Favourable conservation status is defined in Article 1 of the Habitats Directive by four parameters for each habitat types and species. The agreed method for the evaluation of conservation status assesses each of the parameters separately, with the aid of an evaluation matrix, and then combines these assessments to give an overall assessment of conservation status. The parameters, which are discussed in more detail below, are

- Range
- Population (species only)
- Area (habitat types only)
- Habitat for the species (species only)
- Structure & function (habitat types only)
- Future Prospects

Range, population (species), and area (habitat types), all require the setting of threshold values to determine if the parameter is favourable or unfavourable. These are referred to as ‘favourable reference values’ and are explained in the next section.

### III.a FAVOURABLE REFERENCE VALUES

Favourable Reference Values (FRV) are key concepts in the evaluation of Conservation Status. The reporting format requires Member States to identify threshold values for range and area for the habitat types of Annex I and for range and population for the species of Annexes II, IV & V in order to evaluate whether the actual range, area, or population are sufficiently large to conclude the parameter is ‘favourable’ or ‘unfavourable’, and, if ‘unfavourable’, whether the status is ‘inadequate’ or ‘bad’. Favourable Reference Values should be based purely on scientific grounds and may have to change between reporting cycles as our understanding of a habitat type or species changes. Where such changes are required this should be explained in the complementary information section of the reporting format (field 2.8).

Determining these values will not be easy. However the concepts are not new and are treated in many texts on conservation biology (e.g. Soule & Orians (eds) (2001) *Conservation Biology: Research Priorities for the Next Decade* or Primack (2008) *A Primer of Conservation Biology, Fourth Edition*). In many cases our understanding of the biology is not sufficient or data are not available, to make use of many of the approaches described in these texts and it is likely that for many poorly known species expert judgement will have to be used. This should be used as a starting point and improved upon in the future as better understanding and further data become available (e.g. as a result of Article 11 monitoring and surveillance).

For some species and habitat types ‘Action plans’ have been prepared, either at national or European scale, and although these plans do not use the term ‘favourable reference value’ they do sometimes consider related concepts and may be a source of ideas and information. For example the Council of Europe has published European action plans for large carnivores


III.a.i Favourable Reference Range

*Range within which all significant ecological variations of the habitat/species are included for a given biogeographical 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. [Definition from DocHab-04-03/03 rev.3]

The following factors should be considered when estimating Favourable Reference Range (FRR) for both species and habitat types:

- Current range;
- Potential extent of range taking into account physical and ecological conditions (such as climate, geology, soil, altitude);
- Historic range and causes of change;
- Area required for viability of habitat type/species, including consideration of connectivity and migration issues.
- Variability including genetics20.

For many species and habitat types we have sufficient understanding of their ecological requirements that we can model their potential range, for example many arctic-alpine plant species are limited by a maximum mean July temperature while Mediterranean species such as the Olive tree (*Olea europaea*, a key component of habitat type '9320 *Olea and Ceratonia forests*') are limited by minimum winter temperatures. Alterra have modelled several habitat types using various parameters including soil types, altitude, species distribution and existing land cover21 22.

It should be noted that FRR is not necessarily equal to 'potential range': normally, FRR is smaller. For some wide ranging species the FRR may be the entire biogeographic region within a country, as for the Annex V frog *Rana esculenta* (Edible Frog)in several regions of many Member States (see Figure 3). Some species, such as *Lutra lutra* (Eurasian otter), have historically had much wider ranges than at present, in such cases it may not be necessary for all the historical range to be re-occupied to reach FRR if long term survival can be assured.

Many species, including some listed on the annexes of the Habitats Directive (e.g. The Marsh fritillary *Euphydryas aurinia*) are known to have a metapopulation structure with cyclical local

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19 This means different years for different countries: 1994 for BE, DE, DK, ES, FR, GR, IE, IT, LU, NL, PT & UK, 1995 for AT, FI and SE, 2004 for CY, CZ, EE, HU, LV, LT, MT, PL, SI & SK and 2007 for BG & RO.


extinction and recolonization (Warren 1994). In such cases the favourable reference range should take account of this and include enough range to assure long-term survival and variability, even though the species may have disappeared from major parts of that range.

Figure 3: Distribution of *Rana esculenta*, a species where the FRR is equal to the area of the region within a country for a number of countries (e.g. Germany).

III.a.ii Favourable Reference Population (species only)

*Population in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the species; favourable reference value must be at least the size of the population when the Directive came into force*; information on historic distribution/population may be found useful when defining the favourable reference population; 'best expert judgement' may be used to define it in absence of other data. [Definition in DocHab-04-03/03 rev.3]

Favourable reference population (FRP), field 2.4.14. in Annex B, should be given in the same units as that used for ‘population’ (see IV.b.iii).

The following background information and parameters may be useful to set FRP:

- Historic distribution and abundances and causes of change

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24 This means different years for different countries: 1994 for BE, DE, DK, ES, FR, GR, IE, IT, LU, NL, PT & UK, 1995 for AT, FI and SE, 2004 for CY, CZ, EE, HU, LV, LT, MT, PL, SI, SK and 2007 for BG & RO.
ASSESSING CONSERVATION STATUS

- Potential range
- Biological and ecological conditions
- Migration routes and dispersal ways
- Gene flow or genetic variation including clines
- Population should be sufficiently large to accommodate natural fluctuations and allow a healthy population structure

Favourable Reference Populations should be based on the ecology and genetics of the species. For a few species population viability assessments are available and can be used to help set a FRP (e.g. for *Bison bonasus* (European Bison), Daleszczyk & Bunevich, 2009) but for most species other approaches will need to be used. Even where such analyses are available they are often for the entire population of a species which may include more than one country or regions within a country. Viability analyses and their use in conservation are discussed in a recent paper by Traill *et al* (2010). Estimates of Minimum Viable Population (MPV) will, by definition, be lower than FRP.

Some countries have used the concept of carrying capacity together with estimates of the range or suitable habitat to estimate a FRP, an example for Poland is given in the box 3 below.

If an operator is used to estimate a FRP it should be compared with the minimum population estimate (see section IV.b.iii). It is important to understand that the operator "less than" can only be used in exceptional circumstances, where a species might have developed - due to exceptional circumstances such as supplementary feeding - an exceptionally high population level far beyond that considered as favourable in normal circumstances and which is unlikely to be sustainable or which may even be detrimental to other species or habitats. A careful assessment of such situations needs to be undertaken and an explanation of the reasoning why this operator has been used should be given in the field "other relevant information" (2.8.2).

For some species the historical population may help estimate a FRP.

**Box 3: Favourable Reference Values for Canis lupus in the Continental region of Poland**

The model was elaborated in the Mammal Research Institute in Bialowieża Bialowieża (Jędrzejewski et al 2008). Data on distribution and numbers are fairly good (based on annual inventory). Application of GIS tools allowed spatial analyses using data on land use (from CORINE Land Cover 2000), density of ungulates, density of roads, and historical distribution of the wolf. The frequency of records of wolf in a given category of land use allowed one to select environments occupied by wolf most willingly and indicate areas which potentially meet the habitat requirements of the species (suitable habitat). In addition to large dense forests, certain marshy areas and areas in close vicinity to running and standing

waters were also included. The area of selected habitats and size of the wolf population in eastern Poland was a basis for estimating the potential numbers of wolf in the remaining part of the country. The results were then verified, taking into account food availability (biomass of ungulates per area unit). The estimated FRR for the Continental region was 95 540 km² and FRP 1260-1335 individuals, while suitable habitat is 53 575 km². The present range in the Continental biogeographical region was estimated as 25 170 km² and population 310 – 420, while currently occupied habitat is 15 327 km².

(Example based on the 2001-2006 report from Poland)

III.a.iii  Favourable Reference Area (habitat types only)

Total surface area in a given biogeographical 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 force²⁸: 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. [Definition in DocHab-04-03/03 rev.3]

This is probably the most difficult of the three reference values to establish. There is some theoretical work on minimum area required for long term viability of some habitat types (mostly forests) but this is based on single sites rather than a network of sites. In some cases it may be possible to estimate the Favourable Reference Area (FRA), section 2.4.10 in Annex D, from a consideration of the conservation requirements of one or more ‘key’ species.

The following background information and parameters may be useful to set FRA:

- Historic distribution and causes of change
- Potential natural vegetation
- Natural variation
- Actual distribution and actual variation (including quality of habitat)
- Dynamics of the habitat type
- Requirements of typical species (including gene flow)

If there is no information showing that enlarged area of the habitat type is necessary for either

- typical species to reach favourable conservation status, or for
- the necessary structures or functions of the habitat type to exist,

then the FRA can be taken as the surface area of the habitat type when the directive came into force.

If available, Red Lists of habitat types, plant communities or biotopes which correspond to the habitat types of Annex I of the Directive should be taken into consideration to identify the favourable area of habitat types. For example in cases where the habitat types are

²⁸ This means different years for different countries: 1994 for BE, DE, DK, ES, FR, GR, IE, IT, LU, NL, PT & UK, 1995 for AT, FI & SE, 2004 for CY, CZ, EE, HU, LV, LT, MT, PL, SI & SK and 2007 for BG & RO.
“threatened by extinction”, “critically endangered” or similar, the present day area of the type is unlikely to be sufficient to be considered as favourable.

There will be cases where the area of a habitat type in a Member State or within a region of a Member State is small with no possibility of enlargement through restoration due to natural limitations (e.g. calcareous grasslands in regions with predominately acidic soils). It would be reasonable to conclude that this is the FRA.

Habitat type 7120 ‘Degraded raised bogs still capable of natural regeneration’ is a special case as when restored it becomes ‘7110 Active raised bogs’ and the favourable reference area will be less than the present day area and possibly be zero if all the habitat type could be restored. There may be other cases where the operator ‘less than’ (<) (see III.a.iv) can be justified for a habitat type, for example due to restoration projects which results in the change of a non-priority habitat type into a priority habitat type, the reasoning for such cases needs to be explained under field 2.8.2 ‘Other relevant information’.

**III.a.iv Using operators**

In many cases it is not possible to estimate a value for FRV but it is clear that the FRV is greater than the present day value. For example, the Annex II moss *Buxbaumia viridis* only has one locality in the Atlantic region of Denmark which is not considered a large enough population for the species to be at FCS. Although the FRP is not known, expert opinion is that it must be more than 1 locality and an assessment can be made.

Using operators ‘greater than’ (>) and ‘much greater than’ (>>) can be preferable to reporting a parameter as ‘unknown’. There will also be habitat types and species where FRV = current value, especially for Favourable Reference Range. Figure 2 shows how this decision can be taken. Expert judgement will be required to determine if the operator should be ‘>’ or ‘>>’. If the operator is ‘>>’, the current value is very likely to be ‘more than 10% below FRV and the parameter ‘Unfavourable-bad’.

The operator ‘less than’ (<) can be used only in limited cases, see above under section III.a.ii Favourable Reference Population and III.a.iii Favourable Reference Area. If used, an explanation must be provided in the ‘Other relevant information’ field (2.8.2 for species and 2.7.5 for habitat types).

![Flow chart to help decide if a Favourable Reference Value should be equal or larger than the present day value. A habitat or species is threatened if subject to...](image-url)
significant pressures or threats. Note that in some rare cases the FRV may be less than the present day value (flow chart provided by Sweden).

If an operator is used, then there is no need to supply a value in the reference value field, or the value reported must be the same as that of the actual value reported (e.g. 2.3.8 for Favourable Reference Range for habitat types). If the value reported for a favourable reference value differs from the actual reported value no operator should be used. The use of operators should help to reduce the use of ‘unknown’ to a minimum.

The United Kingdom has produced a series of ‘keys’ to help estimate FRVs and to help distinguish between ‘Unfavourable-inadequate’ and ‘Unfavourable-bad’ and this approach may be useful elsewhere, see pages 33-38 in JNCC (2007)²⁹.

III.a.v Possible conflict between habitat types

There are many instances where two or more Annex I habitat types form an ecological succession and where estimates of favourable reference area will need to take into account the requirements of both habitat types; this takes into account the nature conservation priorities set by Member States within the legal framework of the Habitats Directive. For example in much of Europe ‘6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)’ if not managed will tend to develop to ‘9150 Medio-European limestone beech forests of the Cephalanthero-Fagion’, possibly via ‘5130 Juniperus communis formations on heaths or calcareous grasslands’. In such cases the favourable reference range may be the same or very similar as it will be based on underlying geology, topography and climate but the reference areas will need to be assessed together and will be informed by national or regional conservation priorities.

Box 4: Favourable reference area for 9010 Western Taiga in Sweden

A Swedish compilation of studies of 17 species which are habitat specialists (umbrella species) dependent on the Western Taiga show that the threshold value of how much habitat is needed vary from 10% to 50% with a mean value of 19%. Thus, a value of 20% has been chosen to be the threshold value of how much of the original area (i.e. before industrial forestry) of western taiga 9010 is needed to maintain its specialised species in viable populations.

The original forested land cover has been estimated as 250 000 km², of which 9010 western taiga has been estimated to be a little more than 205 420 km². Hence, the Favourable Reference Area is 20% of the original area – 41 085 km² (reported value in 2007 was 18 975 km²). This figure applies to the whole territory but has then been split up to three biogeographic regions.

(From Hans Gardfjell, Swedish University of Agricultural Sciences)

Box 5: Favourable reference area for 9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli in Poland

In Poland habitat type 9160 only occurs in the Continental biogeographic region and the present area has been established at 300 km². The area is fairly stable (two opposing
### Evaluation matrix for assessing the conservation status of habitats under Article 17 reporting

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong> (within the biogeographical region concerned)</td>
<td><strong>Favourable</strong>&lt;br&gt;Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'</td>
</tr>
<tr>
<td><strong>Area covered by habitat type within range</strong>&lt;br&gt;Note: There may be situations where the habitat area has decreased as a result of management measures to restore another Annex I habitat or habitat of an Annex II species. The habitat could still be considered to be at 'Favourable Conservation Status' but in such cases please give details in the Complementary information section ('Other relevant information') of Annex D</td>
<td><strong>Favourable</strong>&lt;br&gt;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)</td>
</tr>
<tr>
<td><strong>Specific structures and functions (including typical species)</strong></td>
<td><strong>Favourable</strong>&lt;br&gt;Structures and functions (including typical species) in good condition and no significant deteriorations / pressures.</td>
</tr>
<tr>
<td><strong>Future prospects</strong> (as regards range, area covered and specific structures and functions)</td>
<td><strong>Favourable</strong>&lt;br&gt;The habitats prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured.</td>
</tr>
<tr>
<td><strong>Overall assessment of CS</strong></td>
<td>All 'green'&lt;br&gt;OR&lt;br&gt;three 'green' and one 'unknown'</td>
</tr>
</tbody>
</table>

*E.g. by discontinuation of former management, or is under pressure from significant adverse influences, e.g. critical loads of pollution exceeded.

Source: Adapted from EC 2005
### Evaluation matrix for assessing the conservation status of non-bird species under Article 17 reporting Table 4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Favourable</th>
<th>Unfavourable - Inadequate</th>
<th>Unfavourable - Bad</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range (within the biogeographical region concerned)</td>
<td>Stable (loss and expansion in balance) or increasing and not smaller than the 'favourable reference range'</td>
<td>Any other combination</td>
<td>Large decline: Equivalent to a loss of more than 1% per year within period specified by MS OR more than 10% below favourable reference range</td>
<td>No or insufficient reliable information available</td>
</tr>
<tr>
<td>Population</td>
<td>Population(s) not lower than 'favourable reference population' AND reproduction, mortality and age structure not deviating from normal (if data available)</td>
<td>Any other combination</td>
<td>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)</td>
<td>No or insufficient reliable information available</td>
</tr>
<tr>
<td>Habitat for the species</td>
<td>Area of habitat is sufficiently large (and stable or increasing) AND habitat quality is suitable for the long term survival of the species</td>
<td>Any other combination</td>
<td>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</td>
<td>No or insufficient reliable information available</td>
</tr>
<tr>
<td>Future prospects (as regards to population, range and habitat availability)</td>
<td>Main pressures and threats to the species not significant; species will remain viable on the long-term</td>
<td>Any other combination</td>
<td>Severe influence of pressures and threats to the species; very bad prospects for its future, long-term viability at risk.</td>
<td>No or insufficient reliable information available</td>
</tr>
<tr>
<td>Overall assessment of CS</td>
<td>All 'green' OR three 'green' and one 'unknown'</td>
<td>One or more 'amber' but no 'red'</td>
<td>One or more 'red'</td>
<td>Two or more 'unknown' combined with green or all 'unknown'</td>
</tr>
</tbody>
</table>

Source: Adapted from EC 2005