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 :

H2130: Fixed dunes with herbaceous vegetation (`grey dunes`)

H2130 Fixed dunes with herbaceous vegetation ('grey dunes')

Audit trail compiled and edited by JNCC and the UK statutory nature conservation agencies Coastal Lead Coordination 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 H2130 and its relations with UK classifications.

H2130 is a priority habitat with most of the global resource within EU member states. It may have benefitted from geomorphological changes but it has still suffered significant anthropogenic impacts. Fixed dune vegetation occurs mainly on the largest dune systems, being those that have the width to allow it to develop. It typically occurs inland off the zone dominated by marram *Ammophila arenaria* on coastal dunes, and represents the vegetation that replaces marram as the dune stabilises and the organic content of the sand increases. In the UK the vegetation corresponds to the following NVC types:

SD7 *Ammophila arenaria – Festuca rubra* semi-fixed dune community
SD8 *Festuca rubra – Galium verum* fixed dune grassland
SD9a *Ammophila arenaria – Arrhenatherum elatius* dune grassland, typical sub-community pp
SD9b *Ammophila arenaria – Arrhenatherum elatius* dune grassland, *Geranium sanguineum* sub-community
SD11 *Carex arenaria – Cornicularia aculeata* dune community pp
SD12 *Carex arenaria – Festuca ovina – Agrostis capillaris* dune grassland pp
CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland pp
CG13 *Dryas octopetala – Carex flacca* heath pp

Some examples of SD9a *Ammophila arenaria – Arrhenatherum elatius* dune grassland, typical sub-community, can also be referable to this vegetation type. Inland stands of SD11 *Carex – Cornicularia* community and SD12 *Carex – Festuca – Agrostis* dune grassland are referable to Annex I type H2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands.

Fixed dunes are an extremely complex habitat type. For the purposes of the Habitats Directive, Fixed dunes with herbaceous vegetation ("grey dunes") has been divided into a series of sub-types (European Commission DG Environment 1999). The UK is particularly important for Atlantic dune (*Mesobromion*) grasslands.

The herbaceous vegetation of fixed dunes in the UK exhibits considerable variation. The most widespread type is Atlantic dune grassland, consisting of a short sward characterised by red fescue *Festuca rubra* and lady's bedstraw *Galium verum* and typically rich in species of calcareous substrates. The vegetation shows considerable variation both from north to south and from east to west. In northern Scotland, Scottish primrose *Primula scotica* can occur in this community; in the south, several orchid species are

found, including pyramidal orchid *Anacamptis pyramidalis*, and a rich variety of other species. In south-west England and in Wales wild thyme *Thymus polytrichus* often dominates this type of vegetation. A taller type of dune grassland vegetation, in which bloody crane's-bill *Geranium sanguineum* is prominent, is particularly characteristic of north-east England. In areas with a drier and more continental climate, such as Norfolk, and where the substrate is at the acidic end of the spectrum, the fixed dune vegetation is rich in lichens.

Where 'climbing dunes' have developed over bedrock, grasslands similar to inland calcicolous types may occur, notably in the Western Isles where forms of NVC type CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland are widespread on fixed dunes. Herb-rich transitions to CG13 *Dryas octopetala – Carex flacca* heath (6170 Alpine and subalpine calcareous grasslands) on wind-blown sand occur very locally in the north and west.

As with 2110 Embryonic shifting dunes and 2120 Shifting dunes along the shoreline with *Ammophila arenaria*, this Annex I type is widely distributed throughout the EU. Fixed dunes with herbaceous vegetation occur widely around the coasts of the UK and are a major component of many sand dune systems.

Table 1.1.1 Summary description of habitat H2130 and its relations with UK vegetation/habitat classifications

Classification	Correspondence with Annex I type	Comments
NVC	In the UK the vegetation corresponds to the following NVC types: SD7 *Ammophila arenaria – Festuca rubra* semi-fixed dune community SD8 *Festuca rubra – Galium verum* fixed dune grassland SD9a *Ammophila arenaria – Arrhenatherum elatius* dune grassland, typical sub-community pp SD9b *Ammophila arenaria – Arrhenatherum elatius* dune grassland, *Geranium sanguineum* sub-community SD11 *Carex arenaria – Cornicularia aculeata* dune community pp SD12 *Carex arenaria – Festuca ovina – Agrostis capillaris* dune grassland pp CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland pp CG13 *Dryas octopetala – Carex flacca* heath pp	
BAP priority habitat type	Coastal sand dune	This BAP type is broader than H2130 as it encompasses all other coastal dune types.

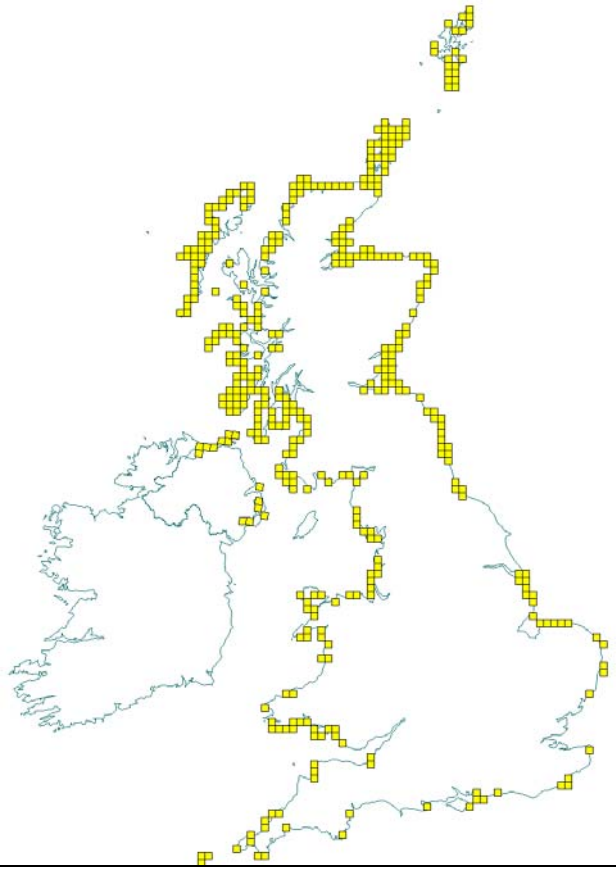
2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: **3,686 km²**
Date calculated [2.3.2]: **May 2007**
Quality of data [2.3.3]: **Moderate**

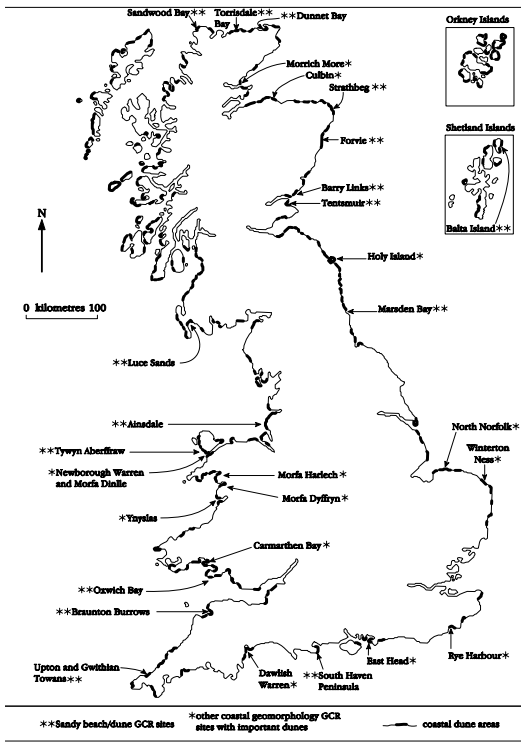
The surface area estimate was calculated within alpha hull software, using extent of occurrence as a proxy measure for range (see Map 2.1.1). The value of alpha was set at 25 km; the alpha hull software used to calculate the surface area of the range could only be clipped to a 10km strip width along the coast. The geomorphological and physical factors influencing the distribution of the habitats are likely to occur only within a far smaller distance of the coastline (at most 1km) and hence the area value has been reduced by a factor of 10 to give a more realistic value for the surface area of the range for these habitats.

Maps 2.1.1 and 2.1.2 show the range and distribution of H2130 in the UK. The map shows coastal records for NVC types SD7, SD8, SD9b, SD11 and SD12, together with Special Areas of Conservation (SACs) supporting this Annex I type. Some of these NVC types are also found on machair; these records have not been distinguished on this map. Note that inland examples of NVC communities SD11 and SD12 are considered to be referable to H2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands and are not shown above.

Map 2.1.1 Habitat range map [1.1] for H2130	**Map 2.1.2** Habitat distribution map [1.2] for H2130
	
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 10x10km square of the National Grid and shows the known and/or predicted occurrence of this habitat. 10 km Square Count: 420

See Section 7.1 for map data sources

Map 2.1.3 Sandy beaches and dunes in Britain



From: May and Hansom (2003)

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**

There is no obvious discernable trend in disruption of the range of this habitat. There have been no changes in range over the past 50 years and many dune systems are now protected.

2.3 Favourable reference range

Favourable reference range[2.5.1.]: **3,686 km^2**

Grey dunes are found throughout their geographical range in the UK: the habitat is found around all the coasts of the UK; the range is extensive and the distribution therein is homogenous, leading us to believe that there is no or only a very limited fragmentation of the range. The range of H1230 has been relatively stable over the last 50 years and the current range is considered to be equal to the potential range, and to the favourable reference range, making this habitat viable in the long term regarding range, especially as there is a potential for habitat expansion. The range is considered viable for maintaining H2130.

2.4 Conclusions on range

Conclusion[2.6.i]: **Favourable**

We still have good geographical representation of grey dunes both in terms of longitude and latitude in the UK and it seems likely that most of the variation in community composition as a result of north-south and east-west climatic differences can still be found. Despite localised losses there has been no sizeable contraction of the range which is considered to be broadly stable.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **223km^2**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **3 = ground based survey**
Quality of data [2.4.4]: **Moderate**

Table 3.1.1 provides information on the area of H2130 in the UK. Comprehensive extent data are available from the Sand Dune Survey of Great Britain (1987-1990) and the subsequent Sand Dune Vegetation Survey of Scotland. The Sand Dune Database and other survey reports provide information on NVC types SD7, SD8, SD9b, SD11 and SD12. The data for Scotland are likely to be an overestimate as it includes a large part of the machair resource. The figure for Northern Ireland is an estimate based on expert opinion. The estimated 22,300 ha of grey dune habitat in the UK is probably not far off the mark. An estimate for Great Britain based on a spreadsheet compiled from data collected in the Sand Dune Vegetation Survey of Great Britain and the Sand Dune Vegetation Survey of Scotland was 22,807 ha, but some of the categories included were mosaics and transitional types.

Table 3.1.1 Area of H2130 in the UK

	Area (ha)	Method [2.4.3]	Quality of data [2.4.4]
England	3900	3	Moderate
Scotland	14900	3	Moderate
Wales	2700	3	Moderate
Northern Ireland	800	3	Moderate
Total UK extent [2.4.1]	22,300	3	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]: **Increasing**
Trend magnitude[2.4.6]: **Unknown**
Trend period[2.4.7]: **1950-2006**
Reasons for reported trend[2.4.8]: **Not applicable**

There is little doubt that large losses have occurred due to agricultural (including afforestation), industrial and urban developments, but overall there has probably been a trend of increasing grey dune habitat over the past 50 years or so. This relates to the fact that dunes have become more stable over this period. Newborough Warren in Wales, for example, was more mobile in the 1950s with mobile dunes occupying over 70% of the site as opposed to just 6% today (Rhind *et al.* 2001). There is good evidence that this stabilisation was typical for many other dune systems. However, significant areas of grey dune habitat have been lost to the development of conifer plantations. In Wales, for example, plantations cover approximately 21% (1,700 ha) of the dune resource, and of this, a large proportion would have included grey dunes.

3.3 Favourable reference area

Favourable reference area[2.5.2]: **223 km^2**

Section 3.2.2.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference area estimates have been determined in the UK. Based on this approach, the current extent, 223 km^2, has been set as the favourable reference area. Reasons for this are discussed below.

H2130 are found all around the UK coasts. The extent is sufficient for the habitat not to be considered scarce. There is no concern regarding connectivity between patches and/or sites. The major concern is that most of the area is fossilised dune systems which do not provide the necessary conditions for natural sand dune processes: the resource becomes rank and encroached by scrubs, leading to too much stability. However, there is a good potential for restoration and recreation of the habitat (see 5.1).

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: Favourable

The habitat has probably increased in area over the past 50 years and is considered to be viable in terms of area, with prospects for expanding the habitat. The main concern is the increasing stability which can compromise the processes of the dune system.

4. Specific Structures and Functions **(including typical species)**

4.1 Main pressures [2.4.10]

The factors affecting coastal sand dunes are covered in the *Habitat Action Plan for Coastal sand dunes* (UKBAP website). The main pressures affecting H2130 are listed below. The related EC codes are shown in brackets.

- Grazing (**101 Modification of cultivation practices, 140 Grazing**)

In the absence of human interference, most stable dunes, with the exception of those experiencing severe exposure, would develop into scrub and woodland. The preponderance of grassland and heath vegetation on British dunes is due to a long history of grazing by livestock. Continued grazing is normally necessary to maintain the typical fixed dune communities, but over-grazing, particularly when combined with the provision of imported feedstuffs, can have damaging effects. A more widespread problem is under-grazing, leading to invasion by coarse grasses and scrub, though rabbits are locally effective in maintaining a short turf. Parts of some stabilised dune systems have been entirely converted to agricultural use, resulting in almost total loss of the conservation interest.

- Forestry (**162 Artificial planting**)

Afforestation of dunes is not as prevalent in Britain as it is in parts of continental Europe, but in a few locations it has had a major effect on large areas of dune landscape. Some sites hold large conifer plantations which have the effect of suppressing the dune vegetation communities and lowering the water table. However, both routine fellings and permanent removal of conifers have shown that vegetation close to the original can be restored in a relatively short time.

- Recreation (**622 walking, horse riding and non-motorised vehicles, 623 motorised vehicles**)

Recreation is a major land use on sand dunes. Many dune systems are used extensively by holiday-makers, mostly on foot but also for parking cars and in some cases for driving four-wheel-drive vehicles or motorcycles. Moderate pressure by pedestrians may cause little damage, and may even help to counteract the effects of abandonment of grazing. However, excessive pedestrian use, as on routes between car parks and beaches, and vehicular use in particular, have caused unacceptable erosion on many dune sites. Many dune systems also support one or more golf courses. Here much of the original vegetation may be retained in the rough, but the communities of the fairways, and particularly the greens and tees, are often severely modified by mowing, fertilising and re-seeding. Fragmentation of dune systems by golf courses makes grazing management much more difficult.

- Sea defences and stabilisation (**871 sea defence or coast protection works**)

Many dune systems are affected by sea defence works or artificial stabilisation measures such as sand fencing and marram planting. These practices are particularly prevalent on the more developed coastlines where drifting sand may be perceived as a threat to urban or holiday developments. While carefully

applied dune management measures can help to counteract severe erosion which may threaten the existence of a dune, engineered defence systems usually reduce the biodiversity inherent in the natural dynamism of dune systems, and may cause sediment starvation down-drift. UK dunes as a whole suffer from over-stabilisation and poor representation of the mobile phases.

- Beach management (**302 removal of beach material, 622 walking, horse riding and non-motorised vehicles, 623 motorised vehicles**)

The seaward accretion of dune systems takes place through the accumulation of wind-blown sand caught by plants or debris along the driftline; the initial accumulations are colonised by pioneer plant species and form embryo dunes. On some heavily used beaches this process is inhibited by pressure of pedestrian or vehicular traffic, or by beach cleaning using mechanical methods, where the organic nuclei for sand deposition may be removed. These factors may remove the minor obstacles which would catch the sand initially, or destroy the embryo dunes at an early stage in their formation. In either case a dune system in a location where the physical conditions exist for accretion may actually be static or eroding.

- Erosion and progradation (**900 erosion**)

Unless artificially constrained, the seaward edges of sand dunes can be a highly mobile feature, though there is a natural trend to greater stability further inland. Very few dune systems are in overall equilibrium, and a majority of those in the UK demonstrate net erosion rather than net progradation; insufficient sand supply is frequently the underlying cause. There is no particular geographical distribution of either trend, both normally being present along any one stretch of coastline, and often within individual sites. Changes may be cyclical, both seasonally and over longer periods of time. Landward movement of mobile dunes often entails loss of fixed dune and dune heath habitat, as the latter are usually stable, or retreat may be impeded by development; in a few cases dune systems may move inland where not artificially constrained. The net loss of dune habitat in England to erosion has been estimated as not more than 2% of the resource over the next 20 years.

- Other human influences (**302 removal of beach material, 400 Urbanised areas, human habitation, 410 Industrial or commercial areas, 422 disposal of industrial waste, 421 disposal of household waste**)

Sand dunes have also been affected in the past by housing developments, industrial development, waste tips on or adjacent to them, fly tipping and sand extraction. Indirect effects on dunes include atmospheric nutrient deposition, and coastal squeeze due to rising sea levels and increased storminess. The potential for dredging and marine aggregate extraction, through the disruption of coastal processes, to have cumulative and long-term effects on sand dunes is an area for further investigation.

- Air pollution (**702 air pollution**)

Based on an assessment of the exceedence of relevant critical loads (see Technical note III), air pollution is not 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/page-2199) provide a means to assess the structure and functioning of H2130 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat:

- Habitat extent.
- Vegetation structure: range of zones of vegetation.
- Vegetation structure: flowering and fruiting.
- Vegetation composition
    - typical species

- indicators of negative trends.

- Other negative indicators (negative indicator species and signs of disturbance).

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 H2130. 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:

- 69% of the area and 69% of the number of assessments was Unfavourable; and
- at least 29% of the total UK habitat area was in Unfavourable condition.

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:

- 74% of strongly indicative assessments and 48% weakly indicative assessments were Unfavourable.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H2130. 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	2,855	8
	No change	1,279	5
	Unclassified	848	3
	Recovering	1,594	4
	Total	6,576	20
	% of all assessments	***69%***	***69%***
	% of total UK resource	***29%***	***unknown***
Favourable	Maintained	2,247	7
	Recovered		
	Unclassified	640	2
	Total	2,886	9
	% of all assessments	***31%***	***31%***
	% of total UK resource	***13%***	***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.

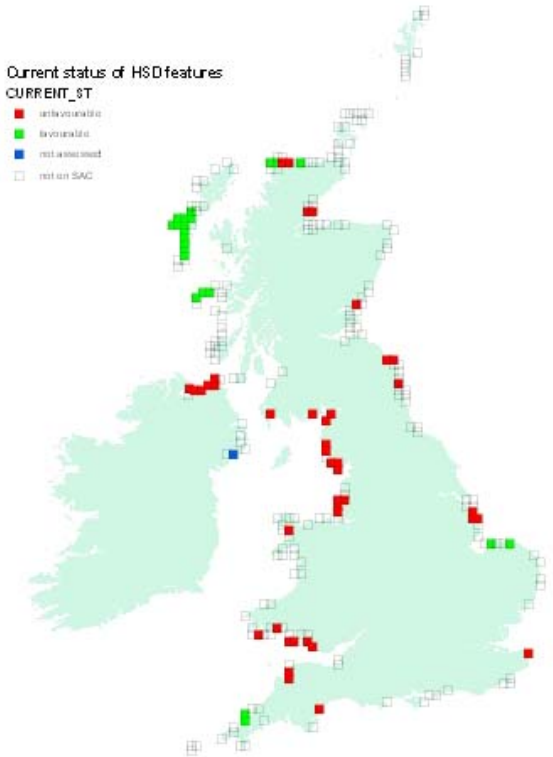
Table 4.2.2 CSM condition assessment results for UK SSSI/ASSIs that were judged to be either strongly or weakly indicative of the condition of H2130 on SSSI/ASSIs. See notes below table and Technical note II for further details

Condition	Condition sub-categories	Number of assessments	
		Strongly indicative assessments (Category 1)	Weakly indicative assessments (Category 2)
Unfavourable	Declining	10	10
	No change	8	15
	Unclassified	1	1
	Recovering	40	3
	Total	59	29
	% of all assessments	***74%***	***48%***
Favourable	Maintained		31
	Recovered		
	Unclassified	21	
	Total	21	31
	% of all assessments	***26%***	***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.

Current Condition of H2130 based on Common Standard Monitoring 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]: ***Vulpia fasciculata, Phleum arenarium, Vicia lathyroides, Cerastium semidecandrum, Trifolium arvense, Viola canina, Thalictrum minus, Euphorbia paralias***

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

Several species show a medium to very high degree of faithfulness to this habitat or at least to the related sand dune and calcicolous grassland community types (SD7, SD8, SD9a, SD9b, SD11, SD12, CG10 and CG13) within the NVC. Trends in the occurrence of these species across the UK during the last 25 years are set out in the table below. All but three showed significant increases, mostly of less than 25%. These data suggest that at least some species associated with H2130 have increased in occurrence, though not necessarily within this sand dune type.

Table 4.3.1 Trends and faithfulness of selected typical species for H2130

Typical species [2.5.3]	**Faithfulness to habitat H2130 (based on analysis of NVC synoptic tables)**	**Trend over last 25 years from BSBI atlas – based on change in 10 km square occupancy across UK (see http://www.jncc.gov.uk/page-3254)**
Vulpia fasciculata	Very high	Significant increase, but <25% in 25 years
Phleum arenarium	Very high	Significant decline, but <25% in 25 years
Vicia lathyroides	Very high	Significant increase, but <25% in 25 years
Cerastium semidecandrum	High	Significant increase, but <25% in 25 years
Trifolium arvense	Medium	Significant increase, but <25% in 25 years
Viola canina	Medium	Significant decline, but <25% in 25 years
Thalictrum minus	Medium	Significant increase, but <25% in 25 years
Euphorbia paralias	Medium	No significant change

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

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

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.

CSM condition assessments for SACs for H2130 show that, in terms of area, 69% are classed as Unfavourable, which represents 29% of the total UK resource. About 30% of the area assessed, and thus 12% of the overall resource, is classed as declining.

5. Future Prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

There is little doubt that the current area of grey dunes could be expanded through various restoration or re-creation techniques. Grey dunes are very susceptible to scrub encroachment and can easily become rank in the absence of appropriate management (Houston 1997). More sympathetic management could improve many sites. Deforestation of dune conifer plantations could also create hundreds of hectares of new grey dunes if appropriate follow-up management was carried out (Atkinson and Sturgess, 1991; Sturgess and Atkinson 1993). Any favourable reference area should include areas that still have the potential to be restored such as those now affected by conifer planting. A management model is being developed for H2130 (European Commission, in preparation), providing guidelines to address threats and pressures and drawing on experience from other European countries (the Netherlands, Denmark, Germany…) for a better conservation of British dune slacks.

- Protection within designated sites

Around 42% of the resource of H2130 lies within SACs with management measures specifically aimed at maintaining and enhancing the features for which they are designated, and to address some of the pressures listed within section 4.1 and the future threats listed in section 5.1.2. A significant proportion of the resource of this habitat also lies within the SSSI/ASSI series where similar management measures are in place.

- UK BAP

The habitat is covered by the *Coastal sand dunes action plan* under the UK Biodiversity Action Plan (see www.ukbap.org.uk), as well as under country and local biodiversity action plans and strategies, with targets to maintain, improve, restore and expand the resource.

5.1.2 Main future threats[2.4.11]

The most obvious major future threats to H1210 are listed below, several of which are referred to in Section 4.1. The related EC codes are shown in brackets.

- Grazing (**101 Modification of cultivation practices, 140 Grazing**)
- Forestry (**162 Artificial planting**)
- Recreation (**622 walking, horse riding and non-motorised vehicles, 623 motorised vehicles**)
- Sea defences and stabilisation (**871 sea defence or coast protection works**)
- Beach management (**302 removal of beach material, 622 walking, horse riding and non-motorised vehicles, 623 motorised vehicles**)
- Erosion and progradation (**900 erosion**)
- Other human influences (**302 removal of beach material, 400 Urbanised areas, human habitation, 410 Industrial or commercial areas, 422 disposal of industrial waste, 421 disposal of household waste**)

- Climate change (**900 erosion, 930 submersion**)

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.

- Air pollution (**702 air pollution**)

Nutrient enrichment is possibly one of the greatest threats to the long-term conservation of this habitat. The recommended critical load range for sand dunes is 10 – 20 kg N ha-1 yr-1 (Jones *et al.* 2002a, b) and several sites in the UK are now regarded as approaching threshold levels on the basis of atmospheric inputs alone.

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 H2130 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. There are a number of caveats to this approach, which are set out beneath this table.

SAC condition assessments

Table 5.2.1 and Map 5.2.1 summarise the predicted potential future condition of H2130 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:

- 47% of the area and 45% of the number of assessments fall within the future-Favourable category; and
- at least 20% of the total UK habitat area falls within the future-Favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H2130 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	2,855	8
	Unfavourable no change	1,279	5
	Unfavourable unclassified	848	3
	Total	4,982	16
	% of assessments	***53%***	***55%***
	% of total UK extent	***22%***	***Unknown***
Future-Favourable	Favourable maintained	2,247	7
	Favourable recovered		
	Unfavourable recovering	1,594	4
	Favourable unclassified	640	2
	Total	4,480	13
	% of assessments	***47%***	***45%***
	% of total extent	***20%***	***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.

Table 5.2.2 Predicted future condition of H2130 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	10	10
	Unfavourable no change	8	15
	Unfavourable unclassified	1	1
	Total	***19***	***26***
	% of assessments	***24%***	***43%***
Future-Favourable	Favourable maintained		31
	Favourable recovered		
	Unfavourable recovering	40	3
	Favourable unclassified	21	
	Total	61	34
	% of assessments	***76%***	***57%***

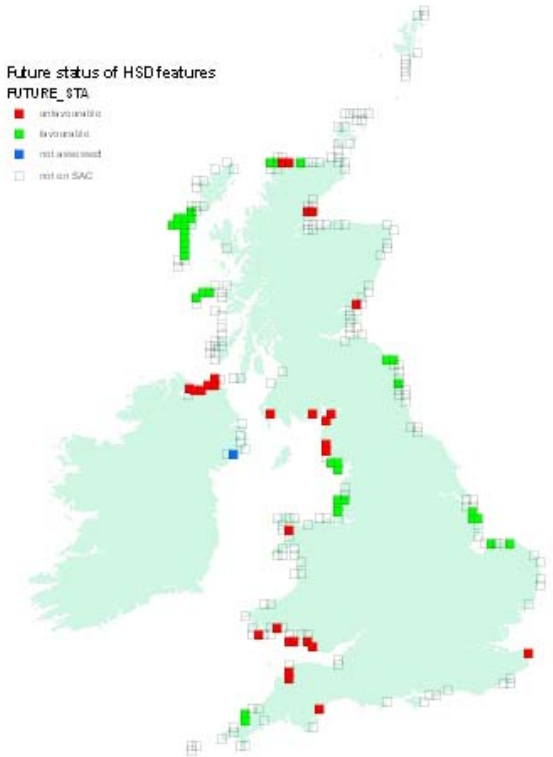
Note that the scenario presented above is based on the same information as used to construct the Table 4.2.2. It is based on the following premises:
(i) the Unfavourable-recovering condition assessments will at some point in the future become Favourable;
(ii) all Unfavourable-unclassified sites will 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.

SSSI/ASSI condition assessments

Table 5.2.2 and Maps 5.2.2 and 5.2.3 summarise the predicted potential future condition of H2130 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:

- 76% of strongly indicative assessments and 57% weakly indicative assessments fall within the future-Favourable category.

Predicted Future Condition of H2130 based on Common Standard Monitoring 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 – Bad and deteriorating

The EC Guidance states that where "habitat prospects are bad, with severe impacts from threats expected and long-term viability not assured", the judgement should be Unfavourable – Bad. In the UK, this was generally taken to mean that habitat range and/or area are in decline, and/or less than 75% of the habitat area is likely to be in favourable condition in 12-15 years.

CSM site condition assessments for SACs show that a large part of this habitat is expected to remain in Unfavourable condition: 53% of SAC area, representing 21% of the total UK resource. SSSI results show that 24% of strongly indicative assessments and 43% weakly indicative assessments remain Unfavourable in the foreseeable future. A large proportion (30%) of the SAC resource is expected to decline, which represent 12% of the UK resource. The UK BAP, working towards enhancing future viability, has targets to bring the dune systems into Favourable or recovering condition by 2010 while maintaining the current extent. Despite progress already made and some additional recovery once further conservation measures are put into place, the expectation is that more than 25% of the habitat will be in Unfavourable condition in the next 10-15 years.

6. Overall Conclusions and Judgements on Conservation Status [2.6]

Conclusion[2.6]: Unfavourable – Bad and deteriorating

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

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Current range is stable and not less than the favourable reference range.	2
Area covered by habitat type within range	Favourable	Current extent is stable and not less than the favourable reference area.	2
Specific structures and functions (including typical species)	Unfavourable – Bad and deteriorating	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 declining than improving.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable – Bad and deteriorating	Habitat prospects over next 12-15 years considered to be bad, with severe impact from threats expected and long term viability not assured. Further measures are required to address threats to future structure and function for the overall UK resource.	2
Overall assessment of conservation status	Unfavourable – Bad and deteriorating	On the basis of the Structure and Function and Future Prospects assessments, the overall conclusion for this habitat feature is 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

AIR POLLUTION INFORMATION SYSTEM. 2004. www.apis.ceh.ac.uk

ATKINSON, D. & STURGESS, P.W. 1991. Restoration of sand dune communities following deforestation. In: *Terrestrial and aquatic ecosystems – purturbation and recovery*. ed. O. Ravera. Ellis Horwood Publishers.

EUROPEAN COMMISSION. In preparation. *Management models for habitats in* Natura 2000 *sites. 2130 *Fixed coastal dunes with herbaceous vegetation ("grey dunes").*

HAINES-YOUNG, R.H. *et al.* 2000. *Accounting for nature: assessing habitats in the UK countryside.* DETR, Rotherham.

HOUSTON, J. 1997. Conservation management practice on British dune systems. *British Wildlife,* **8**: 297-307.

JACKSON, D.L. & MCLEOD, C.R. (eds.) 2002. Handbook on the UK status of EC Habitats Directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. *JNCC Report* No. 312. Version 2. www.jncc.gov.uk/page-2447

JOINT NATURE CONSERVATION COMMITTEE. 2005. *Common Standards Monitoring (CSM).* Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/page-2217

JONES, M.L.M., REYNOLDS, B., STEVENS, P.A., NORRIS, D. & EMMETT, B.A. 2002a. Changing nutrient budget if sand dunes: Consequences for nature conservation interest and dunes management. 1. A Review. Centre for Ecology and Hydrology, Bangor. CCW Contract Science Report 566a.

JONES, M.L.M., HAYES, F., BRITTAIN, S.A., HARIA, S., WILLIAMS, P.D., ASHENDEN, T.W., NORRIS, D.A. & REYNOLDS, B. 2002b. Changing nutrient budget if sand dunes: Consequences for nature conservation interest and dunes management. 2. Field Survey. Centre for Ecology and Hydrology, Bangor. CCW Contract Science Report 566b.

MAY, V.J. & HANSOM, J.D. 2003. Coastal Geomorphology of Great Britain. Geological Conservation review series No. 28. Joint Nature Conservation Committee, Peterborough.

MCLEOD, C.R., YEO, M., BROWN, A.E., BURN, A.J., HOPKINS, J.J. & WAY, S.F. (eds.) 2008. *The Habitats Directive: selection of Special Areas of Conservation in the UK.* 2nd edn. Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/SACselection

RHIND, P.M., BLACKSTOCK, T.H., HARDY, H.S., JONES, R.E. & SANDISON, W. 2001. The evolution of Newborough Warren dune system with particular reference to the past four decades. In: J. A. Houston, S. E. Edmondson & P. J. Rooney (eds). *Coastal dune management. Shared experience of European conservation practice*. Proceedings of the European Symposium Coastal Dunes of the Atlantic Biogeographical Region Southport, northwest England, September 1998. Liverpool University Press.

STURGESS, P. & ATKINSON, D. 1993. The clear felling of sand dune plantations: soil and vegetation processes in habitat restoration. *Biological Conservation,* **66**: 171-183.

Map data sources

British Plant Communities.1995. Volumes 1-5. Cambridge University Press, Cambridge.

Coastal vegetation survey of Northern Ireland. 1992. University of Lancaster, Unit of Vegetation Science.

Sand Dune Database. 1995. Joint Nature Conservation Committee.

JNCC International Designations Database. Joint Nature Conservation Committee.

Sand dune vegetation survey of Scotland. Scottish Natural Heritage.

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)	30
Number of SACs with CSM assessments (b)	29
% of SACs assessed (b/a)	97
Extent of feature in the UK – hectares (c)	22,300
Extent of feature on SACs – hectares (d)	9,589
Extent of features assessed – hectares (e)	9,462
% of total UK hectarage on SACs (d/c)	43
% of SAC total hectarage that has been assessed (e/d)	99
% of total UK hectarage that has been assessed (e/c)	42

Notes

1. Extent of features on SACs (d) includes only those features that have been submitted on the official Natura 2000 data form as qualifying features. This figure is based on the habitat extent figures presented on standard Natura 2000 data forms.
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).

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)	41	16%
Current – Favourable (green)	22	9%
On SAC but not assessed (blue)	1	0%
Not on SAC (transparent)	186	74%
Total Number of 10km squares (any colour)	250	100%
Future – Unfavourable (red)	28	11%
Future – Favourable (green)	35	14%