



National Environmental Research Institute
University of Aarhus · Denmark

NERI Technical Report No. 647, 2007

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Natural habitat types and species
covered by the EEC Habitats Directive
and birds covered by the EEC Birds Directive



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Data sheet

- Series title and no.: NERI Technical Report No. 647
- Title: Criteria for favourable conservation status in Denmark
Subtitle: Natural habitat types and species covered by the EEC Habitats Directive and birds covered by the EEC Birds Directive
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- Publisher: National Environmental Research Institute ©
University of Aarhus - Denmark
URL: <http://www.neri.dk>
- Year of publication: December 2007
Editing completed: December 2007
Referee: Flemming Skov
Editor: Tommy Asferg
- Financial support: The National Forest and Nature Agency, Denmark.
- Please cite as: Søgaard, B., Skov, F., Ejrnæs, R., Pihl, S., Fredshavn, J., Nielsen, K.E., Clausen, P., Laursen, K., Bregnballe, T., Madsen, J., Baatrup-Pedersen, A., Søndergaard, M., Lauridsen, T.L., Aude, E., Nygaard, B., Møller, P.F., Riis-Nielsen, T., & Buttenschøn, R.M., 2007. Criteria for favourable conservation status in Denmark. Natural habitat types and species covered by the EEC Habitats Directive and birds covered by the EEC Birds Directive. National Environmental Research Institute, University of Aarhus. 92 pp. – NERI Technical report No. 647. <http://www.dmu.dk/Pub/FR647.pdf>
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- Abstract: The National Environmental Research Institute has drawn up technical criteria for favourable conservation status for the various habitat types and species covered by the EEC Habitats Directive, and for birds covered by the EEC Birds Directive. These criteria will form the background for preparing conservation objectives for both habitat types and species, for nature planning, and for monitoring programmes assessing the conservation status of the natural habitat types and species in Denmark. This report presents selected examples of criteria for natural habitat types (7) and species (13).
- Keywords: favourable conservation status, habitat types, habitat species, EEC Habitats directive, EEC Birds Directive
- Layout: NERI Graphics Group, Silkeborg
Translation: Annie Laursen & Else-Marie Nielsen
- Front page photo: Species-rich Nardus grassland (6230) with Myrtilus and lichen-covered rocks in the Mols Bjerge NATURA2000-area. Photo: Roar Skovlund Poulsen
- ISBN: 978-87-7073-019-8
ISSN (electronic): 1600-0048
- Number of pages: 92
- Internet version: The report is available in electronic format (pdf) at NERI's website <http://www.dmu.dk/Pub/FR647.pdf>
- Supplementary information: This report is a condensed version in English of the NERI technical report No. 457 http://www2.dmu.dk/1_viden/2_Publikationer/3_fagrappporter/rapporter/FR457.PDF

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Preface

This report is a condensed version in English of the NERI technical report No. 457 concerning criteria for favourable conservation status of natural habitat types and species covered by the EEC Habitats Directive and by the EEC Birds Directive in Denmark (Søgaard et al. 2003, 3. ed. 2005*).

The Danish version of the report states the criteria for favourable conservation status on a national as well as a local level for 51 terrestrial and limnetic/marine natural habitat types, listed on Annex I of the Habitats Directive, 36 species, listed in Annex II of the Habitats Directive and 74 species and sub-species of birds covered by the Birds Directive.

This report contains criteria for favourable conservation status for 7 selected natural habitat types and 9 species (Habitats Directive) and 4 species of birds (Birds Directive) to illustrate the first work in Denmark to define criteria for favourable conservation status.

The criteria form the background for the national monitoring programmes, the purpose of which is assessment of the conservation status of the natural habitat types and species in Denmark. The criteria are the first generation products of their kind and they will be evolved concurrently with increased knowledge about the types and species obtained during the monitoring programmes. The reporting format for article 17 of the Habitats Directive as adopted by the Habitats Committee in April 2005 will also influence the evolution of the criteria.

* http://www2.dmu.dk/1_viden/2_Publikationer/3_fagrappporter/rapporter/FR457.PDF

Summary

The Natura 2000 network in Denmark covers 254 areas designated under the EEC Habitats Directive, and 113 areas listed under the EEC Birds Directive, which together with 27 areas designated under the Ramsar Convention, are called international protection areas. In general, it can be said that these areas must contribute to the promotion and protection of nature and the biological diversity on a national and a European level by maintaining or restoring “favourable conservation status” for the habitat types and species for which the areas are designated.

The Danish Forest and Nature Agency, that manages the guidelines for setting the conservation objectives for the international protection areas, has requested the National Environmental Research Institute to draw up technical criteria for favourable conservation status for the various habitat types and species covered by the EEC Habitats Directive, and for birds covered by the EEC Birds Directive.

These criteria will form the background for preparing conservation objectives for both habitat types and species, for nature planning, and for monitoring programmes assessing the conservation status of the natural habitat types and species. Primarily, the report applies to a series of authorities and organisations working with the monitoring, protection, and management of Danish nature.

Criteria for favourable conservation status

Chapter 3 states the criteria for favourable conservation status on a national as well as a local level for the 51 terrestrial and limnetic natural habitat types, listed in Annex I of the EEC Habitats Directive Annex I, which occur in Denmark.

Each criterion is given its own indicators, which can all be related to the three general points that must be fulfilled according to the Habitats Directive in order to ensure a favourable conservation status for the natural habitats. The three general points are: 1) area and range, 2) structure and function, and 3) characteristic species.

Chapter 4 states the criteria for favourable conservation status on a national as well as a local level for the 36 species, listed in Annex II of the EEC Habitats Directive. The species are divided into the following groups: mammals, amphibians, fish, butterflies, dragonflies, beetles, pseudoscorpions, snails, mussels, vascular plants and mosses.

National level criteria are given for the aggregate size of the populations and habitats, and for the natural range, whereas the local level criteria deal with the size of the specific population and the specific habitat as well as the quality of the habitat.

Chapter 5 states the criteria for favourable conservation status of 74 species and sub-species of birds covered by the EEC Birds Directive. Fa-

vourable conservation status has been given to 68 species on both a national and local level, whereas for six species that are currently immigrating, and which have not yet been breeding regularly in Denmark for a period of 12 years, the preliminary conservation status is given only on a local level. Chapter 5 includes 41 species of breeding birds listed in Annex I of the Birds Directive, and 37 species and sub-species of regularly recurring migratory birds.

Criteria have been given on a national level for the aggregate size of populations and habitats, and for the development of the natural range, whereas the local level criteria deal with the number of the specific population and the specific habitat as well as the quality of the habitat.

1 Introduction

1.1 Background

In 1992 the Council of the European Communities adopted *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. The main aim of the directive is to contribute to promoting biodiversity by conserving natural habitat and species of wild flora and fauna essential to the community within the European territory of the Member States.

The most important tool to fulfil the aim of the directive is the establishment of a European system of Special Areas of Conservation, known as the Natura 2000 network. This network includes the special areas of conservation designated under the Habitats Directive, and the areas designated under the Birds Directive.

Under the Habitats Directive, Denmark has designated a total of 254 areas for Natura 2000 (Fig. 1). The designation is based on the occurrence of approximately 60 of the natural habitat types listed in Annex I of the directive, and approximately 40 of the species listed in Annex II occurring within Denmark. Like the other Member States, Denmark is obliged to monitor and assess the conservation status of these habitats and species, and to report the results of this monitoring to the community every six years (Habitats Directive, Article 17).

In 1979 the Council of the European Communities adopted *Council Directive 79/402 of 2 April 1979 for the protection of wild birds*, referred to as the Birds Directive. The primary aim of the Directive is to help protect the wild birds within the Community's borders, by such measures as protecting their habitats. To this end, Denmark has designated 113 bird protection areas for species listed in Annex I and/or regularly recurring migratory bird species (Fig. 2).

Denmark has also in 1978 designated 27 sites under the Convention for the conservation of wetlands of international importance, in particular habitats for waterfowl, known as the Ramsar Convention. These Ramsar sites are located within the bird protection areas, which, for the most part, are identical with the habitat areas. Together, these areas are called international nature protection areas.

In general, the international nature protection areas help to preserve and protect various types of nature and biodiversity on both a national and European level. The requirements in the Directives and the Conventions can be summarised in a conservation objective in maintaining or restoring favourable conservation status for the species and natural habitat listed for which the areas have been designated.

The "Order concerning the delimitation and administration of international nature protection areas" (No. 444 of 7 June 2003) further describes how the obligations are to be administered in Denmark.

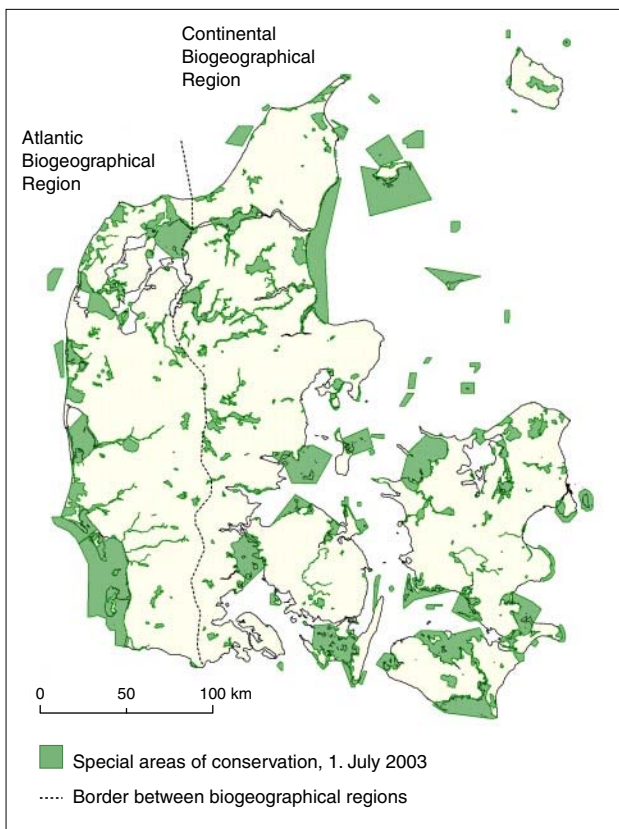


Figure 1. Special areas of conservation in Denmark (254) designated according to the Habitat Directive.

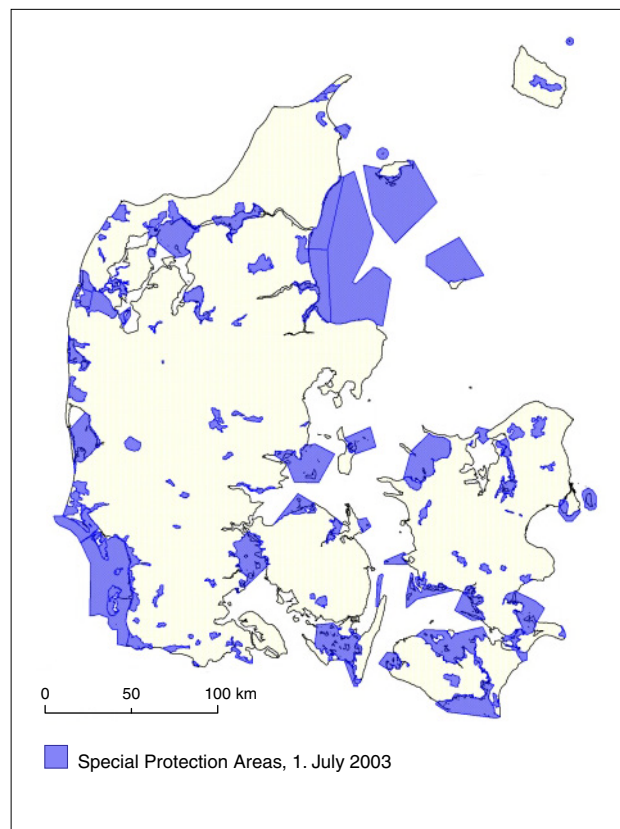


Figure 2. Special protection areas in Denmark (113) designated according to the Wild Birds Directive.

The Danish Forest and Nature Agency is in charge of drawing up guidelines for setting conservation objectives and the regional authorities (the counties and forest management) are responsible for setting the specific conservation objectives for each individual area.

The Danish Forest and Nature Agency has requested the National Environmental Research Institute – in cooperation with Danish Centre for Forest, Landscape and Planning and the Geological Survey of Denmark and Greenland – to list the criteria for favourable conservation status, which are presented in this report, with a view to setting the conservation objectives. These criteria will form an important background for monitoring, planning, and managing nature, and for carrying out EIA (Environmental Impact Assessment) and assessments of potential setbacks or disturbances to the quality of the habitat within the specific areas.

The Habitats Directive states a series of criteria, which must be fulfilled in order to classify a natural habitat or species as having favourable conservation status.

The conservation status of a natural habitat shall be taken as being “favourable” when:

- its natural range and areas it covers within that range are stable or increasing, and

- 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
- the conservation status of its typical species is favourable as defined in (litra i) cf. conservation status of the species.

The conservation status of a species will be considered “favourable” when:

- population dynamic 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
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

These criteria are very general, and in terms of management, the meaning of concepts such as “natural range” needs to be specified. The European Community is expected to formulate this specification, but until then “natural range” in this report means the specific occurrence, i.e. the actual distribution of a species or the range of a natural habitat.

On the basis of these general criteria, the National Environmental Research Institute, in co-operation with the Danish Forest and Nature Agency and the Danish counties, made a preliminary and tentative assessment of the conservation status of the natural habitats and species covered by the Habitats Directive (Pihl et al. 2000). One of the main conclusions of this work was that the information and background data available were insufficient to carry out a final evaluation of the conservation status of the majority of the natural habitats and species concerned.

1.2 Purpose and application

The purpose of this report is to draw up operational criteria for the favourable conservation status of natural habitats and species listed in the Annexes I and II of the EEC Habitats Directive, which form the basis for the designation of 254 special areas of conservation (see Fig. 1), and of the species listed in Annex I of the Birds Directive, that breed in Denmark on a regular basis, and of species of regularly recurring migratory birds that are listed in the designation of the 113 Danish special protection areas.

These criteria will form the basis for establishing conservation objectives, for nature planning, and for monitoring programmes for assessing the favourable conservation status of the natural habitats and the species. Thus, the report is primarily aimed at authorities and organisations working with the monitoring, protection and management of nature in Denmark.

The monitoring of natural habitats and species forms part of NOVANA, which is an integrated nature and environment-monitoring programme that is to be implemented during the period 2004-2009. The monitoring is carried out on the basis of technical instructions (recommended meth-

ods), that provide detailed instructions as how to monitor the specific parameters in the criteria for favourable conservation status and the conservation objectives.

As new knowledge and experience are gained from the monitoring of these natural habitats and species, the criteria for favourable conservation status will need to be adjusted. These adjustments may then consequently require modifications of the conservation status and also to the monitoring programme. Thus, on the basis of this, it may be appropriate to revise the criteria every six years in connection with the obligatory submission of a national report to the EU Commission.

2 Method

2.1 Selection of criteria for favourable conservation status

On the basis of the general criteria in the Habitats Directive of favourable conservation status (see section 1.1.4) more specific, precise criteria need to be developed to describe when the conservation status of each habitat type and species can be considered to be favourable. These criteria should meet the following requirements:

- They should be able to form the basis for monitoring the conservation status of the habitat type or the species;
- They should be biologically relevant, and provide a basis for the protection of nature;
- They should be immediately intelligible, and based on professionally reasonable simplifications;
- The monitoring methods should be operational, and repeatable;
- They should be quantifiable.

The criteria should include relevant characteristics for the habitat types and species in question, and also for the latter's habitats. Furthermore, the criteria should specify which limiting values have to be met in order for the habitat types and species in question to achieve favourable conservation status.

In principle, the indicators and criteria for favourable conservation status follow a draft developed in England (Anon. 1999a, 1999b). A set of indicators has been laid down for each habitat type and species, which together is considered to provide an adequate assessment of the conservation status of the type or species. Each of these indicators must specify:

- The characteristics they describe;
- The units of measurement used;
- The criteria/threshold values, which need to be fulfilled in order to achieve favourable conservation status.

The criteria for favourable conservation status are stated on a national and site level, respectively. The national level criteria sum up those used on the site level within the overall criteria for favourable conservation status. On the site level, the criteria represent conditions, which can be measured or described in a standardised way within the individual locality.

It is not yet possible to provide a precise set of rules for how fulfilment of the specific criteria should be summed up for a site – or national – evaluation. In many cases all the criteria need to be fulfilled, if a total evaluation of the status is to be “favourable”, but it is conceivable that exceptions may be made, to a certain extent, for the specific habitat type or species, depending on a detailed individual assessment.

Chapters 3, 4, and 5 list indicators and criteria for favourable conservation status in tables for both the national and site levels, stating which properties and units of measurement they represent, and often with supplementary comments on the specific parameters. The specific indicators and criteria for national and site level are defined in detail and described in the introduction to these chapters.

In chapters 4 and 5, regarding species and birds respectively, a distinction is made between obligatory monitoring indicators (which are marked with an asterisk * in the tables) and other indicators. The obligatory indicators, which relate to occurrence, population, and range, always form part of the associated monitoring programme. As a principal rule, the monitoring is limited to the obligatory indicators when habitat types and species have favourable conservation status, while the other indicators, which primarily concern the habitats and their quality, should be included in the monitoring when conservation status is assessed to be unfavourable.

One property that keeps cropping up in the definition of favourable conservation status is that a series of conditions as a minimum need to be preserved (or maintained) or improved, so that in the long term the conditions will be stable, or possibly even improving. This applies to factors such as the range, population, and habitat quality. In order to simplify things, such criteria are, whenever possible, abbreviated to “stable or increasing” or the like in the tables in the respective chapters.

In a number of cases there are factors whose stability is not adequate to ensure long-term maintenance, and thus a favourable conservation status. This is true, for example where the population of a species has been reduced so much that it will probably become extinct, purely as a consequence of its small size. In such cases, an increase to a certain threshold value is required in order for it to achieve favourable conservation status. Similarly, some of the criteria for the habitat types may be critical threshold values, which are crucial for the long-term maintenance of the type.

For other parameters, for which no critical threshold value has been identified, objectives have been set in the comments column in the respective tables, and it is these levels that should be observed or aimed at in order to ensure that no deterioration takes place. If an objective in the comments column has not been met, improvements will need to be made towards the stated level if favourable conservation status is to be achieved.

2.2 Acknowledgement

A number of people have contributed to the preparation of this report. Our special thanks go to Erik Vinter, who was seconded from the County of Funen to the National Environmental Research Institute (NERI) for a period, with the task of setting the first generations of criteria for the favourable conservation status for habitat types and species.

Furthermore, we would like to thank Jonas Teilmann, Hans Baagøe, Kåre Fog, Mogens Holmen, Peter Wind and Jens Reddersen for their contribu-

tions to the criteria for favourable conservation status for habitat types and species.

Thanks also to Bjarke Huus Jensen from the County of North Jutland and John Frikke from the County of Ribe for their perusal of the chapter on birds; and to the following employees at NERI and others who have read parts of the chapter: Ole Amstrup, Mogens Bak, Thomas Kjær Christensen, Mark Desholm, Tony Fox, Hans Erik Jørgensen, Hans Meltofte, Henrik Haaning Nielsen, Ib Krag Petersen, Lars Maltha Rasmussen, Palle Rasmussen and Ole Thorup.

3 Habitat types

3.1 The habitat types of the Habitats Directive

This chapter deals with the terrestrial and limnetic habitat types listed in Annex 1 of the EEC Habitats Directive (see Table 3.2). The marine habitat types are described in a separate report (Dahl et al. 2003).

There is a short description of each habitat type, and its conservation status in 2000, if available, as well as a description of the criteria which are to form part of the assessment of favourable conservation status on the national and site levels. A number of indicators are stated for each habitat type, together with a criterion or a threshold value which has to be fulfilled. These indicators relate to the three general points which the Habitats Directive requires fulfilled for favourable conservation status to be achieved. These three general points are:

- area and natural range
- structure and function
- characteristic species.

3.2 Criteria for favourable conservation status on a national level

On a national level, the information on the monitoring localities is collated in order to make an overall assessment of the conservation status of the habitat type. Information on the area and conservation status is generated from data concerning the specific natural areas (or monitoring stations).

The criteria for favourable conservation status on a national level include a specification of how large an area and natural range should be covered by the natural type. As a starting point, the area and the number of occurrences must be stable or increasing.

Favourable conservation status on a national level implies a good status in a considerable part of the specific areas covered by the respective habitat types. With a few exceptions, this level has to date been chosen as having favourable conservation status for more than 70-75% of the designated area or number of occurrences of the habitat type. In the long term it might be necessary to adjust this share when the EC issues its final statement.

Favourable conservation status on a national level implies that the natural range of the characteristic species is not decreasing, and that there is a stable or increasing number of occurrences. If the population is assessed to be too small to be viable in the long-term, it must be increasing.

Table 3.1. General indicators and criteria for favourable conservation status common to all habitat types on a national level.

NATIONAL	Property	Unit of measurement	Criteria	Comments
Area and natural range	Area	Number of hectares	Stable or increasing in relation to the level laid down	Minor losses of area, due to natural succession or dynamism, including factors such as coastal erosion, may be accepted.
	The range of the habitat type	Number of occurrences and number of hectares in each province within the natural range of the habitat type.	Stable or increasing	
Structure and function	Area with favourable conservation status *	Hectare	Stable or increasing compared to the level laid down	Ought not to be less than 70-75% of the mapped area in the habitat areas. Requires developmental work.
Characteristic species	Population of each characteristic species	Number of occurrences per species, and overall index of frequency	Stable or increasing	The species should be considered to be able to maintain current levels as a viable component of its natural habitats on a long-term basis, on the basis of data from at least two consecutive monitoring periods.
	The range of the characteristic species	The number of provinces with occurrences of the characteristic species	Stable or increasing	

* Found by adding together the total area with favourable conservation status on a site level

Similar indicators are used for all habitat types when assessing whether the specific type has a favourable conservation status. The indicators applied can be seen in table 3.1.

In order to follow whether or not the development is positive, a start figure has been specified in a number of cases. In other cases, there is not enough knowledge available to assess the start figure, which must be provided by the ongoing mapping and monitoring.

Criteria for favourable conservation status on a local/site level

The area of the habitat type is an important indicator, and the conservation criterion is, per definition, that the area must be stable or increasing. The development in the total area, and in the area with favourable conservation status is assessed in relation to the introductory mapping. This places demands on quality as well as reproducibility, both with regards to the delimitation of the habitat type, and the methodology used for mapping.

There may be a decrease in the area of the habitat type due to land use, and as a result of natural development whereby an area with a defined habitat type can develop into another defined habitat type, as occurs naturally in the case of dunes, for example. In order to be able to assess the importance of this development, a critical area size for the habitat type

should be specified locally, and the development should be assessed in relation to the total area with the habitat type, both regionally and nationally. When these clarifications are available it will thus be possible to decide whether a specific occurrence is of particular importance for the national range of the habitat type concerned. And whether such succession towards a new habitat type leads to total or partial fulfilment of the criterion for the national conservation status of this habitat type, without conflicting with the conservation status of the disappearing habitat type.

The structure and function of the habitat type are defined by using a set of indicators to which criteria for favourable conservation status are assigned. The status will be a function of previous and current impacts. Such impacts include eutrophication, a lack of grazing, disturbances, or changed hydrology (Pihl et al. 2000).

A number of these impacts can be quantified (e.g. eutrophication), and the effect of the impact can be measured by registering the indicator species or derived indicator values (e.g. the preferences of the species for moisture and nitrogen in Ellenberg's moisture scale and nitrogen values). The indicator species/-values quantify the biological effects on the development of the habitat type, rather than the impact (cf. the indicators of impact and condition above). In order to be able to reduce a negative impact, it is necessary to know the extent of both the impact and the effect, and at the same time to have a well-documented relationship between the impact and effect indicator.

The monitoring will be able to answer questions concerning the condition of the habitat types, their development, and the effect of the most important impacts. Thus, the description of the condition will need to include parameters describing the most important impacts and effects. The development is, in principle, an expression of the change in the status of the area over time, and can thus be described by the development in the parameters which form part of the description of its status. But not all elements in an ecosystem react equally fast to certain impacts, so it is appropriate to define parameters that react both quickly and more slowly in the monitoring, in order to describe the development in the long term. There may be considerable delays between impacts and effects, due to the fact that the system may possess a considerable buffer quality (ecological inertia). It may take decades from the time that ammonia supplies decrease to the time an effect is seen on the composition of the vegetation, due to accumulated stocks in the organic contents in the soil. The ecological inertia may vary from locality to locality depending on the natural conditions and the prehistory of the area.

The knowledge of a number of indicators mentioned in this report is limited or inadequate in relation to being able to designate precise criteria for a favourable conservation status. In these cases, the final designation must await the practical knowledge that is being acquired in connection with the monitoring. This ongoing acquisition of knowledge may lead to changes and adjustments of threshold values, and it is possible that, in some cases, the results may reveal unrecognised parameters which should form part of the later monitoring and status assessment. Some of the resources therefore need to be allocated to this acquisition of knowledge, in order to provide clarification before the monitoring programme is revised in 2009.

In cases where characteristic species are found in the habitat type, the populations must be ensured “long-term maintenance on a stable or increasing level”. Short-term, natural fluctuations in the size of the population may be compatible with favourable conservation status. Thus, the development must be evaluated over a number of years, comprising at least two consecutive monitoring periods, before it potentially becomes a deciding factor in the assessment of the conservation status.

A few of the characteristic species may be so scarce, that their long-term survival requires an increasing population.

In the final evaluation, it will similarly be found that even when the status has not been exposed to outside influences, a certain fluctuation can be expected in the occurrence of rare and scarce species. Some species will disappear locally, while other species will immigrate. In the long-term it may be necessary to adjust for factors such as climate changes when assessing the occurrence and development of the species.

Table 3.2. Overview of Danish habitat types covered by the EEC Habitats Directive. Only grey shaded habitat types included in this report.

Paragraph	Habitat types in coastal and halophytic habitats
	<i>Open sea and tidal areas</i>
	1110 Sandbanks which are slightly covered by sea all the time
	1130 Estuaries
	1140 Mudflats and sandflats not covered by seawater at low tide
	1150 * Coastal lagoons
	1160 Large shallow inlets and bays
	1170 Reefs
	1180 Submarine structures made by leaking gases
3.4	Sea cliffs and shingle or stony beaches
	1210 Annual vegetation of drift lines
	1220 Perennial vegetation of stony banks
	1230 Vegetated sea cliffs on the Atlantic and Baltic Coasts
3.5	Atlantic and continental salt marshes and salt meadows
	1310 <i>Salicornia</i> and other annuals colonizing mud and sand
	1320 <i>Spartina</i> swards (<i>Spartinion maritimae</i>)
	1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)
	1340 * Inland salt meadows
3.6	Coastal sand dunes and inland dunes
	<i>Sea dunes of the Atlantic, North Sea and Baltic coasts</i>
	2110 Embryonic shifting dunes
	2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (“white dunes”)
	2130 * Fixed coastal dunes with herbaceous vegetation (“grey dunes”)
	2140 Decalcified fixed dunes with <i>Empetrum nigrum</i>
	2160 Dunes with <i>Hippophaë rhamnoides</i>
	2170 Dunes with <i>Salix repens</i> ssp. <i>argentea</i> / <i>Salicion arenariae</i>)
	2180 Wooded dunes of the Atlantic, Continental and Boreal region
	2190 Humid dunes slacks
	<i>Sea dunes of the Mediterranean coast</i>
	2250 * Coastal dunes with <i>Juniperus</i> spp.
	<i>Inland dunes, old and decalcified</i>
	2310 Dry sand heaths with <i>Calluna</i> and <i>Genista</i>
	2320 Dry sand heat <i>Calluna</i> and <i>Empetrum nigrum</i>
	2330 Inland dunes with open <i>Corynephorus</i> and <i>Agrostis</i> grassland

Tabel 3.2. continued

3.7	Freshwater habitats
	<i>Standing water</i>
3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation
3160	Natural dystrophic lakes and ponds
	<i>Running water – sections of water courses with natural or semi-natural dynamics (minor, average and major beds) where the water quality shows no significant deterioration</i>
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation
3270	Rivers with muddy banks with <i>Chenopodion rubri</i> p.p. and <i>Bidention</i> p.p. vegetation
3.8	Temperate heath and scrub
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
3.9	Sclerophyllous scrub
	<i>Sub-Mediterranean and temperate scrub</i>
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
3.10	Natural and semi-natural grassland formations
	<i>Natural grasslands</i>
6120	* Xeric sand calcareous grasslands
	<i>Semi-natural dry grasslands and scrubland facies</i>
6210	(*) Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites)
6230	* Species-rich <i>Nardus</i> grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)
	<i>Semi-natural tall-herb humid meadows</i>
6410	<i>Molina</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
3.11	Raised bogs and mires and fens
	<i>Sphagnum acid bogs</i>
7110	* Active raised bogs
7120	Degraded raised bogs still capable of natural regeneration
7140	Transition mires and quaking bogs
7150	Depressions on peat substrates of the <i>Rhynchosporion</i>
	<i>Calcareous fens</i>
7210	* Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>
7220	* Petrifying springs with tufa formation (<i>Cratoneurion</i>)
7230	Alkaline fens

Table 3.2. continued

3.12	Rocky habitats and caves
	<i>Rocky slopes with chasmophytic vegetation</i>
8220	Siliceous rocky slopes with chasmophytic vegetation
	<i>Other rocky habitats</i>
8330	Submerged or partially submerged sea caves
3.13	Forest
	<i>Forest of temperate Europe</i>
9110	<i>Luzulo-Fagetum</i> beech forests
9120	Atlantic acidophilous beech forest with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer (<i>Quercion robori-petraeae</i> or <i>Liici-Fagenion</i>)
9130	<i>Asperulo-Fagetum</i> beech forests
9150	Medio-European limestone beech forests of the <i>Cephalanthero-Fagion</i>
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the <i>Carpinion betuli</i>
9170	<i>Galio-Carpinetum</i> oak-hornbeam forests
9190	Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains
91D0	* Bog woodland
91E0	* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)

3.5 Atlantic and continental salt marshes and salt meadows

1330 - Salt meadows

Salt meadows comprise plant communities that are flooded by the sea. The vegetation consists of salt tolerant plants. For centuries salt meadows have been utilised for grazing and/or mowing resulting in low-growing and species-rich vegetation. Cessation of management results in an overgrowth of tall plant species. Many sub-types are found in this habitat type, e.g. reef swamps. Salt meadows are found along coasts protected against the impact of waves and consequent erosion.

Characteristic species include: *Juncus gerardii*, *Agrostis stolonifera*, *Festuca rubra*, *Puccinellia maritima*, *Seriphidium maritimum*, *Elytrigia repens*, *Elytrigia pungens*, *Armeria maritima*, *Spergularia marina*, *Blysmus rufus*, *Puccinellia suécica*, *Atriplex prostrata*, *Halimione*-species, *Tripolium vulgare*, *Beta vulgaris* ssp. *maritima*, *Archangelica litoralis*, *Potentilla anserina*, *Tripleurospermum maritimum*, *Atriplex littoralis*, *Glaux maritima*, *Triglochin maritimum*, *Plantago maritima*, *Eleocharis*-species, *Carex extensa* and *Puccinellia distans*

Salt meadows are commonly found near fjords and inlets as well as along shallow-water coastal areas. Large, well-developed salt meadows are found in the Wadden Sea, the Liim Fiord, the Ise Fiord, and along parts of the coast of Lolland.

Coastal grasslands are flooded too rarely to belong to the salt meadow habitat type as defined in the Directive, so they belong to the dry grasslands habitat type (6210 and 6230).

The national conservation status for natural habitat type 1330 has not been assessed, but local studies show a reduction in the area of this type of habitat and a decline in its value as a habitat for the characteristic fauna and flora (including red-listed plant species).

Favourable conservation status for habitat type 1330 implies that the type is widespread, and found in both the Atlantic and Continental regions.

The area with the habitat type must be stable or increasing and the habitat type must be represented throughout its geographic range.

The most important threats against the habitat type are overgrowth by tall plant species due to ceased management, changed hydrological conditions due to drainage, and eutrophication. At the local level assessment of grazing pressure, overgrowth, drainage and indicators of eutrophication must be included in the assessment of favourable conservation status.

Table 3.7 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.7. Criteria for favourable conservation status on a local/site level for habitat type 1330. Indicators marked (P) are pressure indicators.

Type 1330	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Natural nutrient level	Nitrogen deposition (kg/N/hectare/year)	Not exceeding the critical load	The critical load 30-40 kg N/Hectare/year, UNECE 2003.
	(P) Hydrology	Proportion of area exposed to flooding from the sea	Stable or increasing	The ideal is natural hydrological processes with tidal creeks, beach ridges, landlocked lagoons, and salt pans. Sea walls, drains and ditches obstruct these processes.
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality.	If no historical information is available, the natural pH can be predicted by modelling.
	Conductivity	Conductivity (microsiemens)	Within the natural range for the habitat type in Denmark. Stable or improving.	Conductivity expresses the total ion capacity and is thus an important indicator for eutrophication.
	(P) Natural environment factors	Distance (m) to nearest area with pesticide and fertiliser application.	Stable or increasing	Should follow the current recommendations (minimum 50 m).
	Balance between low- and tall-growing species	Proportion of area with intense grazing/mowing.	Stable or increasing, although areas with extensive grazing should not be excluded.	Areas with extensive grazing and tall species may be valuable.
	Species composition of plants	Deviation from the species composition of this habitat type in the reference condition.	The deviation is within the natural variation of the habitat in Denmark.	The species composition is a strong indicator of changes in the environment.
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Register by species, e.g. using the DAFOR scale. Variations are natural. In special cases declines may be acceptable/targeted.

3.6 Coastal sand dunes and inland dunes

2130 -* Fixed coastal dunes with herbaceous vegetation ("grey dunes")

This habitat type comprises fixed dunes behind the white dune and has a more or less closed vegetation cover of herbs, grasses and phanerogams and a large number of mosses and lichens, often in mosaic patterns. The calcium content in the soil can vary considerably, depending on the origin and age of the subsoil, and the leaching of the dunes. The habitat type comprises grey and green dunes as well as other subtypes dominated by herbaceous plants. The grey dune is a habitat for certain types of lichens, especially reindeer mosses.

The green dune is not as leached and acid as the grey dune and it contains the largest number of species. The habitat type is part of a dynamism where sand drifts, embryo dunes and breaches occur naturally, such that the characteristic plant communities are mixed on the gradient of the white dune and down to the fixed crowberry heathland. The dynamism in the grey and the green dunes is more pronounced than in the fixed crowberry heathland (type 2140 – decalcified fixed dunes with *Empetrum nigrum*). This type of habitat may form a mosaic of vegetation with dwarf scrub areas, thicket or tree populations in dunes, and with humid dune hollows. In Denmark these dune types are commonly found along the west coast, but on a European level they are rare and threatened.

The flora often contains one or more of the following characteristic species: Early Hair grass *Aira praecox*, Silver Hair grass *Aira caryophyllea*, *Bromus hordeaceus*, *Carex nigra*, species of *Cerastium*, Grey Hair grass *Corynephorus canescens*, Common stork's bill *Erodium cicutarium*, *Galium verum*, *Gentianella campestris*, *Koeleria glauca*, *Myosotis ramosissima* Rochel, Common Restharrow *Ononis spinosa*, *Phleum arenarium*, *Polygala vulgaris*, *Silene otites* and *Viola tricolor* ssp. *curtisii*.

Mosses: *Tortula ruraliformis* and lichens: *Cladonia* ssp.

The hinterland dunes do not belong to this habitat type, nor do dunes where the vegetation is dominated by trees, thicket, or dwarf scrub such as crowberry or heather. Moreover, humid dune hollows are not included in this habitat type, as they are described exclusively in habitat type 2190.

On a national level, the conservation status of habitat type 2130 is evaluated as being unstable. In many localities the type is under pressure of change from subdued dynamism, due to coast protection and the prevention of sand drifts, and scrub invasion due to the grazing being stopped. Previously, the sheep grazing has maintained the dynamism by means of grazing, and through wear and tear caused by the "sheep paths" on steep slopes, and shelters in the hollows between the dunes.

In the Netherlands, considerable damage has been observed on lichens in the dune heathland and there has been a drastic growth of mosses at

the cost of lichen. These alterations are attributed to the increased nitrogen fallout, due to factors such as intensive farming. In Denmark, the nitrogen burden is at about the estimated critical level, which might mean that any changes will only show up in the long-term.

Succession will take place in the direction of decalcified dunes with scrub vegetation (habitat type 2140) and in the event of disturbances, in the direction of the white dunes (habitat type 2120). Scrub invasion in the form of deciduous trees (especially aspen *Populus* and birch *Betula*) and conifers (especially pine *Pinus*) is common.

The area supporting habitat types 2120, 2130 and 2140 must be stable. As these habitat types are unlikely to extend into the country at the cost of the existing land use, the dune series 2110-2140, like other near-shore, low-lying areas, will be particularly vulnerable to coastal erosion that might occur both generally, or due to the sea level rising (geological isostasy equivalence and global warming).

The most important threats to this habitat type are wear and tear, eutrophication and too little, or wrong, management, which, among other things has caused scrub invasion.

The dune habitat types often occur in large- and small-scale mosaics, which interact in complex succession patterns. When setting the locale conservation objectives, it will often be a good idea to relate to the entire dune complex, comprising a mosaic of several dune habitat types. Overall objectives should be set for the mosaic as a whole, and, if necessary, for sub-areas, such that dynamism and succession can be continued. In certain cases, especially on localities, where new dunes are formed continuously, it may be expedient to target free succession, as any loss of area by succession would be compensated for by the increase of younger succession levels. In practice, the objectives for a dune area should thus include units of measurement for the distribution of the habitat types in question in terms of area.

Table 3.11 states the specific criteria, which have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.11. Criteria for favourable conservation status on local/site level for the habitat type 2130. Indicators marked with (P) are pressure indicators.

Type 2130	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Not exceeding the critical load	The critical load 10-20 kg/N/hectare/ year, UNECE 2003
	Naturally low nutrient level	Nitrogen content (mg/g) in <i>Cladonia portentosa</i> . Damages on foliage leaf are observed by N >8 mg/g and by N=13 mg/m lichen are dying	Within the natural range of the habitat type in Denmark. Stable or improving	Should be less than 6 mg/g. Level in countries without N-load 2-4 mg/g, in Denmark 5.3-9.6 mg/g, lowest in Western Jutland, highest in Mid-Jutland
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality.	If no historical information is available, the natural pH can be predicted by model
	(P) Mechanical impact	Proportion of area influenced by wear and tear from e.g. tourism	Stable or decreasing	Should not exceed 10%
	Open, herbal dominated vegetation	Coverage of non-indigenous trees and bushes	Stable or decreasing	Overgrowth is partly due to seed-pressure from plantations and invasive species. Mountain pine, dune pine, Norway spruce and Japanese rose should be removed
	Cryptogams	Lichen/moss-ratio in grey dune	Within the natural range of the habitat type in Denmark. Stable or improving	Should be higher than 3:1. The grey dune is characteristic of a rich lichen flora. The criterion is preliminary, but studies have shown that eutrophication is increasing the proportion of mosses
	Species composition of plants	Deviation from the species composition of this habitat type in reference condition	The deviation is within the expected variation of the natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environment factors
	Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level

3.8 Temperate heath and scrub

4030 – European Dry Heaths

Dwarf bushes dominate the vegetation and thrives under dry conditions. After fires or beetle attacks, the coverage of dwarf bushes will typically be very poor for about 2-3 years. The dry heath habitat type often develops on sandy, leached out, poor and sour soil. The vegetation develops best in areas with a great deal of rainfall.

Characteristic species include: Heather *Calluna vulgaris*, crowberry *Empetrum nigrum*, Cowberry *Vaccinium vitis-idaea*, Bilberry *Vaccinium myrtillus*, Petty Whin *Genista anglica*, *Genista germanica* and Hairy Greenweed *Genista pilosa*.

The habitat type is found mainly in Western-, Central- and Northern Jutland and in a few smaller areas in Eastern Denmark. Some parts, which are dominated by *Juniperus*, are kept separated as habitat type 5130, and other types of dwarf bush communities are separated as habitat types 2140, 2310, and 2320.

For centuries, the heaths have been used extensively in many different ways, such as for extensive grazing, peat cutting, heath harvesting and – burning, which have created and maintained the habitat type on a certain succession level. In general, today the heath is found in several succession levels. In the absence of maintenance, the natural succession develops in the direction of forest, and on the way it runs through a series of succession levels. On the most leached out and least nutritious heaths, a slow succession can be expected, from areas dominated by heather *Calluna vulgaris* towards areas dominated by crowberry *Empetrum nigrum*. Relatively nutritious heaths can be expected to develop towards a grass community dominated by bent grass *Deschampsia flexuosa* or purple moor-grass *Molinia caerulea*. Grazing with very little grazing pressure has been shown to be a very important precondition for stable and varied heath vegetation. Grazing not only prevents trees from reproducing, but also seems to improve the conditions for the heath's non-dominant herbs, the sedge family, and the cryptogam communities.

The national conservation status in Denmark has not been evaluated. Large parts of the heaths are being invaded by scrub, especially mountain pine *Pinus montana*, aspen *Populus tremula*, oak *Quercus*, and juniper *Juniperus*. Provided that the heaths are used/maintained, the most serious threat to the West European heaths is the increased fallout of atmospheric nitrogen. The increased eutrophication of the soil, including the raw humus layer, has caused many heaths in the Netherlands and England to develop into grass heaths. Locally, the decrease in heather may further be accelerated by the increased frequency and intensity of attacks by the heather-leaf beetle, apparently due to the increased nutrient content of the heather's.

It is uncertain whether the heaths can be sustained throughout their natural range with the current nitrogen fallout. Moreover, it is uncertain

whether the heaths can be preserved, if they are not used to a greater extent.

The area with this habitat type must be stable or increasing, and the habitat type must be represented throughout its geographic range.

The most serious threats to this habitat type are eutrophication, and too much and/or wrong maintenance, resulting in scrub invasion (scrub invasion is not an anthropogenic impact, but the result of management history). These circumstances shall be included in the assessment of the conservation status.

Table 3.29 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.29. Criteria for favourable conservation status on local/site level for the habitat type 4030. Indicators marked with (P) are pressure indicators.

Type 4030	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Not exceeding the critical load	Critical load 10-20 kg/N/year, UNECE 2003
	Naturally low nutrient level	C/N relation in upper layer of peat	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Should be >30
	Naturally low nutrient level	Nutrition content in year-shoot of dwarf bushes	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Should be <14 mg/g
	Naturally low nutrient level	Frequency and intensity of the heather's leaf-beetle	Not exceeding one large attack each 15 years	Natural part of the dynamic of the heath, but increased frequency may indicate increased N-content in parts of the plant
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality.	If no historical information is available, the natural pH can be predicted by model
	Open vegetation	Coverage of Mountain pine, Spruce, Aspen, Oak, Birch, and Juniper	Stable or decreasing	Should be <10%. Sparse occurrence of trees may be acceptable out of consideration for animals and birds
	Vegetation dynamics	Coverage /frequency of heather (dwarf bushes) the pioneer stage	Within the expected invariation of the natural habitat type in Denmark. Stable or improving	Should be about 10% of the heather/ dwarf bush area. Dynamic is favourable where the heath's other plant communities and fauna shift with the stages of the heather's life cycle
	Regeneration (heather/ dwarf bushes)	Coverage of bare soil	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Preferably >20% at intervals of some years. Important for establishing of lichen/ mosses, herbs, the sedge family, and for heat-demanding insects
	Invasive species	Coverage/ frequency of Campylopus introflexus and the other cryptogames	Stable or decreasing	Should be <5%, but not more than 10% of the cryptogame community's total frequency. The moss is invasive and an aggressive competitor to the heather's lichen-species
	Species composition of plants	Deviation from the species composition of the habitat type in reference condition	The deviation is within the expected variation of the natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environment factors
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Variations are natural. In special cases declines may be acceptable /targeted.

3.10 Natural and seminatural grassland formations

6210 (*) - Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)

This habitat type comprises the extensively managed and grassed semi-natural dry grasslands on calcareous soils in Denmark. The habitat type includes numerous subtypes, and is broadly defined. It is often found on slopes with scrubs as a natural part of the area. Very dry, open sandy soil is included in habitat type 6120. Generally, habitat type 6210 has been occasionally grazed by domestic or wild fauna, to keep the vegetation open. Extensive management implies a flora composition that has not been impoverished by fertilisation, spraying, or re-sowing.

The habitat type is prioritised when the area contains:

- several species of orchid, or
- a significant population of at least one uncommon species of , or
- one or more species of orchid that is on the red-listed (rare or very rare).

The flora is often species-rich and comprises the following characteristic species: *Anthyllis vulneraria*, *Arabis hirsuta*, *Brachypodium pinnatum*, *Bromus inermis*, *Campanula glomerata*, *Carex caryophyllea*, *Carlina vulgaris*, *Centaurea scabiosa*, *Koeleria pyramidata*, *Leontodon hispidus*, *Medicago sativa*, *Ophrys insectifera*, *Orchis mascula*, *Orchis morio*, *Orchis purpurea*, *Orchis ustulata*, *Primula veris*, *Sanguisorba minor ssp. minor*, *Scabiosa columbaria*, *Bromus erectus*, and *Silene otites*.

Furthermore, the following common species may indicate the habitat type: *Carex flacca* Schreb, *Dactylis glomerata*, *Leucanthemum vulgare* Lam., *Prunella vulgaris*, *Cirsium acaule* Scop., *Plantago media*, *Linum catharticum*, *Viola hirta*, *Artemisia campestris*, *Potentilla argentea*, *Briza media*, *Filipendula vulgaris* Moench, *Juniperus communis*, *Medicago lupulina*, and *Thymus pulegioides*.

Important occurrences of the habitat type are found in many places, including on calcareous moraine, but most of the occurrences are small. Areas with prioritised sub-types (orchid sites) are found in places such as High Møn and Himmerland. Overgrown stages, in the form of open scrub are included in the habitat type as long as the semi-natural dry grassland vegetation is not in too much shade. Locally, the habitat type may occur in mosaic patterns with other natural grassland types. For a more detailed description, see Buchwald & Søgaard (2000).

On a national level, the conservation status of habitat type 6210* is evaluated as unstable. The reasons for this are problems with airborne eutrophication, scrub invasion, and small populations of some of the characteristic species of the habitat type e.g. *Orchis ustulata*. The national conservation status of habitat type 6210 without orchids has not been evaluated.

The area with this habitat type must be stable or increasing.

Orchis ustulata used to be spread sparsely throughout the natural range of the habitat type, but today it is only found at two local sites in Himmerland. This habitat type will form part of the national conservation status in order to preserve optimal conditions for the *Orchis ustulata* in Denmark.

The most serious threats to this habitat type are eutrophication, and too little or wrong management which result in scrub invasion. The habitat type relies on the continuous germination of seeds and the successful establishment of new individuals. Therefore, it is assessed to be essential that bare spots of mineral soils appear for a number of years in the periods between October and March. Moreover, an assessment of grazing, scrub invasion and indicators of undisturbed nutrient balance should be included in the criteria for favourable conservation status at a local level.

This habitat type includes a number of characteristic species, which are rare on a national or local level: *Brachypodium pinnatum*, *Cypripedium calceolus*, *Orchis morio*, *Orchis purpurea*, *Campanula glomerata*, and *Scabiosa columbaria*. The prosperity of these species will form part of the assessment of the favourable conservation status.

Table 3.3 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.32. Criteria for favourable conservation status on a local/site level for the habitat type 6210. Indicators marked with (P) are pressure indicators.

Type 6210	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Nitrogen deposition should not exceed the level laid down	Critical load 15-25 kg/N/year, UNECE 2003
	Naturally low nutrient level	C/N relation in upper layer of peat	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Should be at least 15-18. Preliminary criteria value. Low C/N increases the mineralising (nitrate) risking leach of N and dominance of few species
	Naturally low nutrient level	Nutrition content in the characteristic grasses	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Should be <14 mg N/g dry weight. Preliminary criteria value
	Fertilising and overgrazing	Phosphorus value	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Generally, a phosphorus value about 1-2 indicates that the locality has not been fertilised
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality (c. 7-8).	If no historical information is available, the natural pH can be predicted by model
	Continuity	Proportion of area with extensively grazing of domestic or wild fauna	Stable or increasing	Cessation of grazing leads to high risk of scrub invasion
	Balance between low grass- or herbal dominated vegetation and scrub/trees	Coverage of bushes and trees	Within the expected variation of the natural habitat type in Denmark. Stable or improving	The criterion admits of preservation of old valuable scrub
	Species composition of plants	Deviation from the species composition of the habitat type in reference condition	The deviation is within the expected variation of this natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environment factors
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Register by species, e.g. using the DAFOR scale. Fluctuations are natural. In special cases declines may be acceptable /targeted.

6410 – *Molina* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

This habitat type represents meadows and communities of fens, which develop on sites where the groundwater level fluctuates. Only very small amounts of nitrates and phosphates are available to the plants, and the habitat type is typically grazed or mowed.

The following characteristic species are found on calcareous soils: *Molinia caerulea*, *Inula salicina* L., *Dianthus superbus*, *Selinum carvifolia*, engskær, and *Tetragonolobus maritimus*. The following characteristic species are found on lime-deficient soils: *Molinia caerulea*, *Viola palustris*, *Viola persicifolia* Schreb., *Galium uliginosum*, *Juncus conglomeratus*, *Inula britannica*, *Ophioglossum vulgatum*, *Crepis paludosa* (L.) Moench, *Luzula multiflora* (Ehrh.) Lej., *Potentilla erecta* (L.) Rausch., *Potentilla anglica* Laichard., *Lotus pedunculatus* Cav., *Dianthus deltoides* L., and *Carex pallescens* L. The habitat type is found sporadically all over the country but most frequently in the western part. For a more detailed description, see Buchwald & Søgaard (2000).

The flora in habitat type varies, and may be extremely rich in species, and contain many rare vascular plants and mosses. The type occurs naturally in hollows in heath areas, and at the edge of lakes and streams with poor nutrition and bogs and moors. Furthermore, the habitat type also occurs where there is uncovered peat and sand, and fluctuating water levels due to human disturbances, e.g. peat cutting on heather moors.

The plant communities found in calcareous soil with constantly water-saturated soil is included in habitat type 7230. The plant communities found in calcareous soil where *Cladium mariscus* (L.) Pohl forms a substantial element of the vegetation is included in habitat type 7210. The plant communities found in humid dune hollows are described in habitat type 2190. Habitat type 6410 often occurs as mosaic vegetation together with type 4010, as well as in the inner, fresh parts of salt meadow areas.

The national conservation status for habitat type 6410 has not been evaluated.

Favourable conservation status of this habitat type on a national level implies that the type is found in both the Atlantic and the continental region in Denmark.

The area of the habitat type must be stable or increasing.

The most serious threats to this habitat type are changed hydrological conditions due to drainage or water catchments, eutrophication and overgrowth. These factors should therefore be considered when assessing the conservation status of the occurrences.

One of the most important factors for the presence of this habitat type is a temporarily high water level, typically during the winter. Changes in the water level, which prevent winter flooding, are thus unfavourable to the habitat type.

Type 6410 is a habitat type characterised by the low availability of nutrients. Eutrophication via atmospheric deposition and supplies from neighbouring areas are thus threats to the growth of the habitat type.

Most areas within habitat type 6410 are dependent on grazing or mowing.

This type includes a number of characteristic species which are rare on a national or regional level, such as *Viola persicifolia* Schreb., and *Serratula tinctoria*. The growth of these species should be considered when assessing the conservation status.

Table 3.34 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.34. Criteria for favourable conservation status on a local/site level for the habitat type 6410. Indicators marked with (P) are pressure indicators.

Type 6410	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Nitrogen deposition should not exceed the level laid down	Critical load 15-25 kg/N/year, UNECE 2003
	(P) Hydrology	Proportion of area exposed to drain, ditching and water catchment drilling	Stable or decreasing	Drainage etc. have a negative effect, and water catchment in the type's hydrological catchment may influence negatively
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality	If no historical information is available, the natural pH can be predicted by model
	Conductivity	Conductivity (microsiemens)	Within the natural range for the habitat type in Denmark. Stable or improving.	Conductivity expresses the total ion capacity and is thus an important indicator for eutrophication.
	(P) Natural environment factors	Distance (m) to nearest area with pesticide and fertiliser application.	Stable or increasing	Should be >50 m
	Continuity	Proportion of extensively grazing of domestic animals or game	Stable or improving	Cessation of grazing leads to high risk of scrub invasion
	Open, herbal dominated vegetation	Coverage of bushes and trees	Within the expected variation of this habitat type in Denmark. Stable or improving	The best <10%
	Species composition of plants	Deviation from the species composition of the habitat type in reference condition	The deviation is within the expected variation of this natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environmental factors
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Register by species, e.g. using the DAFOR scale. Fluctuations are natural. In special cases declines may be acceptable /targeted.

3.11 Raised bogs and mires and fens

7110 - *Active raised bogs

Active raised bogs are characterised by so much peat formation over thousands of years that the bog has no connection with the groundwater in the underlying soil and thus only receives rainwater. The peat layer maintains a so-called “secondary water surface” and the active raised bog is deficient in lime, acidic, and naturally lacking in nutrients. The peat is primarily formed by the characteristic raised-bog mosses *Sphagnum cuspidatum*, *S. rubellum* and *S. magellanicum*. Only a few species of vascular plants and mosses are specialised at surviving in this extremely low nutrient, acidic and wet environment. The habitat type is dominated by sphagnum mosses and dwarf bushes, and the open central raised-bog surface is the only Danish habitat type that does not host any species of grass. The type includes small lakes on the surface.

Ideally, the raised bog may be divided in three separate units, all of which are included in this habitat type: the raised bog surface, the marginal bog, and the lagg, which is a wet zone around the bog. The central raised-bog surface can be differentiated in relatively dry hummocks with *Empetrum nigrum*, *Calluna vulgaris*, *Erica tetralix* and *Andromeda polifolia* and in wet hollows dominated by *Sphagnum*, *Rhynchospora alba*, and *Eriophorum angustifolium*.

The term “active raised bog” refers to the fact that the active peat formation must be ongoing. The type also includes raised bogs, which are temporarily not growing, for reasons such as climatically related droughts. Trees often grow in the marginal and lagg-zones and they are included in this type 7110, as long as their growth is too widespread to be considered as a forest type (maximum 50% coverage of crowns).

Heavy drainage, peat digging or the like classifies the habitat type as type 7120, which is degraded raised bogs with a potential for regeneration. Drained dugout and eutrophic raised bogs, which are now covered by forest, should be considered as a cultural product and are included in forest type 91D0.

According to the EC Interpretation Manual, this type normally includes one or more of the following characteristic species: *Andromeda polifolia*, *Drosera rotundifolia*, *Drosera anglica*, *Drosera intermedia*, *Eriophorum vaginatum*, *Vaccinium oxycoccus*, *Calluna vulgaris*, *Carex nigra*, *Carex limosa*, *Carex pauciflora*, *Eriophorum gracile*, *Rhynchospora alba*, *Rhynchospora fusca*, *Scheuchzeria palustris*, *Utricularia intermedia*, *Utricularia minor*, *Utricularia ochroleuca*, *Odontoschima sphagni*, *Sphagnum magellanicum*, *S. angustifolium*, *S. imbricatum*, *S. fuscum*, *S. balticum*, *S. majus* and the reindeer mosses (*Cladonia* spp.). The following species are those that occur most commonly in Danish conditions: *Calluna vulgaris*, *Erica tetralix*, *Empetrum nigrum*, *Andromeda polifolia*, *Vaccinium oxycoccus*, *Eriophorum angustifolium*, *Eriophorum vaginatum*, *Trichophorum cespitosum*, *Rhynchospora alba*, *Drosera rotundifolia*, *Drosera intermedia*, and *Rubus chamaemorus*.

Moreover, the following species of invertebrates are characteristic for the type:

Spider: *Pardosa sphagnicola*

Dragonflies: *Leucorrhinia dubia*, *Aeshna subartica*, *Aeshna juncea*, and *Soma-tochlora artica*

Moths: *Hyphenodes humidalis* (synonym: *turfosalis*) and *Eugraphe subrosea*

Butterflies: *Colias palaeno*, *Boloria aquilonaris*, *Coenonympha tullia*, *Vaccini-ina optilete*

Grasshoppers: *Metrioptera brachyptera* and *Stethophyma grossus*.

The national conservation status of this habitat type is considered to be unfavourable (Pihl et al. 2000). The assessment is considered to be reliable as more than half of the habitats are being monitored. More than 90% of the 22 localities that have been reported are assessed to have an unfavourable conservation status. This assessment is primarily based on a relatively high number of raised bogs, which face problems with drainage, and scrub invasion related to eutrophication. Moreover, sports-hunting interests (the release and supplementary feeding of game and the digging of waterholes) have an unfavourable influence on raised bogs. Monitoring data (Risager & Aaby 1996, Risager 1997) support this assessment of the conservation status. In the period from 1987/1989 to 1995/1996 the hummock vegetation on the raised bogs has generally been on the increase. This increase is primarily due to intensive scrub invasion of the hollows. The scrub invasion is not thought to be exclusively due to desiccation, but is probably also caused by increases in nitrogen deposits.

It should be noted that the monitoring has primarily been concentrated on the raised bog surface, on the assumption that the vegetation changes will be most noticeable here. The entire raised bog, including the marginal and laggzones, should be considered as a single ecosystem. The primary functions of a raised bog is the formation of peat, and in order to maintain this, the lagg, margin and surface should be preserved as a whole.

The national conservation objective must be to ensure a favourable conservation status for this habitat type 7110. This implies a broad composition of active raised bogs with characteristic geomorphological and biological features, representing all the Danish varieties.

It is of national and international importance to ensure a favourable conservation status for Lille Vildmose, which covers 2,000 ha and represents more than half of the total area of raised bogs in Denmark. Moreover, it is one of the largest raised bogs in the European lowlands. Succession with the immigration of trees and other uncharacteristic raised bogs species is not a natural process in Denmark. Substantial areas of degraded raised bogs (type 7120) and forest-covered raised bogs (part of type 91D0) must be re-established in order to obtain favourable conservation status and to obtain habitats that are sufficiently large for the characteristic species of

this type. On a national level, the area and the range must increase until it is proved that the habitats are sufficiently large.

The most serious threat to this habitat type today is changed hydrological conditions caused by drainage and water catchment in the hydrological basin of the bog. In order to obtain favourable conservation status it is necessary to secure a buffer zone around the bog where there is no drainage or water catchment. Moreover, this habitat type, which is extremely lacking in nutrients, is seriously threatened by eutrophication, which has doubled since the 1950s (Risager 1999). The reduction of the area, range, and quality of this habitat type means that many raised bogs today are too small to be able to maintain viable populations of the characteristic species.

Furthermore, drainage is not the only forest management measure that distresses raised bogs situated close to large forest areas. The massive occurrences of *Picea abies* and other coniferous trees have had an unfavourable hydrological influence on the habitat type (Rune 1997). Finally, it is important to avoid grazing domestic animals and unnatural dense (fed) game at the very bog.

Table 3.36 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.36. Criteria for favourable conservation status on a local/site level for the habitat type 7110. Indicators marked with (P) are pressure indicators.

Type 7110	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Nitrogen deposition should not exceed the level laid down	Critical load 5-10 kg/N/year, UNECE 2003
	Naturally low nutrient level	Content of N in peat mosses	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Should be <10 mg N/g dry weight. Preliminary criteria value. Low C/N increases the mineralising (nitrate) risking leach of N and dominance of few species
	Naturally low nutrient level	C/N relation in the upper layer	Within the expected variation of the natural habitat type in Denmark. Stable or improving.	Should be >25 mg. Preliminary criteria value. Low C/N increases the mineralising (nitrate) risking leach of N and dominance of few species
	Naturally low nutrient level	NO ₃ -N in water	Within the expected variation of the natural habitat type in Denmark. Stable or improving.	Should be <0,03 mg N/liter. Nitrate is an indication of mineralising of the peat and cessation of the peat development
	(P) Natural environment factors	Distance (m) to nearest area with pesticide and fertiliser application.	Stable or increasing	Should be >100 m. The type is very sensitive to impacts
	Undisturbed hydrology and nutrient level	Frequency/coverage of grasses in wet hollows	Within the expected variation of the natural habitat type in Denmark. Stable or improving	The raised bog surface is the only terrestrial habitat type in Denmark without grasses.
	Undisturbed hydrology and peat development	The height (mm) of the secondary water surface	Within the expected variation of the natural habitat type in Denmark. Stable or improving	Year- and season fluctuations should only depend on rainfall and evaporation
	Undisturbed hydrology and peat development	Coverage of wet hollows	Within the expected variation of the natural habitat type in Denmark. Stable or improving	A decrease in wet hollows indicates significant changes of the conditions
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality (<4,2).	If no historical information is available, the natural pH can be predicted by model
	Conductivity	Conductivity (microsiemens)	Conductivity should not change in relation to the natural conductivity of the habitat type	Conductivity is an important indicator for a potential changed eutrophication.

Table continues on next page

	Scrub invasion	Coverage of trees and bushes at the raised bog	Stable or decreasing. No trees or bushes should grow at the central part of the habitat type (surface)	Scrub invasion may happen due to drainage and eutrophication and may accelerate exsiccation.
	Mechanical disturbance	The number of grazing animals/ha and distance to nearest	No grazing of domestic animal. Distance to game feeding stable or increasing	Distance to game feeding should be >200 m
	Species composition of plants	Deviation from the species composition of the habitat type in reference condition	The deviation is within the expected variation of this natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environment factors
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Register by species, e.g. using the DAFOR scale. Fluctuations are natural. In special cases declines may be acceptable /targeted.

7230 – Alkaline fens

The habitat type represents bogs and meadows with soil that is constantly water-saturated, where the groundwater level is more or less calcareous, but lacking in nutrients, resulting in the special alkaline fen vegetation. The habitat type may comprise occurrences similar to springs. The vegetation is open and low growing, generally with low sedges and mosses when the habitat type is grazed or mowed. Without grazing or mowing, the habitat type develops into higher growth with overgrown areas, which gradually become scrub or swamp forest. One of the rare variations is extremely rich fens, a habitat type that is in drastic decline, and which occurs on particularly calcareous soil.

Characteristic species include: *Schoenus nigricans*, *Schoenus ferrugineus*, *Eriophorum latifolium*, and the mosses *Cindlidium stygium*, *Tomenthypnum* and various sedge-species (*Carex nigra*, *C. panicea*, *C. pulicaris*, *C. dioica*, *C. hirta*, *C. lepidocarpa*, *C. demissa*, *C. oederi ssp. pulchella*, *C. oederi ssp. oederi*, *C. flava*, *C. echinata*, *C. hostiana*, *C. flacca*, *C. rostrata*, *C. paniculata*, and *C. ovalis*).

In addition to the characteristic species, the following plants also define the habitat type: *Juncus subnodulosus*, *Dactylorhiza incarnata*, *D. purpurella*, *Liparis loeselii*, *Herminium monorchis*, *Epipactis palustris*, *Pinguicula vulgaris*, *Primula farinosa*, *Blysmus compressus*, *Eleocharis quinqueflora*, and *Parnassia palustris*. The list of plants has a certain over-representation of extremely rich species of fens, but transitional alkaline fens are included in this habitat type. Taller species, such as *Peucedanum palustre*, *Eupatorium cannabinum*, *Calamagrostis canescens*, and *Phragmites australis* may dominate in the overgrown stages of this habitat type.

The habitat type is found spread around small areas in the most of the country, but only in a few places west of the main ice line. For a detailed description see (Buchwald & Søgaard 2000).

Alkaline fens in dune hollows belong to habitat type 2190. Plant communities in which *Cladium mariscus* is a substantial feature belong to habitat type 7210. Eutrophicated meadows, high-growing vegetation and reed beds are not included in habitat type 7230, unless they are the early overgrowing stages of more low-growing meadows, poor in nutrients, with alkaline fen features. Plant communities on calcareous soil with fluctuating groundwater levels (dry in summer) belong to habitat type 6410. The border with poor fen areas follows the traditional Danish division between rich and poor fens.

The national status of habitat type 7230 has not been evaluated.

Favourable conservation status for habitat type 7230 implies that the type is found in both the Atlantic and the continental regions in Denmark.

The area with this habitat type must be stable or increasing.

The most serious threats to this habitat type are overgrowth, eutrophication, and changed hydrological conditions due to drainage and water catchment. These factors should be considered when assessing the fa-

vourable conservation status. Most occurrences are likely to be small areas, which is why the impact from neighbouring areas will generally be of great importance.

One of the most important conditions for habitat type 7230 is soil that is constantly water-saturated. Particular threats to this type thus include dehydration caused by drainage, water catchment (or other regulations) and increased evaporation from hydrologically connected neighbouring areas, where trees and bushes dominate on adjacent areas.

Habitat type 7230 is a type characterised by a very low supply of nutrients. Eutrophication caused by direct fertilisation, atmospheric deposition, and the conveyance of nutrients of any kind from neighbouring areas are thus threats to the condition and growth of the habitat type.

Several of the characteristic species of this type are rare on a national or regional level, including *Schoenus ferrugineus*, *Eriophorum latifolium*, *Schoenus nigricans*, *Carex flava*, *C. lepidocarpa*, *C. hostiana*, *C. pulicaris*, and *C. dioica*. The growth of these species will form part of the evaluation of the favourable conservation status.

Table 3.42 states the criteria that have to be met before the habitat type can be assessed to have favourable conservation status.

Table 3.42. Criteria for favourable conservation status on a local/site level for the habitat type 7230. Indicators marked with (P) are pressure indicators.

Type 7230	Property	Unit of measurement	Criteria	Comments
Area	Area (hectares)	Number of hectares	Stable or increasing	
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Critical load should not exceed the level laid down	Critical load is estimated to be 15-25 kg/N/year
	Naturally low nutrient level	Content of nitrogen in peat mosses	Within the natural range for the habitat type in Denmark. Stable or improving.	Should be <10 mg/N/g dry weight. Preliminary criteria value.
	Naturally low nutrient level	NO ₃ -N in water	Within the natural range for the habitat type in Denmark. Stable or improving.	Should be <0,03 mg N/liter. Nitrate is an indication of mineralising of the peat and thus cessation of peat development
	(P) Hydrology	Proportion of area exposed to drain, ditching and water catchment drilling in buffer zone	Stable or decreasing	Drainage and water catchment have a negative effect in the type's hydrological catchment
	Natural nutrient composition	Distance (m) to the nearest area with liming and fertilizing	Stable or increasing. Liming and fertilizing must not take place in the area	
	Acidity	pH	The pH must be stable and not considerably lower than the natural acidity of the locality	If no historical information is available, the natural pH can be predicted by model
	Conductivity	Conductivity (microsiemens)	Within the natural range for the habitat type in Denmark. Stable or improving.	Conductivity expresses the total ion capacity and is thus an important indicator for a potential changed eutrophication.
	Balance between herbal dominated vegetation and scrub/trees	Coverage of bushes and trees	Stable or decreasing. Only few individuals should be accepted	Scrub invasion is the highest threat caused by natural succession, eutrophication, or lowering of water level
	Continuity	Proportion of extensively grazing or other previous utilisation	Stable or improving	If previous management causes the open conditions
	Species composition of plants	Deviation from the species composition of the habitat type in reference condition	The deviation is within the expected variation of this natural habitat type in Denmark	The species composition is a diversity indicator of changes in the environment factors
Characteristic species	Population of characteristic species	Index of populations of characteristic species present	Long-term maintenance on a stable or increasing level	Register by species, e.g. using the DAFOR scale. Fluctuations are natural. In special cases declines may be acceptable /targeted.

4 Species

The criteria used to evaluate the conservation status of the species in the individual sites and on a national level are chosen within the framework laid down for favourable conservation status in the Habitats Directive (see section 1.1). The following indicators should therefore be included in the criteria for the various species: population, habitat, geographical range and size of habitat.

4.1 Criteria for favourable conservation status on a national level

The national criteria for granting a species favourable conservation status include indicators describing:

- populations
- geographical range
- total size of habitats.

Setting national criteria for species whose national conservation status is assessed to be “unfavourable” poses a particular problem. Only rarely is there adequate scientific knowledge to be able to predict how a given species or habitat would be able to achieve “favourable conservation status”.

Several of the species covered by the Habitats Directive either have their primary geographical range to the north or south of Denmark, or have only a marginal population in Denmark. In such cases a more fluctuating population can be expected compared to the more central areas of their geographical range. Thus, for species with “unfavourable” conservation status in Denmark, it is possible to set criteria for favourable conservation status, but relevant national management measures cannot be implemented to improve their status.

For some lesser-known species, such as the Allis shad *Alosa alosa*, the Narrow-mouthed whorl snail *Vertigo angustior* and the pseudoscorpion (*Anthrenochernes stellae*) it has only been possible to indicate criteria for favourable conservation status with some degree of reservation. For better-known species such as the Fen Orchid *Liparis loeselii* and the Yellow Marsh Saxifrage *Saxifraga hirculus*, threshold values for distribution and quantity have been chosen, based on the species’ biology and its potential for dispersion, and these must be fulfilled in order for the species to be granted favourable conservation status. The distinction between the species’ unfavourable conservation status and favourable conservation status is, however, difficult to define.

Typically, a species will experience growth in some parts of the country and a reduction in numbers in others, or their numbers will fluctuate from one year to the next. Thus, in practice, such increases and decreases in numbers have to be weighed up when evaluating the national conservation status.

Based on preliminary estimates of conservation status for species with unfavourable conservation status, the populations, geographical range and size of habitat must, in general, be on the increase until conservation status is assessed to be favourable. Threshold values have been set for the majority of the species, but in several cases they have, as yet, been impossible to stipulate. In these instances, a note has been written in the comment column in the tables in question.

For species with favourable conservation status, the indicators must at least be stable, while for species with uncertain or unknown conservation status, the lack of data and scientific knowledge about the size of the population, the geographical range and the habitat makes it difficult to clarify whether development is increasing or stable. The development of these species is therefore usually indicated as being stable or increasing, as a better specification will have to wait until the data required to evaluate their conservation status become available.

The criteria for the occurrence of viable populations (Minimum Viable Population, MVP) on a national level are stated here, and some species also indicate the number of viable populations related to the various regions and parts of Denmark (see the definitions). It is stated that the Danish population as a whole must be stable or increasing, as it is assumed that "normal" fluctuations over the years are included in the assessment. Should the current national conservation status be considered unfavourable, the total population must increase until the status is assessed to be favourable. Thereafter the population must, as a minimum, be stable within the above-mentioned fluctuations.

A certain fluctuation in the occurrence of rare and scarce species is to be expected, even when there are no external influences. Some local populations will become extinct, others will immigrate. Furthermore, corrections will need to be made for changes in the external environment, such as climate, before a long-term estimate can be made. Thus an overall national evaluation must include the total number of species that are on the decrease, and compare this with those that are stable or on the increase.

The geographical range of each individual species is related to regions and provinces, and the current number of habitats is estimated. The criterion is often that the species must be found in a stable or increasing number of localities, whereas for some species a specific number is indicated. Please note that where a specific number of sites is stated for the species the figure is based on an assessment of the number required to prevent a reduction in the geographical range. This estimate is primarily based on historic information for the species in question. It is impossible to give a more precise statement or calculation of the occurrence required, from the knowledge that is available.

The concept "size" of habitat is relative, and is to be understood in relation to the biological demands made by each individual species. Individuals such as the Grey Seal, the Pond Bat and the Fen Orchid have different requirements in terms of space and a more general and objective way of defining the size of habitat is therefore offered by the ecological concept of "carrying capacity". This concept describes the number of individuals which can be supported by a given resource (e.g. food, or in this case, size). The introduction of the concept of a Minimum Viable Po-

population (MVP) requires that the habitat is of a certain minimum size. In order for species to survive, the size of the current, suitable habitats needs to be at least stable, and preferably on the increase.

4.2 Criteria for favourable conservation status on a local level

The criteria for favourable conservation status of a species in a locality comprise indicators such as

- the population
- the state of the habitat
- the size of habitat.

The occurrence of a species is naturally the best indication of the suitability of a habitat. It does not necessarily mean that the locality has a favourable conservation status, which requires the population to be stable or increasing. This is done to ensure that localities supporting small populations or variable occurrence of a species are also able to achieve a favourable conservation status. Should the conservation status be assessed not to be favourable, the population must be increasing until the status is assessed to be favourable. Hereafter, the population must at least be stable within the scope of normal fluctuations.

Only rarely is there a criterion that the populations of the various localities must be viable, and thus meet the demands of MVP. Such a criterion would in many cases be unnecessary and unrealistic, as not all localities are able to support so many individuals. The majority of species do not require the presence of a MVP for each individual occurrence, which is, to a certain extent, linked by means of genetic exchange, e.g. diversification in a metapopulation. The knowledge of, and the criteria for MVP, are necessarily specific to a particular species and are seldom available to the extent required.

The concept of metapopulation (see the definitions) is also relevant for some species where it is impossible to focus exclusively on the populations in the various localities. For other species it is impossible to estimate the individual populations due to a lack of suitable methods (e.g. the Allis Shad and the Twaite Shad). In these instances, a viable population may be the main target.

The state of the habitat is naturally extremely important for the conservation status of the biology of the species. A series of parameters are chosen on the basis of the biology of the species which are of considerable importance to the species and easy to measure. These parameters are used to describe a favourable state for the habitat as a locality.

The size of the habitat is usually described as the area of the habitat but in some cases the number (e.g. of small ponds) or the length (e.g. of streams) can be used as indicators. Such specifications may comprise both the actual habitat and suitable/potential habitats, in localities supporting either current or previous occurrences of the species in question. In terms of habitat a distinction can be made between breeding, foraging and wintering sites for some species. It is important to sustain and create

the largest possible habitats, in order to ensure a comprehensive variation in the quality, both within each individual locality and within the metapopulation. This variation is probably one of the explanations as to why species supported by large localities have a lower death rate than species living in small localities. Maintaining a large variation in habitat quality requires either large localities or many small ones.

4.3 The criteria for the favourable conservation status of species

The criteria for favourable conservation status have been prepared for 36 Danish species comprised by the Annex II of the EEC Habitats Directive (Table 4.1), and a preliminary assessment of the conservation status is indicated for each species. This work has been carried out by the NERI (Pihl et al. 2000). The assessment is divided into five categories: favourable, uncertain, unfavourable, unknown and disappeared. For further definitions of these categories, see Pihl et al. (2000).

Table 4.1. List of 36 Danish species covered by the Annex II of the EEC Habitats Directive for which criteria for favourable conservation status have been prepared. Prioritised species are marked with an *. Provisional conservation status as designated in Pihl et al (2000). Only grey shaded species are included in this report.

Section	Group of species/species	Code	Latin name	Conservation status
4.4	Mammals			
	Pond Bat	1318	<i>Myotis dasycneme</i>	Favourable
	Harbour Porpoise	1351	<i>Phocoena phocoena</i>	Uncertain
	Otter	1355	<i>Lutra lutra</i>	Uncertain
	Grey Seal	1364	<i>Halichoerus gryphus</i>	Uncertain
	Harbour Seal	1365	<i>Phoca vitulina</i>	Favourable
4.5	Amphibians			
	Great Crested Newt	1166	<i>Triturus cristatus</i>	Uncertain
	Fire-bellied Toad	1188	<i>Bombina bombina</i>	Uncertain
4.6	Fish			
	Sea Lamprey	1095	<i>Petromyzon marinus</i>	Unknown
	Brook Lamprey	1096	<i>Lampreta planeri</i>	Favourable
	River Lamprey	1099	<i>Lampreta fluviatilis</i>	Unknown
	Allis Shad	1102	<i>Alosa alosa</i>	Unknown
	Twaite Shad	1103	<i>Alosa fallax</i>	Unknown
	Salmon	1106	<i>Salmo salar</i>	Unfavourable
	*Houting	1113	<i>Coregonus oxyrhynchus</i>	Uncertain
	Spined Loach	1049	<i>Cobitis taenia</i>	Favourable
	Weatherfish	1145	<i>Misgurnus fossilis</i>	Unfavourable
4.7	Butterflies			
Marsh Fritillary	1065	<i>Euphydryas aurinia</i>	Unfavourable	
4.8	Dragonflies			
	Green Club-tailed Dragonfly	1037	<i>Ophiogomphus cecilia</i>	Uncertain
	Large White-faced Darter	1042	<i>Leucorrhina pectoralis</i>	Unfavourable
4.9	Beetles			
	Great Diving Beetle	1081	<i>Dyticus latissimus</i>	Unfavourable
	Dipping Beetle	1082	<i>Graphoderus bilineatus</i>	Unfavourable
	*Hermit	1084	<i>Osmoderma eremita</i>	Uncertain
4.10	Pseudoscorpions			
	Stellas moskorpion	1936	<i>Anthrenochernes stellae</i>	Not evaluated
4.11	Snails			
	Geyer's Whorl Snail	1013	<i>Vertigo geyeri</i>	Unknown
	Narrow-mouthed Whorl Snail	1014	<i>Vertigo angustior</i>	Unknown
	Desmoulins' Whorl Snail	1016	<i>Vertigo moulinsiana</i>	Unknown
4.12	Bivalves			
	Freshwater Pearl Mussel	1029	<i>Margaritifera margaritifera</i>	Unfavourable
	Thick Shelled River Mussel	1032	<i>Unio crassus</i>	Unknown
4.13	Vascular plants			
	Little Grapefern	1419	<i>Botrychium simplex</i>	Unfavourable
	Yellow Marsh Saxifrage	1528	<i>Saxifraga hirculus</i>	Unfavourable
	Floating Water Plantain	1831	<i>Luronium natans</i>	Uncertain
	Slender Naiad	1833	<i>Najas flexilis</i>	Unfavourable
	Lady's Slipper Orchid	1902	<i>Cypripedium calceolus</i>	Uncertain
	Fen Orchid	1903	<i>Liparis loeselii</i>	Unfavourable
4.14	Mosses			
	Green Shield Moss	1386	<i>Buxbaumia viridis</i>	Unfavourable
	Slender Green Feather-moss	1393	<i>Hamatocaulis vernicosus</i>	Unfavourable

4.4 Mammals

1318 – The Pond Bat *Myotis dasycneme*

The national conservation status for the Pond Bat is provisionally assessed as favourable due to the fact that the number and occurrence of the species seem to be stable (Pihl et al. 2000).

On a national level and within the continental region, the population must be stable or increasing in the most important, known wintering sites, within a normal population fluctuation (Table 4.2.). This requires among other things, that there are or continue to be good living conditions in the known wintering sites within the continental region of Jutland.

The overall occurrence of the Pond Bat in Jutland within the continental region (south of the Liim Fjord) must constitute a viable population. Furthermore, the sites must have stable or increasing areas with wintering localities containing pits /galleries offering the Pond Bat suitable wintering conditions.

The current habitats for the Pond Bat must sustain/create suitable living conditions for the species and there must be indications that the population is stable or on the increase (Table 4.3), meaning that the known wintering sites (lime pits) must provide optimal living conditions during hibernation, i.e. constantly low frost-free temperatures, high levels of humidity, very little draught in the pits and protection against being hunted.

Moreover the species must be protected against being disturbed as bats during hibernation cannot tolerate being disturbed very many times before their energy, which is stored as fat, is exhausted. Should the species experience repeated disturbances, they may have difficulties in lasting the entire winter period and/or the following autumn with a high level of activity but with limited food resources.

During the arrival period in the autumn (August-November) and again during the departure period in the spring (March-June) large numbers of bats hang in the open in the pits a few hundred metres closest to the exit. In the evening and during the night they are active, flying in and out. During these periods, comings and goings and other disturbing activities should be avoided.

Furthermore the habitat must offer the Pond Bat stable or increasing winter localities such as pit walls/galleries which provide suitable conditions for hibernation.

Table 4.2. The Pond Bat *Myotis dasycneme* Criteria for favourable conservation status on a national level. Obligatory monitoring indicators are marked *.

The Pond Bat	Feature	Unit of measurement	Criteria	Comments
Populations	*Viable populations	Number of individuals	The Pond Bat must occur in MVP for the Pond Bat is un- a viable population in the continental region of Jutland (south of the Limfjorden)	The Pond Bat is un- known, but the present popu- lation in Mid- and East Jutland is estimated as viable
	*Population	Number of individuals in known hibernating sites	Stable or increasing	Counts at hibernating sites may give a relative indication of population size. The known hibernating sites are the lime pits of Smidie, Mønsted, Daubjerg and Ting- bæk.
Geographical range	*Distribution	Localities with hiber- nating Pond Bats	Pond Bats must occur in the continental part of Jutland (south of the Limfjorden) at the known hibernating sites	
Size of habitats	Current and suitable habitats	Number, area and length of current and otherwise suitable hibernating sites for the Pond Bat	Stable or increasing	Pond Bats require a suffi- ciently large number of hiber- nating sites to maintain/create a self-sustaining and viable population

Table 4.3. The Pond Bat. Criterion for favourable conservation status on a local/site level (winter localities). Obligate monitoring indicators are marked with *.

The Pond Bat	Feature	Unit of measurement	Criterion	Comments
Population	*Occurrence	Individual	The presence of the species	Counts in winter localities may result in a relative indication of the size of the population, but not a population estimate
	*Population	No. of individuals	Stable or increasing	
Habitat	Temperature	Degrees	Stable coolness	Constantly low frost-free temperatures (6-10°), high level of humidity, and very little draught in the pits provide optimal conditions for hibernating bats.
	Humidity	Relative percentage of humidity (Hygrometre)	High level of humidity	
	Draught	Based on inspection, visual/physical assessment	No/little draught	
	State of entrances	Size of entrance without negative impact	Constant and free access for the bats to hibernate	If required, mounting of a safety grate. No stand must block the entrance. No artificial light at the entrance.
	Undisturbedness	Human activity	Quiet hibernating conditions for the Pond Bat . Low level of human activity. No disturbance during the arrival period in the autumn (August-November) and during the departure period in spring (March-June)	It is essential for the hibernating bats not to be disturbed, as this may drain away their energy resources, thus influencing negatively on their chance of surviving the winter and the following early spring with scarce food supply.
		Noise and light	No artificial light and/or noise	
Size of habitat	Current and suitable habitats	Pit walls/galleries measured as ha/metres either holding Pond Bats or providing suitable conditions for hibernation	Stable or increasing	Sufficiently large areas/stretches of suitable winter localities in order to sustain/provide a viable population, are necessary

1355 – Otter *Lutra lutra*

Compared to the rest of Europe, the Danish otter population is very isolated (Mitschell-Jones et al. 1999) and the size of the population (Minimum Viable Population Size) makes it uncertain whether the genetic variation can be sustained. The national conservation status for the otter is, therefore, provisionally assessed as uncertain (Pihl et al., 2000).

Tests of DNA from otter material from the period 1883-1993 (stored by the natural history museums) have shown that low genetic variation is a natural phenomenon for the species in Denmark, and is not an expression of a loss of genetic material ("Bottleneck"), when the population was at its lowest in the 1980s (Pertoldi et al. 2001). Based on this fact, it is assessed that the population is increasing, and will, eventually, obtain favourable conservation status in Denmark.

New investigations of Danish otters have shown that the quantities of chemicals such as cadmium, lead, mercury, organochlorine pesticide residues and polychlorinated bi-phenyles are lower than in other populations in Europe, and do not currently constitute a hazard to the Danish otter population (Madsen & Sogaard 2001). In spite of orders not to use stop-grids in eel traps, to prevent otters from drowning, and increasing numbers of fauna passages that have been established to avoid traffic kills, the number of dead otters that has been found has risen throughout the 1990s. During the period 1995-1999, the Forest and Nature Agency received 25-35 dead otters a year, the majority of which came from traffic kills (Madsen & Sogaard 2001).

Favourable conservation status for the otter in Denmark requires the species to have a total viable population of at least 1,200 individuals in Jutland (Table 4.6). A theoretical calculation of the MVP assesses it to be between 1,200 and 1,600 otters (Wansink & Ringenaldus 1991), based on a recommendation for an actual population of 500 sexually mature individuals in order to sustain sufficient genetic variation (Shaffer 1981). Moreover, the population must be stable or on the increase, both on a national level and in the Atlantic and continental regions.

Moreover, the species must occur in the Atlantic and the continental regions in both Jutland and Zealand, and in all the 20 areas of interest which are designated in the national management plan for the species (Sogaard & Madsen 1996). Furthermore, the number of streams in which the otter occurs must be stable or on the increase. Finally, the length of streams and areas with lakes offering suitable habitats for the otter must be stable or increasing.

Good living conditions must be maintained/created in current and suitable habitats, and there must be indications that the population is stable or increasing (Table 4.7).

The habitat must offer adequate feeding (streams/lakes covered by a fishing stream policy), and there must also be undisturbed habitats (safe areas) where the otter can breed and take refuge.

Man-made mortality factors, such as trap drowning and traffic kills, must be reduced by providing information about, and controlling, blocking devices in fish traps and the establishment of fauna passages where heavy traffic crosses habitats/streams.

To maintain/improve the population and its density, there must be stable or increasing stretches/areas with suitable habitats for the otter.

Table 4.6. The Otter. Criteria for favourable conservation status on national level. Obligatory monitoring indicators are marked *.

The Otter	Feature	Unit of measurement	Criteria	Comments
Populations	*Viable populations	Tracks (in fixed observing stations)	The otter must be found in a viable population in the Atlantic and the continental regions of Jutland	There is considered to be one coherent population of otters in Jutland which covers both the biogeographical regions. A viable population must be more than 1,200 individuals.
	*Population	Tracks (in fixed observing stations)	Stable or increasing number of individuals	This applies for both the Jutland and the Zealand populations. There is presently no agreed standardised method of determining population size. The track method constitutes a relative indication of otter occurrence and presence, but it does not provide an actual population estimate.
Geographical range	*Distribution	Geographical range	Stable or increasing	The otter must occur in a stable or increasing number of streams in the Atlantic and continental regions and in all the 20 designated areas of interest (Søgaard & Madsen 1996)
		Number of streams where the otter occur	Stable or increasing	
Size of habitats	Current and suitable habitats	Total number of km/ha of streams/ lakes where the otter either occur or which, moreover, is a suitable habitat	Stable or increasing	To sustain/create a self-reproducing and viable population there must be sufficient areas/stretches of suitable habitats.

Table 4.7. The Otter. Criteria for favourable conservation status on a local/site level. Obligatory monitoring indicators are marked *.

The Otter	Feature	Unit of measurement	Criteria	Comments
Population	*Viable populations	Tracks of/delivered otters	The presence of the Otter	The surveys take place in October-April
	*Population	Tracks (in fixed observing stations)	Stable or increasing number of individuals	The method described by Madsen (2001) offers a relative indication of the occurrence and presence in the area but not an actual population estimate
Habitat	Hide/refuge	Occurrence of refuges (such as forest of reeds, scrub or other kinds of stands, uncultivated fringes, undisturbed areas etc.).	Stable or increasing	As a minimum there must be a refuge for each 5 km of stream. A refuge is considered an unexploited area (measuring minimum 1,000 m ²) with little human activity).
	Undisturbedness	Recreational exploitation (in particular traffic, angling, hunting and navigation).	Moderate exploitation of the locality, in the area as well as during the day. Preferably areas with no disturbance at all (refer to refuges).	Undisturbed localities support the possibilities of breeding and help tolerating some disturbance in other parts of the habitat.
	Dispersal and habitat barriers	Faunapassages under roads crossing streams	The occurrence of or establishing faunapassages	-At all moderate to heavily trafficed roads (defined from day/seasonal traffic) crossing important streams/habitats, there ought to be faunapassages to prevent otters from traffic kills. Roads/traffic (and fishing tackle) may constitute dispersal ecological barriers, which prevent the species from spreading, as well as being negative for the free movement in the habitat (habitat fragmentation).
		Stop grids or blocking devices in fish traps and fishing tackles.	Stable or increasing	To prevent the otter from drowning in fish traps. Current regulations order use of stop grids/blocking devices in both salt water and fresh water.
Size of habitat	Current and suitable habitats	The number of km/ha of streams/lakes which either support the otter and moreover offers suitable habitats in the stream system.	Stable or increasing	To sustain/create a self-reproductive and viable population, it is necessary with a sufficiently large area/stretches of suitable habitats.

4.5 Amphibians

1188 – Fire-bellied Toad *Bombina bombina*

The national conservation status for Fire-bellied Toad is assessed as uncertain (Pihl et al 2000). The species is distributed in south-eastern Denmark and was previously common on the Danish islands from Als in west to Bornholm in east and towards north to Tunø, Samsø and Hesselø. Only ca. eight of ca. 23 populations, which were known in Denmark in 1970, have survived some of which were only represented by very few individuals: Enø (9), Hjortø (4) and Ærø with only 1 single male. The population on Ærø was later reconstructed by including breeding from Hjortø and Avernakø (Fog 1999). Since the beginning of the 1980's many ponds have been dredged and digged. Furthermore the Fire-bellied Toad has been artificially propagated and released. Within its former range and for each of the current populations, reserves were established based on an EU-project starting in 1999. From mid 1980's the species totalled ca. 1,000 individuals increasing to ca. 1,600 in 2000. All the existing populations are, however, assessed to be too small to be able to survive at the very long sight (Fog 1999).

A favourable conservation status for the Fire-bellied Toad in Denmark depends mainly on the presence of the species within the continental region, more explicit in the sub-regions of Funen and Zealand/Lolland/Falster (Table 4.14).

For each of the known intact populations there must be an original and a reserve population. Furthermore the mixed population on Ærø must be maintained which means that there have to be at least $2 \times 7 + 1 = 15$ populations. In each of the 15 populations there have to be at least three ponds where the species succeed to breed in most years. The total population must be increasing.

To sustain a population on the very long sight there must be at least 1,000 adult individuals (estimated viable population/MVP). Therefore, there have to be at least this number of individuals for each of the surviving genetic entities (populations), which means both from the original as well as from the reserve population. To avoid inbreeding, individuals must be exchanged regularly between each original population and its reserve population.

There must be a viable population holding at least 1,000 individuals in each of the 8/15 localities with an original/reserve population which must be stable or increasing (Table 4.15).

Favourable breeding, rearing and forage conditions must be maintained/offered in the present, known localities with breeding Fire-bellied Toads. Further to what has already been mentioned about the number of breeding ponds it is important that in each locality within short distance there must be at least two potential breeding ponds of such nature that one is very shallow without drying out in cold, wet years while the other is deeper, rather permanent and functions in warm, dry years.

Table 4.14. The Fire-bellied Toad. Criteria for favourable conservation status on a national level. Obligate monitoring indicators are marked with *.

The Fire-bellied Toad	Feature	Unit of measurement	Criterion	Comments
Populations	*Viable populations/ genetic units	Number of adult individuals	Within the continental region the Fire-bellied Toad must occur in viable populations	The eight genetic units/remaining populations comprise partly an original population, partly a reserve population if established
	*Population	Number of adult individuals	Increasing	The number of adult individuals (MVP>1,000) is probably necessary to obtain a viable population in the long term.
Habitat	*Distribution	Range	Stable or increasing	The Fire-bellied Toad must occur within the continental region, primarily on Funen and Zealand/Lolland/Falster (sub-regions)
		Number of localities with Fire-Bellied Toad	Increasing	As a minimum, there must be 15 localities holding the species, one mixed population (Ærø) and 2 x 7 (one original plus its reserve population)
Size of habitat	Current and suitable habitats	Total area with occurrence/population of the Fen Orchids or which moreover is a suitable habitat	Increasing	Increasing size of the present and other suitable habitats is a precondition for the preservation/increase of the Fen Orchids populations.

The number of breeding ponds must be stable or increasing and breeding on an annual basis must be successful in at least three ponds. Each individual population must be offered a stable or increasing number of breeding ponds.

Table 4.15. The Fire-bellied Toad. Criteria for favourable conservation status on a local level (separate localities holding the species). Obligate monitoring indicators are marked with *.

The Fire-bellied Toad Feature		Unit of measurement	Criterion	Comments
Population	*Occurrence	Adults, tadpoles, eggs	The presence of the Fire-bellied Toad	A viable population of at least 1,000 adults must be present. However, exchange of individuals with a reserve population demands only a total of 1,000 individuals.
	*Population	Number of adults	Stable or on the increase	
Habitat	Water level	The number of ponds characterized by shallow flooding	Stable or increasing	Within each population, at least one of the breeding ponds must be characterized by shallow flooding during most summers
	Water quality	Water quality estimated from flora, invertebrate fauna and/or thickness of the mud	Stable or increasing	Eutrofication has a negative impact on the breeding success
	Shadow	Shadowing trees and bushes	Stable or decreasing	Overgrowing with marsh plants, particularly reed mace has a negative impact and must constitute only 50%
	Occurrence of predators	Unnatural occurrence of fish, crayfish and ducks	Stable or decreasing	Ditching must not establish access for fish
	Uncultivated margins	Width of uncultivated margins round ponds holding the species	Stable or increasing	The uncultivated margins round ponds should be at least 5 metres estimated from maximum winter population
	Contact to uncultivated areas/distance to cultivated areas	Uncultivated /extensively exploited areas holding the most important ponds	Each population should have access to several ponds in large, uncultivated, grazed or extensively exploited areas, which are unfertilized and without crop spraying	Farming of the surrounding areas is important for the quality of the breeding locality and for the survival during migration
Size of habitat	Current breeding ponds	The number of breeding ponds	Breeding success in each population	To secure that no random variations bring down the number to zero, three ponds are considered a minimum
	Suitable breeding ponds Forage and wintering grounds	Number of suitable breeding ponds including the current breeding ponds Number and area of other natural habitats within a distance of approx. 400 m from the breeding ponds	Stable or increasing Each of the important breeding ponds must be adjacent to at least one possible wintering ground via uncultivated areas without fertilization and	If the population reproduces itself and becomes widespread the potential living conditions must not be reduced. Mortality during migration must be kept low between the ponds and between the ponds and the wintering grounds.

4.6 Fish

1113 – The Houting *Coregonus oxyrhynchus*

The national conservation status for the Houting is preliminary assessed as unfavourable which is due to the fact that the species is only reproducing itself in the streams of Vidå, Ribe Å, Varde Å and Brede Å. Only Vidå supports a considerable production of fry (Pihl et al. 2000)

At the beginning of the 19 century, the houting was a common species in the Wadden Sea but gradually disappeared during the 1920s and 1930s from the Dutch and German rivers (Jensen et al. 1999) due to pollution and regulation of the streams. The species became more and more scarce in Denmark and in 1979-1980 it was confined to the Vidå-system supporting only a very small population (Jensen et al. 1999). Its decline was possibly caused by deterioration of spawning and reproduction conditions caused by extreme stream maintenance, poor water quality and the installation of dams which prevented the fish from reaching its spawning grounds. Regulations have, likewise, reduced winter flooding and thus nursery habitats for the fry (Jensen et al. 1999).

Because of this decline, Ribe and Sønderjyllands counties initiated a species action plan partly to enhance breeding and reproduction by improving the environment and partly by rearing and restocking houting fry in streams previously inhabited by the species. Thus a total of 1.7 mio. houting fry was restocked into the streams of Vidå, Brede Å, Ribe Å, Varde Å, Kongeå and Sneum Å. Reproduction has been observed only in the four first mentioned streams.

By medio 1990/2000 the populations in each stream have been estimated by the capture/recapture method supplemented by other methods, viz.: Vidå: 3,000/4,000, Brede Å: 2,000/400, Ribe Å: 1,650/1,200, Varde Å: 783/600, Sneum Å: 171/<50, Brøns Å: 36/<50 and Rejsby Å: <25/? (Jensen et al. 1999, Jensen et al. 2003). Presumably, there are no other populations of the houting in Denmark.

Favourable conservation status for the Houting in Denmark depends mainly on the fact that the species within the Atlantic region must be found in viable, self-maintaining populations which migrate upstream to spawn in each of the streams of Vidå, Brede Å, Ribe Å and Varde Å (Table 4.28). Furthermore, the total population must be increasing. The population must be self-sustaining through egg-laying and must not be supplemented with artificial introduction.

Favourable conservation status implies, furthermore, that reproduction is possible in the streams of Sneum Å, Konge Å and Brøns Å and in other suitable streams flowing into the Wadden Sea.

Finally the stretch of streams/areas with suitable spawn and nursery habitats must be increasing. This is a condition required in order to maintain/increase the distribution and population. As a minimum Vidå, Brede Å, Ribe Å and Varde Å must be open to the species.

In each individual locality the population must be stable or increasing (Table 4.29). In the current habitats (stream systems) spawn and nursery opportunities must be maintained/established. This requires that the suitable spawn and nursery habitats are stable or increasing and that the streams have no obstructions preventing access to suitable breeding grounds or preventing/hindering the fry from reaching the sea. Likewise, the water quality must meet the same requirements as the spawn and nursery habitats for salmonids.

Table 4.28. The Houting. Criteria for favourable conservation status on a national level. Obligate monitoring indicators are marked with *.

The Houting	Feature	Unit of measurement	Criterion	Comments
Populations	*Viable populations	Number of upstreams spawner	Viable populations must be present in the streams of Vidå, Brede Å, Ribe Å and Varde Å	Viable populations secure survival of the species and enhance dispersal to other localities
	*Population	Number of upstreams/ downstreams individuals	Increasing	Populations are estimated from standardized methods
Habitat	*Distribution	Number of localities supporting the Houting	Stable or Increasing	Related to the streams of Vidå, Brede Å, Ribe Å, Varde Å, Kongeå, Sneum Å and Brøns Å. The current number of stream systems supporting the Houting is estimated to be sufficient to maintain a favourable conservation status for the species.
		Range	The occurrence of the species must depict its range in Denmark, i.e. the streams flowing into the Wadden Sea from Ho Bugt to the Danish-German border	
Size of habitat	Current and suitable breeding grounds Suitable nursery habitats	Total km of streams, either exploited by the species or suitable for spawning within Vidå, Brede Å, Ribe Å and Varde Å including the other stream systems Total number/hectares of streams/lakes and flooded areas with suitable nursery habitats for the fry within Vidå, Brede Å, Ribe Å and Varde Å including the other stream systems	Increasing Increasing	Increasing number of streams with current and suitable breeding grounds and nursery habitats is a precondition for the preservation/increase of the Houting's distribution and population size The suitable breeding grounds and nursery habitats have to be accessible to the species as a minimum in Vidå, Brede Å, Ribe Å and Varde Å.

Table 4.29. The Houting. Criteria for favourable conservation status on a local level (catchments). Obligatory monitoring indicators are marked with *.

The Houting	Feature	Unit of measurement	Criterion	Comments
Population	*Occurrence	Individual	The presence of the Houting	
	*Population of spawning Houting	Number of individuals migrating upstream	Stable or on the increase	The Houting is searched for in suitable breeding grounds in November/December and captured/recaptured
	*Population of fry	Number of fry migrating downstream	Stable or on the increase	Fry migrating downstream is monitored by mounting of traps
Habitat	Water quality	Estimated from the occurrence of fry in the breeding grounds (DVFI)	Stable or increasing	The quality of the water course is decisive for its suitability as habitat for the species. Fauna class 5 (DVFI) is estimated as minimum.
	Access to the breeding grounds	Mapping and description of obstructions of streams	Decreasing number of blockings	The Houting must not be prevented/substantially hindered by obstructions in reaching the suitable breeding grounds
	Access for the fry to the sea	Mapping and description of obstructions for fry migrating downstream	Removing obstructions to water courses	Obstructions to water courses stop or hinder the establishment of viable populations of the Houting. Even fish ladders designed for fish species like salmon and trout are effective obstructions to the Houting.
	Nursery grounds	Mapping of area	Nursery grounds for the fry must be stable or increasing	The Houting in its nursery grounds requires shallow water with plankton (e.g. Rudbøl Sø and Magisterkogen)
Size of habitat	Current and suitable spawning grounds Suitable nursery grounds	The extent of water courses where the Houting either spawn or has the opportunity of doing so Number of km/ha water courses/lakes and flooding offering suitable nursery grounds to the Houting	Stable or increasing Stable or increasing	To sustain/create a viable population the species needs areas holding suitable spawning and nursery grounds

4.7 Butterflies

1065 – Marsh Fritillary *Euphydryas aurinia*

The national conservation status for the Marsh Fritillary has provisionally been assessed as unfavourable, as the species has disappeared from many localities (Pihl et al. 2000).

Previously, the Marsh Fritillary was widespread throughout the country. The species was, however, last observed outside Jutland in the 1920s, and in about 1950 this butterfly slowly disappeared from many of its localities in Jutland. In 1998, a search was made for the species at 21 localities in Jutland, at most of which its presence had been demonstrated in the beginning of the 1990s. Only in four of these habitats was the Marsh Fritillary found again. The species may, however, have been overlooked (Pihl et al. 2000).

The Marsh Fritillary was found in nine habitats in North Jutland during a survey carried out in the summer of 2000, and it is assessed that the species may occur in 3-4 other habitats (Skov- og Naturstyrelsen 2000). In connection with a pilot project to survey the species in 2001, the Marsh Fritillary was registered in nine localities, two of which were not included in the nine known habitats from the 2000 survey programme (NERI, unpublished data).

A favourable conservation status for the Marsh Fritillary in Denmark depends mainly on the species being able to be consolidated within its present natural range (Table 4.34). This means that the species must be found in the northern part of the country, in both the Atlantic and the continental regions, and occur in one or more viable populations. There are no data for the smallest viable population of the Marsh Fritillary, but the rule of thumb is that MVP for butterflies is approximately 500 imagines, which corresponds to approximately 125 caterpillar cocoons (Skov- og Naturstyrelsen 2000).

A favourable conservation status implies, furthermore, that the present population increases, and ideally in such a way that its present habitat range is expanded. From a professional point of view, it is not possible to define a specific number of Marsh Fritillary populations, as this would depend on the development at the existing localities where the species is found, but it is assessed that there ought to be a minimum of 20 localities with the Marsh Fritillary.

The present Marsh Fritillary habitats must maintain/create good general conditions for the species (Table 4.35), which means that the vegetation in particular must comprise a low-growth, open plant community containing a large stock of devil's-bit, scabious *Succisa pratensis*, and that there should be no negative influence from the surrounding areas. Each individual population of the Marsh Fritillary must be stable or on the increase within a normal fluctuation. The same applies to areas where the species occurs, and suitable habitats.

The species is known for fluctuating a great deal, and moving around between different areas. Consequently, there may be a positive development in the area, but a negative one in terms of the size of the population. Fluctuations should therefore be assessed accordingly, and over a number of years.

Table 4.34. The Marsh Fritillary. Criteria for favourable conservation status on national level. Obligatory monitoring indicators are marked *.

The Marsh Fritillary	Feature	Unit of measurement	Criteria	Comments
Populations	*Viable populations	Number of imagines or caterpillar cocoons	The Marsh Fritillary must be found in one or more viable populations within both the Atlantic and the continental regions	Viable populations ensure the survival of the species in the long term, and improve the possibilities of it spreading into other localities. A minimum of 500 imagines or 125 caterpillar cocoons for each population/meta population.
	*Population	Number of imagines or caterpillar cocoons	Increasing	
Geographical range	*Distribution	Localities with occurrence/population of the Marsh Fritillary	Increasing	There ought to be at least 20 localities with the Marsh Fritillary. There are currently assessed to be too few Marsh Fritillary localities for the species to survive in the long term.
		Natural range	Increasing	As a minimum, the species should occur in the northern part of the Atlantic region, and to the north and south of the Liim Fiord (sub-regions) in the continental part of Jutland.
Size of habitats	Current and suitable habitats	Total area with occurrence/population of the Marsh Fritillary, or which otherwise constitutes suitable habitat for the species.	Increasing	The preservation/increase of the Marsh Fritillary populations depends on the size of the present and suitable/potential habitats being stable or increasing.

Table 4.35. The Marsh Fritillary. Criteria for favourable conservation status on a local/site level. Obligatory monitoring indicators are marked *.

The Marsh Fritillary	Feature	Unit of measurement	Criteria	Comments
Population	Occurrence	The presence of caterpillar cocoons on the leaves of devil's-bit scabious, and/or the occurrence of imago	The presence of the Marsh Fritillary	The imago can basically only be registered in June (depending on the weather), and the caterpillars mainly in August.
	*Population	Number of caterpillar cocoons	Stable or Increasing	
	Occurrence of parasites	Parasite cocoons (numbers in the caterpillar cocoons)	Stable or decreasing	Parasites on ichneumons constitute a considerable reason for fluctuations in the population size, and may explain whether changes are due to increased parasiting or external impacts.
Habitat	*Devil's-bit scabious	DAFOR scale	The occurrence of Devil's-bit scabious must be stable or on the increase	The Devil's-bit scabious must be at least "Occasional" according to the DAFOR scale. It is crucial for the breeding habitat that the Devil's-bit scabious is sufficiently dense, and not too well hidden.
	Flowering herbs	DAFOR scale	The occurrence of flowering herbs must be stable or on the increase	The occurrence must be at least "Frequent" according to the DAFOR scale. The mountain tobacco, Arnica montana, thistles, and mouse-ear hawkweed, Hieracium pilosella, are examples of good nectar plants.
Size of habitat	Vegetation height	Height in centimetres	Low growth, open plant community with spots of bare ground	Approximately 8-20 cm in the period May-June. Imagos fly in May-June, and it is during this period that the vegetation height is particularly important. The height may, however, vary a great deal in the habitats, and several of the nectar plants are much taller than 20 centimetres, e.g. the thistles.

4.8 Dragonflies

1037 – The Green Club-tailed Dragonfly *Ophiogomphus cecilia*

The national conservation status for the Green Club-tailed Dragonfly is preliminary assessed as uncertain because it is uncertain whether the current sub populations can support a viable population.

Since the beginning of the 20th century the species has been recognized from the following five catchments: Varde Å, Skjern Å, Karup Å, Gudenå and Storå. The last observations of the species in Varde Å was in 1943, but are still to be found in Skjern Å, Karup Å and Gudenå, where the species is registered in 1999 in numerous places and it is estimated that the species thrives in good and stable populations in all three stream catchments (Nielsen 2002). New discoveries are recognized from Storåen from 1999, 2001 and 2002 (Aagaard 2002). The Danish habitats for the Green Club-tailed Dragon fly are fairly far away from other known present European populations (approx. 400 km) along the west border of the total range of the species (Brock et al. 1997).

It seems as if the species has improved probably due to the renewed management of the Danish stream systems during recent years (Nielsen 2002). Concurrently with the improvements it is likely that the species will spread to other large, pure stream catchments in Jutland (Nielsen 2002).

Favourable conservation status for the Green Club-tailed Dragonfly in Denmark depends mainly on the fact that the species breeds in more of the large stream catchments in Jutland and thus is to be found in viable populations within the Atlantic as well as the continental region in Denmark (Table 4.36). Furthermore the total population must be stable or increasing.

Estimating a specific number of stream catchments supporting the species are not possible from a scientific point of view as such a number will depend on the trend within the existing systems. In order to maintain/increase the population, stable or increasing numbers of areas in the present and suitable habitats are required.

Each individual population of Green Club-tailed Dragonfly must be stable or increasing (Table 4.37). In the present known habitats (stream catchments) supporting the species, good breeding and nursery facilities must be maintained/created which implies that the the extent of stream catchments with suitable breeding opportunities is stable or increasing. Furthermore, the water quality of potential breeding localities must meet with the demands on suitability as spawn and nursery habitats for salmonids.

Whether the conservation status for the Green Club-tailed Dragonfly in Denmark and in each individual locality (stream catchments) is favourable, more detailed knowledge on the population size of the species is required. Furthermore, improvements of standardised methods for the

registration of and assessment of population size of the species are required.

Table 4.36. The Green Club-tailed Dragonfly. Criteria for favourable conservation status on a national level. Obligatory monitoring indicators are marked with *.

The Green Club-tailed Feature Dragonfly		Unit of measurement	Criterion	Comments
Populations	*Viable populations	Number of individuals	Viable populations must be within the Atlantic and the Continental region	Viable populations secure survival of the species and enhance dispersal to other localities
	*Population	Number of individuals	Stable or Increasing	There are no standardized methods available for population estimate
Range	*Distribution	Range	Stable or Increasing	The Green Club-tailed Dragonfly must be present in large stream catchments within the Atlantic and the continental region.
		Number of stream catchments with the presence of the species	Stable or increasing	The present distribution in the systems of Skjern Å, Karup Å and Gudenå is sufficient for a favourable conservation status of the species.
Size of habitat	Current and suitable habitats	Total km of streams supporting or suitable for the support of the species.	Stable or Increasing	Stable or increasing range of the current and potential habitats is a precondition for the preservation/increase of the species.

Table 4.37. Green Club-tailed Dragonfly. Criteria for favourable conservation status on a local level (catchments). Obligatory monitoring indicators are marked with *.

The Green Club-tailed Dragonfly	Feature	Unit of measurement	Criterion	Comments
Population	*Occurrence	Abundance of the species as larvae, cast exuviae or free flying adults	The presence of the Green Club-tailed Dragonfly	The species is searched for in catchments in July-August, either visual observations of adults or cast exuviae or by dredging after larvae
	*Population	Number of individuals	Stable or on the increase	There are no standardised methods to assess population size. When choosing methods and assess the results of the surveys, the 3-4 year life cycle of the species must be taken into consideration
Habitat	Water quality	Estimated from the abundance of fry in the breeding grounds (DVFI)		The quality of the water course is decisive for its suitability as habitat for the species. Fauna class 5 (DVFI) is estimated as a minimum for the species.
	Maintenance of the catchments	Pruning and mowing of weeds	Careful maintenance of the streams	Regulation of the stream bottom may be harmful to the larvae which lives here buried.
	Stream blockings	Mapping and description of stream blockings where the species occur	The number of stream blockings must be stable or decreasing	Stream blockings may reduce the rate of flow and thus destroy/reduce building up viable populations of the Green Club-tailed Dragonfly
Size of habitat	Current and suitable habitats	The extent of water courses where the species occurs or which are, moreover, suitable as habitat for the species.	Stable or increasing	To sustain/create a self-maintaining population the species needs areas holding suitable spawning and nursery grounds (stretches with fast flowing water where the river bed is comprised of sand or gravel).

4.9 Beetles

1084* - The Hermit *Osmoderma eremita*

The national conservation status for the Hermit is preliminary assessed as uncertain due to the fact that the current habitats are vulnerable towards changes in management of the areas. The Hermit, furthermore, disperses poorly and as each individual population is isolated, it is hardly possible that the species will survive even though the areas remain unchanged (Pihl et al. 2000). Surveys show that 85% of Hermits remain all life in the same tree and disperse between 30 and 190 metres (Ranius 2001).

About 1830-1999, 30 localities in Denmark supporting Hermits were registered, all located east of Storebælt except for one individual which was found in 1886 in East Jutland (Fussingø forest). In recent years the species is only found on Zealand and Lolland and was last seen on Falster in 1938. After 1950 the species was observed in 14 localities, in 1993 in 10 and in 1999 in 9 of these localities (6 on Sealand and 3 on Lolland (Martin 2002)). In the summer of 2000 the Danish population is estimated at approximately 1,200 beetles (Martin 2002).

Favourable conservation status for the Hermit in Denmark depends mainly on the fact that the species is present within the continental region including the subregion Sealand/Lolland/Falster (Table 4.44). The population must be present in one or more viable populations within both the counties of Storstrøm, West Sealand and Roskilde. Furthermore the total population must be stable or increasing.

Favourable conservation status implies, furthermore, that the present nine localities are on the increase supporting the species. To technically state a certain number of populations is not possible as such a number depends on the trend of the current localities supporting the Hermit. The number of current and suitable/potential host trees must, as a minimum, be stable or on the increase.

The number of individuals in each population must be stable or on the increase (Table 4.45). In the current and in suitable habitats proper conditions must be maintained/created in order to support and maintain host trees holding a distance of no more than 300 metres.

Table 4.44. The Hermit. Criteria for favourable conservation status on a national level. Obligatory monitoring indicators are marked with *.

The Hermit	Feature	Unit of measurement	Criterion	Comments
Populations	*Viable populations	Number of individuals (larvae)	Viable populations must be present within the Continental region	Viable populations secure survival of the species and enhance dispersal to other localities
	*Population	Number of individuals (larvae)	Stable or Increasing	The population is estimated by the number of host trees with a distance not exceeding 300 metres which define the limit of a metapopulation
Range	*Distribution	Number of localities with Hermits	Increasing	The number of localities with the Hermit is estimated to be too low to sustain a viable population. The species must occur in 15 localities as a minimum.
		Range	Stable or increasing	The distribution of the Hermit must depict its range in Denmark, i.e. the continental region
Size of habitat	Current and suitable habitats	The total number of host trees for the Hermit or trees likely to become host trees for the species.	Stable or Increasing	Stable or increasing range of the current and potential habitats is a precondition for the preservation/increase of the species.

Table 4.45. The Hermit. Criteria for favourable conservation status on a local level (catchments). Obligatory monitoring indicators are marked with *.

The Hermit	Feature	Unit of measurement	Criterion	Comments
Population	*Occurrence	Individual	The presence of the Hermit	
	*Population	Number of individuals estimated from the presence of host trees with an individual distance of 300 m to the other host trees	Stable or on the increase	Host trees can be counted all year round. The size of the population is in principle estimated for a metapopulation as each individual host tree is understood as habitat for sub-populations
Habitat	Host trees	Number of host trees, i.e. trees with recorded occurrence of the species	Stable or on the increase	Dead trees and branches are favoured by the Hermit. Swedish surveys indicate that each host tree supports the production of approximately 20 Hermits per year on an average.
Size of habitat	Suitable habitats	Number of suitable host trees	Stable or increasing	Many old trees are required to secure a sufficient number of host trees for the Hermit. Suitable host trees are defined as oak, beech and other deciduous trees with a diameter in chest height of >50 cm and with obvious or hidden cavities. Continuity in time and space is vital for the habitats of this species.
	Future suitable habitats	Younger trees going to become suitable as host trees	Stable or increasing	Younger age groups of trees to become host trees for the species must be secured. Numbers of these younger groups must be at least the double of the current host trees and a minimum of five.

4.11 Snails

1013 – The Geyer's Whorl Snail *Vertigo geyeri*

The national conservation status for the Geyer's Whorl Snail is preliminary assessed as unknown. Apparently, since 1970, the species was found in only one locality where four individuals were found in 1999. A more intensive survey of the former known habitats is, therefore, required.

The Geyer's Whorl Snail was, during approximately 1900-1970, registered in 14 localities in Denmark distributed in the northern part of Jutland, North- and South Sealand and Bornholm. Most of these areas were surveyed in 1999 and 2000 and in one locality where the species was last registered in 1936, it was apparently rediscovered. Analyses of the shells did, however, show that it was another *Vertigo* species. The conclusion is, therefore, that the species has not been recovered in Denmark since 1970 and it is uncertain whether it is to be found in Denmark (Fog 2002). In September 2001 the species was purely incidently found in North Jutland in a new locality and positively identified as a Geyer's Whorl Snail (M. Holmen, pers. comm.).

According to Fog (2002) the current method of registration is insufficiently precise to represent its distribution. Thus, new and more applied investigation of the localities in question using sieve tests are required to obtain secure information. The species may probably be found in other and not yet surveyed localities.

Favourable conservation status for the Geyer's Whorl Snail in Denmark implies the occurrence of the species within the continental region (Table 4.48) in which one or more viable populations occur. Each habitat must provide favourable conditions to support a viable population considering its relict distribution and very poor capability of dispersal. In conclusion the population must be stable or increasing.

To technically state a certain number of localities supporting the Geyer's Whorl Snail is not possible as this would depend on the trend within each individual population but to preserve the species in Denmark, an increase in number of habitats and the total area of suitable breeding sites is required. To estimate the status of the species an extensive study of the distribution of the species is required.

The population of the Geyer's Whorl Snail in each habitat must be stable or increasing and the area offering favourable conditions to the species must be stable or increasing (Table 4.49).

To estimate whether the Geyer's Whorl Snail is offered a favourable conservation status in Denmark and in each locality, more detailed information on the occurrence and population is required. Consequently, standardized methods must be applied to estimate the size of the population.

Table 4.48. The Geyer's Whorl Snail. Criteria for favourable conservation status on a national level. Obligatory monitoring indicators are marked with *.

The Geyer's Whorl Snail	Feature	Unit of measurement	Criterion	Comments
Populations	*Viable populations	Number of individuals	Viable populations must be present within the Continental region of Denmark	Viable populations secure survival of the species and enhance dispersal to other localities. The species disperses poorly and as for now it is not possible to state/investigate the population size.
	*Population	Number of individuals	Stable or Increasing	
Range	*Distribution	Number of petrifying springs with the Geyer's Whorl Snail	Increasing	The actual occurrence/distribution is not sufficient for the species to attain a favourable conservation status in Denmark.
		Range	Stable or increasing	The species has to occur within the continental region, i.e. the eastern and northern part of Jutland and on Zealand/Lolland/Falster.
Size of habitat	Current and suitable habitats	The extent of areas either supporting the Geyer's Whorl Snail or which, moreover, could be suitable for the species.	Stable or Increasing	Stable or increasing range of the current and potential habitats is a precondition for the preservation/increase of the species.

Table 4.49. The Geyer's Whorl Snail. Criteria for favourable conservation status on a local level. Obligatory monitoring indicators are marked with *.

The Geyer's Whorl Snail	Feature	Unit of measurement	Criterion	Comments
Population	*Occurrence	Individuals	The presence of the Geyer's Whorl Snail	Each location supporting the species must provide proper conditions to obtain/main-tain a viable population
	*Population	Individuals	Stable or on the increase	Registration methods are described by Fog (2002)
Habitat	Hydrology	The occurrence of outgoing ground water	Stable or on the increase	Outgoing ground water should occur all year round.
	Vegetation	Natural nutritious matters	The level of nutritious matters must be stable or decreasing	Pure nutritious water is a prerequisite for the occurrence of the species.
	Uncultivated/extensive cultivation close to the habitat	Occurrence of ditches and dammed-up water	Stable or decreasing	No influence and admission of nutritious water.
		Incidence of boring for water	Stable or decreasing	Each ditching or damming has a negative influence on the habitat of the species
		Presence of sedge communities, grass species and rush which are tufted	Stable or increasing	No extensive boring for water ought to take place in the area
		Other natural habitats and arable land are searched for within a distance of 50 m from the habitat of the species	Extensive farming must be stable or increasing	Growth of woody plants and other high-growing species influences negatively on the low-growing vegetation. The sedge communities must cover at least one third and purple moor grass no more than two thirds of the area. Insecticides, draining or fertilizer on the adjacent areas may influence negatively on the population
Size of habitat	Current and suitable habitats	The extent of the current habitat or areas which, moreover, could be suitable areas	Stable or increasing	A sufficiently large area with current/suitable habitats is required if a self reproductive population is to be maintained/established.

4.13 Vascular plants

1903 – Fen Orchid *Liparis loeselii*

The national conservation status for the Fen orchid has provisionally been assessed as unfavourable, in part because the species has experienced a decline throughout the 1900s, and because of the modest size and negative trend of the current populations (Pihl et al. 2000). Up until 1950, the species was registered with certainty in approximately 100 localities to the north and east of the main ice formation line, primarily on the islands (Wind 2002).

In 1997-1999, a search was carried out for the Fen orchid in 18 localities in which the species had been registered within the past 10 years. The species was only found again in 11 localities with a total population of 5,000 individuals (Wind 1999, Wind 2002, Pihl et al. 2000).

A favourable conservation status for the Fen orchid in Denmark implies that the species occurs within the continental region, including the northern and eastern part of Jutland, Funen and Sealand/Lolland/Falster, and in one or more viable populations in each of these four areas (Table 4.68). On a national level, the population must be on the increase.

The number of individuals in each population must be stable or on the increase (Table 4.69). The habitats must sustain/create proper conditions in which the species can get established and live. Areas supporting the Fen orchid, and areas with good living conditions for the species must be stable or on the increase.

Table 4.68. The Fen Orchid. Criteria for favourable conservation status on a national level. Obligatory monitoring indicators are marked *.

The Fen Orchid	Feature	Unit of measurement	Criteria	Comments
Populations	*Viable populations	Vegetative and flowering individuals	The Fen Orchid must occur in more viable populations within the continental region	Viable populations improve the species' chances of surviving in the habitat, and of spreading to other, potential habitats.
	*Population	Vegetative and flowering individuals	Increasing	
Geographical range	*Distribution	Number of localities supporting the Fen Orchid	Increasing	The current number of localities is assessed to be too low for the Fen Orchid to survive in the long term. The species should be found in at least 20 localities.
		Natural range	Increasing	The distribution of the Fen Orchid must be increasing within the continental region including in the northern and eastern parts of Jutland, Funen and on Sealand/Lolland/Falster.
Size of habitats	Current and suitable habitats	Total area with occurrence/population of the Fen Orchid, or which is otherwise a suitable habitat for the species.	Increasing	The preservation/increase of the Fen Orchid populations depends on the size of the current and other suitable habitats increasing.

Table 4.69. The Fen Orchid. Criteria for favourable conservation status on a local/site level. Obligatory monitoring indicators are marked *.

The Fen Orchid	Feature	Unit of measurement	Criteria	Comments
Population	Occurrence	Flowering and vegetative individuals	The presence of the Fen Orchid	The best time for counting is mid-June to the end of August (total number).
	*Population	Flowering and vegetative individuals	Stable or on the increase	
	Ability to reproduce	Age distribution: number of seedlings, including young and old individuals by size	The population of Fen Orchid must include a large spread of ages	A substantial spread of ages indicates the ability to reproduce, and thus viability
Habitat	Vegetation	The amount of low plant growth dominated by herbs belonging to the species-rich fen plant community	Stable or increasing	Please refer to 7230, Species-rich Fen: Danish natural types in the European Natura 2000 network (The Forest and Nature Agency, 2000)
	Vegetation height/overgrowth	The coverage of trees and bushes as a percentage of the area	Stable or decreasing	The growth of woody plants and tall herbs has a negative impact on the Fen Orchid, so there should be less than approximately 5% coverage of trees and bushes.
	Bare soil	Amount of bare soil	Occurrence of bare soil	There should be 5-50% bare soil, which is required for seedlings.
	Hydrology	Groundwater level	Stable or increasing	Draining, water catchment and flooding with nutritious (eutrophied) water has a negative impact on the Fen Orchid.
	Uncultivated/ extensively exploited nature in the vicinity of the habitat	The occurrence of other natural habitats and farmland within a distance of approximately 50 metres from the area supporting the Fen Orchid	Extensively exploited areas must be stable or on the increase	Crop spraying with e.g. herbicides, draining and fertilization close to the habitat may have a negative influence on the Fen Orchid population.
Size of habitat	Current and suitable habitats	The size of the current habitat in the locality, and other, suitable habitats	Stable or increasing	To sustain/create a viable population, the species needs sufficiently large areas containing suitable habitats.

5 Birds

5.1 Conservation status for birds in Denmark

Preliminary assessments of the national conservation status for 42 bird species on the EEC Birds Directives Annex I and 37 species and subspecies of regularly migrating birds have been prepared in connection with planning the monitoring program NOVANA (Pihl et al. 2003). As four species are both listed on Annex I and are migratory birds preliminary assessments of conservation status have been prepared for 75 species and subspecies of birds (Table 5.1).

The overall national conservation status for breeding birds are assessed on the basis of the local status of the birds which is based on the results from the monitoring programmes. Conservation status for migratory birds is assessed from the trend in the whole Danish population of the species. However, as the migratory birds are only seasonally present in Denmark, this trend might differ from the trend seen for a species over the whole distribution range (flyway). The surveys of the migratory birds are carried out at seasons that are believed to be optimal for the various species.

Table 5.1. List of 74 Danish bird species for which criteria for favourable conservation status have been prepared. The species are either covered by the Annex I of the EEC Birds Directive or recurring migratory birds. For Barnacle Goose, Avocet, Golden Plover and Dunlin the criteria have been developed for both breeding and as migratory species. Black Grouse has now disappeared and criteria have not been developed for this species. Provisional conservation status as designated in Pihl et al. (2003). Only grey shaded species are included in this report.

Bird species	Annex I	Migratory species ¹	Code	Latin name	Conservation status
Red-necked Grebe	No	Yes	A006	<i>Podiceps griseogena</i>	Favourable
Bittern	Yes	No	A021	<i>Botaurus stellaris</i>	Favourable
Black Stork	Yes	No	A030	<i>Ciconia nigra</i>	Uncertain
White Stork	Yes	No	A031	<i>Ciconia ciconia</i>	Unfavourable
Spoonbill	Yes	No	A034	<i>Platalea leucorodia</i>	Uncertain
Mute Swan	No	Yes	A036	<i>Cygnus olor</i>	Favourable
Bewick's Swan	Yes	Yes	A037	<i>Cygnus bewickii</i>	Favourable
Whooper Swan	Yes	Yes	A038	<i>Cygnus cygnus</i>	Favourable
Bean Goose	No	Yes	A039	<i>Anser fabalis</i>	Favourable/Uncertain
Pink-footed Goose	No	Yes	A040	<i>Anser brachyrhynchus</i>	Favourable
Greylag Goose	No	Yes	A043	<i>Anser anser</i>	Favourable
Barnacle Goose	Yes	Yes	A045	<i>Branta leucopsis</i>	Favourable/Favourable
Dark-bellied Brent Goose	No	Yes	A046	<i>Branta b. bernicla</i>	Favourable
Light-bellied Brent Goose	No	Yes	A047	<i>Branta b. hrota</i>	Unfavourable
Shelduck	No	Yes	A048	<i>Tadorna tadorna</i>	Favourable
Wigeon	No	Yes	A050	<i>Anas penelope</i>	Favourable
Teal	No	Yes	A052	<i>Anas crecca</i>	Favourable
Pintail	No	Yes	A054	<i>Anas acuta</i>	Favourable
Shoveler	No	Yes	A056	<i>Anas clypeata</i>	Favourable
Pochard	No	Yes	A059	<i>Aythya farina</i>	Favourable
Tufted Duck	No	Yes	A061	<i>Aythya fuligula</i>	Favourable
Scaup	No	Yes	A062	<i>Aythya marila</i>	Favourable

¹ Only species mentioned as recurring migratory species in one or more special protection areas are included in this column

Eider	No	Yes	A063	<i>Somateria mollissima</i>	Unfavourable
Long-tailed Duck	No	Yes	A064	<i>Clangula hyemalis</i>	Favourable
Common scoter	No	Yes	A065	<i>Melanitta nigra</i>	Favourable
Velvet Scoter	No	Yes	A066	<i>Melanitta fusca</i>	Favourable
Goldeneye	No	Yes	A067	<i>Bucephala clangula</i>	Favourable
Smew	Yes	Yes	A068	<i>Mergellus albellus</i>	Favourable
Red-breasted Merganser	No	Yes	A069	<i>Mergus serrator</i>	Favourable
Goosander	No	Yes	A070	<i>Mergus merganser</i>	Favourable
Honey Buzzard	Yes	No	A072	<i>Pernis apivorus</i>	Favourable
Red Kite	Yes	No	A074	<i>Milvus milvus</i>	Favourable
White-tailed Sea-Eagle	Yes	No	A075	<i>Haliaeetus albicilla</i>	Favourable
Marsh Harrier	Yes	No	A081	<i>Circus aeruginosus</i>	Favourable
Hen Harrier	Yes	No	A082	<i>Circus cyaneus</i>	Uncertain
Montague's Harrier	Yes	No	A084	<i>Circus pygargus</i>	Unfavourable
Golden Eagle	Yes	No	A091	<i>Aquila chrysaetos</i>	Uncertain
Osprey	Yes	No	A094	<i>Pandion haliaeetus</i>	Uncertain
Peregrine falcon	Yes	No	A103	<i>Falco peregrinus</i>	Uncertain
Black Grouse	Yes	No	A107	<i>Tetrao tetrix</i>	Disappeared
Spotted Crake	Yes	No	A119	<i>Porzana porzana</i>	Unfavourable
Corncrake	Yes	No	A122	<i>Crex crex</i>	Unfavourable
Coot	No	Yes	A125	<i>Fulica atra</i>	Favourable
Crane	Yes	No	A127	<i>Grus grus</i>	Favourable
Oystercatcher	No	Yes	A130	<i>Haematopus ostralegus</i>	Favourable
Avoset	Yes	Yes	A132	<i>Recurvirostra avosetta</i>	Favourable/Favourable
Kentish Plover	Yes	No	A138	<i>Charadrius alexandrinus</i>	Uncertain
Golden Plover	Yes	Yes	A140	<i>Pluvialis apricaria</i>	Unfavourable/Favourable
Grey Plover	No	Yes	A141	<i>Pluvialis squatarola</i>	Favourable
Knot	No	Yes	A143	<i>Calidris canutus</i>	Favourable
Dunlin	Yes	Yes	A149	<i>Calidris alpine</i>	Unfavourable/Favourable
Ruff	Yes	No	A151	<i>Philomachus pugnax</i>	Unfavourable
Bar-tailed Godwit	Yes	Yes	A157	<i>Limosa lapponica</i>	Favourable
Curlew	No	Yes	A160	<i>Numenius arquata</i>	Favourable
Redshank	No	Yes	A162	<i>Tringa tetanus</i>	Favourable
Greenshank	No	Yes	A164	<i>Tringa nebularia</i>	Favourable
Wood Sandpiper	Yes	No	A166	<i>Tringa glareola</i>	Unfavourable
Mediterranean Gull	Yes	No	A176	<i>Larus melanocephalus</i>	Uncertain
Gull-billed Tern	Yes	No	A189	<i>Gelochelidon nilotica</i>	Unfavourable
Sandwich Tern	Yes	No	A191	<i>Sterna sandvicensis</i>	Unfavourable
Common Tern	Yes	No	A193	<i>Sterna hirundo</i>	Favourable
Arctic Tern	Yes	No	A194	<i>Sterna paradisaea</i>	Favourable
Little Tern	Yes	No	A195	<i>Sterna albifrons</i>	Unfavourable
Black Tern	Yes	No	A197	<i>Chlidonias niger</i>	Unfavourable
Eagle Owl	Yes	No	A215	<i>Bubo bubo</i>	Favourable
Short-eared Owl	Yes	No	A222	<i>Asio flammeus</i>	Unfavourable
Tengmalm's Owl	Yes	No	A223	<i>Aegolius funereus</i>	Uncertain
Nightjar	Yes	No	A224	<i>Caprimulgus europaeus</i>	Favourable
Kingfisher	Yes	No	A229	<i>Alcedo atthis</i>	Favourable
Black Woodpecker	Yes	No	A236	<i>Dryocopus martius</i>	Favourable
Wood Lark	Yes	No	A246	<i>Lullula arborea</i>	Favourable
Tawny pipit	Yes	No	A255	<i>Anthus campestris</i>	Unfavourable
Bluethroat	Yes	No	A270	<i>Luscinia svecica</i>	Favourable
Barred Warbler	Yes	No	A307	<i>Sylvia nisoria</i>	Unfavourable
Red-backed Shrike	Yes	No	A338	<i>Lanius collurio</i>	Favourable

5.2 Bird monitoring

Danish monitoring of migratory birds which is outlined in NOVANA includes regular countryside surveys of waterbirds. These surveys form the background for the assessment of the national status for the species, but it is also the scale to which the local occurrences are measured. A small decrease for a species in one area is not necessarily equivalent to

unfavourable conservation status for the area, if the national population has decreased similarly or more or if it can be demonstrated that the decrease is not a result of deterioration of the habitat in terms of quality or size.

Waterbird monitoring is a part of the international monitoring carried out by Wetlands International. The results of the international surveys give the possibility to compare numbers and distribution in Denmark with figures from the whole distribution area of the species. One of the most important products of the international monitoring is an updated, global review of the population sizes of waterbirds – Waterbird Population Estimates – which is published every third year in connection with the Ramsar Convention's meeting of the parties (COP). Changes in the population sizes have an effect on the 1% criterion, which has been established to determine the internationally important areas for waterbirds. If 1% or more of a waterbird population regularly is staying in an area this area qualify as an internationally important waterbird site. This criterion is in Europe the most important to identify internationally important waterbird sites. Designation of SPA's or Ramsar sites most often happens on the basis of the 1% criterion and changes in the population estimates leading to changes in the 1% criterion will also lead to changes in the ongoing assessments of the importance of the designated areas.

5.3 Criteria for favourable conservation status on a national level

Criteria for the conservation status on a national scale are developed on the basis of the three overall criteria for conservation status for species as defined in the Habitats Directive:

- viable populations, which will typically be stable or increasing;
- distribution area is stable or increasing;
- areas of suitable habitat are stable or increasing.

Both breeding and migratory birds might be affected by conditions on sites outside Denmark, which might lead to a decreasing population trend for the species, i.e. conditions that the nature management in Denmark is unable to control but which has an effect on the populations occurring here.

Often a species will increase or expands in one region of the country and decrease in terms of numbers or distribution in other regions. Or the annual variations in numbers are fluctuating. At the assessment of the national conservation status based on the overall criteria such in- and decreases must be weighed against each other.

Some species are apparently under colonisation of Denmark, even though they still have not been able to establish stable Danish breeding populations. Preliminary criteria have been developed for these species, criteria that will be replaced by real criteria when the request for stability is obtained.

Under this heading criteria for the size of the Danish populations of the various bird species are given. These criteria will be the starting point for

species with favourable conservation status. The criterion for the population level will be developed in detail once the results from the monitoring are collated as the overall criterion is stable or increasing populations. Hence, this criterion might change over time. The overall principle will be to maintain the known population sizes of bird species, which are in a favourable conservation status.

Populations of the waterbird species, which winter in Denmark, are generally well documented. These birds are primarily, swans, geese and diving ducks. Ideally, the initial criterion for the total Danish winter population of these species should be based on data about population sizes during the period 1979-1983 when the Birds Directive was developed and went in to force and when the SPA's in Denmark were designated. In reality, the criteria are based on the results of countrywide surveys during the period 1987-2000 (Laubek 1995, Laursen et al. 1997, Pihl et al. 1992, Pihl & Laubek 1999). The criteria will be below the known population level for the bird species to take population fluctuations into account.

Migratory birds such as dabbling ducks and a number of shorebird species typically occur outside the winter season, in which the traditional countrywide mid-winter surveys have been conducted. Thus, these species have been poorly covered by the former monitoring programme and only limited data exists to establish the threshold between favourable and unfavourable conservation status. The criteria for the population sizes of these species are based partly on late summer surveys in the period 1987-1989 and partly of surveys of birds in the Danish Wadden Sea (Laursen et al. 1997, Meltofte 1981, Meltofte et al. 1994).

Development of criteria for population sizes for species in unfavourable conservation status is much more difficult. Rarely enough data exists to be able to predict, how much a population must increase to obtain favourable conservation status. Thus, only occasionally it is possible to establish a certain threshold between favourable and unfavourable conservation status. The target has been chosen to be, if that has been a possibility, the population size in the period 1979-1983, when the Birds Directive went into force and the 111 (later 113) Danish SPA's were originally designated.

For re-immigrating species establishment of criteria for population sizes will if possible be based on the number of breeding pairs deemed necessary for the species to maintain a viable breeding population. The criterion will be based on the former numbers on distribution of the species in Denmark. For immigrating species the Danish potential for the species is unknown, and a criterion will not be developed before the immigration phase is over.

Under this heading criteria for the distribution area of the species in regions, larger parts of the country or SPA's is given. For the SPA's it is requested that the species either is included in the justification for designation or regularly occurs in internationally important numbers.

Often a distribution area for a bird species will expand in some parts of the country and decrease in others. The assessment of the national conservation status must weigh this. The overall criterion requirements that the distribution area is stable or increasing is interpreted such that fa-

vourable conservation status might be maintained despite local decreases when these decreases are out-weighed by increases in other local areas.

Under this heading the total area of the species habitats is collated if possible. The areas must be stable or increasing because these areas form the total frame for the existence of the species in Denmark. However, for a number of breeding birds it has not been possible to establish criteria for the size of the habitats of the species. This is caused by the lack of precise information of the necessary required size of habitat, that the habitat quality is more important or that the size of the feeding area seems to be of little importance. Among the last species are some of the breeding birds in the open country, e.g. Red Kite *Milvus milvus* and Great Horned Owl *Bubo bubo*, which both seem to rely more on an ideal area for placing the nests than of feeding areas. For the migratory birds the lack of knowledge about the necessary size of the habitats are even more pronounced than for the breeding birds. For instance Long-tailed Ducks *Clangula hyemalis* occur on the open seas, but the detailed backgrounds for the local occurrences are unknown.

The principles for the estimation of the habitat size for herbivore water-birds, which primarily feed on sub-merged vegetation, are developed on the basis of the energetic requirements.

5.4 Criteria for favourable conservation status on a local level

Local criteria are established as a number of parameters, for which the fulfilment of the requirements is monitored quantitatively by standardised monitoring within each SPA. The conservation status locally for the species is assessed on the basis of this monitoring. The criteria are relevant for SPA's in which the species is included in the justification for the designation of the SPA or in which species on Annex I of the Birds Directive has regularly bred or internationally important numbers of migratory species have been recorded.

Criteria for conservation status on a local scale are developed on the basis of the overall criteria for conservation status in species as defined in the Habitats Directive:

- stable or increasing populations
- stable or expanding distribution
- stable or increasing quality of the habitat required by the species.

The occurrence of a species on a site is obviously the best indicator, that an area is suitable for the species, but it does not necessarily mean that the conservation status of the area is favourable. The number of birds on the site must generally be stable or increasing for the site to be assessed in favourable conservation status. For regularly occurring migratory birds is the basis the justification for designation including the 1% criteria which was valid in 1983, when the SPA's were designated.

The main part of the Danish breeding populations of species on Annex I of the Birds Directive comprise only a small fraction of the total popula-

tion in the distribution area of the species (flyway). In general, bird species have a large dispersing potential and the concept of 'Minimum viable population' (MVP) is rarely relevant for birds as for most species on the Appendices of the Habitats Directive, although the breeding numbers of birds on the single site is often very small.

For the regularly occurring migratory bird species the variation in local occurrences are often very big. The available food resources will determine the occurrences and the birds will usually be able to find alternative feeding areas if human activities such as the construction work, hunting, fisheries, routes of fast ferries were to make a feeding areas less attractive. If the human activities are only temporary the birds will most often return once the human activities have ceased. Changes in feeding conditions and climate are the most likely causes of large-scale annual variations in local numbers of migratory birds. Thus, the assessment of conservation status in the various SPA's must be related to the national/international population.

Area is chosen for the size of the species' habitat and it includes the habitat within the site with current or previous occurrences of the species. Under habitat is distinguished between breeding-, staging- and wintering sites. It is important to maintain or re-establish as large habitats as possible, as this secures great variation in the quality of the habitats both for the local and the national populations. For a few breeding bird species the number of possibilities for placement of the nest or colonies is given, because the occurrence of some species seems to rely more on possibilities for these placements than of the size of the breeding habitat. Especially for the migratory birds it seems to be accessibility rather than the size of the feeding habitat that is important. It is not very useful for instance if large mussel-beds occur in an area, if the diving ducks are unable to exploit the resource because of human activities in the area.

The condition of the habitat is important for the occurrence of the birds and hence for their conservation status. From the biology of the birds a number of parameters are chosen, which are important for the species and which are measurable. The parameters are used to describe the status of a site in relation to a species, although the Danish sites are not solely responsible for the wellbeing of the species. The majority of the species dealt with here is migratory birds and as such affected by the local conditions in areas outside Denmark, in which they occur during parts of the year. For some species, e.g. Gull-billed Tern *Gelochelidon nilotica* and Tengmalm's Owl *Aegolius funereus* it is doubtful if they are able to maintain a population in Denmark without immigration. For such species it might not necessarily lead to improved conservation status that the breeding areas are protected.

5.5 Bird species

Criteria for favourable conservation status for 74 bird species and subspecies are presented. Barnacle Goose *Branta leucopsis*, Avoset *Recurvirostra avosetta*, Golden Plover *Pluvialis apricaria* and Dunlin *Calidris alpina* occur both as breeding birds and as migratory birds. Black Grouse *Tetrao tetrix* is mentioned, but as it has now disappeared from Denmark no cri-

teria for favourable conservation status have been developed for Black Grouse.

The 41 species of Danish breeding birds for which criteria for favourable conservation status have been developed include the 16 species on the Annex I of the Birds Directive (breeding birds) which can found in the original justifications for designation of the Danish SPA's. Previously, Cormorant *Phalacrocorax carbo* was also included in Annex I of the Birds Directive, but it was taken out in 1997.

The Danish bird fauna has changed considerably since the Birds Directive went into force. A number of species on Annex I of the Directive has established themselves as Danish breeding birds or are under colonisation of Denmark. Further, not all the species on Annex I of the Directive were included in the original justifications for designation of the Danish SPA's and some species have been added to Annex I of the Directive on later occasions. This includes a total of 24 bird species, which have bred more or less regularly in Denmark, but which are not included in the original justifications for designation of the Danish SPA's. Among these is Black Grouse which has now disappeared and consequently no criteria for favourable conservation status for this species have been developed. Finally, the Annex I of the Directive is updated with the entry of new member states to the Union. It is thus already known, that Kentish Plover *Charadrius alexandrinus*, Little Gull *Larus minutus* and Southern Dunlin *Calidris alpina schinzii* will be included in the Annex I in the near future. Of these Kentish Plover and Southern Dunlin are treated here whereas Little Gull similarly with Slavonian Grebe *Podiceps auritus* and Whooper Swan *Cygnus cygnus* breed too irregularly to be included here.

Among the 16 species of breeding birds in the original justifications for designation Avoset and Gull-billed Tern are also assessed species for which Denmark has a special responsibility according to the 1997 Amber List (Stoltze 1998). Southern Dunlin and Cormorant are likewise species for which Denmark has a special responsibility, but of these two Cormorant is monitored under a different scheme.

Of the 38 migratory species and sub-species treated here the 37 can be found in the original justifications for designation of one or more Danish SPA's. Of these 21 species are assessed species for which Denmark has a special responsibility according to the 1997 Amber List (Stoltze 1998). Further, criteria for favourable conservation status have been developed for the Red-necked Grebe *Podiceps grisegena*, which is also a species for which Denmark has special responsibility, but which does not occur in the justifications for the designation of Danish SPA's. The other species for which Denmark has a special responsibility includes Red-throated Diver *Gavia stellata*, Mallard *Anas platyrhynchos*, Razorbill *Alca torda* and Little Auk *Alle alle*. These species are not treated here. Mallard is numerous and released in great numbers for hunting purposes, that it does not make sense to develop criteria for the species. Red-throated Diver, Razorbill and Little Auk occur in offshore areas often far outside the 12 Nautical Mile zone. Criteria for favourable conservation status for these species might be developed once criteria for the designation of offshore SPA's has been developed and such offshore SPA's has been designated.

5.6 The species outline

Under each species three items are dealt with:

- National conservation status. The preliminary national conservation status as assessed in Pihl et al. (2003) is presented;
- Criteria for favourable conservation status on a national scale. Overall criteria is given and presented in a table;
- Criteria for favourable conservation status on a local scale. Local criteria for each species in the SPA's are given and presented in a table. For migratory birds the criteria set certain requirements to the size and quality rather than occurrence of birds. If criteria in the future are developed for each of the SPA's it would seem natural to let the habitat requirements of the criteria develop on the basis of the number of birds connected to the habitat that is part of the original justification of the designation.

5.7 Effects

All species are subject to a number of effects, which might deteriorate or enhance the species conservation status. Some of these effects are natural which human beings are unable to influence and some are man-made.

The results of man-made effects might at least in theory be neutralised in contrast to most natural effects. But not all man-made effects are negative to species and habitats. A well-known example is grassed salt-march, which is the favoured habitat for a number of shorebirds and ducks. Grassing might also create habitat for geese and Wigeon *Anas penelope* during migration. If the grassing ceases the species composition of the plant communities will change to taller plants and the grassing waterbirds will disappear. In wood the management in relation to birds is more complex. Some species need tall trees as nest sites (raptors and Black Stork *Ciconia nigra*), while others will require large open spaces (Nightjar *Caprimulgus europaeus*, Wood Lark *Lullula arborea* and Red-backed Shrike *Lanius collurio*).

Unnaturally high amounts of nitrogen and phosphorus have been lead to the Danish coastal areas over the last 30-40 years resulting in eutrophication. In the first instance higher concentrations of nutrients will lead to increased production of algae. At high concentrations algae bloom an oxygen depletion might happen as it did in Danish waters in the autumn 2002. By intensive algae bloom the sunlight only penetrates the surface waters and rooted plants might disappear due to lack of sunlight. By oxygen depletion the benthic fauna and the fish are affected negatively. In severe incidents all life in the bottom zone will disappear. Under such circumstances the birds that feed on plants or animals will have to find alternative feeding areas. On the other hand mild eutrophication leading to a moderate increase in algae production might be an advantage for bivalves which feed on algae. This might have been part of the explanation that a number of diving ducks, e.g. Eider *Somateria mollissima* increased in numbers in Danish waters until about 1990.

Human disturbance of the birds has drawing increased attention during the last 20 years. It is well known that breeding birds might abandon

nests with eggs or chicks because of disturbances. In particular large raptors and Black Stork have shown to be susceptible to disturbance. A derived affect is that eggs or chicks often are predated because of repeated disturbances, which by chasing the brooding bird from the nest reveal the nest to potential predators.

It has been demonstrated by experimental studies that disturbances from hunting are much more severe than previously believed (Madsen 1998). Other types of human activities might affect the birds negatively, such as windsurfing, aerial traffic, speedboats, fast ferries and free dogs. The effect is mainly that the feeding areas become unavailable due to human presence, or that the birds several times will have to flee from their preferred feeding areas or staging sites, to areas that is not necessarily useful as feeding sites.

5.8 The possibilities for the species to obtain favourable conservation status

The possibilities for the species to obtain favourable conservation status rely on the numbers and size of the protected areas, legislation and on-site management as well as conditions outside the Danish territory. Most of the species conserved by the Birds Directive are migratory species, which spend a considerable part of the year outside Denmark. It thus seems quite likely that some species during the period they stay outside Denmark are under negative effects, which are more important than the positive effects management in Denmark might lead to. Further, Denmark constitutes the northern boundary of distribution for a number of continental species for which changes in distribution especially occur in the border zone of their distribution. Such species might not necessarily obtain favourable conservation status with an increased effort to secure the species in Denmark. Despite a considerable effort to secure the Black Grouse this species is no longer a Danish breeding bird.

A021 – Bittern *Botaurus stellaris*

The preliminary, national conservation status for Bittern in Denmark is assessed favourable (Pihl et al. 2003).

The total number of breeding pairs in Denmark must amount to at least 40 and be stable or increasing. Suitable breeding habitats are to be found in the SPA's for which Bittern is a part of the justification for designation and in SPA's where Bittern is established as a breeding bird (Table 5.2). The criterion is based on results from a survey of sites carried out in the period 1978-1981 (Dybbro 1985).

The number of breeding Bitterns in the SPA must be stable or increasing if the conservation status is to be assessed favourable. The prerequisite for this is large undisturbed reed-beds, which are permanently covered with water during the breeding season of Bittern. The water quality must be sufficiently well to house fish, frogs and newts, which constitutes the main feeding items for Bittern (Table 5.3).

Table 5.2. Bittern. Criteria for favourable conservation status on a national level. Obligatory indicators for monitoring are marked with *.

Bittern	Character	Measurable unit	Criteria	Remarks
Populations	*Number of breeding pairs	Number	The number of breeding Bitterns must be stable or increasing over rolling 12-year periods.	The species is registered by calling males. The criterion aims to maintain the population level on a minimum of 150 pairs (Grell 1998). The species is affected by severe winters, which increase mortality and population changes occur.
Distribution area	*Distribution	Area of distribution	The distribution must be stable or increasing and include breeding pairs in all parts of the country except Bornholm.	The current distribution area is assessed to reflect the occurrence that would be expected from the conditions of the Danish nature.
Size of habitats	Size of suitable habitats	Area of water covered reed-bed	The total area of the mentioned habitat in Denmark must be stable or increasing.	

Table 5.3. Bittern. Criteria for favourable conservation status on a local level. Obligatory indicators for monitoring are marked with *.

Bittern	Character	Measurable unit	Criteria	Remarks
Populations	*Occurrence	Presence	The species is present	The species is registered by calling males
	*Population	Number	Stable or increasing number of breeding pairs	
Conditions of the habitat	Water coverage	Water coverage of the reed-bed	The reed-bed must be covered with water during the breeding season.	The prædation on Bittern decreases considerable when the reed-bed is covered with water permanently. Estimated minimum water coverage is 15 cm during the period 1. February-1. June.
	Disturbance	Human activities	The reed-bed must be undisturbed during the breeding season and relatively undisturbed during the rest of the year.	Bittern require undisturbed breeding areas in the period 1. February-1. August
Size of the habitat	Reed-bed	Area of water covered reed-bed	Enough suitable reed-bed must be available to support the number of Bittern mentioned in the valid justification for designation of the SPA. The area of reed-bed must be stable or increasing.	The demand for the size of territories has in Vejlerne been estimated at 20 ha although territories of 7 ha have occurred.

A084 – Montague’s Harrier *Circus pygargus*

The preliminary, national conservation status for Bittern in Denmark is assessed favourable (Pihl et al. 2003).

Breeding pairs of Montague’s Harrier must be present in at least 8 SPA’s in which the species is a part of the justification for designation or in which the species has bred regularly within the last 20 years. The total number of breeding pairs in Denmark must amount to at least 50 and be stable or increasing over rolling 12-year periods (Table 5.4). The criteria are based on what constitutes a viable population of the species.

The number of breeding Montague’s Harrier in each SPA must be stable or increasing if the conservation status is to be assessed favourable. The prerequisite for this is that undisturbed breeding habitats are available in the form of small reed-swamps and bogs and open feeding areas with plentiful available prey. Nests of Montague’s Harrier in cultivated land should be secured (Table 5.5).

Table 5.4. Montague’s Harrier. Criteria for favourable conservation status on a national level. Obligatory indicators for monitoring are marked with *.

Montague’s Harrier	Character	Measurable unit	Criteria	Remarks
Populations	*Number of breeding pairs	Number	The number of breeding pairs of Montague’s Harrier must be increasing until conservation status is considered favourable, and thereafter stable or increasing over rolling 12-year periods.	The species is registered as breeding pairs during the breeding season. The criterion aims at an increase to 50 pairs, which is considered a viable population in Denmark. The numbers in Denmark has varied between 35 and 50 pairs in the period 1993-2001.
Distribution area	*Distribution	Area of distribution	The distribution must include south and south-west Jutland in stable or increasing number of SPA’s in which Montague’s Harrier is part of the justification for designation or in which the species has bred regularly during the last 20 years.	The current distribution area of the species is assessed to reflect the natural distribution based on the nature conditions after drainage and cultivation has decreased the potential distribution area in Denmark.
Size of habitats	Feeding area	Area of moorland and permanent grassland	The area of the mentioned habitats must be stable or increasing.	Estimated maximum height of vegetation is 30 cm in the period 1. April-1. September.

Table 5.5. Montague's Harrier. Criteria for favourable conservation status on a local level. Obligatory indicators for monitoring are marked with *.

Montague's Harrier	Character	Measurable unit	Criteria	Remarks
Populations	*Occurrence	Presence	The species is present.	The species is registered as breeding pairs during the breeding season.
	*Population	Number of breeding pairs	Stable or increasing	
Condition of the habitat	Breeding habitat	Number of suitable places for placement of nests in the form of small swamps, bogs or moors.	Suitable places for placement of nests must be available for the number of Montague's Harrier, which is mentioned in the valid justification for designation.	The change in nest placement to cultivated areas indicates that suitable nest sites might be a limiting factor for the number of breeding Montague's Harrier.
	Disturbance	Human activities	The immediate vicinity of the nest must be undisturbed.	It is estimated that the nest and an area of 200 m around it must be undisturbed in the period 1. April-15. August.
Size of the habitat	Feeding area	Area of permanent grassed grassland	A suitable area of permanent grassed grassland to support at least the number of breeding pairs, which is mentioned in the justification for designation of the SPA must be available. The area of permanent grassed grassland must be stable or increasing.	Estimated minimum is 200 ha feeding area with a maximum vegetation height of 30 cm in the period 1. April-1. September.

A063 – Eider *Somateria mollissima*

The preliminary, national conservation status for Eider as a migratory species in Denmark is assessed unfavourable-decreasing (Pihl et al. 2003).

The decreasing trend must be turned around and the total Danish winter population must increase to a level of at least 500.000 birds and be stable or increasing over rolling 12-year periods. The number of Eider in late summer must at least amount to 90.000 birds and be stable or increasing over rolling 12-year periods (Table 5.6). The criteria are based on the results from countrywide mid-winter surveys of waterbirds during 1969-1973 (Joensen 1974), and for late summer the basis is results of countrywide late summer surveys during the period 1987-1989 (Laursen et al. 1997).

Sufficient habitat must be present in each SPA for at least the number of Eiders mentioned in the justification for designation for the SPA and the number of Eiders in the SPA must be stable or increasing over rolling 12-year periods for the conservation status to be assessed favourable. The prerequisite for this is the presence of extensive areas with the feeding items of Eider primarily Blue Mussels. The areas must be undisturbed in late summer when the Eiders moult their flight feathers (Table 5.7).

Table 5.6. Eider. Criteria for favourable conservation status on a national level. Obligatory indicators for monitoring are marked with *.

Eider	Character	Measurable unit	Criteria	Remarks
Populations	*Winter population	Number	The number of Eiders must be increasing until conservation status is assessed favourable and thereafter stable or increasing over rolling 12-year periods.	The species is registered by surveys in January-February. The criterion aims at restoring the population level to c. 500,000 at mid-winter. Eiders have in the period 1996-2001 been affected by disease, which has caused large-scale population reductions and annual changes in population level.
	*Late summer population	Number	The number of moulting Eiders must be increasing until conservation status is assessed favourable and thereafter stable or increasing over rolling 12-year periods.	The species is registered by surveys in August. The criterion aims at restoring the population level to c. 90,000 in late summer. Eiders have in the period 1996-2001 been affected by disease, which has caused large-scale population reductions and annual changes in population level.
Distribution area	*Distribution	Area of distribution	The area of distribution must be stable or increasing and include the central parts of the Danish waters and the Wadden Sea.	The current distribution area is assessed to reflect the occurrence that would be expected from the conditions of the Danish nature.
Size of habitats	Marine area	Area of feedings areas in the form of Blue Mussel beds.	The total area of the Eider feeding areas in SPA's in which Eider is a part of the justification for the designation must be stable or increasing.	Feeding areas means areas where the food items are abundant and the birds are not prevented from exploiting the food resource by e.g. disturbance.

Table 5.7. Eider. Criteria for favourable conservation status on a local level. Obligatory indicators for monitoring are marked with*.

Eider	Character	Measurable unit	Criteria	Remarks
Populations	*Occurrence	Presence	The species is present	The species is registered by surveys in January-February and August. A decrease must not be caused by negative impacts of the habitat.
	*Population	The numbers of staging or moulting birds	Stable or increasing	
Condition of the habitat	Disturbance	Human activities	Moulting sites must be undisturbed.	The moulting must be undisturbed in the period 1. July-15. September.
	Disturbance	Human activities	The feeding areas must be relative undisturbed.	It is estimated that 80% of the feeding areas must be relatively undisturbed in the period 15. September-1. April by e.g. sailing, fishing, construction work and hunting.
Size of the habitat	Marine area	Area of feeding area in the for of Blue Mussel beds	Sufficient habitat to support the number of Eiders mentioned in the valid justification for designation. The size of the area must be stable or increasing.	Feeding areas means areas where the food items are abundant and the birds are not prevented from exploiting the food resource by e.g. disturbance.

A157 – Bar-tailed Godwit *Limosa lapponica*

The preliminary, national conservation status for Bar-tailed Godwit as a migratory species in Denmark is assessed favourable (Pihl et al. 2003).

The spring population in Denmark must amount to at least 30.000 birds and be stable or increasing over rolling 12-year periods (Table 5.8). This criterion is based on the average number of Bar-tailed Godwits in the Danish SPA's in the period 1974-1992 (Meltofte et al. 1997, Meltofte 1981).

Sufficient feeding and staging habitat must be present in each SPA for at least the number of Bar-tailed Godwits mentioned in the justification for designation for the SPA and the number of birds in the SPA must be stable or increasing over rolling 12-year periods for the conservation status to be assessed favourable (Table 5.9).

Table 5.8. Bar-tailed Godwit. Criteria for favourable conservation status on a national level. Obligatory indicators for monitoring are marked with *.

Bar-tailed Godwit	Character	Measurable unit	Criteria	Remarks
Population	*Number	Number	The number of Bar-tailed Godwit must be stable or increasing over rolling 12-year periods.	The species is registered by survey in May. The criterion aims to maintain the population level of c. 30,000 birds in May.
Distribution area	*Distribution	Area of distribution	The species must occur all over the country.	
Size of the habitats	Feeding areas	Area of tidal flats	The area of tidal flats in SPA's designated for this species, must be stable or increasing.	

Table 5.9. Bar-tailed Godwit. Criteria for favourable conservation status on a local level. Obligatory indicators for monitoring are marked with *.

Bar-tailed Godwit	Character	Measurable unit	Criteria	Remarks
Population	*Occurrence	Presence	The species is present	The species is registered by survey in May. A decrease must not be caused by negative impacts of the habitat.
	*Population	Number of staging birds	Stable or increasing	
Conditions of the habitat	High tide roosting sites	Number of undisturbed high tide roosting sites	Stable or increasing number of undisturbed high tide roosting sites.	At least one suitable high tide roost site must be available in SPA's designated for Bar-tailed Godwit, though four in the Wadden Sea and two on Mandø.
	Disturbance	Human activities	The feeding areas must be relatively undisturbed.	It is estimated that 80% of the feeding areas must be relatively undisturbed in the period 15. September-1. April by e.g. sailing, fishing, construction work and hunting.
Size of the habitat	Feeding area	Area of tidal flats	The area of tidal flats must be able to support the number of Bar-tailed Godwits mentioned in the valid justification for designation and the size of the area must be stable or increasing.	

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The National Environmental Research Institute has drawn up technical criteria for favourable conservation status for the various habitat types and species covered by the EEC Habitats Directive, and for birds covered by the EEC Birds Directive. These criteria will form the background for preparing conservation objectives for both habitat types and species, for nature planning, and for monitoring programmes assessing the conservation status of the natural habitat types and species in Denmark. This report presents selected examples of criteria for natural habitat types (7) and species (13).

National Environmental Research Institute
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ISBN 978-87-7073-019-8
ISSN 1600-0048