

Lowland grassland in Natural Areas

National assessment of significance

No. 171 - English Nature Research Reports



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English Nature Research Reports

Supplement to number 171

**Lowland grassland in Natural Areas:
National assessment of significance**

Richard G Jefferson

English Nature
Lowlands Team

ISSN 0967-876X
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1. Introduction

Since the above document was published in 1996, the Natural Areas map has been revised following further analysis in tandem with the Countryside Commission (Figure 1). Each new Natural Area (NA) coincides with one or more of the Countryside Commission's Character Areas.

The new map is not radically different from the first version but there are nonetheless a number of changes which include:

- a. boundary changes to the original NAs;
- b. the appearance of new NAs which either fall wholly within the boundary of an original NA (eg 96 - West Penwith from Cornish Killas & Granites) or cross cut a number of old NAs (eg 44 Midland Clay Pastures from Severn Valley, Greater Cotswolds and Middle England);
- c. name changes, eg Central Marches is now known as Clun and North West Herefordshire Hills (58).

In view of these changes it was felt desirable to provide, as a minimum, revised lowland grassland significance assessments for the new Natural Areas to ensure that national priorities for grassland conservation are fully up to date.

2. Methodology

Due to time constraints, this update has concentrated on checking the original significance assessments where there have been boundary changes to the original NAs and the production of new assessments for the small number of additional NAs. Since ENRR 171 was published, two new sources of data have become available (Jefferson 1997, Sanderson in prep) and these have been used in this update report.

Table 1 lists the new NAs with the revised significance assessments. Where there has been a change in significance the reason for this is explained in Column 3 (Comments).

For wholly new NAs with a significance rating of Notable and above, the key grassland types are given in Column 3 with those highlighted in bold being of the greatest significance/or contribute significantly to the significance ranking that equate to nationally important concentrations of lowland grassland (see page 5 of ENRR 171 for further explanation). Similarly, where a NA significance rating has changed due to the addition of a grassland type not originally considered to be present or originally of lesser significance, this is detailed in column 3, with the types of the greatest significance again emboldened.

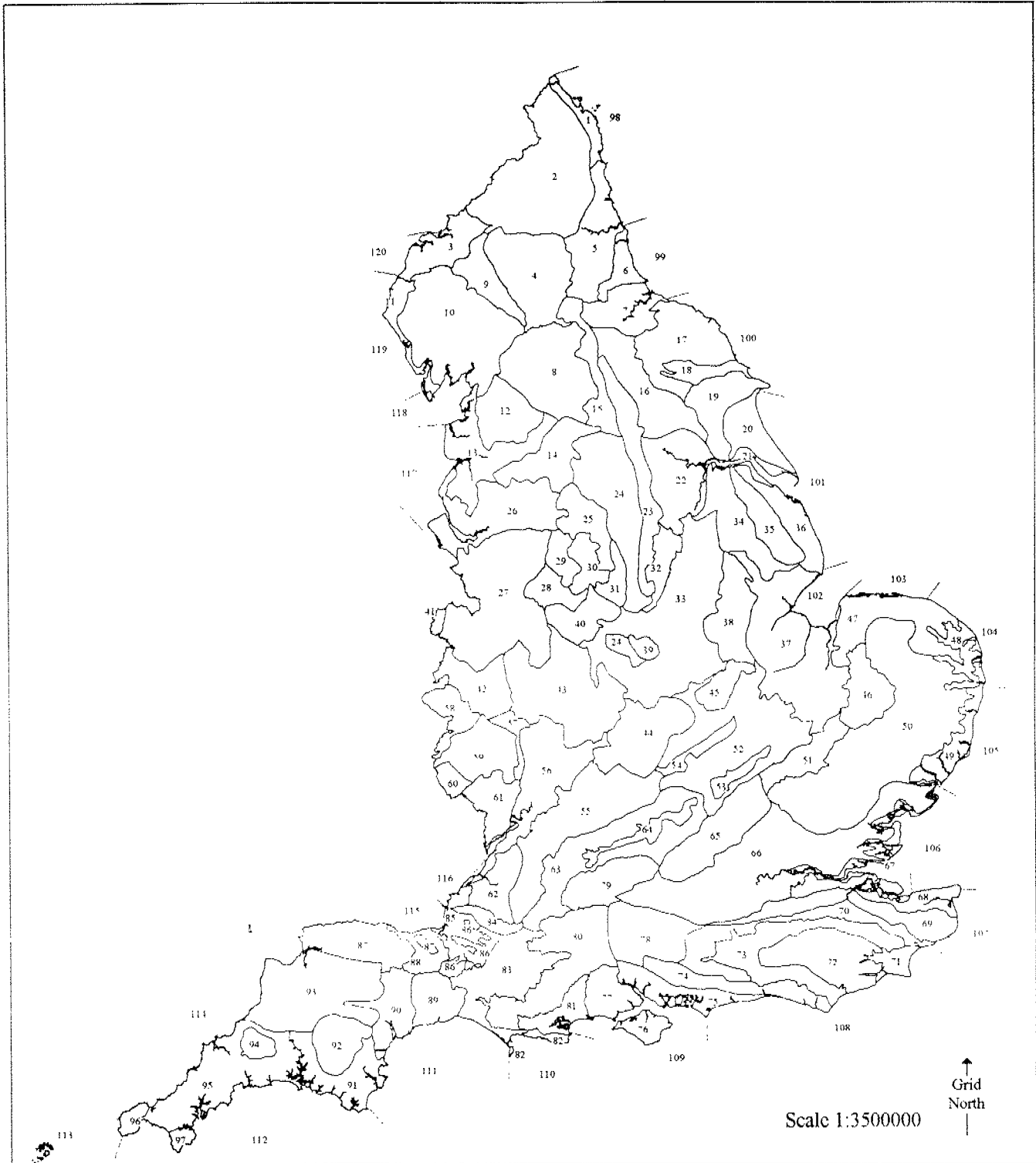
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Figure 1.

Natural Areas



- | | | | | | |
|---------------------------------------|--|--|--|-----------------------------------|---|
| 1. North Northumberland Coastal Plain | 11. West Cumbria Coastal Plain | 21. Humber Estuary | 31. Derbyshire Peak Fringe and Lower Derwent | 41. Osewtery Uplands | 51. East Anglian Chalk |
| 2. Border Uplands | 12. Forest of Bowland | 22. Humberhead Levels | 32. Sherwood | 42. Shropshire Hills | 52. West Anglian Plain |
| 3. Solway Basin | 13. Lancashire Plain and Valleys | 23. Southern Magnesian Limestone | 33. Trent Valley and Rises | 43. Midlands Hills | 53. Bedfordshire Greensand Ridge |
| 4. North Pennines | 14. Southern Pennines | 24. Coal Measures | 34. North Lincolnshire Coovertlands and Clay Vales | 44. Midlands Plateau | 54. Yareley-Whitlewood Ridge |
| 5. Northumbria Coal Measures | 15. Pennine Dales Fringe | 25. Dark Peak | 35. Lincolnshire Wolds | 45. Midland Clay Pastures | 55. Cotswolds |
| 6. Durham Magnesian Limestone Plateau | 16. Vale of York and Mowbray | 26. Urban Mersey Basin | 36. Lincolnshire Coast and Marshes | 46. Breckland | 56. Severn and Avon Vales |
| 7. Tees Lowlands | 17. North York Moors and Hills | 27. Mosser and Meres | 37. The Fens | 47. North Norfolk | 57. Malvern Hills and Tenre Valley |
| 8. Yorkshire Dales | 18. Vale of Pickering | 28. Pottericos and Chamet Valley | 38. Lincolnshire and Rutland Limestone | 48. The Broads | 58. Clun and North West Herefordshire Hills |
| 9. Eden Valley | 19. Yorkshire Wolds | 29. South West Peak | 39. Charnwood | 49. Suffolk Coast and Heaths | 59. Central Herefordshire |
| 10. Cumbria Fells and Dales | 20. Holderness | 30. White Peak | 40. Needwood and South Derbyshire Claylands | 50. East Anglian Plain | 60. Black Mountains and Golden Valley |
| 61. Dean Plateau and Wye Valley | 71. Romney Marshes | 81. Dorset Heaths | 91. South Devon | 101. Bridlington to Skegness | 111. Lyme Bay |
| 62. Bristol, Avon Valleys and Ridges | 72. High Weald | 82. Isles of Portland and Purbeck | 92. Dartmoor | 102. The Wash | 112. Start Point to Land's End |
| 63. Thames and Avon Vales | 73. Low Weald and Peverney | 83. Wessex Vales | 93. The Culm | 103. Old Hunstanton to Sheringham | 113. Isles of Scilly |
| 64. Midvale Ridge | 74. South Downs | 84. Mendip Hills | 94. Bodman Moor | 104. Sheringham to Lowestoft | 114. Land's End to Minehead |
| 65. Chilterns | 75. South Coast Plain and Hampshire Lowlands | 85. Somerset Levels and Moors | 95. Cornish Killas and Granites | 105. Suffolk Coast | 115. Bridgwater Bay |
| 66. London Basin | 76. Isle of Wight | 86. Mid Somerset Hills | 96. West Penwith | 106. North Kent Coast | 116. Severn Estuary |
| 67. Greater Thames Estuary | 77. New Forest | 87. Exmoor and the Quantocks | 97. The Lizard | 107. East Kent Coast | 117. Liverpool Bay |
| 68. North Kent Plain | 78. Hampshire Downs | 88. Vale of Taunton and Quantock Fringes | 98. Northumberland Coast | 108. Folkstone to Selsey Bill | 118. Morecambe Bay |
| 69. North Downs | 79. Berkshire and Marlborough Downs | 89. Blackdowns | 99. Tyne to Tees Coast | 109. Solent and Poole Bay | 119. Cumbrian Coast |
| 70. Wealden Greensand | 80. South Wessex Downs | 90. Devon Redlands | 100. Saltburn to Bridlington | 110. South Dorset Coast | 120. Solway Firth |

Table 1. Lowland grassland significance assessments for terrestrial Natural Areas

New Natural Area		Lowland Grassland significance	Comments
1.	North Northumberland Coastal plain	NOTABLE	
2.	Border Uplands	SIGNIFICANT	
3.	Solway Basin	SOME	
4.	North Pennines	OUTSTANDING	
5.	Northumbria Coal Measures	SOME	
6.	Durham Magnesian Limestone Plateau	OUTSTANDING	
7.	Tees Lowlands	NEGLIGIBLE	
8.	Yorkshire Dales	OUTSTANDING	
9.	Eden Valley	SOME	
10.	Cumbria Fells & Dales	OUTSTANDING	
11.	West Cumbria Coastal Plain	SOME	
12.	Forest of Bowland	NOTABLE	
13.	Lancashire Plain & Valleys	SOME	
14.	Southern Pennines	SOME	
15.	Pennine Dales Fringe	SOME	
16.	Vale of York & Mowbray	CONSIDERABLE	
17.	North York Moors & Hills	NOTABLE	
18.	Vale of Pickering	NEGLIGIBLE	
19.	Yorkshire Wolds	SIGNIFICANT	
20.	Holderness	NOTABLE	
21.	Humber Estuary	NEGLIGIBLE	

New Natural Area		Lowland Grassland significance	Comments
22.	Humberhead Levels	CONSIDERABLE	Change due to new data on distribution/extent of MG4 grassland and boundary changes
23.	Southern Magnesian Limestone	NOTABLE	
24.	Coal Measures	SOME	
25.	Dark Peak	SOME	
26.	Urban Mersey Basin	SOME	
27.	Mosses & Meres	NOTABLE	Change due to new data on distribution/extent of MG4 grassland in conjunction with a boundary change
28.	Potteries & Churnet Valley	SOME	
29.	South West Peak	SOME	
30.	White Peak	OUTSTANDING	
31.	Derbyshire Peak Fringe & Lower Derwent	NEGLIGIBLE	
32.	Sherwood	SOME	
33.	Trent Valley & Rises	SIGNIFICANT	Change due to new data on distribution/extent of MG4 grassland
34.	North Lincolnshire Coversands & Clay Vales	NOTABLE	Change due to new data derived from acid grassland review and the significance of the NA for U1 acid grassland
35.	Lincolnshire Wolds	SOME	
36.	Lincolnshire Coast & Marshes	SOME	
37.	The Fens	CONSIDERABLE	
38.	Lincolnshire & Rutland Limestone	NOTABLE	
39.	Charnwood	NOTABLE	
40.	Needwood & South Derbyshire Claylands	SOME	

New Natural Area		Lowland Grassland significance	Comments
41.	Oswestry Uplands	SOME	
42.	Shropshire Hills	NOTABLE	Add U1 as key grassland type
43.	Midlands Plateau	SIGNIFICANT	Change due to new data on distribution/extent of MG4 grassland
44.	Midland Clay Pasture	NOTABLE	Key grassland types: wet neutral grassland (MG4) , dry neutral meadow/pasture (MG5), Calcareous (limestone) grassland (CG5, CG7), acid grassland (U1)
45.	Rockingham Forest	NOTABLE	Key grassland types: Calcareous (Jurassic limestone) grassland (CG3,CG4, CG5) , Wet neutral grassland (MG4) , Dry neutral grassland (MG5), Fen Meadow (M22)
46.	Breckland	OUTSTANDING	
47.	North Norfolk	SOME	
48.	The Broads	SIGNIFICANT	
49.	Suffolk Coast & Heaths	NOTABLE	
50.	East Anglian Plain	NOTABLE	
51.	East Anglian Chalk	NOTABLE	
52.	West Anglian Plain	CONSIDERABLE	Change due to new data on distribution/extent of MG4 grassland
53.	Bedfordshire Greensand Ridge	SOME	
54.	Yardley-Whittlewood Ridge	SOME	
55.	Cotswolds	OUTSTANDING	
56.	Severn & Avon Vales	CONSIDERABLE	
57.	Malvern Hills & Teme Valley	SOME	
58.	Clun & North West Herefordshire Hills	SOME	
59.	Central Herefordshire	SOME	

New Natural Area		Lowland Grassland significance	Comments
60.	Black Mountains & Golden Valley	SOME	
61.	Dean Plateau & Wye Valley	NOTABLE	
62.	Bristol, Avon Valleys & Ridges	SOME	
63.	Thames & Avon Vales	CONSIDERABLE	
64.	Midvale Ridge	NOTABLE	
65.	Chilterns	SIGNIFICANT	
66.	London Basin	NOTABLE	
67.	Greater Thames Estuary	SOME	
68.	North Kent Plain	SOME	
69.	North Downs	SIGNIFICANT	
70.	Wealden Greensand	NOTABLE	Change due to new data derived from acid grassland review and increased importance of U1 grassland communities
71.	Romney Marshes	SIGNIFICANT	Change due to recent assessment of importance of Dungeness and coast for U1 grassland communities in the acid grassland review
72.	High Weald	NOTABLE	
73.	Low Weald & Pevensey	SOME	
74.	South Downs	CONSIDERABLE	
75.	South Coast Plain & Hampshire Lowlands	SOME	
76.	Isle of Wight	SIGNIFICANT	Add U1 to key grassland types
77.	New Forest	OUTSTANDING	
78.	Hampshire Downs	CONSIDERABLE	
79.	Berkshire & Marlborough Downs	SIGNIFICANT	

New Natural Area		Lowland Grassland significance	Comments
80.	South Wessex Downs	OUTSTANDING	
81.	Dorset Heaths	NOTABLE	
82.	Isles of Portland & Purbeck	CONSIDERABLE	
83.	Wessex Vales	NOTABLE	
84.	Mendip Hills	OUTSTANDING	
85.	Somerset Levels & Moors	OUTSTANDING	
86.	Mid Somerset Hills	SOME	
87.	Exmoor & the Quantocks	SOME	
88.	Vale of Taunton & Quantock Fringes	SOME	
89.	Blackdowns	SOME	
90.	Devon Redlands	SOME	
91.	South Devon	SIGNIFICANT	add coastal U1 grassland as additional key grassland type
92.	Dartmoor	CONSIDERABLE	
93.	The Culm	OUTSTANDING	
94.	Bodmin Moor	SOME	
95.	Cornish Killas & Granites	NOTABLE	Change to reflect occurrence and significance of coastal U1 grassland
96.	West Penwith	SOME	
97.	The Lizard	SOME	

English Nature Research Reports

Number 171

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ISSN 0967-876X
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Acknowledgements

I would like to thank the following English Nature Local Team staff for comments on individual profiles:

Tim Barfield, John Barrett, Richard Bradford, Alison Carter, Catherine Chatters, Max Coleman, Gareth Dalglish, Stephen Davies, Craig Dixon, Clive Doarks, Chris Durell, Phil Eckersley, Richard Hall, Colin Hayes, Andrew Hearle, Jon Hickling, Dr Peter Holmes, Dagmar Junghanns, Peter Lambley, Simon Leach, Jenny Loring, Roger Morris, Charlotte Pagendam, Charles Pulteney, Rachel Robbins, Dr Stephen Rothera, John Shackles, Nick Sibbett, Greg Smith, Graham Steven, Jon Stewart, Ian Taylor, Mike Wilkinson, Dr Rob Wolton.

I am especially grateful to Dr Heather Robertson for support, discussion over the approach and for reading and commenting on the text.

Thanks are also due to Dr Keith Porter, Rob Cooke, Dr Jayne Manley and Dr Nick Michael for useful discussions regarding the methodology and overall encouragement.

Dr Andy King and Dr Tony Mitchell-Jones kindly provided useful supporting information.

I am grateful to Mary Roberts for typing the text.

1. Introduction

Since 1993, English Nature has been developing the concept of Natural Areas. In 1994 a Natural Areas map was produced (Figure 1) which divides England into areas which have a greater degree of ecological and topographical integrity than, for example, administrative regions such as Counties or Districts.

Natural Areas are a delivery framework for conservation and EN is currently producing "profiles" for each area which describe the key nature conservation features, identify the key issues affecting these and set draft objectives. The UK Biodiversity Action Plan (UK Steering Group 1995) which sets targets for species and habitats will be delivered through the Natural Areas approach. In parallel EN is collaborating with CC on production of a joint map of England which reflects the natural and cultural dimensions of the landscape. This map will be used as a framework to help EN and the Countryside Commission deliver their objectives using the Natural Areas approach and the Countryside Character Programme respectively.

This report has been produced to provide a national overview of lowland grasslands in Natural Areas and ensure that national priorities for grassland conservation are taken into account during the process of producing the locally-generated Natural Area profiles.

This forms part of programme to produce similar overviews for all habitats, species assemblages and earth science features (King *et al* 1996).

This report should be viewed as a source document which includes an indication of the main semi-natural grassland types occurring in each Natural Area, the key issues affecting the resource, a list of the key sites and most importantly, an overall assessment of the national significance of each Natural Area for its lowland semi-natural grassland.

2. Methodology

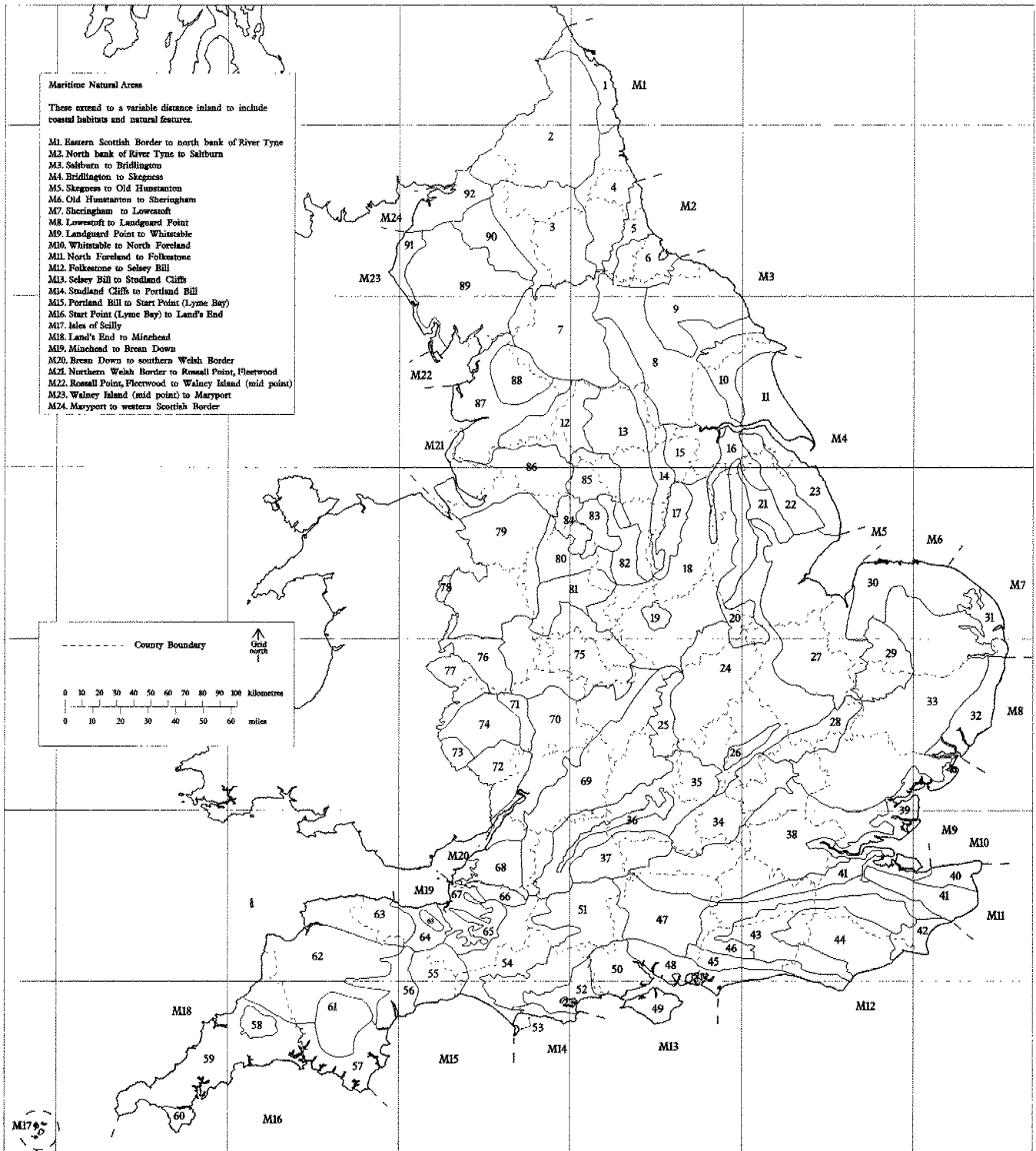
2.1 Definitions

The assessment of significance is based on **semi-natural, agriculturally unimproved grassland types** which includes the National Vegetation Classification Communities listed at Annex 1. This approach is justified on the grounds that similar assessments of significance by Natural Area have been undertaken or are in preparation for species groups. This should ensure the significance of recent or semi-improved/reverted grasslands for selected species/species assemblages is recognised (Grice *et al* 1994, Drake in prep).

Lowland grassland includes semi-natural swards which are usually enclosed, occur below the "moor wall" and lie at an altitude below 350m.

This definition thus includes enclosed meadows and pastures which occur in upland Natural Areas, often as part of in-bye and allotment land. "Upland" Natural Areas have been defined using a combination of the Less Favoured Area (LFA) boundaries and the nature of vegetation communities and farming systems.

Figure 1.
Natural Areas



- | | | | | |
|----------------------------------|----------------------------------|-----------------------------------|---------------------------------------|----------------------------------|
| 1. Northumberland Coastal Plain | 19. Charnwood Forest | 38. London Basin | 56. Devon Redland | 74. Hereford Plain |
| 2. Border Uplands | 20. Lincolnshire Limestone | 39. Thames Marshes | 57. South Devon | 75. Midlands Plateau |
| 3. North Pennines | 21. Lincolnshire Clay Vales | 40. North Kent Plain | 58. Bodmin Moor | 76. Shropshire Hills |
| 4. Northumbrian Coal Measures | 22. Lincolnshire Wolds | 41. North Downs | 59. Cornish Killas and Granite | 77. Central Marches |
| 5. Durham Magnesian Limestone | 23. Lincolnshire Marsh and Coast | 42. Romney Marsh | 60. The Lizard | 78. Oswestry Uplands |
| 6. Lower Tees | 24. Middle England | 43. Low Weald | 61. Dartmoor | 79. Moses and Meres |
| 7. Yorkshire Dales | 25. Northamptonshire Uplands | 44. High Weald | 62. Culm Measures | 80. Staffordshire Uplands |
| 8. The Vales of Yorkshire | 26. Bedfordshire Greensand | 45. South Downs | 63. Exmoor and the Quantocks | 81. Upper Trent Valley |
| 9. North York Moors | 27. Fenland | 46. Greensand | 64. Vale of Taunton | 82. The Derwent Valley |
| 10. Yorkshire Wolds | 28. East Anglian Southern Chalk | 47. Hampshire Chalk | 65. Mid Somerset Hills | 83. White Peak |
| 11. Plain of Holderness | 29. Breckland | 48. South Coast Plain | 66. Mendips | 84. South West Peak |
| 12. Southern Pennines | 30. North Norfolk | 49. Isle of Wight | 67. Somerset Levels and Moors | 85. Dark Peak |
| 13. Coal Measures | 31. Broadland | 50. New Forest | 68. Avon Ridges and Valleys | 86. Urban Mersey Basin |
| 14. Southern Magnesian Limestone | 32. Suffolk Coast and Heaths | 51. South Wessex Downs | 69. Greater Cotswolds | 87. Lancashire Plain and Valleys |
| 15. Humberhead Levels | 33. East Anglian Plain | 52. Dorset Heaths | 70. Severn Valley | 88. Forest of Bowland |
| 16. Coversands | 34. Chilterns | 53. Isles of Portland and Purbeck | 71. Malvern Hills and Teme Valley | 89. Cumbrian Fells and Dales |
| 17. Sherwood Forest | 35. Oxford Clay Vales | 54. Wessex Vales | 72. Dean Plateau and Wye Valley | 90. Eden Valley |
| 18. Trent Valley and Levels | 36. Oxford Heights | 55. Blackdowns | 73. Black Mountains and Golden Valley | 91. West Cumbria Coastal Plain |
| | | | | 92. Solway Basin |

The following Natural Areas are considered by English Nature to be upland:

Border Uplands	Shropshire Hills
North Pennines	Central Marches
Yorkshire Dales	Oswestry Uplands
North York Moors	Staffordshire Uplands
Southern Pennines	South West Peak
Bodmin Moor	Dark Peak
Dartmoor	Forest of Bowland
Exmoor & the Quantocks	Cumbrian Fells & Dales
Black Mountains & Golden Valley	White Peak

It should be noted that "lowland grassland" does not include maritime cliff /sub-maritime grassland communities (MC communities in the NVC) but would normally embrace those communities listed at Annex 1 which occur in areas with a maritime influence and which may grade into maritime communities such as cliff grassland and saltmarsh. The former often include "coastal" calcareous and wet neutral grasslands.

2.2 Sources of information

The grassland overviews for each Natural Area were compiled using a variety of information sources. The key sources are listed below:

- NCC/EN Phase 2 grassland surveys.
- EN County Grassland Inventories.
- EN Lowland Wet Grassland Inventory (Dargie 1993, 1995).
- *Birds in England : A Natural Areas approach* (Grice *et al* 1994).
- *Scarce Plants Atlas and Red Data Book* (Stewart, Pearman & Preston 1994, Perring & Farrell 1983)
- SSSI schedules
- Database of Nature Conservation Review (NCR) sites
- *National Vegetation Classification* (Rodwell 1991,1992)
- Author's personal knowledge

In addition, the draft overviews were sent to Local Teams for comment and the Natural Area core profiles were consulted and used to finalise the overviews.

2.3 Natural Areas proforma

The overview for each Natural Area consists of a standard proforma containing nine sections. The proforma has been adapted from the one used for birds in England (Grice *et al* 1994). The contents of each section of the proforma is explained below.

Number and name

This gives the name and number of each terrestrial Natural Area (see Figure 1). Since this original Natural Area map was published, the Northamptonshire Uplands (25) has been merged with the Greater Cotswolds (69) and the Thames Marshes has been subsumed into the Landguard Point to Whitstable maritime Natural Area. However, a proforma has been produced for the latter area as it supports much, ostensibly terrestrial habitat.

Some of the lowland grassland types covered by this report (see Annex 1) occur in maritime Natural Areas. These are shown and listed in Figure 1. Thus for those terrestrial areas which border maritime Natural Areas, the significance assessment will include some grassland that technically occurs in a maritime Natural area.

Lowland grassland significance

This significance rating which ranges from Negligible to Outstanding (see below) is guided by the estimated extent of lowland semi-natural grassland in each Natural Area:

OUTSTANDING: >40% of the England resource of a grassland type (usually an NVC community type) or 3 or more types with >10% - <40%;

CONSIDERABLE: 1-2 types with >10%-40% of the resource or 3 or more types with >5% -<10%;

SIGNIFICANT: > 5% - <10% of 1 or 2 types or 3 or more types with >1%- <5%;

NOTABLE: >1% - <5% of 1 or 2 types;

SOME: Small amounts of semi-natural grassland present (<1%);

NEGLECTIBLE: Semi-natural grassland extremely scarce.

These assessments are based on the current state of knowledge of the semi-natural grassland resource. For some Natural Areas areas, the extent of survey coverage will be less than comprehensive and subsequent survey effort may ultimately mean changes to the significance assessment. Much effort, for example, has been put into documenting the extent of lowland calcareous grassland in England (see Jefferson & Robertson 1996) but the survey coverage of acid and neutral grasslands and fen meadows is much less comprehensive.

This method has disadvantages, for example, it tends to over-emphasise the importance of very scarce communities where the bulk of a particular grassland type occurs in one or two Natural Areas. However, given the varying coverage and quality of the data, the approach is justifiable.

Natural Areas which are classified as Notable, Significant, Considerable or Outstanding should be viewed as supporting nationally important concentrations of lowland semi-natural grassland.

Figure 2 shows the spatial distribution of significance assessments by Natural Area. Table 1 summarises the number of Natural Areas falling into the six significance categories.

Table 1: summary of significance assessments by natural area	
Significance assessment/ranking	Number of Natural Areas
Negligible	3
Some	39
Notable	20
Significant	9
Considerable	8
Outstanding	12

Description

This provides a brief summary of the landscape, topography, geology and land use of the Natural Area together with an indication of the semi-natural grassland interest.

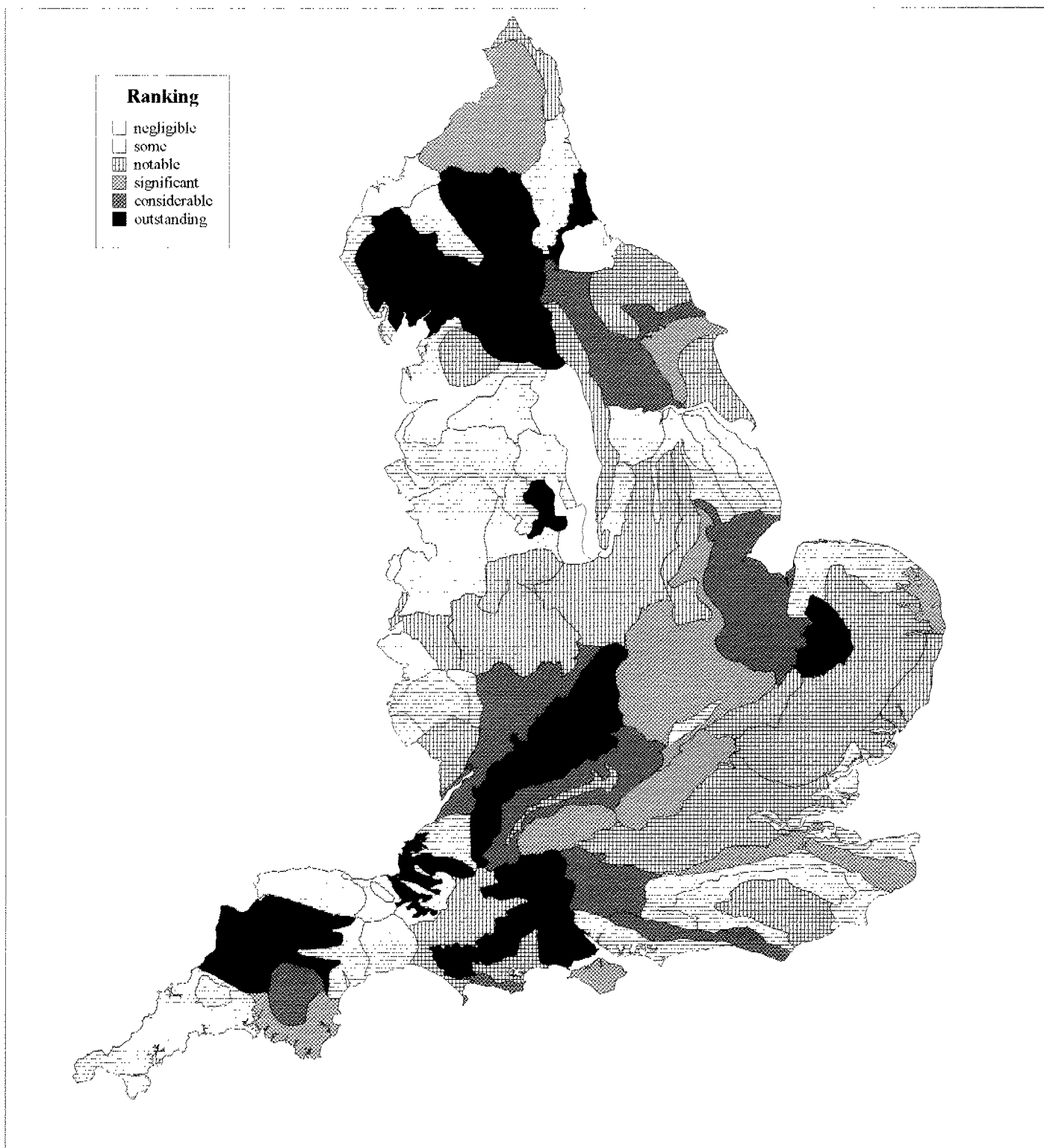
Key grassland types

This includes the semi-natural grassland types occurring in each Natural Area. Normally the appropriate National Vegetation Classification Communities and sub-communities are given where these are known. The grassland types that are of greatest significance and/or that contribute to the assessment of significance are highlighted in bold.

Nationally rare/scarce plant species

This lists all nationally rare and scarce vascular plant species (see Perring & Farrell 1983, Stewart, Pearson & Preston 1994 for definitions and qualifying criteria) deemed to be closely associated with semi-natural grassland and occurring in the particular Natural Area. Species which have a wide ecological amplitude and occur in other habitats will only be listed for a Natural Area where they occur in lowland semi-natural grassland as defined in section 2.1. Decisions as to what constitutes a "grassland species" are problematical and the ones listed here are based on the author's opinion. This section is left blank if there are no known extant occurrences of rare/scarce vascular plant species in the Natural Area.

Fig 2 : Ranking of grassland importance by Natural Area



Key sites

This includes existing NCR sites which have a significant lowland grassland component, sites put forward to the European Commission (to date) as candidate Special Areas for Conservation (SAC) and a selection of sites deemed by the author to be of NCR quality but which have not been formally approved. The section is left blank if there are currently no NCR/SAC sites in the Natural Area. Only those SAC sites which have been selected for their lowland grassland interest or for scarce characteristic vascular plant species (eg *Gentianella anglica*) or plant species assemblages (eg important orchids of calcareous grassland) have been included (see Council of the European Communities 1992 - Annexes I & II). The list of proposed SACs includes some grassland sites which have not formally been allocated NCR status. This is clearly an anomaly and any pSAC site that is by definition of European importance would also be of national importance and thus warrant the NCR "label".

It is important to stress that this list may not always include all of the key lowland grassland sites in a Natural Area for a number of reasons. The grassland NCR site series, in common with other habitats, has not been the subject of a systematic, comprehensive revision since its publication (Ratcliffe 1977) although some new sites have been added over the following 19 years (see Jefferson & Robertson 1996 for a full list of grassland NCR sites).

It is the author's view, for example, that the current NCR list is noticeably deficient in lowland neutral grasslands, particularly meadows.

Associated interests

This section provides an indication of other habitats/flora/fauna associated with lowland semi-natural grassland. This does not claim to be exhaustive or a systematic treatment especially in the case of invertebrates. An assessment of the significance of Natural Areas and their component habitats for invertebrates is currently in preparation (Drake in prep). Associated interests includes faunal or floral assemblages (birds, invertebrates, mammals, lower plants etc) closely associated with particular grassland types or associated features such as ditches on wet grassland. Where important faunal assemblages are associated with improved/semi-improved or reverted grassland these are also highlighted.

Some Natural Areas support tracts of coastal grazing marsh that consists largely of botanically species-poor grassland but is often of importance for breeding and wintering birds and vascular plants and invertebrates of the ditches. These marshes can often be brackish in nature. There are a suite of scarce plant species which occur in this grassland often where there are areas of bare ground. These are mentioned collectively in this section. The species in question are *Alopecurus bulbosus*, *Althaea officinalis*, *Bupleureum tenuissimum*, *Carex divisa* and *Trifolium squamosum*.

The section also includes habitats which form zonation with grassland or are derived by recent succession from grassland following change in environmental factors such as intensity of management.

Key issues

These are the issues which appear to have the greatest impact on the maintenance and enhancement of lowland grassland. These have been derived from the authors knowledge supplemented by views from English Nature's Local Teams. Most are self-explanatory. However, "pressure for agricultural intensification" covers overgrazing, improvement by use of artificial fertilisers, slurry etc, ploughing and reseeded with rye grass, drainage improvement and change from hay to silage. Pressure for urban/industrial development includes housing development, mineral working and other industrial development.

Table 2 provides a summary of the key issues across all Natural Areas. Only those key issues listed in five or more Natural Areas are detailed.

Key issue	% of Natural Areas where issue listed
Opportunities for grassland creation	96
Lack of management (grazing, mowing etc)	88
Pressure for agricultural intensification	79
Hydrology (maintenance of water tables etc)	48
Pressure for industrial/urban development	35
Overgrazing by horses	10
Recreational pressure/development	10
Knowledge of semi-natural grassland resource	8

While the significance assessment of each Natural Area is based on the extent of semi-natural grassland, this section and the key objectives often highlight the desirability of creating new grassland on ex-arable land or enhancing the nature conservation of improved/semi-improved grassland.

Key objectives

These are "high level" objectives and do not normally indicate the mechanisms to achieve the objectives particularly where these would involve the application, or possible extension of existing Environmental Land Management Schemes such as Environmentally Sensitive Areas (ESAs), Countryside Stewardship Scheme (CSS) and schemes which are related to statutorily designated sites.

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Annex 1 Types of lowland grassland

Semi-natural grasslands	National Vegetation Classification equivalent(s)
Neutral grasslands	
Coarse grassland	MG1
Tall herb grassland	MG2
Mountain/northern hay meadows	MG3
Flood/alluvial meadow	MG4
Clay/loam pasture, old meadow/pasture	MG5
Water meadow, flood pasture	MG8
Inundation grassland	MG11
Inundation grassland, washland, alluvial meadow	MG13
Calcareous grassland (dry grasslands)	
Limestone grassland	CG1
Chalk/limestone grassland	CG2, CG3, CG4, CG5, CG6, CG7
(Magnesian) limestone grassland	CG8
Carboniferous limestone grassland (lowland examples)	CG9
Calaminarian grassland (Metalliferous grassland)	OV37
Acid grasslands	
Grass-heath	U1
Grass-heath	U2
Grass-heath	U3
Acid grassland	U4
Fen meadows ('mires')	
Rich fen meadow	M22
Rush pasture, wet acid grassland	M23
Wet acid grassland	M24
Wet acid grassland	M25
Mixed-fen	M26
Tall herb fen	M27

Natural Area Profiles

Natural area: 1: Northumberland Coastal Plain

Lowland Grassland Significance: **NOTABLE**

Description:

A low-lying intensively farmed coastal Plain dissected by wooded river valleys. The area is underlain by Carboniferous rocks of limestone and gritstone which in turn are often overlain with blown sand and glacial till. The intrusive igneous dolerite Whin sill gives rise to prominent inland ridges and sea cliffs.

The principal grassland interest are the acid and calcareous communities associated with the intruded Whin Sill.

Key Grassland Types:

1. **Acid grassland (U1)**
2. **Calcareous grassland (CG2, CG6, CG7)**
3. **Neutral grassland (MG5, MG11)**

Nationally Rare & Scarce Grassland Plant Species:

A.schoenoprasum, Dianthus deltooides, Potentilla neumanniana, Sesleria caerulea.

Key sites:

Associated interests:

Key Issues:

- Lack of grazing and undergrazing
- Pressure for land use change - agricultural intensification
- Opportunities for grassland creation on farmland and in disused Whin quarries

Key Objectives:

- Maintain the current extent of semi-natural grassland in favourable conservation status
- Restore semi-natural grassland in sub-optimal condition to optimal condition
- Seek opportunities to expand the grassland resource

Natural area: 2. Border Uplands

Lowland Grassland Significance: **SIGNIFICANT**

Description:

Rolling country of fells and dales with the highest land in the west forming the Cheviot Hills which rise to c.800m. The latter consist of igneous volcanic rocks whereas the lower fells are made up of Carboniferous rocks including limestones, sandstones, shales, and gritstones. Predominantly an area of hill farming but there are also large tracts of coniferous plantation. The main habitats are acid, limestone and neutral grassland, mire, dwarf-shrub heath, valley woodland and open water. The key 'lowland' grassland types are those associated with the intruded Whin Sill and the northern neutral hay meadows which occur principally in the valleys of the North Tyne and Coquet rivers.

Key Grassland Types:

1. **Neutral grassland (Northern hay meadows) (MG3)**
2. **Acid grassland (U1, U4)**
3. **Calcareous grassland (CG2, CG6, CG7)**

Nationally Rare & Scarce Grassland Plant Species:

Allium schoenoprasum, *Crepis mollis*, *Dianthus deltoides*, *Euphrasia rostoviana subsp. montana*, *E. rostoviana subsp. rostoviana*, *Minuartia verna*, *Polemonium caeruleum*, *Thlaspi caerulescens*.

Key sites:

North Pennine Dalcs Meadows p. SAC including Gowk Bank

Associated interests:

1. Flush/mire/fen meadow communities associated with neutral hay meadows.

Key Issues:

- lack of grazing/undergrazing of Whin grasslands
- creation of grassland in disused Whin quarries
- pressure for agricultural intensification including changes in traditional meadow management

Key Objectives:

- Maintain the current extent of semi-natural grassland in favourable conservation status
- Restore semi-natural grassland in sub-optimal condition to optimal condition
- Seek opportunities to expand the grassland resource

Description:

The northernmost region of the Pennines is composed of Carboniferous limestone and Millstone Grit and includes some of the highest terrain in the Pennines rising to nearly 900m. To the east the land falls away gradually to the rolling landscape of the Coal Measures while to the west it falls away sharply to the low ground of the Eden valley. The landscape of hills and dales consists of large tracts of unenclosed upland blanket mire, dwarf-shrub heath, limestone grassland and montane communities together with enclosed grassland. The principal land uses are extensive livestock production and grouse shooting.

Enclosed species-rich meadows and pastures are the principal interest as far as lowland grasslands are concerned. Notable concentrations occur in Teesdale, Baldersdale and Lunedale. The enclosed grasslands are also nationally significant for their breeding wader and black grouse populations.

Key Grassland Types

1. **Neutral grassland (MG2, MG3, MG5, MG8)**
2. **Metalliferous (Calaminarian) grassland associated with river gravels and mine spoil (OV37)**
3. Fen meadow /rush pasture (M23, M25c, M26b)
4. Calcareous (Carboniferous limestone) grassland (CG9, CG10)
5. Acid grassland (U4)

Nationally Rare & Scarce Grassland Plant Species:

Alchemilla acutiloba, *A. monticola*, *A. subcrenata*, *Allium oleraceum*, *Bartsia alpina*, *Carex ericetorum*, *Crepis mollis*, *Epipactis atrorubens*, *Euphrasia rostkoviana* subsp. *montana*, *Gentiana verna*, *Minuartia verna*, *Primula farinosa*, *Sesleria albicans*, *Thlaspi caerulescens*

Key sites:

North Pennine Dales Meadows pSAC (including Upper Teesdale Meadows), Tyne/Allen River Gravels (pSAC)

Associated interests:

1. Breeding birds of semi-natural and semi-improved enclosed grassland
2. Mire & flush communities (eg M10) occurring in a mosaic with grassland communities in enclosed meadows and pastures

Key Issues:

- Pressure for agricultural intensification of meadows including change from hay to silage and from use of farmyard manure to slurry or artificial fertilisers
- Pressure for intensification of grazing on all grassland types
- Vegetation change on river gravels and decisions relating to the most appropriate management regime
- Opportunities for grassland restoration/creation on enclosed farmland

Key Objectives:

- Maintain the current extent of semi-natural grassland in favourable conservation status
- Restore semi-natural grassland in sub-optimal condition to optimal condition
- Seek opportunities to expand the grassland resource
- Lobby for agricultural policies which favour low intensity livestock production systems and in particular the retention of traditional winter housing of cattle
- Explore possible management strategies for metalliferous river shingle communities

Natural area: 4. Northumbrian Coal Measures

Lowland Grassland Significance: **SOME**

Description:

The Coal Measures consists of country of lower altitude with a diversity of scenery resulting from variations in the underlying Carboniferous rock types and human exploitation. Parts of the area are heavily urbanised with attendant heavy industry whilst the rural areas consist of intensive farmland.

Small pockets of semi-natural neutral grassland still occur and are the principal grassland interest of the area.

Key Grassland Types:

1. Dry neutral grassland (MG5a,c)

Nationally Rare & Scarce Grassland Plant Species:

Minuartia verna, *Thlaspi caerulescens*

Key sites:

Associated interests:

Key Issues:

- Pressure for agricultural intensification
- Pressure for urban/industrial development including roads
- Opportunities for creation of neutral grassland
- Lack of agricultural management of existing semi-natural grassland

Key Objectives:

- Maintain the current extent of semi-natural grassland in favourable conservation status
- Restore semi-natural grassland in sub-optimal condition to optimal condition
- Seek opportunities to expand the grassland resource
- Seek to ensure strong policies for grassland conservation appear in structure/development plans

Natural area: 5. Durham Magnesian Limestone

Lowland Grassland Significance: **OUTSTANDING**

Description:

The Permian Magnesian limestone outcrops in East Durham and Tyne and Wear and forms the cliffs of the coastline between Hartlepool and South Shields. This area consists of relatively low-lying undulating intensively farmed countryside ranging in altitude between 50m and 180m. East flowing streams have formed steep sided, "denes" near the coast which are often wooded. The area supports an important concentration of calcareous grassland and most notably is the only locality for the *Sesleria albicans-Scabiosa columbaria* community type.

Quarrying activity has been responsible for losses of calcareous grassland in the past but disused quarries, conversely, now support secondary grassland of interest.

Key Grassland Types:

1. **Calcareous (Magnesian (Permian) limestone) grassland (CG2d, CG3, CG6, CG8a,b,c)**
2. Neutral grassland (MG5)

Nationally Rare & Scarce Grassland Plant Species:

Epipactis atrorubens, Linum perenne ssp. perenne, Primula farinosa, Sesleria albicans

Key sites:

Cassop Vale, Thrislington Plantation (pSAC)

Associated interests:

1. Invertebrates associated with Magnesian limestone grassland

Key Issues:

- Lack of grazing/undergrazing of limestone grassland
- Pressure for agricultural intensification
- Restoration of limestone grassland
- Opportunities for grassland creation on farmland and in disused quarries
- Pressure for development especially quarrying, urban expansion

Key Objectives:

- Maintain the current extent of semi-natural grassland in favourable conservation status
- Restore semi-natural grassland in sub-optimal condition to optimal condition
- Seek opportunities to expand the grassland resource
- Seek to ensure strong policies for grassland conservation appear in structure/development plans