

37.3 Existing information

Flora

The coincidence maps (**Map 2** to **4**) of lowland grassland species listed in **Table 1** show very high concentrations of records in Breckland, the Sandlings and along the River Waveney. Declines are evident from inspection of recent records, with the River Waveney suffering the greatest declines and Breckland the smallest declines.

The flora of Breckland was covered by Trist (1979) and the flora of the whole of Suffolk by Simpson (1982). The flora was analysed using the following units; and species from **Table 1** were listed in **Table 6** in these units (extract below).

- The Breckland Natural Area (46). The whole of the Natural Area, including Norfolk.
- The Suffolk Coast and Heaths Natural Area (49). The whole of the Natural Area.
- The river corridor along the River Waveney in both Suffolk and Norfolk in the East Anglian Plain (50) and the Broads (48) Natural Areas.

Breckland (all of NA46) is famed for its exceptionally rich grass heath flora, including species characteristic of dry acidic and base-rich soils, as well as sand dunes. It is the richest area in Britain for lowland acid grassland species with 24 species of the 33 species in **Table 1** extant and two apparently extinct. Many other species are present including large populations of *Carex arenaria*, rare species such as *Muscari neglecta*, *Silene otites* and *Veronica spicata* and many more widespread species. Trist (1979) and data on lower plant distibutions indicate that about 64 species listed on both **Tables 2** and **3** occur in Breckland in general, probably the highest total in Britain. *Holosteum umbellatum* has been long extinct and many surviving species are in a precarious situation, eg *Scleranthus perennis prostratus*. Rich *Cladonia* communities are present in the acid grasslands but the lichen flora of the calcicolous grass heaths is much richer in rare lichen species. The bryophyte flora of the acid grasslands is not very distinctive and the fungi flora is unknown (Lambley, 1994a). Within Breckland concentrations of species characteristic of disturbed acid sandy soils (**Maps 8-10**) still survive but these species are now rare beyond this area.

The Sandlings (NA49) is less famous for its acid grassland flora but collectively the area does support a rich acid grassland flora with 18 species extant and four apparently extinct. Beyond these areas, the extent of acid grassland is very limited but there is a respectable flora recorded from the River Waveney corridor, with sixteen species recently recorded and 4 apparent extinctions from the relevant 10km grid squares.

Fauna

Breckland harbours an important bird fauna including 10% of British Nightjars, 30% of British Woodlarks and over 50% of British Stone Curlews. It is one of the few areas where grass heaths are still sufficiently extensive to support Stone Curlew and although this species is increasingly using arable fields in which to nest, positive management of grass heath is resulting in a gradual return to this habitat.

Other species such as Woodlark and Nightjar depend more on the ephemeral appearance of acid grassland habitat types within clear felled conifer plantations rather than on grass heaths, from which they are nearly extinct, although Woodlark has recently expanded back on to the grass heaths.

Wheatear is increasingly scarce, whilst Stonechat and Whinchat numbers are extremely low. Ring Plover, abundant in rabbit warrens in the 19th century, is now confined to arable fields and gravel pits. Montagu and Hen Harriers were lost by the middle of this century. However, a positive feature is the colonisation of grass heaths by Curlew, which utilise longer grass than Stone Curlew and other species (Gibons *et al*, 1993 & Dolman, 1994).

The long term conservation of most species is thought to require the restoration of heavier grazing and greater physical disturbance. It is worth noting that many of these species (Woodlark, Nightjar, Ring Plover, Wheatear, Stonechat and Whinchat) currently have larger populations on acid grasslands in the New Forest than they do in Breckland.

The importance and status of the invertebrates of Breckland is summarised in the report *Ecological change in Breckland* (Haggett 1994, Duffey 1994 & Lambley 1994b). Numerous RDB (160) and Notable (154) species are recorded from Breckland habitats including grass heaths, fen, pingo ponds and ruderal communities. The grass heath represents an important habitat with 34.2% of the RDB species recorded from it. Interestingly, the taller Heather stands which have appeared since myxomatosis reduced rabbit populations have no particular spiders of interest. This is in contrast to the rich spider fauna of the grass heaths. For groups which there is sufficient data, such as the moths and butterflies, there is firm evidence to indicate the decline and extinction of many species of disturbed grass heath or early succession communities.

Habitat surveys

The Grassland Inventory records large areas of acid grassland and calcicolous and acid grassland mosaics in Breckland. Significant areas also occur in the Sandlings and some small areas in the East Anglian Plain, mainly along the River Wavney. The Heathland Inventory indicates a similar distribution. The majority of the sites recorded on both Inventories are either commons or the relics of large scale enclosure of commons, warrens or rough grazings.

Breckland NVC heathland survey (Smith, 1996 and Smith & James, 1995)

Most of the Suffolk Breckland acid grasslands and heaths on SSSIs are now covered by high quality Phase 2 surveys. These show U2 on ungrazed sites and mixtures of U1a, U1b, U1d, U1f, SD10 and SD11 on grazed sites. The vegetation patterns are often complicated with heath (H1), Bracken (U20) and calcicolous grassland entering into the mixture of vegetation types. Selected data from Lakenheath Warren SSSI is given in Volume I, Appendix 1, to illustrate the composition and characteristics of U2 and SD10 on grass heaths.

518ha of U1 and 175ha of *Deschampsia* grass heath (U2) have been recorded from the Breckland SSSIs. UId and U1b were the most frequent types of U1 found, but an area of 49ha of the lichen-rich U1a was also recorded. The latter sub-community however, was surprisingly poor in lichen species compared to stands in Dungeness (Ferry *et al*, 1990) and Hampshire (Sanderson and Stanbury 1996). This may be part of the general degradation of the grass heath of the Breckland. Also, none of the Erodium-Teesdalia sub-community (U1c), was found, possibly another sign of the decline in the quality of the grass heaths.

A survey of unimproved grassland in Suffolk Wildlife sites (Casey et al, 1995)

Suffolk Wildlife Trust carried out NVC surveys of non-SSSI unimproved grasslands in 1994 and 1995. These surveys recorded a total of 106ha of dry acid grassland and transitions to acid grassland and Bracken, mainly in Breckland but also in the Sandlings and the edges of river valleys (River Waveney and River Stour). Of this total 18.6 ha is U20, of the remainder all but about 3 ha is U1 or U1 transitions. The non-U1 3.3 ha is Deschampsia flexuosa grassland (U2) and sand dune type SD10. Most U1 was not assigned to a sub-community (and may have been the Typical sub-community (U1b)) with U1a, U1b, U1d and U1e specifically recorded. An impresive range of Breckland RDB and nationally scarce species were recorded from some sites. An example is Icklingham Playing Fields with 1.1ha of mown U1 with *Silene otites, Crassula tillaea, Medicago minima, Medicago sativa falcata, Silene conica,* and *Vulpia ciliata ambigua.* A total of 176 sites were recorded in Suffolk as a whole. The predominant community type was mesotrophic grassland in 76% of sites, mires in 10%, calcicolous in 8% and acid grassland in 6%. Of the sites, 27 had RDB or nationally scarce species recorded from them. Six were non-grass heath sites and 21 were mainly Breckland grass heath sites. Of the latter 10 had U1 and/or SD10, 4 had CG7 and U1, 4 had CC7 and 3 were sites overgrown with

MG1. These results indicate the importance of both the Breckland grass heaths and the acid grassland within these sites.

Shingle surveys

The Suffolk coast has miles of shingle beaches, and as at Dungeness (Ferry, 1990), parched acid grassland (U1) is likely to be the main community of stabilised shingle grassland beyond the maritime edge, with U1d the main sub-community.

The maps in the NVC Volume 3 show lichen rich U1a was sampled along the Suffolk coast. These shingle grasslands can support a rich lowland acid grassland flora. The national shingle survey (Sneddon & Randall, 1994) is difficult to interpret but the site descriptions indicate that parched acid grasslands are widespread. Many of the synonymies suggested between the surveyed communities and the NVC (apparently derived by the use of computer comparisons) may not be correct.

Summary of consultations with Local Team Conservation Officers

The area of acid grassland in Suffolk is likely to be about 1000ha. It is estimated that about 600-700ha of parched acid grassland (U1) and about 200ha of *Deschampsia* grass heath (U2) are present. Most of this is found in Breckland and the Sandlings and a little by the River Waveney. Most is found within heathland or the relics of heathland enclosure. Data for the Sandlings SSSIs data indicates that there is about 330ha of acid grassland in this area.

The ecology and conservation of Breckland is summarised in Lambley (1994c). The Brecklands ESA has achieved grazing management on most remaining areas, with Countryside Stewardship funding restoration in the Sandlings. Some mowing is carried out on common land in the latter area, due to the difficulty of fencing for grazing purposes.

Cattle grazing has been carried out in Breckland but cattle were regarded as potentially able to damage Heather stands and have therefore been replaced by sheep. In Breckland, the experience is that sheep will only graze *Deschampsia flexuosa* if the stocking rate is sufficiently high. A major problem in obtaining suitable grazing stock is their local scarcity, due to the intensive and arable nature of agriculture in East Anglia.

37.4 Summary of resource

Extent and composition

The acid grassland resource is concentrated in Breckland although large areas are present in the Sandlings and a few significant patches occur elsewhere. The total resource probably somewhat exceeds 1000ha.

Breckland supports complex mixtures of grassland types and the more base-rich U1d is especially abundant. Outside of Breckland, U1b is likely to dominate. Shingle grassland along the Suffolk coast is also likely to hold floristically rich examples that are closely related to U1.

Conservation value

Breckland is the premier area for lowland acid grassland in England and the heathland habitat mosaic of which these grasslands are a part is clearly of international importance. Its condition has, however, given serious cause for concern (Lambley, 1994c) and many of the distinctive species are close to, or are, extinct. Lack of heavy grazing by both stock and rabbits is a major cause of these declines in species, but the legacy of past fragmentation is probably also of significance. The fact that with the

exception of Stone Curlew, the acid grassland bird fauna is faring much better in the New Forest than in Breckland may be related to these factors. The Sandlings and nearby shingle structures are also of high, probably national, importance for acid grasslands, especially for the flora of these grasslands. Breckland and the Sandlings have rich invertebrate faunas, and Breckland, along with the New Forest, is the only area with a surviving lowland acid grassland bird fauna of significance. However, several of the species are now dependant on arable and forestry habitats.

37.5 Future requirements for survey and conservation

Survey

Phase 2 grassland surveys should cover any remaining unsurveyed areas of these important grasslands, for instance in the Sandlings. These surveys are valuable for monitoring and management purposes as well as to establish the composition of the resource.

Conservation

The restoration work that is possible under the ESA and the Countryside Stewardship Scheme needs to be carried out in both Breckland and the rest of the county. The long-term future of the habitats and species of Breckland and the Sandlings probably depends on the fragmentation of the heathlands being substantially reduced through conversion of arable and forestry land back to heathland. Green (1995) has produced a report for EN, setting out a plan for heathland re-creation in Breckland.

37.6 References

CASEY, D., GIBBONS, N., HUGHES, S & WILLIAMSON, B. 1995. *A survey of unimproved grassland in Suffolk wildlife sites.* Suffolk Wildlife Trust.

DOLMAN, P. 1994. Changes in the populations of typical Breckland bird species. *In*: P.W. LAMBLEY, ed. *Ecological change in Breckland*, pp. 85-96. Norwich: English Nature.

DUFFEY, E. 1994. Araneae (Spiders). *In*: P.W. LAMBLEY, ed. *Ecological change in Breckland*, p. 105. Norwich: English Nature.

FERRY, B., LODGE, N. & WATERS, S. 1990. *Dungeness: a vegetation survey of a shingle beach.* Peterborough: Nature Conservancy Council Research and Survey in Nature Conservation, No. 26.

GREEN, J. 1995. *A heathland re-creation plan for Breckland.* A report for English Nature.

HAGGETT, G. 1994. Lepidoptera. In: P.W. LAMBLEY, ed. *Ecological change in Breckland*, pp. 99-103. Norwich: English Nature.

LAMBLEY, P.W. 1994a. Non-vascular plants. *In*: P.W. LAMBLEY, ed. *Ecological change in Breckland*, pp. 75-79. Norwich: English Nature.

LAMBLEY, P.W. 1994b. Other invertebrate groups. *In*: P.W. LAMBLEY, ed. *Ecological change in Breckland*, pp. 107-110. Norwich: English Nature.

LAMBLEY, P.W. 1994c. Breckland habitats. *In*: P.W. LAMBLEY, ed. *Ecological change in Breckland*, pp. 19-33. Norwich: English Nature.

LAMBLEY, P. W. (ed.) 1994d. *Ecological change in Breckland.* Norwich: English Nature.

SANDERSON, N.A. & STANBURY, N.K. 1996. *Woolmer acid grasslands, vegetation survey.* Report prepared by Ecological Planning & Research for Hampshire County Council.

SIMPSON, F.W. 1982. *Simpson's flora of Suffolk.* Ipswich: Suffolk Naturalists' Society.

SMITH, T. 1996. *National Vegetation Classification (NVC) survey of heathland vegetation on Breckland heath Sites of Special Scientific Interest (SSSI) in Suffolk.* Spilsby: Ecosurveys Ltd.

SMITH, T. & JAMES J. 1995. *National vegetation classification (NVC) survey of acid grassland on Breckland heath Sites of Special Scientific Interest (SSSI) in Suffolk.* Spilsby: Ecosurveys Ltd.

SNEDDON, P. & RANDALL, R.E. 1994. *Coastal vegetated shingle structures of Great Britain: Appendix 3. Shingle sites in England.* Peterborough: Joint Nature Conservation Committee.

TRIST, P.J.O. 1979. *An ecological flora of Breckland.* East Ardsley: EP Publishing Limited.

Extract from Table 6 for Suffolk: occurrence of plant species generally faithful to lowland acid grassland

County: Suffolk			
Natural Areas:	**46**	**49**	**48/50**
Grasses			
Apera interrupta	1	1	0
Corynephorus canescens	1		0
Festuca longifolia	1		
Vulpia ciliata ambigua	1	1	1
Other Vascular Plants			
Chamaemelum nobile	0	0	0
Crassula tillaea	1	1	1
Dianthus deltoides	1	0	
Filago minima	1	1	1
Herniaria glabra	1		
Hypochaeris glabra	1	1	1
Medicago minima	1	1	0
Moenchia erecta	0	1	1
Ornithopus perpusillus	1	1	1
Potentilla argentea	1	1	1
Scleranthus perennis	1		
Silene conica	1	0	1
Stellaria pallida	1	1	1
Teesdalia nudicaulis	1	1	1
Thymus serpyllum	1		
Trifolium glomeratum	1	1	1
Trifolium ornithopodioides		1	1
Trifolium scabrum	1	1	1
Trifolium striatum	1	1	1
Trifolium subterraneum	1	1	
Trifolium suffocatum	1	1	1
Veronica verna	1	0	
Vicia lathyroides	1	1	1
Total no. of species extant	**24**	**18**	**16**
Total no. of species extinct	**2**	**4**	**4**
Total no. of species recorded	**26**	**22**	**20**

46 = Breckland (includes Norfolk)
49 =Suffolk Coast and Heaths
48/50 =River Wavney (includes Norfolk) in East Anglian Plain (50) and The Broads (48)

1 = Recent record
0 = Apparently extinct

Suffolk acid grassland surveys

Survey Name	GR	Date	Landscape Types	Comments	No Sites	Site Area	Gr Area	AG Area	H Area	LHA
Grassland Inventory		1983-93	Grass Heaths, Heaths, Enc Relics	Mainly Breckland & Sanderlings + By R. Wavney	49	2183.7	213.1	76.8		
Heathland Inventory		1983-91	Heaths, Grass Heaths, Enc Relics	Mainly Breckland & Sanderlings + By R. Wavney	73	8825.0			836.6	NI
Breckland Ph. 2 surveys		1995-6	Grassheaths, Enclosure relics	NVC surveys of Breckland acid grassland sites	12	1778.7		785.0		
Sandlings		1997	Heaths, Grass Heaths ?	EN SSSI data for Sandlings estimate	13			310.5		
Suffolk Wildlife Sites		1994-5	Mainly enclosure relics	NVC surveys of non-SSSIs (including transitions with other habitats)	37			106.0		
Estimates hectares		1996	As above	Anne Brenchley, EN				1000-5000		
Estimates classes		1996		Anne Brenchley, EN				E		

Survey Name	U1	U1a	U1d	U1c	U1b	U1e	U1f	U2	U2a	U2b	U3	U4	U4a	U4b	U4c	U4d	U4e	U5	U6	SD10	SD11	U20r
Grassland Inv.																						
Heathland Inv.																						
Breckland	517.7	48.7	169.3		266.0	33.7		175.2	175.2											77.7	14.4	
Sandlings	+							+														
* Wildlife Sites	63.7	2	7.5		5.3	+		0.5														
Estimates ha	7/800							200														
Estimates class	D	B	C		C	B		C	C											B	A	

* Pure communities, not transitions or mosaics

Key

Column headings

GR = Grid reference if relevant
No Sites = Number of sites
Site Area = Area of sites
GR Area = Area of grassland
A G Area = Area of acid grassland
H Area = Area of dry heath
LHA = Area of lichen heath
NI = No information
NA = Natural Area
U1-U20r = NVC communities/sub-communities

Area estimates

A = Less than 50 ha
B = 50-100 ha
C = 100-500 ha
D = 500-1,000 ha,
E = 1,000-5,000 ha
F = 5,000-10,000 ha
G = Greater than 10,000 ha
+ = Present but no area given
? = Possibly present

38. Surrey

38.1 Physical

Geology

Surrey is divided by the Chalk hills of the North Downs, with Lower Cretaceous sands and clays to the south and Tertiary deposits to the north. The Lower Cretaceous rocks include a wide band of Lower Greensand associated with extensive heathlands. The Tertiary deposits to the north include part of the largest outcrop of Bagshot and Barton Beds in the Thames Basin and this is also associated with large heathlands. On the dip slope of the North Downs there are also outliers of the sandy Thanet Beds which also support heathland. River terrace gravels are also significant in the Thames Basin.

Soils

Extensive areas of the Lower Greensands and the Bagshot and Barton Beds north of the Downs are dominated by podzols. A small patch of brown sand is recorded on the Downs at Headley (**Map 1b**).

38.2 Landscape history

19th Century

The 1810's 1 inch OS maps record immense areas of heathland commons both on the Greensand and in the Thames Basin. Rough grazings, including heathland were also abundant on the dip slope of the Downs.

Current landscapes and Natural Areas

The Natural areas reflect the geology of the county, with the Low Weald and Pevensey Natural Area (NA73) dominated by the Weald Clay to the south, having the least potential for acid grassland. Other areas include the Wealden Greensand Natural Area (NA70), the London Basin Natural Area (NA66) and the North Downs Natural Area (NA69). All have suffered serious losses of heathland to enclosure, colonisation or planting of woodland or in the case of the first two Areas, urban development.

38.3 Existing information

Flora

The coincidence maps (**Map 2-4**) of lowland acid grassland species listed in **Table 1** show very high concentrations recorded from areas both north and south of the Downs. Declines are evident from inspection of recent records, with the decline in the Thames Basin being much more dramatic than on the Greensand. Concentrations of species typical of disturbed acid sandy soils are recorded north and south of the Downs (**Maps 5-7**) and concentrations of ephemeral pond species are recorded north of the downs (**Maps 8-10**). Declines have also occurred in these species, but some species have been recorded since 1970.

The Flora of Surrey (Lousley, 1976) and its supplement (Leslie, 1987) were consulted. The species recorded from the three Natural Areas involved are listed in **Table 6**, an extract of which is shown below. The maps in Lousley (1976) show acid grassland species to be most frequent in the Greensand heathland areas, with species such as *Carex arenaria*, *Trifolium scabrum* and *Vulpia ciliata ambigua*

confined to the Greensand, where the sands tend to be coarser and most freely draining, compared to other acid soils in Surrey.

Other species, eg *Vicia lathyroides* and *Trifolium striatum* are common on the Greensand, rare on the Bagshot and Barton Beds heathlands but are more frequent on lower terrace river gravels to the north. Other species of interest include *Scilla autumnalis*, which was still recorded at Hurst Park in 1983 (Leslie, 1987), *Scleranthus annuus polycarpos*, *Cerastium diffusum* and *Cerastium arvense*. *Agrostis curtisii* is locally abundant in the Thames Valley heathlands but is absent from the Greensand.

Fauna

The Hampshire/Surrey border population of Wood Lark makes some use of mown acid grassland (Clark, 1993).

Habitat surveys

The Grassland Inventory recognises the presence of acid grassland within the heathlands but does not give any areas. The Heathland Inventory records the extensive survival of heathland north and south of the Downs as well as the survival of Headley Down on the dip slope of the Downs.

Unimproved neutral and acidic grassland in Surrey (Steven, 1990a)

There is one published report on a Phase 2 grassland survey which covered both neutral and acid grassland. Only a few acid grassland sites were sampled. Two of the sites surveyed contained acid grassland: Reigate Heath SSSI, on the Greensand, and Staines Moor SSSI on the Thames flood plain. Reigate Heath is mostly a golf course but species rich stands of parched acid grassland referable to the Typical sub-community (U1b) occur around cricket and football pitches. Species present include *Plantago coronopus*, *Ornithopus perpusillus*, *Myosotis ramosissima*, *Trifolium striatum*, *Trifolium ornithopodioides*, *Scleranthus annuus*, *Cynodon dactylon*, *Silene gallica*, *Moenchia erecta* and *Botrychium lunaria*.

A re-survey in 1997 (Sanderson, N.A., 1997c) confirmed the site was still of interest with species-rich U1b surviving on the mown cricket and football pitches and the edge of the golf course fairways. On the football pitch, enriched patches (MG7) supported one of Surreys few surviving colonies of *Chamaemelum nobile*. A total of six acid grassland species (**Table 1**) and 10 locally characteristic species (**Table 2**) were recorded, giving a total of 16 dry acid grassland indicator species (**Table 8**).

Staines Moor SSSI is a heavily grazed, flood plain, common with parched acid grassland (U1) on the drier ground passing into Lolium-Cynosurus grassland (MG6) on damper ground. The U1 appears to belong to the Anthoxanthum-Lotus sub-community (U1d). *Moenchia erecta* has been recorded.

Three other sites are, rather unconvincingly, described as having Festuca-Agrostis-Galium Grassland (U4). The vegetation described is referred to in all cases as having patches of *Molinia* present, and at least some of it is clearly Molinia-Potentilla grassland (M25b). Some grassland approximating to U4 is, however, clearly present.

Summary of consultations with Local Team Conservation Officers

The Greensand heathlands contain some Deschampsia flexuosa grassland (U2) which is associated with die-off of Heather, a feature absent from the Greensand heaths of Hampshire and Sussex. Species rich parched acid grasslands (U1) are widespread, although much reduced since Lousley's time. They are usually found on disturbed and somewhat enriched soils rather than the podzols found under the U2

grasslands and the heaths. The typical sub-community (U1b) appears to dominate, as in Hampshire, whilst U1e is rare, and not dominant as stated by Rodwell (1992) in the NVC.

Carex arenaria communities are present, with well developed loose sand communities around Frensham Pond, where *Vulpia ciliata* occurs. U1c and U1d are likely also to be present. Good examples occur in the main heathland blocks, especially in the Frensham Pond and Thursley Common areas, but interesting stands extend further west on smaller commons. These include Puttenham Heath (SU9447) St Martha's Hill (TQ0248) and Blackheath(TQ0346), and it is possible that *Lotus angustissimus* may be native here (Dr Rose, pers. comm. 1996). Small patches of grassland occur at Deerleap Wood (TQ1148) and in the far west, Reigate Heath (TQ5024). Several of these sites are golf courses.

As well as these heathland sites, patches of U1 exist on sandy alluvium in the flood plain of the River Wey, but these are not species-rich (Peter Tinning, pers. comm. 1996). Dr Rose considers that there is approximately 50ha of U1 grassland, and at least 100ha of U2 grassland, possibly more, on the Greensand. Greensand heaths are generally considered important for a flora and fauna that reflects their hot, dry character.

The heathlands north of the Downs are considered to be more degraded, with both the heath and the grassland in poor condition (Dr. Rose, pers. comm. 1996). The spread of U2 at the expense of heath is much worse than on the Greensand. There may be some mown areas in the military ranges and Chobham Common is better with large areas of Agrostis curtisii grassland (U3). Some golf courses may be of interest. Village greens and small fields often support acid grassland but the latter are mostly overgrown and the former likely to be semi-improved (Peter Tinning, pers. comm. 1996). It is estimated that between 50-100ha of U1, less than 50ha of U3 and 100-500ha of U2 exist in the heathlands north of the Downs (Dr. Rose, pers. comm. 1996). Headley Heath on the Downs has some interesting acid grassland.

Grazing and other restoration work is being experimentally introduced, and some acid grasslands on golf courses and public open spaces are mown.

38.4 Summary of resource

Extent and composition

There are approximately 500 to 1,000ha of acid grassland in Surrey, with over 500ha of U2, over 100ha of U1 and less than 50ha of U3. The richest grasslands for declining and characteristic plants are those on the Greensand but Lousley (1976) indicates that the gravel terraces near the Thames may also be of interest.

Conservation value

The heathlands and associated acid grasslands of the western Greensands are of exceptional importance. These areas represent a transition between the damper heathlands of the New Forest and the more Continental heathlands of Breckland, but have a distinctive character of their own. The overall heathland ecosystem of the Greensand heathlands are certainly of international importance and the acid grasslands are of at least national importance in their own right.

The heathlands to the north are rather less outstanding. They resemble the New Forest, and although much more degraded, are still of great ecological importance.

38.5 Future requirements for survey and conservation

Survey

A Phase 2 survey of the acid grassland on the Greensand is a high priority. The current condition of the acid grassland flora of the gravel terraces near the Thames should also be investigated.

Conservation

The restoration of extensive grazing to the Surrey heathlands will be the most effective long-term form of conservation. The Greensand has a high potential for the restoration of acid grassland from cultivated land.

38.6 References

CLARK, J.M. & EYRE, J.A. (eds.) 1993. *Birds of Hampshire.* Fleet: Hampshire Ornithological Society.

LESLIE, A.C. 1987. *Flora of Surrey: supplement and checklist.* Guildford: A.C. Leslie.

LOUSLEY, J.E. 1976. *Flora of Surrey.* Newton Abbot: David & Charles.

SANDERSON, N.A. 1997c. *Acid grassland survey of Reigate Heath SSSI, Surrey 1997.* A report to English Nature.

STEVEN, G. 1990a. *A preliminary botanical survey of unimproved neutral and acidic grassland in Surrey.* Lewes: Nature Conservancy Council, South-East Region.

Extract from Table 6 for Surrey: occurrence of plant species generally faithful to lowland acid grassland

County: Surrey			
Natural Areas:	**70**	**66**	**69**
Grasses			
Vulpia ciliata ambigua	1		
Other Vascular Plants			
Chamaemelum nobile	1	1	1
Crassula tillaea		0	
Dianthus deltoides	1	1	
Filago minima	1	1	1
Hypochaeris glabra	1	1	
Moenchia erecta	1	1	
Ornithopus perpusillus	1	1	1
Potentilla argentea	1	1	
Sagina subulata	1	0	
Stellaria pallida	1		
Teesdalia nudicaulis	1	1	
Trifolium ornithopodioides	1	1	1
Trifolium scabrum	1	1	
Trifolium striatum	1	1	1
Trifolium subterraneum	1	1	1
Vicia lathyroides	1	1	
Viola lactea		0	
Total no. of species extant	**16**	**13**	**6**
Total no. of species extinct	**0**	**3**	**0**
Total no. of species recorded	**16**	**16**	**6**

70 = Wealden Greensand
66 = London Basin
69 = North Downs

1 = Recent record
0 = Apparently extinct

Surrey acid grassland surveys

Survey Name	GR	Date	Landscape Types	Comments	No Sites	Site Area	Gr Area	AG Area	H Area	LHA
Grassland Inventory		1986-93	Heath, Enc relic, Flood plain, Common	Mainly in heathlands in NA66 & 70.	15	6235.7	8.5	2.0		
Heathland Inventory		1982-87	Heath, Enc relic	Mainly in NA66 & 70.	59	11778.0			2841.4	
Steven (1990)		1990	Common, Flood plain, Heath	Phase 2 survey report, no areas given	5			NI		
Estimates NA46, classes		1996		Dr Francis Rose, Greensand				C		
Estimates NA38, classes		1996		Dr Francis Rose, Thames Basin heaths				C		
Estimates, classes		1996		Dr Francis Rose, county estimate				D		

Survey Name	U1	U1a	U1b	U1c	U1d	U1e	U1f	U2	U2a	U2b	U3	U4	U4a	U4b	U4c	U4d	U4e	U5	U6	SD10	SD11	U20r
Grassland Inv.																						
Heathland Inv.																						
Steven (1990)	+		+		+							+										
Estimates NA70	A		+	?	+	+		B												?	?	
Estimates NA66	B							C			A	A										
Estimates, class	C		+		+	+		D			A	A								?	?	

Key

Column headings
GR = Grid reference if relevant
No Sites = Number of sites
Site Area = Area of sites
GR Area = Area of grassland
A G Area = Area of acid grassland
H Area = Area of dry heath
LHA = Area of lichen heath
NI = No information
NA = Natural Area
U1-U20r = NVC communities/sub-communities

Area estimates
A = Less than 50 ha
B = 50-100 ha
C = 100-500 ha
D = 500-1,000 ha,
E = 1,000-5,000 ha
F = 5,000-10,000 ha
G = Greater than 10,000 ha
+ = Present but no area given
? = Possibly present