European Community Directive
on the Conservation of Natural Habitats
and of Wild Fauna and Flora
(92/43/EEC)

Second Report by the United Kingdom under Article 17

on the implementation of the Directive from January 2001 to December 2006

Conservation status assessment for :

H6410: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

H6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

Audit trail compiled and edited by JNCC and the UK statutory nature conservation agencies Lowland Grassland Lead Co-ordination Network.

This paper and accompanying appendices contain background information and data used to complete the standard EC reporting form (Annex D), following the methodology outlined in the commission document "Assessment, monitoring and reporting under Article 17 of the Habitats Directive, Explanatory Notes and Guidelines, Final Draft 5; October 2006". The superscript numbers below cross-reference to the headings in the corresponding Annex D reporting form. This supporting information should be read in conjunction with the UK approach for habitats (see 'Assessing Conservation Status: UK Approach').

1. National-biogeographic level information

1.1 General description and correspondence with National Vegetation Classification (NVC) and other habitat types

Table 1.1.1 provides a summary description of H6410 and its relations with UK classifications.

Table 1.1.1 Summary description of habitat H6410 and its relations with UK vegetation/habitat classifications.

Classification	Correspondence with Annex I type	Comments
EU Interpretation Manual	PAL.CLASS 37.31 *Molinia* meadows on chalk and clay (*Eu-Molinion)*	
NVC	M24 *Molinia caerulea – Cirsium dissectum* fen-meadow M26 *Molinia caerulea – Crepis paludosa* mire	Some forms of M24 are referable to Annex I type 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.
BAP priority habitat type	Purple moor-grass and rush pastures (part)	The BAP priority habitat covers a broader range of habitats, including more acid and base-poor *Juncus* and *Molinia* mire communities (M23, M25) as well as *Juncus* fen-meadow (M22)
CSM Reporting categories	SACs: H6410 SSSIs: Fens and marshes – lowland (part)	The SSSI CSM reporting category, Fens and marshes (lowland) is a broad category covering a wider range of habitats than the BAP Priority Habitat. The *Eu-Molinion* therefore forms only a small part.

Eu-Molinion meadows are found mainly on moist, moderately base-rich, peats and peaty gley soils, often with fluctuating water tables. They usually occur as components of wet pastures or fens, and often form mosaics with dry grassland, heath, mire and scrub communities. This habitat type includes the most species-rich *Molinia* grasslands in the UK, in which purple moor-grass *Molinia caerulea* is accompanied by a wide range of associated species, including rushes, sedges and tall-growing herbs. The more impoverished forms of *Molinia* pasture on acidic substrates are excluded from the Annex I definition (in the UK at least). In the UK these grasslands are represented by two NVC types:

M24 *Molinia caerulea – Cirsium dissectum* fen-meadow
M26 *Molinia caerulea – Crepis paludosa* mire

M24 *Molinia – Cirsium* fen-meadow is the more widespread and diverse community. It comprises a heathy form found mainly in south Wales, south-west England and Northern Ireland, a form with tall herbs in the fen systems of East Anglia, and a more widespread 'typical' form widely but locally

distributed in southern Britain. Some forms of *Molinia – Cirsium* fen-meadow with abundant *Cladium* are referable to Annex I type 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.

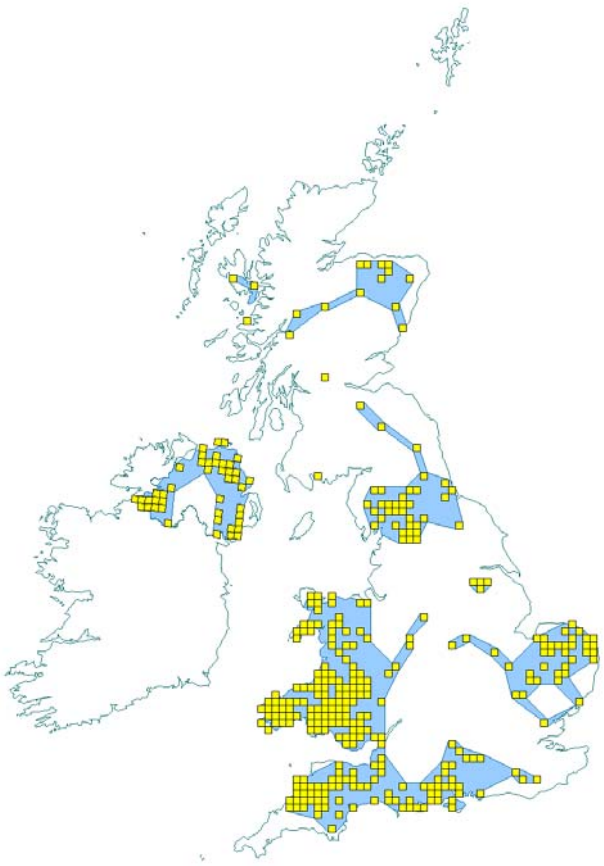
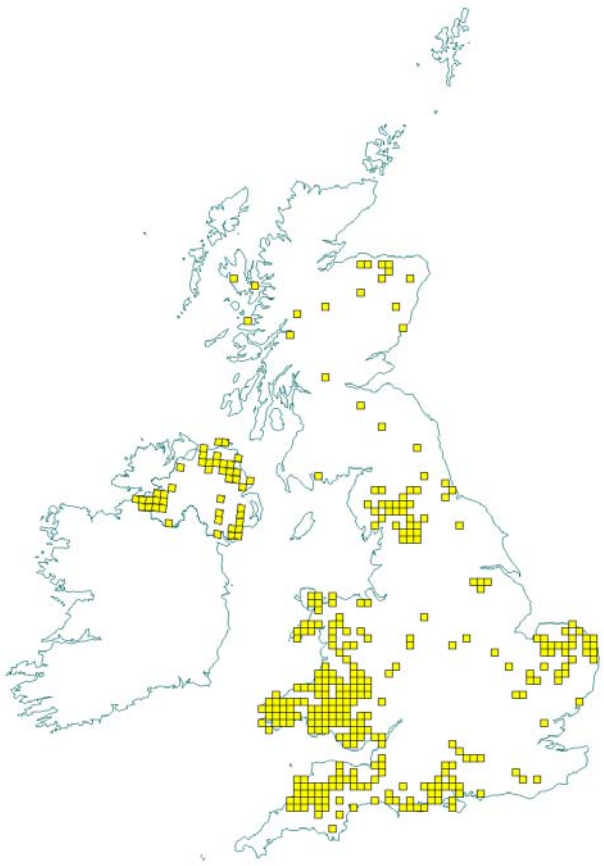
M26 *Molinia caerulea – Crepis paludosa* mire occurs more locally in wet grasslands and fens in uplands and upland margins of northern England and north Wales, and as small scattered stands throughout Scotland as far north as Moray. The vegetation has a distinctive sub-montane character, manifested in the presence of species with a northern distribution, such as marsh hawk's-beard *Crepis paludosa* and globe-flower *Trollius europaeus*.

Some *Molinia* meadows hold populations of notable species, including whorled caraway *Carum verticillatum*, soft-leaved sedge *Carex montana*, and the Annex II butterfly 1065 Marsh fritillary *Euphydryas aurinia*.

2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: **81,903km^2**
Date calculated [2.3.2]: **May 2007**
Quality of data [2.3.3]: **Moderate**

Map 2.1.1 Habitat range map [1.1] for H6410	**Map 2.1.2** Habitat distribution map [1.2] for H6410
	
Range envelope shown in blue/grey shade in above map is a minimum convex polygon constructed using JNCC Alpha Shapes tool (see Technical note I for details of methodology).	Each yellow square represents a 10x10-km square of the National Grid and shows the known and/or predicted occurrence of this habitat. 10-km square count: 352

See Section 7.1 for map data sources

The surface area estimate was calculated within alpha hull software, using extent of occurrence as a proxy measure for range (see Map 2.1.1). The value of alpha was set at 25 km; the alpha was clipped to include inland areas only.

Maps 2.1.1 and 2.1.2 show the range and distribution of H6410 in the UK. *Eu-Molinion* meadows (as interpreted in UK) are widely but discontinuously distributed in Britain, with concentrations in south-west England, western and central Wales, East Anglia, northern England and the south-west of Northern Ireland.

2.2 Trend in range since c.1994

Trend in range[2.3.4]: Stable
Trend magnitude[2.3.5]: Not applicable
Trend period[2.3.6]: 1994-2006
Reasons for reported trend[2.3.7]: Not applicable

Despite historic losses discussed below, best available information indicates that the range has been stable since 1994. However, this is reported with low confidence.

2.3 Favourable reference range

Favourable reference range[2.5.1]: 81,903 km^2

Section 3.2.1.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference range estimates for habitats have been determined in the UK. Based on this approach, the current surface area, 81, 903 km^2, has been set as the favourable reference area; the range calculated by the JNCC Alpha Shapes tool, using the recorded distribution, shows the habitat to be widely distributed, and best judgement suggests range is stable. However, there is low confidence in this judgement due to uncertainty about the coverage and age of some of the survey data.

There are likely to have been substantial losses of this habitat over the last 50 years, which have caused a contraction in range (Blackstock *et al.* 1997). Section 3.2 provides evidence of losses in area that may have had an impact on range. Although this is unlikely to be a problem now, these historic losses to forestry and to intensive agriculture, almost certainly mean that the habitat was formerly much more extensive in range. Consistent with this decline in range, it is known that certain key species of this habitat such as *Cirsium dissectum, Crepis paludosa, Carex hostiana* and *C. pulicaris* have declined over the last 70-80 years, with a contraction in their range (Preston *et al.* 2002). Particularly in central and southern England, there is no reason to assume that the range was not formerly much more extensive, wherever soil and hydrological conditions allowed. Note that recording effort has been less intensive in parts of Scotland.

An alternative approach to a historic range is to look at species distribution. Map 3 shows the 10-km square distribution from all 20th century records for two H6410 species, *Cirsium dissectum* and *Crepis paludosa,* which gives some indication of possible localities where restoration or re-creation could be targeted, although this is probably more useful for M24 in England, Wales and Northern Ireland.

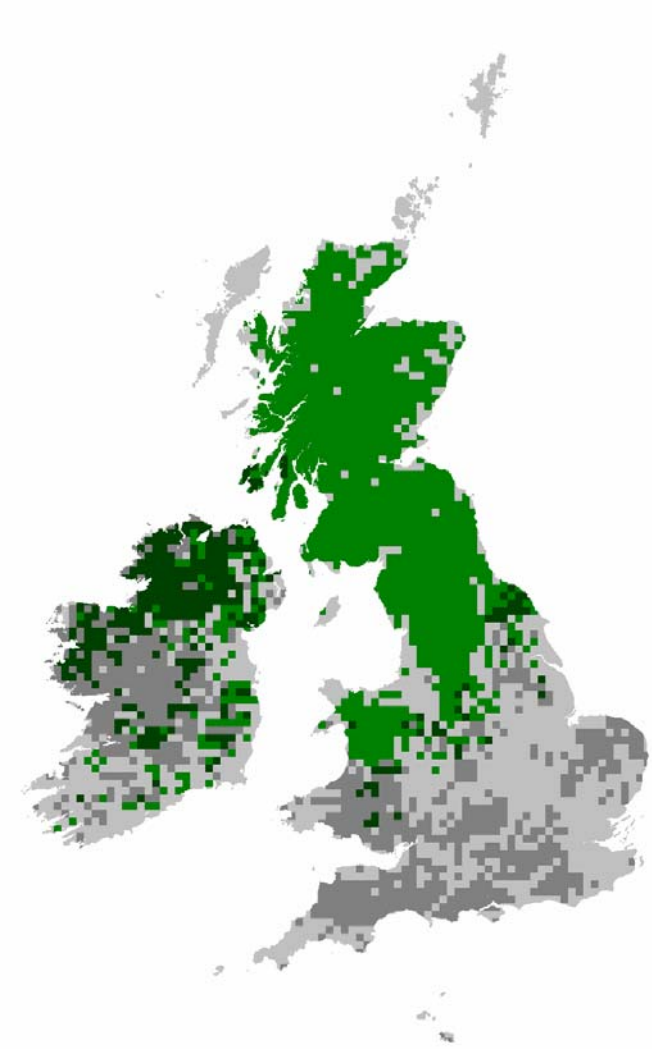
In the last 10-15 years conservation programmes have helped to stem the loss of this habitat and hence the range has probably stabilised to some extent.

2.4 Conclusions on range

Conclusion[2.6.i]: Favourable

Current range is stable and not less than the favourable reference range.

Map 2.4.1 Distribution map showing all native records (regardless of date class) of *Cirsium dissectum* (grey dots) and *Crepis paludosa* (green dots), from Preston *et al.* 2001. (black dots = both species recorded).



3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **38.5km^2**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **1 = only or mostly based on expert opinion**
Quality of data [2.4.4]: **Moderate**

Table 3.1.1 provides information on the area of H6410 in the UK. Estimates in this table derive from: Jackson. and McLeod (2000), which sourced data from Blackstock *et al*. (1998); Richard Jefferson, Natural England (*pers. comm.* 2006.); Alistair Church, Environmental Heritage Service (*pers. comm.* 2006); and Alastair Church, Environmental Heritage Service (*pers. comm.* 2007).

Estimates are based on the extrapolation of findings of recent survey work in different parts of the UK, notably Hewins *et al.* (2005), applied to the results of previous surveys, including Natural England's grassland inventories, the lowland Grassland surveys of Wales and Scotland, and NVC surveys of Northern Ireland.

Table 3.1.1 Area of H6410 in the UK

	Area (ha)	Method [2.4.3]	Quality of data [2.4.4]
England	<2,000	3	Moderate
Scotland	<200	1	Poor
Wales	500-1,000	3	Good
Northern Ireland	850 +/-100	3	Poor
Total UK extent [2.4.1]	3850 (Midpoint of 3550-4150)	1	Moderate

Method used to estimate the habitat surface area: 1 = only or mostly based on expert opinion; 2 = based on remote sensing data; 3 = ground based survey. Only the most relevant class is given if more than one applies.
Quality of habitat surface area data: 'Good' e.g. based on extensive surveys; 'Moderate' e.g. based on partial data with some extrapolation; 'Poor' e.g. based on very incomplete data or on expert judgement

3.2 Trend in area since c.1994

Trend in area[2.4.5]: **Decreasing**
Trend magnitude[2.4.6]: **Probably > 1% per annum**
Trend period[2.4.7]: **c.1990 -2002**
Reasons for reported trend[2.4.8]: **3 – Direct human influence**
4 – Indirect anthropogenic or zoogenic influence

English Nature's assessment in 2002 of non-statutory inventory grassland habitats (Hewins *et al.* 2005), found that of a sample of 100 sites known to have been extant in the 1980s, 10% had been lost by 2002. This rate of loss is compatible with that suggested by other evidence for changes in cover from local case studies, including work undertaken in Devon that indicated a decline in Molinia - Juncus habitat (including Cirsio-Molinietum as a core component) of almost 90% during the 20th century (Wolton 1994).

However there are greater rates of loss in other parts of the UK; the N. Ireland Countryside Survey (NICS) suggests an 18% decline between 1991 and 1998 in Fen meadow category that includes M24 and M26 but also loosely includes types of M23 and M6. NICS suggests that a large part of the 1991-98 loss of fen meadow was due to conifer plantation, a problem shared in other parts of the UK, e.g. Devon and Cornwall. Although there have been losses of this habitat within Northern Ireland there is still a healthy resource remaining and recent survey work suggests a large resource in Western Fermanagh. Around other parts of Northern Ireland outside of ESA, losses are likely to have occurred due to intensive agriculture.

The decline in *Cirsium dissectum*, *Carex hostiana* and *C. pulicaris*, species strongly associated with this habitat over parts of southern Britain (Preston *et al.* 2002) is also indicative of a more widespread reduction in extent.

3.3 Favourable reference area

Favourable reference area[2.5.2]: **at least 45 km^2**

Section 3.2.1.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference range estimates for habitats have been determined in the UK.

The habitat now covers no more than 4,000 ha, but formerly must have been far more extensive (overall and on a site-by-site basis) and much less fragmented. Although it is not clear what area, configuration and connectivity the habitat needs to be considered favourable, it seems likely that the current area is less than the favourable reference area, and probably at least 10% below it.

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: **Unfavourable – Bad and deteriorating**

The area of this habitat has declined substantially over the last century and continues to do so. Rates of decline are available only for some periods and countries and indicate levels of loss of area probably

exceeding 1% per annum in recent years. There is no counter-evidence from other parts of the UK that there have not been significant losses. The current area is less than the favourable reference area and the conclusion is, therefore, Unfavourable - Bad.

4. Specific structures and functions **(including typical species)**

4.1 Main pressures[2.4.10]

140 Grazing
141 Abandonment of pastoral systems
950 Biocenotic evolution
701 water pollution
101 Modification of cultivation practices
120 Fertilisation
162 Artificial planting

- Under-grazing

Eu-Molinion wet grasslands in the UK have been traditionally managed as rough grazing, particularly by cattle, and to a much lesser extent by cutting to maintain favourable structure and function. A major current problem is agricultural neglect leading to litter build-up and scrub invasion.
Underlying causes of under-grazing are still thought to be largely due to current agricultural economics and policies, exacerbated by e.g. BSE and Foot and Mouth disease, leading to a reluctance to keep stock (large stock in particular) on pasture perceived to have little nutritional value.

- Lack of remedial management

It is natural for open fens to change spontaneously into wooded fens, and management, such as scrub clearance and grazing, is required to prevent this.

- Over-grazing

Less prevalent than under-grazing, overgrazing by sheep is still sometimes reported, along with occasional poaching and trampling by livestock during wet periods.

- Water management and quality

The management of surface and groundwater is clearly crucial to providing the surface:groundwater requirements of each type of fen, as are its constituents, for example basic ions such as calcium, its pH, and quantity of the plant nutrients nitrogen and phosphorus.

- Agricultural improvement

This includes drainage, cultivation and fertiliser applications.

Also reported, but probably less widespread, are:
- invasive species
- too frequent burning
- agricultural abandonment, leading to rankness and scrub encroachment through lack of grazing
- fragmentation and disturbance for developments such as housing and road constructions
- afforestation, especially in Northern Ireland and Scotland

Based on an assessment of the exceedence of relevant critical loads (see Technical note III), air pollution is considered to be a potentially significant pressure to the structure and function of this habitat.

4.2 Current condition

4.2.1 Common Standards Monitoring (CSM) condition assessments

Condition assessments based on CSM (see www.jncc.gov.uk/PDF/CSM_lowland_grassland.pdf) provide a means to assess the structure and functioning of H6410 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat:

- Extent
- Grass:herb ratio
- Positive indicator species
- Negative indicator species
- Indicators of local distinctiveness
- Height
- Litter
- Bare ground

Special Area of Conservation (SAC) condition assessments

Table 4.2.1 and Map 4.2.1 summarise the CSM condition assessments for UK SACs supporting habitat H6410. These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 73% of the area and 97% of the number of assessments was unfavourable; and
- at least 32% of the total UK habitat area was in unfavourable condition.

The vast majority of assessments that were unfavourable were nevertheless recovering in condition.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H6410. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining	80	7
	No change	121	6
	Unclassified	108	5
	Recovering	941	13
	Total	1,250	31
	% of all assessments	***73%***	***97%***
	% of total UK resource	***32%***	***unknown***
Favourable	Maintained		
	Recovered		
	Unclassified	461	1
	Total	461	1
	% of all assessments	***27%***	***03%***
	% of total UK resource	***12%***	***unknown***

Notes

1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006. NB: these include additional and some up-date data form those used in the six year report produced by JNCC. (Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report.* Peterborough, JNCC).
3. Only assessments made for qualifying interest features on SAC have been included in this analysis.
4. Area figures for CSM assessments have been calculated using the data presented on the standard Natura 2000 data forms submitted to the EU.

Site of Special Scientific Interest (SSSI)/Area of Special Scientific Interest (ASSI) condition assessments

Table 4.2.2 and Maps 4.2.2 and 4.2.3 summarise the CSM condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical note II for details of methodology behind this). These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 80% of strongly indicative assessments and 48% weakly indicative assessments were unfavourable;
- the majority of strongly indicative assessments that were unfavourable were recovering in condition

Table 4.2.2 CSM condition assessment results for UK SSSI/ASSIs that were judged to be either strongly or weakly indicative of the condition of H6410 on SSSI/ASSIs. See notes below table and Technical note II for further details

Condition	**Condition sub-categories**	**Number of assessments**	
		Strongly indicative assessments (Category 1)	**Weakly indicative assessments (Category 2)**
Unfavourable	Declining	11	6
	No change	13	8
	Unclassified		8
	Recovering	23	2
	Total	47	24
	% of all assessments	***80%***	***48%***
Favourable	Maintained		18
	Recovered		1
	Unclassified	12	7
	Total	12	26
	% of all assessments	***20%***	***52%***

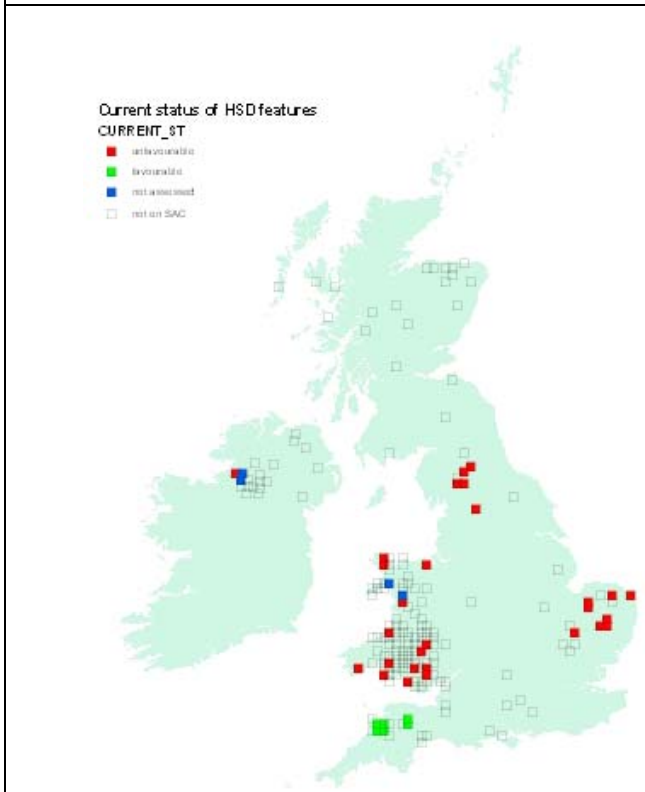
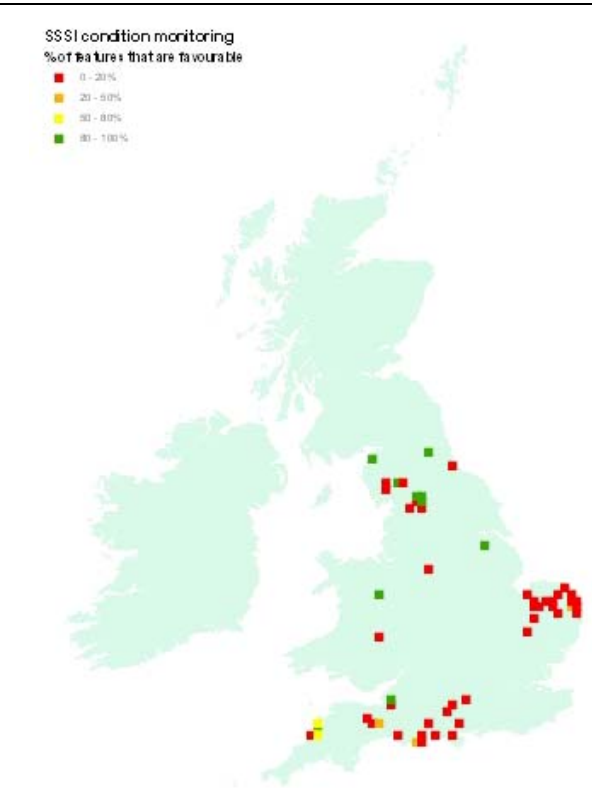
Notes

1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006.

Non-SSSI/ASSI condition assessments

For non-designated sites, data are available for purple moor-grass and rush pastures, in England only, from a sample survey of lowland Biodiversity Action Plan (BAP) priority grasslands (Hewins *et al.*2005). As part of this project the CSM approach was applied to a stratified random sample of 93 non-statutory stands of purple moor-grass and rush pasture across England. Using the same thresholds as for SSSIs, 24% of sites were classed as favourable; using reduced thresholds for certain attributes 35% were classed as favourable (see Table 8 of the report).

Current Condition of H6410 based on CSM condition assessments (See Sections 4.2 and 7.2 for further information)

Map 4.2.1 SAC assessments	**Map 4.2.2** Assessments strongly indicative of the condition on SSSI/ASSIs	**Map 4.2.3** Assessments weakly indicative of the condition on SSSI/ASSIs
		
Key Red = unfavourable, i.e. the square contains at least one SAC where this habitat feature is present and has been judged to be unfavourable Green = favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been assessed as favourable but there are no unfavourable SAC features Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type	Key* Green – 80 – 100% of assessed features on 10-km square are favourable Yellow - 50 – 80% of assessed features on 10-km square are favourable Orange - 20 – 50% of assessed features on 10-km square are favourable Red - 0 – 20% of assessed features on 10-km square are favourable *This is the same key as was used for JNCC CSM Report 2006	

4.3 Typical species

Typical species[2.5.3]: ***Carex hostiana, Carex pulicaris, Cirsium dissectum, Crepis paludosa, Succisa pratensis, Eurphydryas aurinia***

Typical species assessment[2.5.4]: Change in 10 km square occupancy across UK over last 25 years

Assessment of typical species forms a small part of the assessment of structures and functions for this habitat, in that it suggests a long-term decline in some species. This does not contradict the overall assessment of structures and functions which is principally based on site condition monitoring.

A large number of positive indicator plants for M24 and M26 are listed in the JNCC CSM Guidance (2003), many of which occur in a broad range of habitats. Four species that show particular affinity to H6410 are as follows: *Cirsium dissectum, Crepis paludosa, Carex hostiana and C. pulicaris;* although the latter three also occur outside the habitat. In addition, *Succisa pratensis* has also been added to the list being the larval foodplant for the Marsh fritillary (see below).

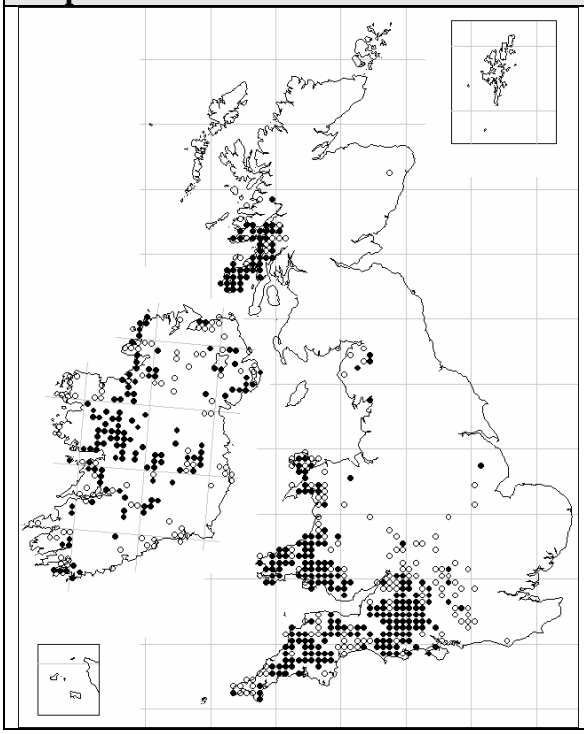
Table 4.3.1 Trends in typical species

Typical species considered:	Trend in BSBI Atlas (Preston *et al.* 2002):	Trend in Braithwaite *et al.* 2006:
Carex hostiana	Decline in S and E England	Stable
Carex pulicaris	Decline in S and E England	Stable
Cirsium dissectum	Decline	Not included
Crepis paludosa	Decline in southern part of range, otherwise stable	Declining
Succisa pratensis	Decline esp S and E England	Declining

This habitat is also home to a varied invertebrate fauna; the best-known example is the uncommon and declining Marsh Fritillary butterfly *Eurodryas aurinia* (Annex II species S1065), which in western Britain is largely restricted to *Molinia* pastures rich in its larval foodplant *Succisa pratensis*. In other parts of the UK both food plant and butterfly are also found in grassland on drier, but still base-rich, soils.

The Marsh Fritillary was once widely distributed throughout the UK but has declined substantially over the last 150 years (Heath *et al.* 1984). Map 4.3.1 shows the continuing recent population extinctions. The Marsh Fritillary Species Action Plan (1995) gives the following reasons for decline: (i) wholesale destruction and fragmentation of habitat by development and agricultural improvement, and (ii) inappropriate grassland management, either by too heavy grazing or abandonment of grazing. It is probable that a decade later, lack of grazing has now become the over-riding problem.

Map 4.3.1 Distribution of the Marsh fritillary butterfly



Filled circles: Distribution from 1995-2004

Open circles: Distribution from 1970-1982

Baseline, map provided courtesy of Butterfly Conservation/Biological Records Centre

4.4 Conclusions on specific structures and functions (including typical species)

Conclusion[2.6.iii]: Unfavourable – Bad but improving

The EC Guidance states that where "more than 25% of the area of the habitat is unfavourable as regards its specific structures and functions", the conclusion should be Unfavourable – Bad. In the UK this was generally taken to mean that more than 25% of the habitat area in unfavourable condition.

For SACs 96% of site features (72% by area) were recorded as unfavourable, whilst for SSSIs and ASSIs 80% of strongly indicative assessments were recorded as unfavourable. The majority of both sets of assessments that were unfavourable were, nevertheless, recovering in condition. A sample of undesignated sites showed that at least 65% were unfavourable. Data about the decline of typical species back up the conclusion of Unfavourable-Bad.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

This habitat is covered by a national action plan under the UK BAP (see www.ukbap.org.uk/UKPlans.aspx?ID=17), with targets to maintain, improve, restore and expand the resource. Actions for the priority habitat (which is broader than the Annex I habitat) have been planned or carried out for many local areas – the Biodiversity Action Reporting System (BARS www.ukbap-reporting.org.uk) lists 154 targets from 25 local areas. Marsh fritillary is also covered by the UK BAP (www.ukbap.org.uk/UKPlans.aspx?ID=300).

Relevant actions under the BAP include:

- programmes to facilitate and encourage grazing of semi-natural grasslands for conservation; and
- socio-economic/marketing research and initiatives to investigate and promote the benefits of food produced from such grasslands.

The habitat is also covered by agri-environment schemes in all countries of the UK, which can contract landowners to maintain, restore and create this type of grassland.

5.1.2 Main future threats

The most obvious major future threats to H6410 are listed below, several of which are referred to in Section 4.1. Maintaining appropriate management in relation to modern agricultural practice is a major challenge for the conservation of existing *Eu-Molinion* across UK.

140 Grazing
141 Abandonment of pastoral systems
950 Biocenotic evolution
701 water pollution
101 Modification of cultivation practices
120 Fertilisation
162 Artificial planting
702 air pollution

- Under-grazing

A major current and on-going problem is agricultural neglect leading to litter build-up and scrub invasion. Underlying causes of under-grazing are still thought to be largely due to current agricultural economics and policies, leading to a reluctance to keep stock (large stock in particular) on pasture perceived to have little nutritional value.

- Lack of remedial management

It is natural for open fens to change spontaneously into wooded fens, and regular management, such as scrub clearance and grazing, is required to prevent this.

- Over-grazing

Less prevalent than under-grazing, overgrazing by sheep is still sometimes reported, along with occasional poaching and trampling by livestock during wet periods.

- Water management and quality

The management of surface and groundwater is clearly crucial to providing the surface:groundwater requirements of each type of fen, as are its constituents, for example basic ions such as calcium, its pH, and quantity of the plant nutrients nitrogen and phosphorus.

- Agricultural improvement

This includes drainage, cultivation and fertiliser applications.

- Air pollution

Based on an assessment of the exceedence of relevant critical loads (see Technical note III), air pollution is considered to be a potentially significant threat to the future condition of this habitat.

- Climate change

Based on the literature review (Technical note IV) climate change is considered a major threat to the future condition of this habitat especially in the long term. However, there is a high degree of uncertainty in defining future climate threats on habitats and species due to uncertainty in: future greenhouse gas emissions; the consequential changes in climatic features (for instance temperature, precipitation CO_2 concentrations); the responses of habitats and species to these changes (for instance location, phenology, community structure) and the role of other socio-economic drivers of environmental change. The scale of change in habitats and species as a result of climate change will vary across ecosystems. Small changes in the climate are more likely to have a substantial impact on habitats and species which exist within a narrow range of environmental conditions. The future impacts of climate change on UK biodiversity will

be exacerbated when coupled with other drivers of environmental change.

5.2 Future condition (as regards range, area covered and specific structures and functions)

5.2.1 CSM condition assessments

The CSM condition assessments reported in Sections 4.2.1-2 provide a basis to predict the potential future condition of H6410 in the UK. This involved treating all assessments currently identified as either favourable or unfavourable recovering as future-favourable: remaining categories were treated as future-unfavourable – see Table 5.2.1.1. There are a number of caveats to this approach, which are set out beneath this table.

Table 5.2.1 Predicted future condition of UK SACs supporting H6410 based on current CSM condition assessments. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Future condition	Present condition	Area (ha)	Number of site features
Future-unfavourable	Unfavourable declining	80	7
	Unfavourable no change	121	6
	Unfavourable unclassified	108	5
	Total	309	18
	% of assessments	***18%***	***56%***
	% of total UK extent	***8%***	***Unknown***
Future-favourable	Favourable maintained		
	Favourable recovered		
	Unfavourable recovering	941	13
	Favourable unclassified	461	1
	Total	1,402	14
	% of assessments	***82%***	***44%***
	% of total extent	***36%***	***Unknown***

Note that the scenario presented above is based on the same information as used to construct the Table in section 4.1. It is based on the following premises:
(i) the unfavourable-recovering condition assessments will at some point in the future become favourable;
(ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;
(iii) sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.
IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

SAC condition assessments

Table 5.2.1 and Map 5.2.1 summarise the predicted potential future condition of H6410 on UK SACs. This is based on the approach described above. The maps give an impression of the overall spread of where future-unfavourable and future-favourable sites are predicted to occur (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 82% of the area and 36% of the number of assessments fall within the future-favourable category; and
- at least 36% of the total UK habitat area falls within the future-favourable category.

SSSI/ASSI condition assessments

Table 5.2.2 and Maps 5.2.2 and 5.2.3 summarise the predicted potential future condition of H6410 on UK SSSI/ASSIs. This is based on the approach described above and utilises condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical note II for details of methodology behind this). The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 59% of strongly indicative assessments and 56% weakly indicative assessments fall within the future-favourable category.

Table 5.2.2 Predicted future condition of H6410 on SSSI/ASSIs based on CSM assessments that were judged to be either strongly or weakly indicative of the condition. See notes below table and Technical note II for further details

Future condition	Present condition	Number of assessments	
		Strongly indicative assessments (Category 1)	**Weakly indicative assessments (Category 2)***
Future-unfavourable	Unfavourable declining	11	6
	Unfavourable no change	13	8
	Unfavourable unclassified		8
	Total	24	22
	% of assessments	***41%***	***44%***
Future-favourable	Favourable maintained		18
	Favourable recovered		1
	Unfavourable recovering	23	2
	Favourable unclassified	12	7
	Total	35	28
	% of assessments	***59%***	***56%***

* CSM reporting category is much broader in scope than Annex I habitat type, but still has some relevance to condition

Note that the scenario presented above is based on the same information as used to construct the Table 4.2.2. It is based on the following premises:

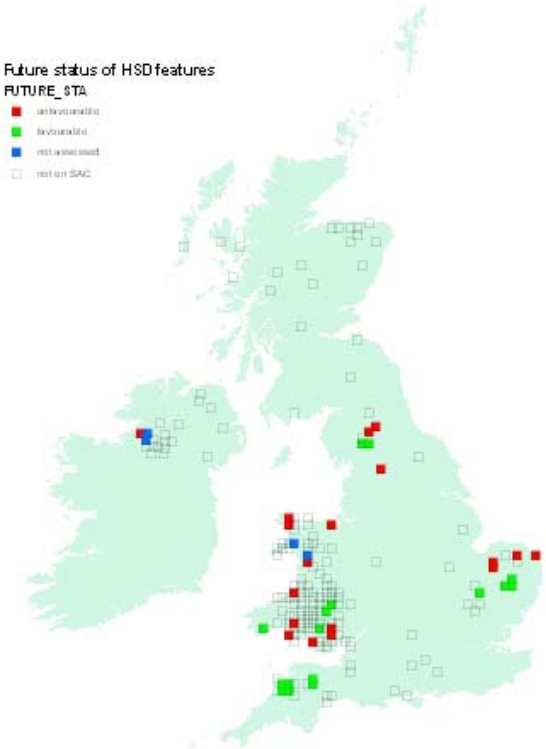
(i) the unfavourable-recovering condition assessments will at some point in the future become favourable;

(ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;

(iii) sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.

IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

Predicted Future Condition of H6410 based on CSM condition assessments (See Sections 5.2 and 7.2 for further information on these maps)

Map 5.2.1 SAC assessments	**Map 5.2.2** Assessments strongly indicative of the condition on SSSI/ASSIs	**Map 5.2.3** Assessments weakly indicative of the condition on SSSI/ASSIs
		
Key Red = future-unfavourable, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable Green = future-favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type	Key* Green – 80 – 100% of assessed features on 10-km square are favourable Yellow - 50 – 80% of assessed features on 10-km square are favourable Orange - 20 – 50% of assessed features on 10-km square are favourable Red - 0 – 20% of assessed features on 10-km square are favourable *This is the same key as was used for JNCC CSM Report 2006	

5.3 Conclusions on future prospects (as regards range, area covered and specific structures and functions)

Conclusion[2.6.iv]: Unfavourable – Inadequate

The EC Guidance states that where habitat prospects are intermediate between "good with no significant impacts from threats expected and long-term viability assured" and "bad with severe impacts from threats expected and long-term viability not assured", the judgement should be Unfavourable – Inadequate. In the UK, this was generally taken to mean that range and/or area are stable or decreasing, and between 75-95% of the habitat area is likely to be in favourable condition in 12-15 years.

Although the area is thought still to be deteriorating, it is not clear that this exceeds 1% per year. Re-creation targets for this habitat have been set in the UK Biodiversity Action Plan (UK Biodiversity Group (1998) but progress to date has been slow. Re-creating stands that resemble existing semi-natural examples will probably take several decades.

The main reason that the future prospects are Unfavourable – Inadequate rests on the site condition data with 82% of SAC area and almost 60% of ASSI/SSSI area expected to attain favourable condition. For sites outside of statutory sites only a small proportion are currently favourable and it is predicted that to bring the remaining resource into favourable condition may take several decades.

It is the opinion of experts that conservation action is improving the prospects for site condition overall, but this is countered by the evidence of continuing declines in area and in addition the improvements may not be achieved in the next ten or so years. On balance, the judgement has been made that the future prospects are, at best, stable.

6. Overall conclusions and judgements on conservation status [2.6]

Conclusion[2.6.iv]: Unfavourable – Bad and deteriorating

On the basis of the Area and Structure and Function assessments, the overall conclusion for this habitat feature is Unfavourable – Bad.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Range is stable and not less than the favourable reference range.	2
Area covered by habitat type within range	Unfavourable – Bad and deteriorating	Current extent is more than 10% below the favourable reference area and has decreased by more 1% per annum. Further measures are required to address threats to future extent for the overall UK resource.	2
Specific structures and functions (including typical species)	Unfavourable – Bad but improving	More than 25% of the habitat area is considered to be unfavourable as regards its specific structures and functions. Significantly more of the resource in unfavourable condition is improving than improving.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable – Inadequate	Habitat prospects considered to be intermediate between "good with no significant impacts from threats expected and long-term viability assured" and "bad with severe impacts from threats expected and long-term viability not assured.	3

Overall assessment of conservation status	Unfavourable – Bad and deteriorating	One or more judgement of Unfavourable – Bad and deteriorating.	2

Key to confidence in judgement: 1 = High; 2 = Medium; 3 = Low

7. Annexed material **(including information sources used 2.2)**

7.1 References

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PRESTON, C.D., PEARMAN, D.A. & DINES, T.D. 2002. *New Atlas of the British and Irish flora*. Oxford University Press, Oxford, UK.

RODWELL, J.R., MOSS, D., MORGAN, V. & JEFFERSON, R.G. 2007. *The European Context of British Lowland Grasslands. JNCC Report* No. 394.

Map data sources

Data used to compile J.S. Rodwell, V. Morgan, R.G. Jefferson & D. Moss (2007) The European context of British Lowland Grasslands. JNCC Report No. 394. Joint Nature Conservation Committee.

JNCC International Designations Database. Joint Nature Conservation Committee.

7.2 Further information on CSM data as presented in Sections 4.2 and 5.2

Table 7.2.1 Summary of the coverage of the data shown in Tables 4.2.1 and 5.2.1

Data	Value
Number of SACs supporting feature (a)	34
Number of SACs with CSM assessments (b)	32
% of SACs assessed (b/a)	94
Extent of feature in the UK – hectares (c)	3,850
Extent of feature on SACs – hectares (d)	2,021
Extent of features assessed – hectares (e)	1,711
% of total UK hectarage on SACs (d/c)	52
% of SAC total hectarage that has been assessed (e/d)	85
% of total UK hectarage that has been assessed (e/c)	44

Table 7.2.2 Summary of grid square map data shown in Maps 4.2.1-3 and 5.2.1-3

Status	Number of squares	Proportion of all squares
Current – Unfavourable (red)	28	15%
Current – Favourable (green)	6	3%
On SAC but not assessed (blue)	4	2%
Not on SAC (transparent)	154	80%
Total Number of 10-km squares (any colour)	192	100%
Future – Unfavourable (red)	18	9%
Future – Favourable (green)	16	8%