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on the Conservation of Natural Habitats
and of Wild Fauna and Flora
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Second Report by the United Kingdom under Article 17

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

Assessing Conservation Status: The UK Approach

Please note that this is a section of the report. For the complete report visit http://www.jncc.gov.uk/article17

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Assessing Conservation Status: The UK Approach

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1 Introduction

It is a requirement under Article 17 of the EU Habitats Directive to report every six years on the conservation status of habitats listed under Annex I and species listed under Annexes II, IV and V of the Directive.

Favourable Conservation Status (FCS) of a habitat is defined in Article 1(e) of the Directive as when:

i. Its natural range and areas it covers within that range are stable or increasing, and;
ii. The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
iii. The conservation status of its typical species is favourable as defined in Article 1(i).

FCS for a species is defined in Article 1(i) of the Directive as when:

i. Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
ii. The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
iii. There is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long term basis.

The European Commission has provided a guidance document to assist Member States to complete the reporting process 'Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes and Guidance, Final Draft 5, October 2006. http://circa.europa.eu/Public/irc/env/monnat/library?l=/guidlines_reporting&vm=detailed&sb=Title. This is referred to within this document as the EC Guidance. The EC guidance sets out the matrices of criteria for assessing conservation status: in Annex C for species, and in Annex E for habitats. This document sets out the approach used in the UK to complete the European Commission's reporting forms for species and habitats. It is a supplement to the guidance produced by the European Commission.

The UK approach follows, as closely as is practical, the EC Guidance, while setting out more clearly the application of the guidance for the 89 UK species and 78 habitats that are listed on the annexes of the Directive.

The main reporting forms are Annex B (for species) and D (for habitats). These present summary information on each of habitat and species assessments, together with the judgements that have been reached on their conservation status. These forms are limited in scope and the underlying information and reasoning by which the judgements have been reached is not included. Therefore, in addition to these annexes, an 'audit trail' has been created for each of the UK assessments. These provide additional information and background on each of the reporting parameters. They also contain an explanation as to how each of the judgements was reached.

The assessments are based on information that could be collated with the resources available to JNCC. There was no commissioning of additional survey or data collation. Data and information sources are acknowledged and have been collated for future reference. Data was sought from Non-Governmental Organisations where appropriate. The conservation status assessments were compiled by staff at JNCC, but they benefited greatly from the input of a more extensive network of specialists. This was achieved mainly through the forum of Inter-Agency Working Groups and Habitat Lead Coordination Networks, within which all the statutory nature conservation organisations (i.e. Countryside Council for Wales, Environment and Heritage Service, JNCC, Natural England, and Scottish Natural Heritage) are represented.

2 Species assessments

2.1 Overview

There are 89 species in the UK that are listed on the Habitats Directive Annexes for which a full report has been submitted. 88 assessments have been carried out, with *Phymatholithon calcareum* and *Lithothamnium coralloides* being considered under a joint assessment for 'mearl' and single assessments for the genera *Sphagnum* and *Lycopodium*, and for the subgenus *Cladina* within the Genus *Cladonia*.

29 species on Annexes IV and V of the Directive, which are classed as vagrants or occasional visitors to the UK, have not been fully assessed. Instead a paragraph of information has been provided on the occurrence of each such species.

The overall conclusion on conservation status for each species is obtained through the assessment of four separate parameters:

1. range;
2. population;
3. habitat for the species; and
4. future prospects.

These have been assessed using the rules of the European Commission's general evaluation matrix 'Annex C' provided in the EC Guidance. Each parameter can be judged as

- Favourable,
- Unfavourable-Inadequate, or
- Unfavourable-Bad.

The option to add the categories of 'but improving' or 'and deteriorating' to the Unfavourable-Inadequate and Unfavourable-Bad conclusions is available.

Where information for a species is very limited and it is not possible to make a judgement, there is the option to use a further category: 'Unknown'. However, the Commission has requested that judgements of 'Unknown' are avoided where possible. For this reason, a high degree of emphasis has been placed on expert opinion for species where data are lacking or incomplete.

The parameters are brought together to form an overall assessment using the rules given in 'Annex C'.

2.1 Making species assessments

2.2.1. Range

Range status assessment includes a measure of the geographical limits of the species distribution across the UK, informed by an estimate of current surface area (and data quality), trends in surface area, and the 'favourable reference range'.

2.2.1.1 Calculation of surface area

Marine species - Range is a difficult parameter to define for this group of species. They are highly mobile and their distribution can vary considerably in time and space. While understanding the distribution of marine species is helpful in assessing their conservation status and while range can be subjected to qualitative assessment, it is not appropriate to estimate the surface area, as this does not convey a great deal of information on their conservation status.

Terrestrial and freshwater species – Range surface area for terrestrial and freshwater species has been assessed using extent of occurrence as a proxy measure. The IUCN Red List defines 'extent of occurrence' as "*the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g .large areas of obviously unsuitable habitat)*." (IUCN 2001)

Extent of occurrence, for the species conservation status assessments, has been calculated using the Alpha Hull algorithm, at a 10-km square resolution. Unlike a more traditional 'convex hull', which is made up of a convex polygon, an alpha hull comprises a series of polygons, allowing indentations and 'holes' within the outline shape. A parameter 'α' determines how tightly polygons are fitted around the distribution points. The smaller the value of α, the tighter the alpha shape is fitted about around the points. For more detailed information on the Alpha Hull algorithm used, see *Technical Note I, Guidance on Using Alpha Shapes for Conservation Status Reporting*.

The value of Alpha used to fit Alpha shapes to a particular feature is the radius of a circle (in km) which would just "slip through" a gap in the distribution (see *Technical Note I* for an explanation). A value of 20 will cause gaps of more than 40km to appear as breaks in the range; a value of 25 will require gaps of over 50km for a break in the range. The values used for individual features are documented in the feature_range parameter of the JNCC conservation status database.

The value of alpha ranges from 18 to 45 in the species conservation status assessments. This has been set to reflect the dispersal behaviour of individual species; to allow a buffer around incomplete records; and to provide the most realistic range estimate in the absence of complete census. For all terrestrial and freshwater species, a set of clipping rules have been applied to ensure that only inland, UK habitats are included within the alpha hull.

Extent of occurrence is highly dependent on available records. Where there are gaps in data range maps do not always represent an ecologically meaningful range outline. For instance, for some widely distributed species small areas of land appear to be excluded from the range because there are no records in those areas, even though the species is considered to occur there. These erroneous 'gaps' could be filled by including artificial records, but there is no means of standardising this process. Therefore, on the basis that these anomalies would not alter the overall conclusion, the 'gaps' have not been 'corrected'.

Current date-class

The EC guidance does not specify the date of the data on which the assessment should be based. This is deliberate to allow for flexibility between species and differences in data quality. Generally, the UK approach has been to provide the most recent and most comprehensive assessment of range. Date classes that include pre-1994 data have been avoided where possible, but where exceptions are necessary they have been justified in the individual audit trails. For well-surveyed species with clearly defined distributions, it has been possible to provide very recent and accurate estimates, post-2000 or even a 2006 estimate. However, for most species the date class is much wider, dictated by data availability and a professional understanding of current species range.

Data sources

Marine species: For all cetaceans, current range was based on maps produced for the Atlas of cetacean distribution in north-west European waters (Reid *et al.,* 2003); distribution of leatherback turtles *Dermochelys coriacea* was based on the 'TURTLE' database (Pierpoint & Penrose 2002).

Terrestrial and freshwater species: Key sources included those available from the NBN Gateway www.searchnbn.net, and additional datasets identified as important by the Inter-Agency Working Groups. Additional data were provided by key non-government organisations for particular species or species groups. For a selection of freshwater species, the Joint Nature Conservation Committee's Report 312 (Jackson & Mcleod 2002) data were also used.

Records identified as erroneous, or likely to be outside the range of breeding populations (including vagrants) have been omitted. Where a species has been introduced outside its natural range or where it has been reintroduced to its former range, inclusion of those areas in the range assessment has been dealt with on a case-by-case basis, with reasons for inclusion/exclusion justified in the individual audit trails.

All records used to map and calculate range have been collated into a single database held at JNCC for future reference.

Assessment of data quality – The data quality category in Annex B relates to the 'current surface area' estimate. It does not account for information used to inform the trend (see 2.1.2) or favourable reference value (see 2.1.3). The Commission's guidance lists the following options and definitions:

'Good', based on extensive surveys;
'Moderate', based on partial data with some extrapolation; or
'Poor', based on very incomplete data or on expert judgement.

These definitions have been followed as closely as is practical. However, exceptions exist. For example, where a species has been extensively surveyed, but is known to be elusive, the judgement may have been reduced from 'good' to 'moderate'. Other exceptions include the use of a large date-class, or taxonomic uncertainties. All such arguments are justified within the audit trails where applied.

2.2.1.2 Range trends

Where possible, the trend since 1994 has been reported; that is, the trend since the EC Habitats Directive came into force. However, due to data insufficiencies, a comparison between the 1994 and 2007 range has not always been possible and alternate trend periods have sometimes been used to inform this judgement. Although historic trends have not been reported, these have, where relevant, been included as contextual information. This is because the main purpose of the reporting process is to investigate change since the Habitat Directive came into force.

2.2.1.3 Favourable reference range

The concept of favourable reference values is included in the EC Guidance, which states that a favourable reference range

"must be sufficiently large and have sufficient coverage to allow the long term survival of the species, and must not be smaller than the 1994 range."

In order to determine a favourable reference value for an individual species range, 1994 was used as a preliminary baseline. Where 1994 data were not available the nearest, most recent alternative was considered. No presumptions have been made as to whether range was favourable or not at that time, but consideration was given to whether the range was sufficiently large to support a long-term viable population of the species. In the absence of detailed modelling, defining favourable reference values at a UK level has been problematic.

To help overcome this, current trend data were used as an indicator. A series of preliminary interpretations were made depending on whether range had increased, decreased or remained stable since 1994. Decisions were then informed by conservation management and vulnerability to stochastic events (although pre-1994 data were not a determinant of the favourable reference range, they were used as contextual information, where relevant). This process is summarised in Table 2.1 below. The information in Table 2.1 has been transposed into a decision tree to assist in setting favourable reference range values (See Note 1 at the end of this document).

Table 2.1 Determining the favourable reference range

FAVOURABLE REFERENCE RANGE		
Consideration	**Interpretation**	**Exceptions**
1) Post-1994 trend	*Increasing trend:* Suggests range is large enough, and has sufficient coverage, to support species survival. FRR likely to be equal to 1994* estimate.	Trend attributed to introduction programme only, or increased survey effort only, rather than natural range increase; OR The 1994 range was at risk from stochastic events (informed by Consideration 2), and reported increase has not been sufficient to suitably eliminate this risk.
	Stable trend: Suggests range is large enough, and has sufficient coverage, to support species survival. FRR likely to be equal to 1994* estimate.	The 1994 range was at risk from stochastic events (informed by Consideration 2).
	Decreasing trend: Suggests range may not be large enough, or have sufficient coverage, to support species survival. FRR may need to be greater than the 1994* estimate.	Trend has been attributed to natural fluctuations, and observed decline is attributed to natural processes.
2) Size/coverage	The longer a species has persisted within a naturally restricted range, the greater the confidence that it is resilient to stochastic events and natural change, thus the greater likelihood it will be equivalent to the FRR.	None.

* Or nearest, most relevant alternative.

Where the 1994 range was deemed suitable for long-term survival (based on the information in Table 2.1), this was set as the favourable reference range. Where evidence suggested the range had not declined since 1994, consideration was given to whether the 1994 range was sufficient for long-term survival. Where this was the case, the favourable reference range was set as greater than the 1994 estimate.

Where possible, actual values for favourable reference range have been provided. However, these are generally not considered to be robust because of the methods used to produce them and it is likely that many will be reviewed and changed in the future as better information

becomes available. For species where there was insufficient evidence to provide an estimated value the favourable reference range has more generally been categorised as either:

- Greater than the 1994 estimate, but not by a factor of more than 10%; or
- More than 10% greater than the 1994 estimate.

An upper threshold was reported for the latter category where justifiable.

The 10% threshold was derived from the Commission's evaluation matrix (see Table 2.3), and helps to distinguish between features that are Unfavourable-Inadequate and Unfavourable-Bad in the range conclusion. However, due to the difficulties in establishing how large a range must be to support long term survival, this judgement was largely based on expert opinion, informed by the contextual information considered in Table 2.1.

2.2.1.4 Determining status of range

The conclusion regarding whether the status of a species' UK range was Favourable, Unfavourable-Inadequate, Unfavourable-Bad or Unknown, is dictated by the rules of the European Commission's general evaluation matrix (Annex C). This matrix specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	**Unknown (insufficient information to make an assessment)**
Range	Stable (loss and expansion in balance) or increasing AND Not smaller than the 'favourable reference range'	Any other combination	Large decline: Equivalent to a loss of more than 1% per year since 1994 OR More than 10% below favourable reference range	No or insufficient reliable information available

For features identified as Unfavourable, there is an additional categorisation possible of 'but improving', or 'and deteriorating', informed by post-1994 trends. Conclusions that state neither of these options mean either that: a) trend was stable; or b) trend was unknown.

Where range is stable or increasing, and greater than or equal to the favourable reference range, the conclusion is Favourable.

Where range has been identified as declining since 1994, the conclusion is Unfavourable. Whether it is then judged as Unfavourable-Inadequate or Unfavourable-Bad rests on two judgements:

1) The rate of decline: where this is greater than 1% per year, the conclusion is Unfavourable-Bad. Where the rate of decline is less than 1% per year, the conclusion is Unfavourable-Inadequate, unless point 2 (below) applies.

2) The size of the favourable reference range: where this is more than 10% greater than the 1994 estimate, the conclusion is Unfavourable-Bad.

2.2.2. Population

Population status assessment includes a current population estimate (taking account of data quality and methods used), population trends, and consideration of a 'favourable reference population' value.

2.2.2.1 Current population estimate

Method of determination - Where possible, current population estimates at UK level were sourced from recent publications, or extrapolated from country estimates, where these were known.

As anticipated by the EC Guidance the population unit used for individual species varies depending on the availability and applicability of information. For example, for some species, numbers of discrete populations are the most useful unit for comparison; for others it may be breeding individuals, or specific life-stages.

Where detailed information was not available at the individual or population/site level, a surrogate of occupied 10-km squares, referred to in the IUCN Red List as area of occupancy (IUCN 2001), has been calculated using the datasets made available for range calculations. Where information at this rather coarse level was considered incomplete, a judgement of unknown was reported.

Current Date-Class - As for range, there is no set guidance for classifying the 'current' date class. Generally, the approach has been to provide the most recent and most comprehensive assessment of population. Date classes including pre-1994 data have been avoided where possible, but where exceptions are necessary they have been justified in the individual audit trails. For well-surveyed species it has been possible to provide very recent and accurate estimates, post-2000 or even a 2006 estimate. However, for most species the date class is much wider, dictated by data availability and a professional understanding of current species population. If a published estimate was used, that date has been reported; where occupied 10-km squares were reported, the date-class reflects that used for range.

Data Quality – Annex B requires that a judgement be made on the quality of data used to calculate the current population estimate. The data quality category in Annex B does not account for information used to inform population trends or favourable reference values. The Commission's guidance lists the following options and definitions:

'Good', based on extensive surveys;
'Moderate', based on partial data with some extrapolation; or
'Poor', based on very incomplete data or on expert judgement.

These definitions have been followed as closely as is practical. For populations, decisions on data quality were determined predominately by methods used and survey coverage (i.e. full inventory or expert opinion), and influenced by scale e.g. estimates given at a 10-km square resolution were, without exception, considered poor.

2.2.2.2 Population trends

Where possible, a judgement on the post-1994 trend has been reported for all species, based on trend data from surveillance schemes, and, for species listed on the UK Biodiversity Action Plan, from information provided in the 2005 UK Biodiversity Action Reporting System (BARS). Although pre-1994 trends have generally not been reported, where relevant, they have been included as contextual information.

2.2.2.3 Main pressures and threats

Main pressures (factors affecting species in the past and currently) and threats (factors considered to be a future problem) have been extracted from a pre-determined list "Impacts and Activities Influencing the Conservation Status of the Site" provided by the European Commission as Appendix E to the EC Guidance. This list is a standard list of pressures used for completion of the standard data form for a Natura 2000 site.

2.2.2.4 Favourable reference population and viability assessment

The EC Guidance states that the favourable reference population must be

"the minimum necessary to ensure the long-term viability of the species; the favourable reference value must be at least the size of the population when the Directive came into force".

For purposes of the assessment long-term has been interpreted by the UK as 12 -15 years or three generations (whichever is longer).

In order to determine a favourable reference value for an individual species population, 1994 was used as a preliminary baseline. Where 1994 data were not available the nearest, most recent alternative was considered. No presumption was made as to whether the population was favourable or not at that time, but consideration was given as to whether the population was viable. Viability is defined as:

'the condition that a habitat or species needs to be in to perpetuate itself indefinitely over time under the likely conditions of future land and water management'.

Due to time and resource constraints, population viability analyses were not carried out. Instead, current trend data were used as an indicator for determining viability. Preliminary interpretations were made depending on whether populations had increased, decreased or remained stable since 1994. Decisions were then informed by population structure, conservation management and vulnerability to stochastic events. Although pre-1994 data were not a determinant of the favourable reference population, they were used as contextual information, where relevant. This process is summarised in Table 2.2 below. The information in Table 2.2 has been transposed into a decision tree to assist in the assessment of favourable reference range (see Note 1 at the end of this document).

Table 2.2 Determining the favourable reference population

FAVOURABLE REFERENCE POPULATION		
Consideration	**Interpretation**	**Exceptions**
1) Current (post-1994) trend	*Increasing trend:* Suggests populations are perpetuating themselves, indicating viability (in terms of both population size and structure). Therefore, FRP likely to be equal to the 1994* estimate.	Trend attributed to introduction programme only, or increased survey effort only, rather than natural population increase; OR The 1994 population was at risk from stochastic events (informed by Consideration 2), and reported increase has not been sufficient to suitably eliminate this risk. OR Increase in absolute population numbers recognised as masking inadequacies in population structure (informed by Consideration 3)
	Stable trend: Suggests populations are maintaining themselves, indicating viability (in terms of both population size and structure). FRP may need to be equal to the 1994* estimate.	The 1994 population was at high risk from stochastic events (informed by Considerations 2) OR Stability in absolute population numbers recognised as masking inadequacies in population structure (informed by Consideration 3)
	Decreasing trend: Suggests populations are not maintaining themselves, indicating they may not be viable (in terms of both population size and structure). Therefore, FRP is more than the 1994* estimate.	Trend has been attributed to natural fluctuations.
2) Size	The longer a species has persisted with naturally low populations, the greater the confidence that these populations are resilient to stochastic events.	None

FAVOURABLE REFERENCE POPULATION		
Consideration	**Interpretation**	**Exceptions**
3) Structure Where known.	Not deviating from normal: This indicates viable populations.	Where evidence suggests there are other external factors likely to affect viability.
	Deviating from normal: Indicates populations are not viable.	None

* Or nearest, most relevant alternative.

Where the 1994 population was deemed suitable for long-term survival (based on the information in Table 2.2), this was set as the favourable reference population.

Where the evidence indicated that a species had declined since 1994, or where a species was only being maintained y intensive conservation action, consideration was given to whether the 1994 population could be considered viable. If not, the favourable reference population was set as greater than the 1994 estimate. For most species, there was insufficient evidence to provide a true estimate of this value. Instead, the favourable reference population has more generally been categorised as either:

- Greater than the 1994 estimate, but not by a factor of more than 25%; or
- More than 25% greater than the 1994 estimate.

An upper threshold was reported for the latter category where justifiable.

The 25% threshold was derived from the EC Guidance Annex C evaluation matrix (see Table 2.3), and helps to distinguish between populations that are Unfavourable-Inadequate and Unfavourable-Bad. However, due to the difficulties in establishing how large a population must be to support long term viability of the species, this judgement was largely based on expert opinion, informed by the contextual information considered in Table 2.2.

2.2.2.5 Determining status of population

The conclusion regarding whether the status of a species' UK population was Favourable, Unfavourable-Inadequate, Unfavourable-Bad or Unknown, is dictated by the rules of the Commission's general evaluation matrix (Annex C). For features identified as Unfavourable, there is an additional potential categorisation of 'but improving', or 'and deteriorating', informed by post-1994 trends. Conclusions that state neither of these options mean either that: a) trend was stable; or b) trend was unknown.

Unlike the Range parameter, the population parameter does not overtly state the importance of population trends, other than where there has been a large decline. However, paucity of relevant data has made it difficult to assess whether reproduction, mortality and age structure are either 'not deviating', 'deviating', or 'strongly deviating' from normal and a population trend has been taken as a proxy measure for this. Stable or increasing populations have been taken as an indication of reproduction, mortality and age structure not deviating from normal, a moderate decline (less than 1% per year) has been taken as an indication of deviating from normal and more than 1% per year as strongly deviating from normal.

Where a population is greater than or equal to the favourable reference population, and trends are stable or increasing, then the conclusion is Favourable.

This matrix specifies the following:

Parameter	Conservation Status			
	Favourable ('green')	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	**Unknown (insufficient information to make an assessment)**
Population	Population(s) above 'favourable reference population' AND Reproduction, mortality and age structure not deviating from normal (if data available)	Any other combination	Large decline: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS AND below 'favourable reference population' OR More than 25% below favourable reference population OR Reproduction, mortality and age structure strongly deviating from normal (if data available)	No or insufficient reliable information available

Whether the conclusion is Unfavourable-Inadequate or Unfavourable-Bad rests on three judgements:

1) The rate of decline: where this is greater than 1% per year and the favourable reference population is less than current, the conclusion is Unfavourable-Bad. Anything less than 1% per year is Unfavourable-Inadequate.
2) The size of the favourable reference population: where this is more than 25% greater than the 1994 estimate, the conclusion is Unfavourable-Bad.
3) Population structure (where known): where this is strongly deviating from normal the conclusion is Unfavourable-Bad. Since there is no definition of strongly deviating, this decision was largely based on trends (see above) and expert opinion based on scientific evidence.

2.2.3. Habitat for the species

Habitat status assessment for a species includes an estimate of the area of habitat currently used (with assessment of data quality), the trend in habitat (area and quality), and the area of 'suitable' habitat required to support a favourable (long-term viable) population of the species. This parameter of the overall status assessment has proved to be very difficult due to a lack of suitable data.

2.2.3.1 Habitat area estimate

Although habitat requirements of many species have been well-documented, rarely have attempts been made to provide quantitative area estimates at a UK level. Even for those very restricted species, information on micro-habitat requirements was generally insufficient to

provide a reliable and meaningful estimate. For these reasons, with the exception of a small number of species, habitat area has been reported as Unknown.

2.2.3.2 Habitat trends

Quantitative data on habitat trends at a species specific level were often lacking. General data on broad habitat types, including the Countryside Survey data, were appropriate for some of the more generalist species. However, most often, post-1994 trends reported have been based on expert opinion informed by contextual information.

2.2.3.3 Suitable habitat

Defined in the EC Guidance as

"Area thought suitable for the species, both currently occupied and currently unoccupied but suitable (km²)".

This requires detailed modelling, using data that were not available at the time assessments were made. Therefore, as with current area, this has usually been reported as Unknown.

2.2.3.4 Determining status of habitat for the species

The EC Guidance Annex C evaluation matrix for this parameter specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	**Unknown (insufficient information to make an assessment)**
Habitat for the species	Area of habitat is sufficiently large (and stable or increasing) AND Habitat quality is suitable for the long term survival of the species	Any other combination	Area of habitat is clearly not sufficiently large to ensure the long term survival of the species OR Habitat quality is bad, clearly not allowing long term survival of the species	No or insufficient reliable information available

For features identified as Unfavourable, there is an additional potential categorisation of 'but improving', or 'and deteriorating', informed by post-1994 trends. Conclusions that state neither of these options mean either that: a) trend was stable; or b) trend was unknown.

Since area estimates were rarely available, current trend and information on current habitat quality were pivotal to the assessment outcome. Less reliance was placed on the results of Common Standards Monitoring of protected sites for species assessments than for assessments of habitats (due to the small percentage of the feature on protected sites, and protected sites often being only a part of the overall habitat resource used by species), but the CSM results were used to help inform decisions on whether habitat quality was sufficient for long-term survival.

2.2.4. Future prospects

The future prospects assessment comprises two parts: an initial judgement regarding whether prospects are good, poor, or bad; and the prospects conclusion (i.e. whether it is Favourable, Unfavourable-Inadequate, Unfavourable-Bad or Unknown).

2.2.4.1 Future prospects judgement

The EC provides no clear definition as to the timescale for considering this parameter, yet this has a marked effect on the assessment conclusion. Therefore, the decision has been taken for all UK species, to assess future prospects on the basis of two reporting rounds, i.e. 12 years.

The definitions provided in the guidance document are:

Good prospects – species expected to survive and prosper;
Poor prospects – species likely to struggle unless conditions change; and
Bad prospects – long-term viability at risk; species likely to become extinct.

Information on legislative protection, policy, conservation action (planned and established) and threats have been used to inform this decision. In addition the results of the UK's site based monitoring programme (Common Standards Monitoring – see www.jncc.gov.uk/page-2217 for details) were used if a significant proportion of the species exists on a protected site. However, the future prospects decision was not always as clear cut as the definitions would imply i.e. many recovering species fall between the good and poor classifications. This problem has been dealt with on a case-by-case basis in the individual audit trails, and the final decision has been justified accordingly.

2.2.4.2 Determining status of future prospects

The EC Guidance Annex C evaluation matrix (summarised in Table 2.3) for future prospects specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	**Unknown (insufficient information to make an assessment)**
Future prospects	Main pressures and threats to the species not significant; species will remain viable on the long-term	Any other combination	Severe influence of pressures and threats to the species; very bad prospects for its future, long-term viability at risk.	No or insufficient reliable information available

For the future prospects assessment, it is expected that where a species has been identified as having good prospects, the conclusion will be Favourable; where prospects are poor, the conclusion will be Unfavourable-Inadequate; and where prospects are bad, a conclusion of Unfavourable-Bad will be reached. However, species did not always fall neatly into these classifications. Some flexibility was therefore applied, such that a judgement of good could

also be associated with a conclusion of Unfavourable-Inadequate, but improving. Where this is the case, full justifications are provided in the audit trails.

2.2.5. Determining overall conservation status for species

The EC Guidance Annex C evaluation matrix (Table 2.3) summarises the rules by which overall conclusions for species are reached.

The EC assessment procedure follows the precautionary principle; that is, if any parameter of an assessment is Unfavourable-Bad, whether it be range, population, habitat or future prospects, the overall conclusion will be reported as Unfavourable-Bad, even if all remaining parameters are Favourable. Similarly, one Unfavourable-Inadequate conclusion combined with all Favourable conclusions results in an overall conclusion of Unfavourable-Inadequate. An overall conclusion of Favourable is only reached where all parameters are Favourable or three parameters are Favourable, and one is Unknown. In cases where there are two or more Unknown conclusions combined with other Favourable conclusions, the overall conclusion will be Unknown.

The definitions in the EC Guidance of Favourable, Unfavourable–Inadequate and Unfavourable-Bad are as follows:

> Favourable (green): habitat or species can be expected to prosper without any change to existing management or policies.
>
> 'Unfavourable-Inadequate (amber): habitat or species require a change in management or policy but the danger of extinction is not so high.
>
> 'Unfavourable-Bad (red): where the habitat or species is in serious danger of becoming extinct (at least locally).

These have not been applied directly, as the UK's decision to use a frame of two reporting rounds to the assessment of future prospects means that the UK decisions are probably more conservative than the definitions in the EC Guidance.

Table 2.3 'Annex C' - Assessing conservation status of a species: Evaluation matrix

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	**Unknown (insufficient information to make an assessment)**
Range	Stable (loss and expansion in balance) or increasing AND Not smaller than the 'favourable reference range'	Any other combination	Large decline: Equivalent to a loss of more than 1% per year since 1994 OR More than 10% below favourable reference range	No or insufficient reliable information available
Population	Population(s) above 'favourable reference population' AND Reproduction, mortality and age structure not deviating from normal (if data available)	Any other combination	Large decline: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS AND below 'favourable reference population' OR More than 25% below favourable reference population OR Reproduction, mortality and age structure strongly deviating from normal (if data available)	No or insufficient reliable information available
Habitat for the species	Area of habitat is sufficiently large (and stable or increasing) AND Habitat quality is suitable for the long term survival of the species	Any other combination	Area of habitat is clearly not sufficiently large to ensure the long term survival of the species OR Habitat quality is bad, clearly not allowing long term survival of the species	No or insufficient reliable information available
Future prospects	Main pressures and threats to the species not significant; species will remain viable on the long-term	Any other combination	Severe influence of pressures and threats to the species; very bad prospects for its future, long-term viability at risk.	No or insufficient reliable information available
Overall assessment of CS	All Favourable 'green' OR three Favourable 'green' and one Unknown	One or more Unfavourable - Inadequate 'amber' but no Unfavourable – Bad 'red'	One or more Unfavourable - Bad 'red'	Two or more 'Unknown' combined with Favourable or all "Unknown"
An additional optional categorisation of 'but improving' or 'and deteriorating' can be used in the unfavourable categories to indicate recovering populations				

3. Habitats assessments

3.1. Overview

There are 78 habitats in the UK that are listed on the Habitats Directive Annex I for which a full report has been prepared. Two of these habitats (6110 and 6111) are very similar in the UK, and the assessments have therefore been combined in one reporting form. The overall conclusion on conservation status for each habitat was arrived at through the assessment of four separate parameters:

1. range,
2. area,
3. specific structures and functions (including typical species),
4. future prospects.

These were assessed using the rules set out in the EC Guidance evaluation matrix 'Annex E' (see Table 3.1). Each parameter and the overall conclusion could be judged as Favourable, Unfavourable-Inadequate or Unfavourable-Bad. In addition there was the option to add the categories of 'but improving' or 'and deteriorating' to the Unfavourable-Inadequate and Unfavourable-Bad conclusions.

Where reliable information for a habitat did not exist or was insufficient to make a judgement, there was the option to use 'Unknown'. However, the Commission has requested that judgements of 'Unknown' were avoided where possible. For this reason, a high level of emphasis was placed on expert opinion for habitats where data were lacking or incomplete.

The assessment of conservation status related to the overall situation for the whole of the UK habitat resource, and not just that within protected areas such as Special Areas of Conservation (SAC) and Sites/Areas of Special Scientific Interest (SSSI/ASSI). Even so, the status of habitats within SACs inevitably made a significant contribution to judgements.

3.2. Making habitats assessments

Each habitat assessment was preceded by a general description of the Annex I habitat type and information on how the type corresponds with habitat classifications used for site survey and assessment in the UK. The classifications covered were those used within the rest of the assessment. The degree of correspondence varied. In some cases it was reasonably strong, at least in terms of the more detailed classifications like the National Vegetation Classification (NVC). In many cases, however, the match was at best only partial and sometimes even the closest corresponding UK habitat classification type was a weak match.

3.2.1. Range

The EC Guidance advises that range should be taken to be the outer limits of the overall area in which a habitat found, i.e. it can be considered as an envelope within which areas actually occupied occur as in many cases not all the range will actually be occupied.

Habitat range was assessed using:

- two dot maps (which showed the current geographical limits of the habitat across the UK),
- an estimate of the surface area enclosed by the current range,
- information on the trend in the range and rate of change since 1994, and
- with reference to the Favourable Reference Range (see below).

Consideration was given to the quality of the data underlying the range maps (whether data were based on extensive surveys, partial data with some extrapolation, or very incomplete data or on expert judgement) and the degree to which the records related to the particular Annex I type. Where necessary the trend since 1994 was extrapolated from trends prior to this date.

Data sources for habitat range

A number of sources were utilised to establish the current range of Annex I habitats. Some were records or collated inventories complied by or on behalf of the statutory nature conservation agencies. For example, the Phase I Habitat Survey of Wales 1979-1997 as maintained by the Countryside Council for Wales, the Uplands Habitats Database as maintained by Scottish Natural Heritage, the National Vegetation Classification Woodland Community Database as maintained by the JNCC Woodland Lead Coordination Network, and the Sand Dune Vegetation Survey of Scotland. The locations shown in the published volumes of the National Vegetation Classification were another important source. In most cases the correspondence between the sources used and the specific Annex I types was not exact, so some interpretation and allowance was made when assessing the current habitat range. This did not apply to the JNCC International Designations Database, which provided information on the location of each SAC designated for each Annex I type. Some of the sources used were the same as or updated versions of those used in JNCC Report 312 (Jackson & McLeod, 2002, www.jncc.gov.uk/page-2447).

3.2.1.1 Calculation of range surface area

3.2.1.1.1. Approach for terrestrial and freshwater habitats

Habitat range for terrestrial and freshwater habitats was mapped and quantified as a surface area measurement following the method recommended by the EC, i.e. using a minimum convex polygon drawn from a grid map.

The UK used an Alpha Shapes range calculation tool (described in more detail in *Technical Note I, Guidance on Using Alpha Shapes for Conservation Status Reporting*) to achieve this. Following the EC Guidance, larger gaps in the distribution (normally comprising at least 4 or 5 non-occupied grids or about 40 – 50 km distance) were treated as breaks in the range. The range envelope generated was clipped to exclude any areas that extended beyond the coastline over the sea. An additional clipping was applied to coastal habitats: this excluded any inland areas more than 10 km inland from the coastline. The smallest (non-clipped) range unit was an individual 10-km square, which was generated where part of a habitat range occurred in an isolated 10-km square. No attempt was made to correct for suspected omissions in the underlying records or for any geographical or ecological limitations to the habitat, which would influence where the habitat could actually occur on the ground.

3.2.1.1.2 **Approach for marine habitats**

Range is a difficult parameter to define and measure for marine features, so a different approach was adopted. The location of marine features (and hence the range of those features) is determined primarily by physical and geological processes occurring over very long time-scales and is not related to the biological communities and processes supported by the habitat. Following trials of the Alpha Shapes range calculation tool with a number of different marine features, it was decided that the outputs did not add value to the assessments and its use was discontinued. For marine features, range area was therefore calculated on a feature by feature basis:

- For marine coastal features and for those with a littoral component (H1130, H1140, H1150, H1160), range area was taken as being equal to the habitat area.
- For marine sublittoral features (H1110, H1170, H1180) range area was based on inference from seabed geology and targeted surveys.
- For H8330 sea caves the range area was taken to be the sum of occurrences in 10-km squares.

3.2.1.2 Range trends

The trend period specified by the UK to determine the status of the habitat range was 1994-2006, i.e. since the Habitats Directive came into force. Where possible this trend was reported. However, due to data insufficiencies, this was not always possible and an alternative period was used to inform on the 1994-2006 trend or the trend was reported as unknown.

3.2.1.3 Favourable Reference Range

A Favourable Reference Range (FRR) was established for each habitat type, where this was possible. FRR is described in the EC Guidance as:

"*Range within which all significant ecological variations of the habitat/species are included for a given bio-geographical region and which is sufficiently large to allow the long term survival of the habitat/species; favourable reference value must be at least the range (in size and configuration) when the Directive came into force; if the range was insufficient to support a favourable status the reference for favourable range should take account of that and should be larger (in such a case information on historic distribution may be found useful when defining the favourable reference range); 'best expert judgement' may be used to define it in absence of other data.*"

To establish what FRR applied to a particular habitat, a judgement was made on the viability of the habitat. Where there was evidence indicating range had declined since 1994, consideration was given to whether the range in 1994 could be considered viable. No presumption was made as to whether the range was favourable or not at this time.

Applying the concept of viability to habitats was problematic. The EC Guidance did not provide a definitive method by which viability of habitat range could be assessed, e.g. by specifying metrics and the thresholds for judgements. Nor was there a widely accepted 'off the shelf' method that could be applied. To overcome this problem, some key factors and

questions were identified to take into account in determining viability. These factors were not necessarily exclusive, nor did they absolutely prove or disprove viability. They were used to give a reasonable indication of viability, based on expert judgement as to the significance of particular factors and the general weight of evidence. The approach relied on expert opinion, trends and general knowledge. In most cases this approach did not precisely define the FRR, but it did help to clarify if the current range was more or less than 10% below the FRR, i.e. if the range should be judged as inadequate or bad.

In essence, the approach to FRRs intended to determine if the total extent and configuration of the range were in themselves sufficient for the habitat to maintain itself (including the majority of associated species) in the foreseeable future, i.e. the next two decades or so. This assumed necessary protection and general management beyond major restoration and continuing intensive care were in place. In simple terms, the approach was looking for cases where there was some deficiency in the range itself that would inevitably result in decline.

Two main factors were considered to judge range viability: (i) the total range area; and (ii) how fragmented the range appeared to be (by way of the number and size of each range block, and how well each block was filled). The view taken was that habitats which covered a large part of the UK, which occupied most 10-km squares within their range, or which had a relatively compact range were generally more likely to be viable. Habitats that had only a limited range or which had a fragmented range were less likely to be viable, partly because of the impact of patchy 'catastrophic' events. A number of other factors were also considered in reaching a conclusion on the viability of habitat range. A recent decline in range triggered some concern, especially if the decline had been rapid (>1% per annum) and extensive. Allowance was made for habitats that are naturally scarce or have been scarce for many centuries, i.e. their current scarcity was not necessarily taken as a cause for concern. Some consideration was made as regards the main ecological variants and any special components.

3.2.1.3.1 Setting the Favourable Reference Range size

Depending on the trend in the habitat range since 1994 and availability of information, the viability of either the 1994 or current range was assessed. Where the range was deemed to be viable, the size of the range at this time was set as that of the FRR. Where evidence suggested that the range was not viable, consideration was given as to how much the range needed to be increased to ensure this. If a limited increase of <10% was deemed necessary, then the size of the FRR was set at 10% above that assessed. If an increase of more than 10% seemed necessary, then the size of the FRR was set at greater than 10% above that assessed. If the range needed to ensure viability could not be determined, the area of the FRR was described as unknown. The 10% threshold was derived from the EC Guidance evaluation matrix (see Table 3.1). Wherever possible an actual value was provided for the area of the FRR. These may, however, be reviewed and changed in the future as better information becomes available.

3.2.1.4 Determining status of range

The conclusion on the conservation status of habitat range was dictated by the criteria set out in the general evaluation matrix (Annex E) of the EC Guidance. This matrix specifies the following:

Parameter	Conservation Status			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decrease: Equivalent to a loss of more than 1% per year within period specified by MS OR More than 10% below 'favourable reference range'	*No or insufficient reliable information available*

These criteria were transposed into a Decision Tree as shown in the appended Note 2. This allowed the assessor to reach the appropriate conclusion. It also gave guidance on the area of the FRR. Unfavourable conclusions were usually categorised into improving or deteriorating, as indicated by the 1994-2006 trend.

3.2.2. Area

Following the EC Guidance, habitat area was assessed using an estimate of the surface area covered by the habitat, information on the trend in the area and rate of change since 1994, and with reference to the Favourable Reference Area (see below).

Consideration was given to

- the method used to estimate the habitat surface area (only or mostly based on expert opinion, based on remote sensing data, or ground based survey),
- the quality of the information (whether data were based on extensive surveys, partial data with some extrapolation, or very incomplete data or on expert judgement), and
- the degree to which the information related to the particular Annex I type.

Where necessary the trend since 1994 was extrapolated from trends prior to this date.

3.2.2.1 Current area

A number of sources were utilised to establish the current UK area of each Annex I habitat. Some had already been collated, totalled and formally published. Others were based on unpublished records or collated inventories complied by or on behalf of the statutory nature conservation agencies (see Data sources for habitat range for examples). For many habitats, the same information or an updated version of that published in JNCC Report 312 was used (see Jackson & McLeod, 2002, www.jncc.gov.uk/page-2447).

In many cases the area of the Annex I habitat was extrapolated based on expert judgement, because the corresponding inventory related to another habitat type that was either broader or narrower in scope. Inevitably the date of survey of inventories was earlier than 2006. In some cases only crude estimates of the area could be made. Even on designated SACs (as held in the JNCC International Designations Database) the extent of Annex I types has not always

been precisely measured: in some cases the value is based on an approximate estimate of the percentage covered for the SAC area as a whole. In some cases the only available information was for SACs, which was then used to set a minimum UK total area. Where no estimates of area were available the total area was reported as "unknown". For habitat H8310 (Caves not open to the public) the area of the habitat was expressed as a length in kilometres rather than as an area measurement in hectares.

3.2.2.2 Trend in area since circa 1994

The trend period specified by the UK to determine the status of the habitat area was 1994-2006, i.e. since the Habitats Directive came into force. Where possible this trend was reported, though in most cases only a descriptive trend could be given, e.g. stable or increasing. Due to data insufficiencies, it was necessary to use information that related to different time periods than just 1994-2006. In some cases the trend in area could not be decided on and was reported as unknown.

3.2.2.3 Favourable Reference Area and viability assessment

As requested, a Favourable Reference Area (FRA) was established for each habitat type, where this was possible. FRA is described in the EC Guidance as:

Total surface area in a given bio-geographical region considered the minimum necessary to ensure the long-term viability of the habitat type; this should include necessary areas for restoration or development for those habitat types for which the present coverage is not sufficient to ensure long-term viability; favourable reference value must be at least the surface area when the Directive came into force; information on historic distribution may be found useful when defining the favourable reference area; 'best expert judgement' may be used to define it in absence of other data.

To establish what FRA applied to a particular habitat, a judgement was made on the viability of the habitat. Where there was evidence indicating area had declined since 1994, consideration was given to whether the area in 1994 could be considered viable. No presumption was made as to whether the area was favourable or not at this time.

Application of the concept of viability to habitats proved problematic, as described in the section on Favourable Reference Range. To overcome this, some key factors and questions were identified to take into account in determining viability. These were not necessarily exclusive, nor did they absolutely prove or disprove viability. They were used to give a reasonable indication of viability, based on expert judgement as to the significance of particular factors and the general weight of evidence. The approach relied on expert opinion, trends and general knowledge. In most cases it did not precisely define the FRA, but did help to clarify if the current range was more or less than 10% below the FRA, i.e. if it should be judged as inadequate or bad.

In essence, the approach intended to determine if total extent and configuration of the area were in themselves sufficient for the habitat to maintain itself (including the majority of associated species) in the foreseeable future, i.e. the next two decades or so. This assumed necessary protection and general management beyond major restoration and continuing intensive care were in place. In simple terms, the approach was looking for cases where there was some deficiency in the area itself that would inevitably result in decline.

Two main factors were considered in judging the viability of the area of a habitat. Firstly, total habitat area. The view taken was that extensive habitats were generally more likely to be viable than scarce habitats, partly because of the impact of patchy 'catastrophic' events. Some consideration was made of the main ecological variants and any special habitat components. As a crude initial guide, habitats covering less than about 3,000 ha were taken as 'scarce' and therefore at possible 'risk'. The second main factor was the area of individual habitat patches. The view taken was that larger patches of habitats are generally more likely to be viable than smaller ones and provide some interior conditions. Smaller, more linear patches are increasingly influenced by edge effects and more vulnerable to 'catastrophic' events. Thinking was primarily influenced by considerations of the requirements of the component species.

A number of additional factors were taken into account, which had a compounding influence on the way the viability of the total habitat area and area of individual patches was viewed. This included the degree of habitat fragmentation and isolation. The view taken was that habitats that were less fragmented and less isolated (better-connected) were generally more likely to be viable. Viability would likely be favoured if the habitat existed predominately within a landscapes where the extent and diversity of semi-natural vegetation and inter-connecting features was relatively high, which is more often the case in upland than lowland areas (where the general quality of the countryside over the last half century has deteriorated more due to agricultural intensification).

Fragmentation and isolation are most likely to result in impoverishment (rather than actual habitat loss). They can be remedied (at least in part) without increasing the actual habitat area (but by way of buffer zones, which could be of another habitat, or improving agricultural practices). As a result, it was judged that fragmentation and isolation were unlikely to lead to a conclusion that the current habitat area need to be increased by more than 10% to ensure viability, i.e. the current area was not more than 10% below the favourable reference area.

Some consideration was made as to the vulnerability and restorability of habitats. Consideration was given to the fact that some habitats have been scarce and/or existed in relative isolation for many centuries and may be naturally scarce. Such habitats will have developed some adaptation to fit with their 'island' status and/or we have inherited an altered habitat state within which those species most vulnerable to such effects will have been lost. Their current scarcity is therefore probably not such a cause of concern. In contrast, concern was triggered where a recent decline in habitat area had occurred, especially if this had been rapid (>1% per annum) and extensive, leaving the habitat far more fragmented and isolated than beforehand.

3.2.2.3.1. Setting the Favourable Reference Area value

Depending on the trend in the habitat area since 1994 and availability of information, the viability of either the 1994 or current area was assessed. Where the area was deemed to be viable, this was taken to be the value of the FRA. Where evidence suggested that the area was not viable, consideration was given as to how much it needed to be increased to ensure viability. If a limited increase of <10% was deemed necessary, then the FRA was set at 10% above the area assessed. If an increase of more than 10% seemed necessary, then the FRA was set at greater than 10% above that assessed. If the area needed to ensure viability could not be determined, the area of the FRA was described as unknown. The 10% threshold was

derived from the EC Guidance evaluation matrix (see Table 3.1). Wherever possible an actual value was provided for the FRA. These may, however, be reviewed and changed in the future as better information becomes available.

3.2.2.5 Determining status of area

The conclusion on the conservation status of habitat area was dictated by the criteria set out in the general evaluation matrix (Annex E) of the EC Guidance. This matrix specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Area covered by habitat type within range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range (if data available)	Any other combination	Large decrease in surface area: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS OR With major losses in distribution pattern within range OR More than 10% below 'favourable reference area'	*No or insufficient reliable information available*

These criteria were transposed into a Decision Tree as shown in the appended Note 2. This allowed the assessor to reach a conclusion. It also gave guidance on the size of the FRA. Unfavourable conclusions were usually categorised into improving or deteriorating, as indicated by the 1994-2006 trend.

3.2.3. Specific structures and functions

The specific structures and functions of habitats were assessed based on the main pressures currently acting on the habitat, information on the habitat condition and, where relevant information was available, the status of typical species associated with the habitat. In many cases the information available was for a related habitat, rather than the specific Annex I type.

3.2.3.1 Main pressures

It was difficult to be sure about which factors should be listed as main pressures. The EC Guidance provided no effective criteria to make this judgement. For most habitats two sources were utilised to devise a list of main pressures:

(i) the adverse factors reported as part of the Common Standards Monitoring site condition assessment process (see http://www.jncc.gov.uk/page-3520); and

(ii) the current factors affecting the status of the UK BAP priority habitats as listed in their Habitat Action Plans (see http://www.ukbap.org.uk/Habitats.aspx).

Account was taken of the likely relevance of such information because the scope of many Annex I types differs from that of BAP priority habitats.

A specific assessment of the potential threat from air pollution to Annex I habitats was carried out. This was based on the use of critical load exceedance data for acidity and nutrient nitrogen. Where critical loads were exceeded for a particular habitat, air pollution was listed as a potentially significant pressure. This assessment has been carried out for most Annex I habitats. A few habitats were excluded because no suitable critical load information was available. Full details of the approach and results are given in *Technical Note III*.

3.2.3.2 Current condition

The main source of information from which the current condition of Annex I habitats was derived was Common Standards Monitoring (CSM) data (see http://www.jncc.gov.uk/page-2199). This provided consistent, UK-wide and habitat-specific assessments of the recent condition of SACs and ASSI/SSSIs, from which the condition of most Annex I habitats could be determined with reasonably high confidence. Although applied at the level of features on sites, CSM is closely linked to the concept of conservation status: the attributes and targets used are related to key parameters of the conservation status definition, notably extent, population, structure and function and typical species. Very often CSM assessments were the only specific data available on habitat condition outside of SACs.

A large database of CSM assessments, as provided by the UK statutory nature conservation agencies, was collated for this reporting. These included all the assessments used in the 2006 report on 'Common Standards Monitoring for Designated Sites: First Six Year Report' (see www.jncc.gov.uk/page-3520), plus some additional assessments that were collated in January 2007. The assessments were carried out between April 1998 and December 2006. They categorised the condition of each feature assessed as Favourable or Unfavourable, with a number of sub-categories of each. The assessments carried on SACs could be directly related to Annex I types and included statistics on the area and number of assessments in each category. Those for ASSI/SSSIs were categorised into a large number of types, most of which corresponded inexactly to the related Annex I habitat type. Nevertheless, it was possible to devise a reasonably large set of corresponding ASSI/SSSI assessments, classifying each as either strongly or weakly indicative of the condition of the Annex I type on ASSI/SSSIs. Full details of the approach, correspondences and ASSI/SSSI assessments used for each Annex I type can be found in *Technical Note II.*

3.2.3.3 Typical species

Member States are requested by the EC Guidance to list typical species for each habitat and to use them in the assessment of the structure and function. The EC guidance gives some advice on the type of species to select. It recognises they should be good indicators for favourable habitat quality, sensitive to changes in the condition of the habitat, and observable by non-destructive means which are not resource intensive to implement. Typical species are often not constant throughout the range of the specific habitat type and can be defined at regional or national level for the purpose of assessing conservation status. Ideally, the list of species chosen should remain stable over the middle-to long-term. The degree of flexibility in choosing species is somewhat restrained by the need for consistency across nations and

preference to include characteristic species listed for habitats in the EU Interpretation Manual of Annex I habitats.

Reporting on typical species for UK Annex I habitats proved to be problematic, partly because a good many of the characteristic species given in the EU Interpretation Manual are not native to the UK. Whilst UK level information exists, notably via the Botanical Society of the British Isles atlases, it is difficult to distinguish species which exist in only one or a very few habitats. Habitat-specific trend data is therefore at a premium.

To overcome this short-coming, assessors attempted to identify plant species that appeared to be reasonably faithful to the Annex I type or at least the main related communities/sub-communities in the National Vegetation Classification (NVC). This was done using information on the occurrence and constancy of species as shown in the synoptic tables of the main volumes of the NVC. Unfortunately this yielded relatively few species that had even a moderate degree of faithfulness. Most are not limited to a particular Annex I type and many occur in several contrasting broad types, such as woodland, heathland and mire. Thus, for many Annex I types it was not possible to draw any particularly meaningful conclusions from the species trend data that was available.

3.2.3.4 Determining status of structure and functions

The conclusion on the conservation status of the structure and function of a habitat was dictated by the criteria set out in the general evaluation matrix (Annex E) of the EC Guidance. This matrix specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Specific structures and functions (including typical species)	Structures and functions (including typical species) in good condition and no significant deteriorations / pressures.	Any other combination	More than 25% of the area is unfavourable as regards its specific structures and functions (including typical species)	*No or insufficient reliable information available*

The threshold given as to when a conclusion of Unfavourable-Bad should be reached was relatively clear, i.e. when more than 25% of the area was unfavourable with respect to specific structures and functions. This means 25% of the whole resource and not just that within the SAC network or protected areas in general or that which has been assessed. No numeric threshold was set as to when a favourable conclusion should be reached, only that the structures and functions should be in good condition with no significant deteriorations.

The favourability of this parameter was largely informed through CSM assessments. In accordance with the EC guidance, it was considered that the condition of the SAC network was particularly important in this respect, but not exclusively so. Decisions on the use of CSM assessments were influenced on a case-by-case basis. Issues that arose included:

(i) accounting for those SSSI/ASSIs that supported Annex I habitat features which were not SAC features; and

(ii) the lack of habitat extent data for non-SAC features. For the latter the proportion of sites in each CSM condition category has been used instead.

The relative weight given to CSM results depended on:

(a) the proportion of a feature which was represented in the site series, ranging from 100% for some rare habitats such as inland saltmarsh, to a much lower proportion for extensive features such as blanket bog;
(b) the proportion of the feature which has actually been monitored (which may vary regionally); and
(c) the match of SSSI/ASSI features to SAC features.

In many cases other sources of information have been used in conjunction with CSM to make judgements on habitat condition.

Recognising the above points, the following general criteria were used to steer the overall judgements reached on structures and functions:

- Unfavourable-Bad = more than 25% of the total UK habitat area and/or more than 50% of the UK SAC habitat area in unfavourable condition as assessed by CSM;
- Unfavourable-Inadequate = 5-25% of the total UK habitat area and/or not more than 50% of the UK SAC habitat area in unfavourable condition as assessed by CSM;
- Favourable = less than 5% of the total UK habitat area in unfavourable condition as assessed by CSM.

It was, in many cases, possible to determine if the upper threshold of 25% was reached on the basis of SAC CSM results for only part of the total habitat area, e.g. if the SAC assessments covered 25% of the total area and all of were reported as unfavourable in condition. Where SAC CSM results did not show this, a decision was made based on the weight and representation of the data that was available (especially that for ASSI/SSSIs).

Unfavourable conclusions were usually categorised as improving or deteriorating, as indicated by the amount of unfavourable habitat that was recorded as recovering and declining. Where CSM and other data were lacking and it was not possible to reach a judgement with any confidence, an “unknown” conclusion was reported. This applied in some cases because the total area of the habitat was not known.

3.2.4. Future prospects

The future prospects assessment was based on an assessment of the conservation measures already in place, the potential future threats to the habitat, and an analysis of the possible future habitat condition based on the same Common Standards Monitoring data used to assess Structures and Functions.

.2.4.1 Main factors affecting the habitat

3.2.4.1.1. Conservation measures

This section lists the main conservation measures put into place for the habitat. These included general policies, national or local action plans, projects and schemes, grant-aid, protection within SACs, SSSIs or other nature reserves, and management control by nature conservation organisations. UKBAP Habitat Action Plans were often a useful source of information here.

3.2.4.1.2 Main future threats

It was difficult to be sure about which factors should be listed as future threats. The EC Guidance provided no effective criteria to make this judgement. The same two sources utilised to devise the list of current pressures (see Structures and Functions section) were used to inform on the list of future threats, as was the assessment of the potential threat from air pollution based on critical load exceedance data for acidity and nutrient nitrogen (see *Technical Note III* for full details). For relevant habitats, climate change was listed as a future threat, following a limited literature review. For more information see *Technical Note IV Climate Change*.

3.2.4.2 Future condition

The potential future condition of Annex I habitats was informed by the same information from Common Standards Monitoring (CSM) that was used to assess current condition. This involved treating all CSM assessments that had been judged as either favourable or unfavourable recovering as future-favourable: all remaining unfavourable categories were treated as future-unfavourable. There were a number of caveats to this approach, as set out in the relevant section in each assessment.

3.2.4.3 Determining status of future prospects

The conclusion on the future prospects of a habitat was dictated by the criteria set out in the general evaluation matrix (Annex E) of the EC Guidance. This matrix specifies the following:

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Future prospects (as regards range, area covered and specific structures and functions)	The habitats prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured.	Any other combination	The habitats prospects are bad, severe impact from threats expected; long-term viability not assured.	*No or insufficient reliable information available*

The criteria given to distinguish between the conclusions on future prospects were not precisely defined, only that the prospects should be excellent/good, bad, or in between. Nor was the EC Guidance clear about the timeframe to use when assessing this parameter, even though this has a marked effect on the conclusion. The decision taken by the UK was to

restrict the timeframe to the foreseeable future and not much beyond the next two reporting rounds or 12-15 years. Conclusions were informed on by likely trends in the habitat range and area, the disparity between the current habitat range/area and that of the favourable reference value, and how much of the habitat might be favourable in condition in 12-15 years time. The latter was mainly informed on by the future-favourability analysis of CSM assessments, recognising the results from this analysis were at best indicative of the future condition, the importance of the condition of SAC network within the overall resource, that some additional recovery was probable once further conservation measures are put into place, and the individual characteristics of each habitat type. A judgement was then made as to whether less than 75%, between 75-95%, or more than 95% of the total UK habitat area was likely to be favourable in 12-15 years. These thresholds pointed to respective conclusions of Unfavourable-Bad, Unfavourable-Inadequate, or Favourable.

3.2.5. Determining overall conservation status of a habitat

The EC Guidance Annex E evaluation matrix (Table 3.1) summarises the rules by which the conclusions on each of the habitat assessment parameters and overall are reached.

Table 3.1 ANNEX E - Assessing conservation status of a habitat type: Evaluation matrix

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decrease: Equivalent to a loss of more than 1% per year within period specified by MS OR More than 10% below 'favourable reference range'	*No or insufficient reliable information available*
Area covered by habitat type within range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range (if data available)	Any other combination	Large decrease in surface area: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS OR With major losses in distribution pattern within range OR More than 10% below 'favourable reference area'	*No or insufficient reliable information available*
Specific structures and functions (including typical species)	Structures and functions (including typical species) in good condition and no significant deteriorations / pressures.	Any other combination	More than 25% of the area is unfavourable as regards its specific structures and functions (including typical species)	*No or insufficient reliable information available*
Future prospects (as	The habitats	Any other	The habitats	*No or insufficient*

Parameter	**Conservation Status**			
	Favourable ('green')	**Unfavourable – Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
regards range, area covered and specific structures and functions)	prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured.	combination	prospects are bad, severe impact from threats expected; long-term viability not assured.	*reliable information available*
Overall assessment of CS	All 'green' OR three 'green' and one 'unknown'	One or more 'amber' but no 'red'	One or more 'red'	Two or more 'unknown' combined with green or all "unknown'

4. Notes: Decision trees for assessing parameters

4.1 Note 1. Species Decision trees

These provide guidance for assessing viability of species range and population and initial guidance on the level of favourable reference values.

RANGE DECISION TREE

1. Post 1994-Trend:

Decreasing	go to 2
Increasing/stable	go to 3
Unknown	go to 6

2. Was the post 1994 decrease:

less than 1% per annum, or unknown	1994 range is less than 10% below the FRR[i]
more than 1% per annum	1994 range is more than 10% below FRR[ii]

3. Can increasing/stable trend be attributed to intensive conservation care?

Yes	go to 4
No	go to 5

4. In the absence of intensive conservation care, is it most likely that post 1994 trends would have been:

Increasing/Stable	set 1994 range as FRR[iii]
less than 1% per annum decrease	1994 range is less than 10% below the FRR[i]
more than 1% per annum decrease	1994 range more than 10% below FRR[ii]

(Informed by pre-1994 trend information and pressures/threats)

5. Is the current range:

Restricted	go to 6
Not restricted	set 1994 range as FRR[iii]

6. Based on contextual information, in 1994, was species considered to be at:

High risk from stochastic events	1994 range is more than 10% below FRR[ii]
Low risk from stochastic events	go to 7

(Informed by pressures/threats/ fragmentation of population etc.)

7. Has the species persisted within a restricted range over at least 15 years prior to 1994?

Yes	set 1994 as FRR[iii]
No	1994 range is less than 10% below the FRR[i]

(Informed by 1979-1994 trend information)

Comments

i. Consider range **Unfavourable–Inadequate**. Assume 1994 baseline 90% of FRR (FRR = 1994 range/0.9)

ii. Consider range **Unfavourable–Bad**. Assume 1994 baseline less than 90% of FRR (FRR = > 1994 range/0.9)

iii. Consider range **Favourable**, i.e. in 1994 sufficiently large to support viable population. If range figure in 1994 not known, use current value.

2.1.1

POPULATION DECISION TREE

1. Post-1994 trend:

Decreasing	go to 2
Increasing/Stable	go to 4
Unknown	go to 6

2. Does evidence suggest this decreasing trend is attributed to natural fluctuations?

Yes	go to 6
No	go to 3

3. Was the post-1994 decrease:

less than 1% per annum	1994 population less than 25% below the FRP[i]
more than 1% per annum	1994 population more than 25% below FRP[ii]

4. Is the Stable/Increasing trend attributed mainly to intensive conservation care?

Yes	go to 5
No	Set 1994 as FRP[iii]

(Informed by pre-1994 trend information and pressures/threats)

5. In the absence of intensive conservation care, is it more likely that post-1994 trends would have been:

Stable/Increasing	go to 6
less than 1% per annum decrease	1994 population less than 25% below FRP[i]
more than 1% per annum decrease	1994 population more than 25% below FRP[ii]

6. Is the species currently persisting (informed by the current estimate) at

High abundance	set 1994 population as FRP[iii]
Low abundance	go to 7

7. Based on contextual information, in 1994, was the species considered to be at:

High risk from stochastic events	1994 population more than 25% below FRP[ii]
Low risk from stochastic events	go to 8

(Consider population density, population structure, dispersal ability and connectivity)

8. Has the species persisted at a low population for at least 15 years (or three generations, whichever longer) prior to 1994?

Yes	set 1994 as FRR[iii]
No	1994 population less than 25% below the FRP[i]

Comments

i. Consider population **Unfavourable–Inadequate**. This is based on decline being used as proxy for reproduction, mortality and age structure deviating from normal, but 'not strongly'. Assume 1994 baseline 75% of FRP (FRP = 1994 population/0.75)

ii. Consider range **Unfavourable-Bad**. Assume 1994 baseline less than 75% of FRP (FRP = >1994 population/0.75)

iii. Consider population **Favourable** i.e. in 1994 sufficiently large to support viable population. If 1994 population not known use current population value.

Note 2. Habitat Decision trees

These provide guidance as to the appropriate conclusion for each of the four assessment parameters and the values for the Favourable Reference Range (FRR) and Favourable Reference Area (FRA).

HABITAT RANGE DECISION TREE

a. Trend in range

Consider if overall range since 1994 has been stable or has it increased or decreased?

… if DECREASED then go to b

… if STABLE go to c

… if INCREASED go to d

… if UNKNOWN go to e

b. Range decreased since 1994

Consider if rate of decline in range has been more or less than 1% per year?

… if >1% per year conclude **UNFAVOURABLE–BAD** (assume 1994 level is less than 90% of FRR)

… if <1% per year or UNKNOWN conclude **AT LEAST UNFAVOURABLE–INADEQUATE** (1994 level is less than FRR) and go to f

c. Range has been stable since 1994

Consider if either 1994 or current range are viable or not? See Section 3.2.1.3.

… if YES then treat 1994 or current range as FRR and conclude **FAVOURABLE**

… if NO then treat 1994 or current range as less than FRR and go to f

… if UNKNOWN conclude **UNKNOWN**

d. Range has increased since 1994

Consider if 1994 range is viable? See Section 3.2.1.3.

… if YES then current range must also be viable, treat 1994 range as FRR, and conclude **FAVOURABLE**

… if NO OR RANGE IN 1994 NOT KNOWN go to e

… if UNKNOWN go to e

e. 1994 range is not viable or unknown

Consider if current range is viable? See Section 3.2.1.3.

… if YES then treat current range as FRR and conclude **FAVOURABLE**

… if NO then treat current range as less than FRR and go to f

… if UNKNOWN and range has decreased conclude **AT LEAST UNFAVOURABLE–INADEQUATE** (1994 level is less than FRR)

… if UNKNOWN and range has remained stable or increased conclude **UNKNOWN**

f. Extent to which current range is below 1994 FRR

Consider if current range is more or less than 10% below 1994 FRR?

… if LESS THAN then conclude **UNFAVOURABLE–INADEQUATE** (assume 1994 level is more than 90% of FRR)

… if MORE THAN then conclude **UNFAVOURABLE–BAD** (assume 1994 level is less than 90% of FRR)

… if UNKNOWN conclude **AT LEAST UNFAVOURABLE–INADEQUATE** (1994 level is less than FRR)

HABITAT AREA DECISION TREE

a. Trend in area

Consider if overall area since 1994 has been stable or has it increased or decreased?

… if DECREASED then go to b
… if STABLE go to c
… if INCREASED go to d
… if UNKNOWN go to e

b. Area decreased since 1994

Consider if rate of decline in area has been more or less than 1% per year OR if there has been a major loss in distribution?

… if MORE THAN 1% per year OR MAJOR LOSS IN DISTRIBUTION then treat 1994 area as FRA and conclude **UNFAVOURABLE–BAD** (assume 1994 level is less than 90% of FRR)
… if LESS THAN 1% per year or UNKNOWN then treat 1994 area as FRA and conclude **UNFAVOURABLE–INADEQUATE** (assume 1994 level is more than 90% of FRA) and go to f

c. Area stable since 1994

Consider if either 1994 or current area viable or not? See Section 3.2.2.3.

… if YES then treat 1994 or current area as FRA and conclude **FAVOURABLE**
… if NO then treat 1994 or current area as less than FRA and go to f
… if UNKNOWN conclude **UNKNOWN**

d. Area has increased since 1994

Consider if 1994 area is viable? See Section 3.2.2.3.

… if YES then current area must also be viable, treat 1994 area as FRA, and conclude **FAVOURABLE**
… if NO OR AREA IN 1994 NOT KNOWN go to e
… if UNKNOWN go to e

e. 1994 area is not viable or unknown

Consider if current area is viable? See Section 3.2.2.3.

… if YES then treat current area as FRA and conclude **FAVOURABLE**
… if NO then treat current area as less than FRA and go to f
… if UNKNOWN and area has decreased conclude **AT LEAST UNFAVOURABLE–INADEQUATE** (1994 level is less than FRA)
… if UNKNOWN and area has remained stable, increased or is unknown conclude **UNKNOWN**

f. Extent to which current area is below 1994 FRA

Consider if current area is more or less than 10% below 1994 FRA?

… if LESS THAN 10% conclude **UNFAVOURABLE–INADEQUATE** (assume 1994 level is more than 90% of FRA)
… if MORE THAN 10% conclude **UNFAVOURABLE–BAD** (assume 1994 level is less than 90% of FRA)

… if UNKNOWN □ conclude **AT LEAST UNFAVOURABLE–INADEQUATE** (1994 level is less than FRA)

HABITAT STRUCTURE AND FUNCTIONS DECISION TREE

a. Extent of unfavourable habitat

Consider how much of habitat is in unfavourable condition?

… if LESS THAN ABOUT 5-10% □ conclude **FAVOURABLE**

… if BETWEEN ABOUT 5-10% AND 25% □ conclude **UNFAVOURABLE–INADEQUATE**

… if MORE THAN ABOUT 25% □ conclude **UNFAVOURABLE–BAD**

… if UNKNOWN □ conclude **UNKNOWN**

HABITAT FUTURE PROSPECTS DECISION TREE

a. Future threats

Consider if likely threats to habitat will reduce its range and/or area over next 10-15 years?

… if YES □ then go to b

… if NO □ then go to c

b. Range and/or area likely to decrease over next 10-15 years

Consider if habitat range and/or area are likely to decline by more or less than 1% per year OR lead to major loss in distribution over next 10-15 years?

… if MORE THAN 1% per year OR MAJOR LOSS IN DISTRIBUTION □ conclude **UNFAVOURABLE–BAD**

… if LESS THAN 1% per year □ conclude **AT LEAST UNFAVOURABLE–INADEQUATE** but check against last criteria in c

c. Range and/or area likely to remain stable or increase over next 10-15 years

Consider likely threats and how much of habitat will be in unfavourable condition in the next 10-15 years?

… if LESS THAN ABOUT 5-10% □ then conclude **FAVOURABLE**

… if BETWEEN ABOUT 5-10% AND 25% □ then conclude **UNFAVOURABLE–INADEQUATE**

… if MORE THAN ABOUT 25% □ then conclude **UNFAVOURABLE–BAD**

5. References

EUROPEAN COMMISSION. October 2006. *Assessment, monitoring and reporting under Article 17 of the Habitats Directive: Explanatory Notes and Guidance. Final Draft 5.* http://circa.europa.eu/Public/irc/env/monnat/library?l=/guidlines_reporting&vm=detailed&sb=Title.

European Commission DG Environment. 2003. *Interpretation manual of European Union habitats* (version EUR25). European Commission DG Environment, Brussels. http://europa.eu.int/comm/environment/nature/

IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1 IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK. ii + 30pp.

JACKSON, D.L. & MCLEOD, C.R. (Editors), (2000), 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, Revised 2002, JNCC Report 312, 180 pages, ISSN 0963 8091

PIERPOINT C., PENROSE R. 2002. *'TURTLE' A database of Marine Turtle Records for the United Kingdom & Eire. (Version 1.3 2002): Introduction, data summary & user notes.* (Contractor: Marine Environmental Monitoring, Llechryd.)

REID, J.B., EVANS, P.G.H. & NORTHRIDGE, S.P. 2003. *Atlas of cetacean distribution in north-west European waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Technical Note I - Guidance on Alpha Shapes Range Mapping Tool

Technical Note II - CSM SAC to ASSI/SSSI Correspondence Tables

Technical Note III - Air Quality Analysis,

Technical Note IV - Climate Change

Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC. www.jncc.gov.uk/page-3520