GUIDELINES

FOR ASSESSING FAVOURABLE CONSERVATION STATUS OF NATURA 2000 SPECIES AND HABITAT TYPES IN BULGARIA

Executive Summary

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This executive summary describes the methodology for assessing the favourable conservation status of N2000 habitats and species on site level in Bulgaria and gives guidelines for its application. The methodology was developed in the frame of the BBI/Matra project 2006/014 “Favourable Conservation Status of Natura 2000 Habitat types and Species in Bulgaria”.

The project was generously supported by the Dutch government under the BBI/Matra programme, which is a combination of two international policy programs of the Dutch government. The objectives and financial resources of the BBI/Matra Programme fall within the remit of the Matra Social Transformation Program of the Ministry of Foreign Affairs and under the International Policy Program on Biodiversity of the Ministry of Agriculture, Nature and Food Quality.

Partners institutes in this project are:

- Bulgarian Biodiversity Foundation (BG) responsible for the project management in Bulgaria;
- Balkani Wildlife Society (BG) responsible for the coordination of the two expert working groups (habitat types and plant species; and animal species) and the editing of the guidelines;
- Orbicon (DK) for bringing in knowledge and experiences from EU countries in setting up a methodology defining Favourable Conservation Status;
- Wageningen International (part of Wageningen University) responsible for the reliability and quality of the final outputs and for the accounting of the project to the donor.

Beneficiary organisations are:

- The Bulgarian Ministry of Environment and Water, its Regional Inspectorates on Environment and Water; National Park Directorates and the Executive Environment Agency;
- The Bulgarian State Forestry Agency and its Regional Forestry Directorates and Nature Park Directorates;
- Bulgarian NGOs and scientific institutions involved in N-2000 implementation.

The importance of a method for assessing the conservation status of habitats and species is based on the main goal of the Habitats Directive; achieving favourable conservation status of species and habitats of European importance. But the method for assessing the conservation status of habitats and species serves more goals. First of all it provides guidance to setting up a monitoring plan for these habitats and species. It also provides guidance to the elaboration of management plans and it forms a base for formulating restrictions and regimes to be included in designation orders of Natura 2000 sites.

Last but not least the method for assessing the conservation status is an indispensible tool for organisations that carry out the so called Appropriate Assessment as required by article 6 of the Habitats Directive. This AA is meant to evaluate the impact of plans and projects on habitats and species listed in the Habitats Directive.

For assessing the conservation status of habitats and species at site level 163 matrixes have been developed giving parameters and threshold values for favourable and unfavourable conservation status for each relevant habitat type and species. This compilation of matrixes will be made available to all relevant organisations working in the field of nature and environmental protection and forest management through the web-sites of the participating organisations and through the distribution of CDs. The Executive Summary in Bulgarian and English as well as the full set of matrixes in Bulgarian are also available at: **www.natura2000.biodiversity.bg**

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Front cover photos: (Clockwise from top left) Grey and Wooded dunes, Kamchiya; Dwarf Almond *Amygdalus nana*, Chepun hill; Official ceremony of handing over the Guidelines to the Bulgarian Ministry of Environment and Water on behalf of the Ambassador of the Kingdom of the Netherlands; High oro-Mediterranean pine forests, Pirin NP; Brown bear *Ursus arctos*; © Petko Tzvetkov; (down) Alkaline fens, Krusheto site © Petko Tzvetkov

Back cover photos: (Clockwise from top left) Wolf *Canis lupus* © Petko Tzvetkov; Project workshop © Karina Kitnaes, Henk Zingstra; Calcareous rocky slopes with chasmophytic vegetation, Provodaiisko plateau; Calcareous and calcshist screes of the montane to alpine levels, Pirin NP; Toothed Orchid *Orhis tridentata*, Sakar mountain © Petko Tzvetkov; (down) Pannonian-Balkanic turkey oak – sessile oak forests, East Rhodope mountains © Rossen Tzonev

Translation: Katya Ancheva, Peter Todorov, Thomas Lodwick

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agriculture, nature and food quality

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1 INTRODUCTION

The Bulgarian Ministry of Environment and Water and the State Forestry Agency are the beneficiaries of the BBI/Matra project “Favourable Conservation Status of Natura 2000 habitat types and species in Bulgaria” implemented by Wageningen International (NL) in cooperation with Bulgarian Biodiversity Foundation (BG), Balkani Wildlife Society (BG), Daphne (SK) and Orbicon (DK).

The project has produced technical criteria and operational parameters for defining and assessing favourable conservation status for the Natura 2000 habitat types and species listed in Annex I and II of the Habitats Directive occurring in Bulgaria.

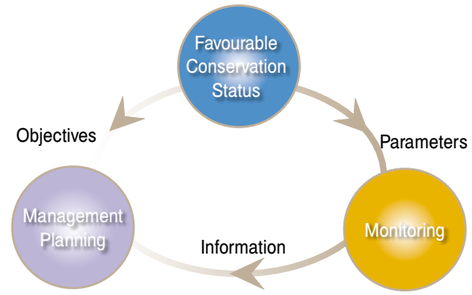
The following report presents the methodological approach to assessing the conservation status of habitats and species and gives guidelines for the application of the method. The core tools of the method are matrixes of all relevant species and habitats in Bulgaria through which the conservation status can be assessed by giving scores to functions and structures.

The method is meant to be used by government organisations and agencies, NGOs science institutes and consultancy firms involved in monitoring of species and habitats, assessment of the impact of plans and projects on habitats and species and management of Natura 2000 habitat types and species in Bulgaria.

The Natura 2000 network in Bulgaria includes 90 Annex I habitat types and 119 Annex II species according to the EU Habitats Directive.

The Natura 2000 sites are composed of SACs (Special Areas of Conservation under the EU Habitats Directive) and SPAs (Special Protected Areas under the EU Birds Directive) and will according to Bulgarian law be designated as protected zones in Bulgaria. Together these areas must contribute to protecting the habitat types and species of European importance by maintaining or restoring “favourable conservation status” of these species and habitats.

The operational criteria and parameters selected to define the conservation status of the habitat types and species are relevant for deciding on the conservation objectives for each of the habitat types and species and for the planning and execution of management measures. The parameters also provide guidance to the design of the monitoring program.



Monitoring is not only important to assess whether the management measures actually contribute to achieving favourable conservation status but is also required to gather the obligatory information for reporting to the European Union. The legal framework for the monitoring and reporting is given in the following scheme:

The monitoring to assessment legal framework

Three articles give the framework

2. THE EU HABITATS DIRECTIVE

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 for fulfilling the aim of the Directive is the establishment of a European system of Special Areas of Conservation which together with the SPAs form the Natura 2000 Network as outlined in the figure beneath.

SPAs: Special Protection Areas

SCIs: Sites of Community Interest

pSCIs: Proposed Sites of Community Interest

SAC: Special Areas of Conservation

Bulgaria has proposed the designation of a total of 229 pSCIs under the Habitats Directive. The designation is based on the occurrence of 90 identified different habitat types listed in Annex I and of 119 identified species listed in Annex II of the EU Habitats Directive.

The main aim of the Habitats Directive is to maintain or achieve favourable conservation status for the species and natural habitat for which the areas are being designated. The Habitats Directive provides several criteria which have to be met before the given habitat or species is in a favourable conservation status.

The **conservation status of a habitat type** 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 below in the description of the conservation status of the species.

The **conservation status of a species** will be taken as being "favourable" when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- 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.

On the basis of these general criteria and based on additional guidance documents prepared by the European Commission, the project has developed an assessment matrix for each species and habitat type including the specification of parameters and their threshold values for when the respective species and habitat types can be described as being in a Favourable Conservation Status.

According to the terminology of the Habitats Directive, management can either be active or preventive and includes measures like grazing, mowing and cutting as well as administrative measures like physical planning, environmental impact assessments and inspection. Management measures should be positive and structural and aimed at achieving Favourable Conservation Status (FCS).

Article 6(1) of the Habitats Directive indicates that the necessary conservation measures should reflect the ecological requirements of the Annex I habitat types and Annex II species occurring in the sites. These ecological requirements are on their turn directly connected with the criteria for Favourable Conservation Status. However, the Directive's criteria for the FCS are rather general and can therefore not directly be applied for each and every particular species or habitat. Furthermore, the ecological requirements of one and the same species may vary depending on the physical, climatic and geographical circumstances in each member state.

This implies that each country has to define its own criteria and set parameters for assessing FCS based on national conditions and processes, which are linked to 1) natural distribution range, 2) typical structures and functions of the habitat types and of the species' habitats, and 3) future prospects.

After having identified for each species and habitat type the essential structures and functions and the future prospects, the conservation status can be assessed and required management measures defined.

3. ASSESSING FAVOURABLE CONSERVATION STATUS OF HABITAT TYPES AND SPECIES AT SITE LEVEL

The FCS of habitat types and species can to be assessed on two levels: national level and site level.

On site level, the three main criteria for assessing favourable conservation status of a **habitat type** are: 1) area covered within site, 2) structures and functions (incl. typical species), and 3) Future prospects (incl. Threats).

On site level, three main criteria for assessing favourable conservation status of a **species** are: 1) Population size and structure in site, 2) Habitat for the species (size, structures and functions), and 3) Future Prospects (incl. Threats).

On national level, two additional criteria – Natural Range and total distribution within national territory – can be used to assess FCS when this information is combined with the sum of the conservation status assessed on site level.

In the method developed by the project, a specific list of parameters for each of the abovementioned criteria has been selected to asses whether the conservation status is a) Favourable, b) Unfavourable (inadequate) or c) Unfavourable (bad). Threshold values for each parameter are given to indicate which of the three levels of conservation status a given species or habitat type has at the time of the assessment.

The importance of the method developed lays not only in its use for assessing the conservation status but has a much broader magnitude. The parameters and their threshold values for assessing FCS at site level developed in the frame of this project and presented in this report can also be used to:

- Plan the management measures of a given Natura 2000 site in order to ensure that the favourable conservation status of the present habitat types and species will be maintained or restored.
- Formulate restrictions and regimes to be included in designation orders of Natura 2000 sites.
- Assess whether plans and projects will have a significant effect on the habitat types and species for which a site has been designated.

3.1. The assessment of conservation status of the Annex I habitat types

A short description of each Annex I habitat type is presented in this report together with a description of the criteria and the parameters selected for the matrix. After the description of each habitat type, the method on how to assess the conservation status of the habitat type by using the matrix is clarified. The parameters and the indicated threshold values in the matrix are the practical tools to be used for the assessment of the conservation status of the given habitat type. For each parameter threshold values are given which indicate whether a habitat type is in a favourable conservation status for that specific criterion on site level.

3.2. The assessment of conservation status of the Annex II Species

A short description of each Annex II species is presented, together with a description of the criteria and parameters selected. After the description of each species the method on how to assess the conservation status of the species by using the matrix is clarified. The parameters and the indicated threshold values in the matrix are the practical tools to be used for the assessment of the conservation status of the given species. For each parameter threshold values are given which indicate whether a species is in a favourable conservation status for that specific criterion.

A number of marine habitat types (Natura 2000 code: 1110, 1140, 1160 and 1170) and species of marine mammals and fish are not included due to limited data to determine exact parameters and threshold values. Two species of amphibians – toads are not included because of the abundant distribution in the country.

4. CONTENT OF THE FULL BULGARIAN VERSION OF THE GUIDELINES

This summary report is based on a full version of the report in Bulgarian with each of the assessment matrixes and explanatory notes included. The table of contents of the Bulgarian version of the report with guidelines of assessing favourable conservation status of Natura 2000 habitat types and species in Bulgaria is presented below.

1. Introduction
2. Explanatory Notes on how to use the guidelines and the matrixes
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   - 3.3. Freshwater habitats
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   - 4.2 Plants
     - 4.2.1 Vascular plants
     - 4.2.2 Mosses

A number of marine habitat types (Natura 2000 code: 1110, 1140, 1160 and 1170) and species of marine mammals and fish are not included due to limited data to determine exact parameters and threshold values. Two species of amphibians - the fire-belied toads are not included because of the abundant distribution in the country.

5. EXPLANATORY NOTES ON THE USE THE GUIDELINES AND THE MATRIXES

Table 1: Format for assessment matrix for habitat types

Criteria and Parameters	Measurable units/ Threshold of FCS for assessing status of separate part/polygons of the site	Favourable	Unfavourable – insufficient	Unfavourable – bad
CRITERION 1. AREA COVERED WITHIN THE SITE				
Parameter 1.1. Size of the area covered by the natural habitat type within the site	Ha	Stable or increasing AND not less than the reference area covered within site	Any other combination	Decline equivalent to a loss of more than 1% per year for specified period OR more than 10% below reference range
CRITERION 2. STRUCTURES AND FUNCTIONS (E.G. TYPICAL SPECIES)				
Parameter 2.1. Canopy density (average) of the first forest layer *	Share in units from 1 to 10	>5	5	<5
Parameter 2.2. …				
Overall assessment for Criterion 2		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 3. FUTURE PROSPECTS (THREATS AND IMPACTS)				
Parameter 3.1. Intensity of grazing within each locality*	0,3-1,5 standard farm animal unit per 1 ha	Not less than 90% of the area in favourable status	Any other combination	Decline of the covered area in favourable status with more than 1% per year for certain period OR more than 75% from the covered area in unfavourable status.
Parameter 3.2. …				
Overall assessment for Criterion 3		All parameters in GREEN OR up to 25 % INSUFFICIENT INFORMATION	Any Combination	At least one parameter in RED
Overall FCS assessment for the habitat type within the site:		All GREEN	Combination	One OR more RED

Table 2: Format for assessment matrix for species

Criteria and Parameters	Measurable units/ Threshold of FCS for assessing status of separate part/polygons of the site	Favourable	Unfavourable – insufficient	Unfavourable – bad
CRITERION 1. AREA COVERED WITHIN THE SITE				
Parameter 1.1. Number and trend of population development	Number of adult individuals	Stable OR increasing AND not less than 99% of the reference population for the site	Any other combination	Decline equivalent to a loss of more than 1% per year for specified period OR more than 10% below reference population for the site
Parameter 1.2. …				
Overall assessment for Criterion 1		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 2. HABITAT OF THE SPECIES – AREA COVERED WITHIN THE SITE				
Parameter 2.1. Total area of suitable unfragmented habitats	Hectares (ha)	Stable OR increasing AND not less than the reference value for the site	Any other combination	Decline equivalent to a loss of more than 1% per year for specified period OR more than 10% below reference area for the site
Parameter 2.2. …				
Overall assessment for Criterion 2		All parameters in GREEN OR up to 25 % INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 3. HABITAT OF THE SPECIES – STRUCTURES AND FUNCTIONS				
Parameter 3.1. Food base	Food base index 1-0.75: Diversity (more than 2 types of food) and coverage of important plant species	All selected plots of sampling/assessment are in favourable status	Between 1 and 25% from all selected plots of sampling/assessment are in unfavorable status	More than 25% from all selected plots of sampling/assessment are in unfavourable status
Parameter 3.2. …				
Overall assessment for Criterion 3		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 4. FUTURE PROSPECTS (THREATS AND IMPACT)				
Parameter 4.1. …				
Parameter 4.2. Human activities in the forests and adjacent areas	Lack of human presence in a perimeter of 500 m and functioning lair and intensive human presence during the year in less than 25% of the habitats suitable for lairs and intensive human presence during the year in less than 50% of the regular/ common habitats	All average individual not overlapping areas (40 km^2) in favorable status	All other combinations	Over 5% of all average individual areas are in unfavorable status
Overall assessment for Criterion 4		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
Overall FCS assessment for the species within the site:		All criteria GREEN	Combination	One OR more RED

* - Additional information on parameters is presented after each matrix

EXPLANATION OF THE MATRIX

Common structure

Each matrix contains five columns and a number of rows (one for each selected parameter) per criterion for defining the favourable conservation status.

The columns contain:

- First column – the name and short description of the parameter
- Second column – descriptions of measurable unit and in selected case of thresholds of the parameter (when determining FCS of discrete units/separated patches, populations or localities)
- Third (green) column with thresholds of **favourable conservation status**
- Fourth (yellow) column with thresholds of **unfavourable insufficient status**
- Fifth (red) column with thresholds of **unfavourable bad status**

Criteria and their Parameters

For habitat types:

- Under *Criterion 1. "Area covered within the site"* parameters are included for reporting on the area occupied by the specific habitat type within the site. In most cases the area covered by the habitat type is described with one parameter only.
- Under *Criterion 2. "Structure and Functions (e.g. typical species)"*,parameters are defined which reflect characteristics which are typical for the specific habitat type.
- Under *Criterion 3. "Future Prospects (threats and impacts)"* activities and impacts (threats) are included as parameters, which relate to the status of the habitat type presented in parameters under previous Criterion.

For species:

- Under *Criterion 1. "Population within the site"* parameters are included for reporting the size and where necessary the structure of the population.
- Under *Criterion 2. "Habitat of the species – area covered within the site"* parameters are included for reporting the size of suitable for particular species habitat
- Under *Criterion 3. "Habitat of the species – structures and functions"* parameters are defined which reflect characteristics of the species habitat which are important for the species.
- Under *Criterion 4. "Future prospects (threats and impact)"* activities and impacts (threats) are included as parameters, which relate to the status of the species and its habitat presented in parameters under previous Criterion.

Assessment of Favourable Conservation Status

- **Within one parameter**. There are two options:

The first option is when the respective parameter is determined in a direct way as an average value for the whole site (See Parameter 2.1. in table 1: Format for Assessment Matrix of Habitat types). In such cases in the second column only the measurable unit or methodology of study is described. In the third and fifth column the threshold values are defined for Favourable Conservation Status.

The second one is when the specific parameter assessment is prepared in the beginning for a discrete unit/part of a habitat or a population (See Parameters 3.1. and 4.2 in table 2: Format for Assessment Matrix of Species). After that the status is summarized for the entire site taking into account all individual areas used by the specific species or plots assigned to specific habitat type.

- **Within one Criterion**

A summary of the status is based on the various parameters used. The status is favourable for the respective criterion when all parameters indicate "favourable" or when all parameters are indicated as "favourable" but where maximum up to 25% of the parameters have been assessed to have insufficient information available. In case the assessment is "unfavourable – bad" for just one parameter, the overall assessment becomes unfavourable – bad. Unfavourable – insufficient status is determined by any other combination of parameters.

- **Overall assessment of all Criteria**

This presents a summary of the status of all criteria and is done in the same way as the summary assessment for each of the criterion.

Reference values of a Species or a Habitat type

For the reference values of quantitative parameters (e.g. for population) and for the area covered (habitats), the parameter should not be less than the value of the parameter when the site was designated as N-2000 site. The values can be even higher if restoration is needed.

6. EXAMPLE MATRIX FOR ASSESSMENT OF FCS OF FOREST HABITAT TYPES

Natura 2000 habitat type (code):

91M0 Pannonian-Balkanic turkey oak- sessile oak forests

Authors: Marius Dimitrov, Rossen Tzonev, Dobromira Dimova

There are three subtypes of this habitat type in Bulgaria. Beneath subtype 1 is presented as an example:

91M0 Subtype 1 – Moesian thermophilic mixed oak woods

Xerotermic to mezoxerothermic oak woods occur in the hilly plains, foothills and the lower parts of Predbalkana mountains, the southern and western parts of the Danube plain, the southern parts of the Ludogorie, Western Bulgaria (the regions of Sofia, Pernik and Kustendil) until a latitude of 800 m. These forests are very often of a mixed type, but in most of the places the dominant species is Hungarian/Italian oak *Quercus frainetto* or it forms mixed communities with Turkey oak *Quercus cerris* and in higher latitude locations it forms mixed communities with another species – the Durmast *Quercus daleschampi*. These communities are formed on rich and deep, but dry soils. The rock bedding is with a multiform character, it consists of silicates and limestone. The mixed thermofilic oak forests are located on slopes with different exposure and ridges of the uplands. Locations that are characterized by high erosion and poor and dry soils are inhabited by phytocenosis with dominant species of Downy oak *Quercus pubescens* and hornbeam *Carpinus orientalis*. The average height of the ligneous layer is 8-12 m. Most of the phytocenoses are of coppice type and are formed as a result of repeated fellings. The dominant species is the Hungarian oak *Quercus frainetto*, but Turkey oak *Quercus cerris* can be a second ligneous species and can be a secondary dominant. There are various reasons for this, but the main reason is connected with the fact that Hungarian oak has been subject to selective cutting due to its precious wood. Species that are typical for the xerotermic oak forests can be found in the herb and shrub layers. Increases in latitude, air humidity and soil moisture, for example in the Predbalkana region, lead to the appearance within the xerothermic oak woods of different mezophilic forest species of trees, herbs and shrubs such as *Carpinus betulus*, *Prunus avium, Carex montana, Luzula forsterii, L. sylvatica*, *Aremonia agrimonoides, Veronica officinalis, Stellaria holostea, Neotia nidus-avis*. In the foothills of the mountains, Juniperus communis can be found in selected areas within oak forests.

Characteristic taxons: Plants:

Trees and scrubs - *Quercus frainetto, Q. cerris, Q.* spp., *Fraxinus ornus, Pyrus pyraster, Acer* spp., *Sorbus domestica, Carpinus orientalis, Crataegus monogyna, Ligustrum vulgare, Euonymus* spp., *Cornus mas; Herb layer – Brachypodium sylvaticum, Dactylis glomerata, Poa nemoralis, Festuca heterophylla, Melica uniflora, Geum urbanum, Luzula* spp., *Clinopodium vulgare, Buglossoides purpurocaerulea, Fragaria* spp., *Veronica chamaedrys, Veronica officinalis, Lychnis coronaria,*

Photo: Pannonian-Balkanic turkey oak- sessile oak forests, Rossen Tzonev

Aremonia agrimonoides, Silene viridiflora, Campanula spp., *Euphorbia polychroma, Euphorbia amygdaloides, Scorzonera hispanica, Physospermum cornubiensis, Laser trilobum, Echniops* spp., *Helleborus odorus, Potentilla micrantha, Tanacetum corymbosum, Ajuga laxmanni, Galium pseudoaristatum, Lathyrus* spp., *Peucedanum spp. Bupleurum praelatum, Viola spp., Viscaria vulgaris, Primula* spp., *Crocus flavus, Iris* spp.

Literature:

Bondev, I. 1991. Vegetation of Bulgaria. Map in scale 1:600000 with description text. Kliment Ohridski University Publisher. Sofia, 183 ps. (In Bulgarian).

Ganchev, I. 1965. Remnants of Forests in Starozagorsko-to Field Valley and Along Peripheral Hills (formation, succession and floristic analyses). – Proceedings of the Institute of Botany, BAS, 14, Sofia: 19-87; 15 : 5-72 (In Bulgarian).

Kochev, Ch. 1976. Vegetation of Batova and Dvojnica Rivers Region, Varnensko. Sofia, 119 ps. (In Bulgarian)

Radkov, I., Minkov, Y. 1963. Oak Woods in Bulgaria. Varna. 256 ps. (In Bulgarian).

Velchev, V. 1971. Vegetation of Vrachanska Mountains. Sofia, 253 ps. (In Bulgarian).

Criteria and Parameters	Measurable units/ Threshold of FCS for assessing status of separate part/polygons of the site	Favourable	Unfavourable – insufficient	Unfavourable – bad
CRITERION 1. AREA COVERED WITHIN THE SITE				
Parameter 1.1. Size of the area occupied by the habitat type within the site	Ha	Stable or increasing AND not less than the reference area* for the site	Any other combination	Decline equivalent to a loss of more than 1% per year for a specified period OR more than 10% below the reference area for the site
CRITERION 2. STRUCTURES AND FUNCTIONS (E.G. TYPICAL SPECIES)				
Parameter 2.1. Canopy density (average) of the first forest layer	Share in units from 1 to 10	>5	5	<5
Parameter 2.2 Composition of the first forest layer (average)	Share in units from 1 to 10	>6 for Hungarian oak AND/OR Turkey oak, AND/OR Durmast; OR combination (mixed forests) of these species	6	5
Parameter 2.3. Average age of the first forest layer (average)	Years	>60 Increasing (not decreasing)	60-40	<40
Parameter 2.4. Old growth forests	% of the total area covered by the habitat type within the site	Not less than 10%		
Parameter 2.5. Quantity of deadwood	Not less than 8 % from the wood stock of the forest and at least 10 standing trees (stems) per ha	60% of the area covered by the habitat type fits to the measurable unit/indicator		
Parameter 2.6. Old trees of at least one age class more than the average forest age	At least 10 trees per ha	60% of the area covered by the habitat type fits to the measurable unit/indicator		
Parameter 2.7. Ground (herb and scrub) cover		The species composition is typical for the habitat	Slide aberration in the typical/ characteristic species composition	Strong aberration in the typical/characteristic species composition
Overall assessment for Criterion 2		All parameter in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	One OR more parameters in RED
CRITERION 3. FUTURE PROSPECTS (THREATS AND IMPACTS)				
Parameter 3.1. Inadequately planned and implemented fellings; disturbance, illegal felling		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.2. Extraction of deadwood		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.3. Afforestation with exotic, alien or hybrid species		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.4. Fire		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.5. Recreation and tourism		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.6. Construction and infrastructure		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.7. Grazing of domestic animals		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.8. Natural disturbances and trends		No threat	Impacting a habitat area <1% per year	Impacting a habitat area >1% per year
Parameter 3.13. Existence of succession processes	Existence/presence share in units from 1 to 10	Absence or presence <3 of Hornbeam AND/OR Ash *Fraxinus ornus*. Dominant is Common Hawthorn *Craategus monogyna*	Presence 3 of Hornbeam and/or Ash	Presence >3 of Hornbeam AND/OR Ash. Dominant are Jeruselem thorn *Paliurus spina-christii*, Blackthorn *Prunus spinosa*, Smokebush *Cotinus coggygria*, Common Juniper *Juniperus communis*
Parameter 3.14. Unregulated and irregular yield of non-forest wood resources (acorn and leaf forage)		No threat	Impact <1% of the area covered by the habitat within the site	Impact >1% of the area covered by the habitat within the site
Overall assessment for Criterion 3		All parameter in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	One OR more parameters in RED
Overall FCS assessment for the habitat type within the site:		All GREEN	One OR more AMBER no RED	One OR more RED

** Additional information on the parameters of forest habitat types*

Parameter 1.1. Size of the area occupied by the habitat type within the site

Reference area: Not less than the one identified at the scientific site proposal date and after April 2005.

Method for data collection: Field mapping of natural habitats.

Mapping of natural habitats (ecosystems) is directly related to their identification within a certain area. Therefore, field surveys include observations and data collection, necessary for the identification of habitats, as well as of their spatial boundaries and distribution area. The type and the boundaries of natural habitats are identified mainly through plant communities being their main components. The adopted method is to identify habitat (ecosystem) boundaries by the boundaries of phytocenosis(es) typical for the habitat based on the indicatory features of vegetation. Quite often, as a result from the existing plant continuum, plant communities do not have distinctive spatial, temporal or syntaxonomic boundaries. Besides, various combinations of fragments pertaining to numerous plan communities may occur within a habitat. In all of these cases, identification of boundaries (mapping) has, to a different extent, a conditional nature.

The mapping material used has a substantial importance for the optimal planning of field surveys and for the mapping of species and natural habitats. The so-called forest maps in scale 1:10000 and 1:25000 could be successfully used for field surveys in FF areas. These maps are of much help when choosing the botanical routes, profile lines, or transects

used for floristic surveys, as well as the vegetation description plots. Quite often habitat boundaries coincide with distinctively outlined relief forms. Differentiation of forest fund areas (into units, and sometimes into subunits) is also done using natural reference points – ridges, gullies, rivers, ravines, etc. Sometimes habitat boundaries will possibly coincide with the boundaries of FF units or subunits. Where there is no such a coincidence, natural habitat boundaries shall be outlined on the reference map by hand. When the boundaries are not distinctive, their theoretical location is to be outlined within the transition area, in dotted line. Whenever there is a continuum, it is recommendable to use the boundaries of soil types or of various particularities in relief.

For sites comparatively small in area, inventory and mapping is recommended to be carried out after the entire area is thoroughly transected and surveyed. For sites comparatively large in area and where additional information is available (taxation descriptions, GIS), it is recommendable to survey all the key (typical) sections, and to map the habitats in the other areas using interpolation and extrapolation, after analyzing the available information.

Sometimes in certain sections within a relatively small area there are fragments of various communities/habitats. In these cases, different combinations or complexes (e.g. complex 9130X9410) could be used as basic units of mapping.

If the area of natural habitats (or complexes) is too small for its actual mapping in a certain scale, it could be indicated as a spot (dot).

For precise mapping (especially of habitats of high priority) it is recommendable to identify their boundaries using GPS.

After being identified, the boundaries of natural habitats (polygons or spots) and the localities of plant species (polygons or spots) are entered in Geographic Information System.

The total habitat area within a certain site is equal to the summary area of all polygons/subunits.

Role for site management: Key for assessment of plans, programmes and investment projects. Any direct deterioration of the habitat changing the vegetation and the natural pattern of land cover should be considered as reduction of the area. Temporary deterioration of vegetation with no change of edaphic characteristics has long-term effect because the habitat slowly restores (more than the 10-year interval of status reporting) its phytocenological characteristics, its typical species and its representativeness. Any activities that are not subject to assessment of impacts and to permitting procedures (e.g. growing exotic and alien plant species) should be mandatory provisioned for in the site management schemes.

Parameter 2.1. Canopy density / thickness (average) of the first forest layer

Description of the parameter: Canopy density and thickness are interrelated forestry parameters, changing in parallel and assessed in tenths of a 100%. Canopy density is the degree of canopy proximity. It is estimated by several methods, most often by sight. Thickness is the degree of intensity of wood mass; it is identified as a correlation of the circular area of a forest cover to the circular area of a standard forest as indicated in sample tables. The most commonly used practice is to estimate the thickness by sight, usually matching the estimates for canopy density.

The average canopy density / thickness is determined as follows: the summary area of polygons (subunits) with equal canopy density (e.g. 0.8) is multiplied by the corresponding degree of canopy density (0.8). The resultant values of the multiplication are summarized and divided by the total habitat area.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.2. Composition of the first forest layer (average)*

Description of the parameter: The composition of the first forest layer is determined by the floristic composition of the forest cover. It is taken into account in the identification of the habitat type. By species composition, forests are conditionally divided into 'pure' and 'mixed'. Pure forests consist of a single tree species, and if there are another tree species, then their yield is less than 10% of the total forest yield. The composition in mixed forests is identified in relative units from 1 to 10, corresponding to 10% of the total yield. The composition is estimated by means of taxation surveys or by sight.

The average composition is determined as follows: the summary area of polygons (subunits) with equal occurrence of a species (e.g. 7) is multiplied by the corresponding degree of occurrence (7). The resultant values of the multiplication are summarized and divided by the total habitat area.

* This parameter is identified during field monitoring.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.3. Average age of the first forest layer (average)

Description of the parameter: The age of a tree species in forests is determined mainly as an average of the degrees of tree thickness.

The average age of a species within a relevant habitat composition is determined as follows: the summary area of polygons (subunits) with equal age of a species (e.g. 70 years) is multiplied by the corresponding age (70). The resultant values of the multiplication are summarized and divided by the total habitat area.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.4. Old growth forests

Description of the parameter: Old growth forests are close to natural ones, having irregular spatial and age structure, and including: old-age live trees of diameters close to the maximum for the relevant tree species; dry-topped trees or trees with deformed or broken tops and branches; trees with massive live branches (often of diameter exceeding 25 cm); trees with marks from fire or hollow trees; dead though still standing trees; fallen deadwood in various stages of decay.

The specific structure and functions of old growth forests (OGF) define them as a habitat for a complex of species from various ecological and taxonomic groups. Although it cannot be determined at this stage how many species are solely related to OGF, it could be certainly stated that a large part of these species find optimal conditions for development in old growth forests.

It takes about 160 to 230 years for a forest to develop typical OGF characteristics. Transformation from mature to old growth forests is gradual and its duration depends a lot on the tree composition (species reach threshold physiological age in different timeframe), the conditions of location (the period is shorter at good locations than at poor ones) and the initial forest structure (the process is slower at homogenous structure than at heterogenic one).

To form old growth forests, at least 10% of the forest habitat area shall be set apart. Especially suitable for this purpose are natural habitats over 100 years of age that have not been commercially managed. Old growth forests shall preferably be evenly distributed within the site, as a complex of old forests shall be not less than 40 ha in area. If possible, these complexes shall be interconnected by corridors that should also consist of OGF.

To be able to reach the OGF characteristics, designated forests shall not be subject to forestry practices or wood extraction, except in the event of extensive natural disturbances (wind throws and calamities effecting areas that cover more than 50% of OGF).

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.5. Quantity of deadwood

Description of the parameter: Maintaining a certain quantity of deadwood is an extremely important element in forest management, especially for biodiversity. It is assumed that standing dead trees and fallen stems and branches in different stage of decay are important in several aspects: they add for the structural diversity at forest level; offer a place for feeding, breeding and protection of many animals and plants (birds, small mammals, amphibians, insects, micro-organisms, lichens and fungi); constitute an important element of the dynamics of energy, nutrients and carbon accumulation; a substrate that aids the regeneration of a number of tree species; protects the soil from erosion processes in forestland; provides the connection between young and old forest (the so-called biological heritage) at regeneration felling; influences the micro-topography and the microclimate of soil in forests.

Surveys show the quantity of deadwood in natural forest ecosystems in the temperate climatic belt varies between 60 and 250 m^3/ha (an average of 130 m^3/ha). The average quantity of deadwood identified for managed forests in various European countries is in the range of 3 and 10 m^3/ha. The requirement for 8% of yield to be available ensures about 10 m^3/ha of deadwood at an yield of about 130 m^3/ha.

Deadwood should be more or less evenly distributed.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.6. Old trees of at least one age class more than the average forest age

Description of the parameter: Age class is a timeframe identifying the forest commercial uniformity. Age classes of coniferous and hard broadleaf trees are ranged at 20 years, of soft broadleaf trees – at 10 years, and of coppices – at 5 years.

Old trees are components of old growth forests (OGF) outside the areas containing OGF. The presence of such trees provides a habitat for a number of animal species.

The probability for occurrence of biologically mature trees within a young forestland is extremely low. To provide for the existence of such trees in the future, younger forests should have relatively older trees that will reach mature age faster.

Example: There should be 50-year old trees in a beech forest whose average age is 30 years.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 2.7. Ground cover

Description of the parameter: The ground cover includes low shrub, small bush, semi-shrub, grass, fern, moss, and lichen species. Every type of habitat is characterized by a specific ground cover. In most cases, the dynamics in the composition and the quantity of ground cover reflects the habitat status and is an indication for undergoing changes.

Method for data collection: Field identification for representative polygons.

Role for site management: Key for identifying the habitat type and for assessment of its status.

Parameter 3.1. Inadequately planned and implemented felling; disturbance and illegal felling

Description of the parameter: Inadequately planned and implemented felling is a main threat for forest habitats. Illegal felling is a serious problem in certain areas. To eliminate the risk it is necessary to apply a differential approach in the planning of felling practices, depending on the specifics of each case. The leading principle shall be: to maintain the natural habitat characteristics; to stop clear cutting; to forbid felling at slopes exceeding 25°; to prevent reduction of main tree species under a defined minimum; to prevent reduction of canopy density / thickness of forest layer under a defined minimum; felling shall be carried out in autumn-winter; felling shall not be carried out in the breeding season of designated animal species; logging practices shall be controlled; effective safeguarding shall be implemented in forests.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 3.2. Extraction of deadwood

Description of the parameter: Extraction of dry and fallen deadwood (laying and standing) is a common forestry practice because these forest components are considered to be a source of decease and infection. However, extraction of dry and fallen deadwood is one of the main factors leading to a loss of biological diversity.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key for planning forestry activities and measures.

Parameter 3.3. Afforestation with exotic, alien or hybrid species

Description of the parameter: Using exotic, alien or hybrid species for afforestation leads to a change in the natural structure and functions of both the habitats and the landscape that is natural for a region. It has a pollution effect on the natural gene fund. It creates risk of future ecological catastrophes (firebreaks in coniferous plantations in lowland and foothill regions).

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of riparian, coppice, disordered forests, and forests designated for transformation.

Parameter 3.4. Fire

Description of the parameter: Fire caused by accident, intentionally or by carelessness have a destructive effect on the main components of natural habitats – both biotic and abiotic.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of habitats of coniferous trees and shrubs, or fire-hazardous areas near the forest habitats (stubbles, fields, meadows, pastures, settlements).

Parameter 3.5. Recreation and tourism

Description of the parameter: A large part of the forests is used for tourism and recreation. Camping, trampling, pollution, noise and other side effects from intensive tourism pressure all have a negative impact on the sensitive species and the habitat as a whole.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at existing tourist sites, routes, resorts, etc., and projects for making new ones.

Parameter 3.6. Construction and infrastructure

Description of the parameter: Construction of tourist resorts, ski-runs, linear infrastructure elements (power lines, roads, lifts), etc. leads to the direct destruction of species and habitats, as well as to changes in water balance, air and water quality, to soil erosion, forest sustainability, invasion of non-typical species, etc.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at existing infrastructure facilities and investment projects.

Parameter 3.7. Grazing of domestic animals

Description of the parameter: Grazing in forests has negative impacts related to: trampling of soil; deterioration of undergrowth (by biting or stumping down); nitrification and introduction of ruderals. There are no systematic scientific surveys to assess this impact. The assessment of any incidence and degree of impact and its spatial effect is based on observations, inquiries, and phytocenological descriptions, as well as on expert opinion.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of riparian forests, coppice, disordered forests, and settlements.

Parameter 3.8. Natural disturbances and trends

Description of the parameter: The status and sustainability of forest habitats are also effected by a number of natural processes related to: wind throws, heavy snowfalls, calamities, erosion. Some forestry practices increase the risk and intensify the effects from the a.m. factors.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Essential, related to taking measures for improving the status or restoring the damaged habitats.

Parameter 3.9. Occurrence of invasive species

Description of the parameter: Incursion of invasive species, either spontaneous or as a result from anthropogenic or zoogenic factor, leads to disturbance of the natural species composition and the structure of habitats. Local species are displaced from their ecological niches on the account of alien species resistant to pathogens.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of riparian forests, coppice, and disordered forests.

Parameter 3.10. Change in water balance

Description of the parameter: Every type of habitat is characterized by a specific hydrological pattern. This case regards groundwater level and periodical flooding in riparian and marshy (swampy) forest habitats. What should be taken into account is the existence of: drainage channels and other drainage structures; dikes; dam lakes; any other infrastructure effecting the water balance.

Method for data collection: Field identification for each polygon under assessment, monitoring and control carried out by competent authorities.

Role for site management: Key for active management – management plans, measures to maintain and restore the normal water balance of water sources. Should be a mandatory provision in the site management schemes.

Parameter 3.11. Clearing of riverbeds

Description of the parameter: Cutting of trees and shrubs in riparian habitats leads to reduction of their area and to a drastic change in their structure and functions.

Method for data collection: Field identification for each polygon under assessment, monitoring and control to be carried out by the competent authorities on the management plans implementation.

Role for site management: Key at occurrence of riparian forest habitats.

Parameter 3.12. Existence of small hydroelectric power stations (HPS) within or near the habitat

Description of the parameter: The existence of small HPS within or near riparian habitats leads to reduction of their area, alteration of the water balance, and to a drastic change in their structure and functions.

Method for data collection: Field identification for each polygon under assessment, monitoring and control to be carried out by the competent authorities on the management plans implementation.

Role for site management: Key at occurrence of riparian forest habitats.

Parameter 3.13. Existence of succession processes

Description of the parameter: The existence of succession processes is considered as a threat only when these processes are regressive and leading to deterioration of the main habitat characteristics.

Their effect is expressed mainly as a change in the species composition of forest and ground cover following the incursion of invasive species.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of coppice and disordered forests.

Parameter 3.14. Unregulated and irregular yield of non-forest wood resources

Description of the parameter: Yield of non-forest wood resources (herbs, mushrooms, leaf fodder, berries, peat, lime blossom, etc.) is to be carried out in scale and methods as indicated in the regulatory acts and documents. Unregulated and irregular yield may negatively impact the health status, structure, and populations of plant and animal species, etc.

Method for data collection: Field identification for each polygon under assessment.

Role for site management: Key at occurrence of forests that are a source of non-forest wood resources

7. EXAMPLE MATRIX FOR ASSESSMENT OF FCS OF SPECIES

Photo: Brown bear *Ursus arctos*, Alexander Dutsov

Natura 2000 species (code): 1354 Brown bear - *Ursus arctos*

Authors: Diana Zlatanova, Alexander Dutsov

The brown bear, which inhabits the Balkan Peninsula belongs to the dominant subspecies *Ursus arctos arctos* L., which is part of the whole European population.

In the past, the brown bear used to inhabit mountains and mountain-forest massifs as well as deciduous forest and low-land meadows. The spreading of humans and the increase of anthropogenic factors pushed out the species in regions, which were not suitable or were not fit for habitation of people, due to this nowadays the species can be found only in mountain-forest regions.

The main part of the Bulgarian brown bear population is concentrated in two subpopulations – The Central Balkan and the Rilo – Rhodopean, which defines it as a national meta population. During the last 10 years many cases of appearance of specimens, inhabiting zones, located outside of permanent and suitable for reproduction subpopulations, such as the regions of Kraishte – Karvav kamuk and Rui, Osogovo, Koniavska planina and West Stara planina have been registered. These specimens are not defined as steady reproductive individuals, but bears in depression, which reclaim new territories.

On an average annual basis 75% of the food of a specimen is vegetarian. In the beginning of the spring, the bear is searching for the remaining of beechnuts, stems and roots of herbaceous and bulbous plants, invertebrates and murine rodents in regions, which are not covered with snow. Part of the diet of a bear consists of carrions of wild animals, which have died during the winter. In the state forestry enterprises (SFEs) and the state hunting enterprises (SHEs) bears are fed up with fodder. Cases of successful hunting of wild boars in feeding up places have been observed, but few bears are looking for a prey through out the whole year.

The individual territories of bears, determined by radiotelemetry in Croatia are between 6 000 and 22 400 ha and up to 31 000 ha for she-bear with offspring in Greece. Tracking of a three year old she-bear in Bulgaria for a short period has facilitated the indication of movement of the specimen through the territory of two national parks NPs – Rila National park and Pirin National park, and two state forestry enterprises with a total area of the convex polygon – 40,3 km^2. The 10 month period of GPS telemetry of a she-bear on the territory of Central Balkan National park showed an individual territory of 65,5 km^2.

In the climate conditions in Bulgaria the bear is in a period of lethargy between the end of December until January. Not all of the bears in Bulgaria fall in continuous lethargy. It is common that male bears do not prepare a real lair, but have a nap in a niche.

Cases of damages to agriculture and stock-breeding (inc. bee-keeping) caused by bears are common in Bulgaria. These cases affect small part of the human population, but have serious social effects due to the wide spread poverty in these regions.

Due to the lack of standardized scientifically grounded monitoring, it is not possible to discuss the trends in the development of the Bulgarian brown bear population. The data based on the annual taxations of the State Forestry Agency, shows an increase of the numbers of bear individuals during the last 5 years. This trend as well as the specified number of individuals is not accepted as reliable data, because no uniform methodology was used in the different administration units (SFEs, SHEs, NPs) and the data from the differing administration units was not compared. The hidden way of life, the vast territories, inhabited by the largest predator in Bulgaria, as well as the movement over large distances and the concentration of large number of bears in a small territory with abundance of food (orchards, raspberry patches, and feeding racks) makes the exact counting of the species almost impossible.

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Criteria and Parameters	Measurable units/ Threshold of FCS for assessing status of separate part/polygons of the site	Favourable	Unfavourable – insufficient	Unfavourable – bad
CRITERION 1. POPULATION WITHIN THE SITE				
Parameter 1.1. Number and trend of population development	Number of adult individuals	Stable OR increasing AND not less than 99% of the reference population for the site	Any other combination	Decline equivalent to a loss of more than 1% per year for specified period OR more than 10% below reference population for the site
Parameter 1.2. Sex structure of adults	Ratio males/females 1:1 within the site	Aberration of favorable status till 5%	Any other combination	Aberration of favorable status over 25%
Parameter 1.3. Successful breeding	Coefficient of growth not less than 0,26	Coefficient of growth not less than 0,26	Coefficient of growth between 0,23-0,25	Coefficient of growth less than 0,23
Parameter 1.4. Mortality rate	% of mortality rate – number of cases of death compared to population number	Mortality rate up to 10%	Mortality rate between 10 – 30%	Mortality rate over 30%
Overall assessment for Criterion 1		All parameter in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 2. HABITAT OF THE SPECIES – AREA COVERED WITHIN THE SITE				
Parameter 2.1. Total area of suitable unfragmented habitats	Hectares (ha)	Stable OR increasing AND not less than the reference value for the site	Any other combination	Decline equivalent to a loss of more than 1% per year for specified period OR more than 10% below reference area for the site
Parameter 2.2. Lair suitable habitats	Hectares per every 40 km^2 of suitable habitats (size of average individual not overlapping area for the country), minimum 50% of the area covered must fit to the requirements for lair suitable habitats	Like parameter 2.1.	-	-
Parameter 2.3. Area of closed (inaccessible) forest basins	Hectares (ha)	Not decreasing	-	Decline equivalent to a loss of more than 1% per year for specified period
Overall assessment for Criterion 2		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 3. HABITAT OF THE SPECIES – STRUCTURES AND FUNCTIONS				
Parameter 3.1. Food base	Food base index 1-0.75: Diversity (more than 2 types of food) and coverage of important plant species	All selected plots of sampling/assessment are in favourable status	Between 1 and 25% from all selected plots of sampling/ assessment are in unfavorable status	More than 25% from all selected plots of sampling/assessment are in unfavourable status
Parameter 3.2. Habitat fragmentation	Lack of artificial barriers for migration of individuals animal within the habitat	No new artificial barriers within the habitat are not created AND less than 1% of the suitable habitats are with significant fragmentation	Creation of new artificial barriers or between 1 and 5% from the specie's habitat are fragmented	Decline of unfragmented areas with more than 1% per year for specified period OR more than 5% from the habitats fragmented

Criteria and Parameters	Measurable units/ Threshold of FCS for assessing status of separate part/polygons of the site	Favourable	Unfavourable – insufficient	Unfavourable – bad
Parameter 3.3. Road density	Density of III rd and higher class of roads within the species' habitat	Less OR equal to 0,1km/km^2	Between 0,1 – 1 km/km^2	Higher OR equal of 1 km/km^2
Parameter 3.4. Forest dirty roads and trails network density	Density of roads and trails suitable for use of off-road motor vehicles and all terrain vehicles /ATV/	Less OR equal to 1km/km^2	Between 1-2 km/km^2	Higher OR equal to 2 km/km^2
Parameter 3.5. Presence of bio-corridors between the suitable habitats	Presence of bio-corridor of forest habitats with a width not less than 1/5 from its length AND at the narrowest sections (less than 2 km wide) should not be narrower than 800 m AND the length of these sections should not be larger than the width and the corridor should not be fragmented	Bio-corridor is present which fit to the requirements	Lack of bio-corridor which fits to the requirements but opportunities for restoration and defragmentation exist	Lack of bio-corridor which fits to the requirements and lack of opportunities for restoration and defragmentation
Overall assessment for Criterion 3		All parameter in GREEN or up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
CRITERION 4. FUTURE PROSPECTS (THREATS AND IMPACT)				
Parameter 4.1. Poaching	Record of killed animals/ individuals	Up to 1% of the population	Any other combination	Over 10% of the population
Parameter 4.2. Human activities in the forests and adjacent areas	Lack of human presence in a perimeter of 500 m of functioning lair AND intensive human presence during the year in less than 25 % of the lair suitable habitats AND intensive human presence during the year in less than 50% of the regular/ common habitats	All average individual not overlapping areas (40 km^2) in favorable status	All other combinations	Over 5% of all individual average areas are in unfavorable status
Parameter 4.3. Disturbance by motor vehicles and other motorized means of transport	Movement/traffic of motor vehicles and other motorized means of transportation outside of the National Road Network within the species' habitat	Movement/traffic of such means of transportation is not allowed except for the purposes of forestry and hunting economy and access to existing buildings	Legal limits are existing but control over its enforcement is insufficient	Any legal limits are missing of movement/traffic of motor vehicles and other motorized means of transportation outside of National Road Network.
Parameter 4.4. Fire intensity in the site	% burned down areas	Species' habitats are not burned down	Any other combination	Affected more than 1% of species' habitats and structures per year for specified period
Overall assessment for Criterion 4		All parameters in GREEN OR up to 25% INSUFFICIENT INFORMATION	Combination	At least one parameter in RED
Overall FCS assessment for the species within the site:		All criteria GREEN	Combination	One OR more RED

** Additional information on parameters of Brown bear – Ursus arctos.*

Parameters 1.1. Number and trend of population development &
Parameters 1.2. Sex structure of adults

The **reference population** is defined on the basis of habitat suitability. It is determined with the help of an inductive GIS habitat model. The model is based on a projection of GPS point locations of bear presence (traces and footprints, excrements, lairs, markings, direct observations and others) on layers of 7 variables of bear importance, including forests, herbs and bushes, agricultural lands, water bodies and urbanized areas, extracted from Corine Land Cover 2000. Additionally, the layers are converted in raster. Due to the low resolution of Corine Land Cover 2000 a layer of roads and a digital elevation model (DEM) are added, all of them with 30 m resolution. More precise maps of these variables can also be applied. A multivariable approach of Mahalanobis distance is applied towards the point locations and the variables. It accounts the similarities of the conditions in the points, accepted as optimum, and interpolates these similarities towards other zones, with rendering an account of the co-variation of these variables towards each other. A slicing procedure for dividing of the continuous data in 7 discrete classes – class 1 is with the lowest values of the Mahalanobis distance (the closest to the optimum and so is the most adapted) and class 7 – the highest (the farthest from the optimum and so is the most unadapted) is applied towards the final product.

Defining the population number and its structure:

The number of individuals and sex structure of the population are defined by applying the mark-recapture method through collecting hair samples or excrements for genetic analysis repeatedly for each monitoring period. The principle of the method is based on accidental catch of DNA of a certain number of samples, marking (mapping of the unique genotype) and a subsequent second catch. The base of the method is the Lincoln – Petersen index, which is determined with the following formula:

$$N = \frac{n1n2}{m}$$

Where N is the estimated number of animals; $n1$ – the number of animals caught the first time, $n2$ – the number of animals caught the second time, m – the number of animals caught two times. In order to determine the population size with a precision of more than 90% it is necessary to collect between 2,5-3 times more samples than the hypothetical population.

In order to determine the population trend controlling censuses are done. The controlling censuses are conducted two times per year in the same seasons (April and October in a full moon), in a permanent number of observation posts in similar conditions (the same amount and quality of bait) for counting of individuals in different suitable habitats. The data of controlling censuses is combined with a year round record of warm traces size. During this recording it is taken into account the correlation of big traces towards medium traces as well as the correlation of medium traces towards small traces (mothers with offspring) for determination of the sex and age population structure (number of females with one year old and two years old offspring).

Parameters 2.1. Total area of suitable unfragmented habitats &
Parameters 2.2. Lair suitable habitats &
Parameters 2.3. Area of closed (inaccessible) forest basins

The size/area of the habitats is determined by applying GIS model with standardized algorithm with scale 30x30 pixels.

- A suitable habitat is each habitat, which includes more than 40 km^2 (average not overlapping individual territory) of forest areas, with density of building or other artificial equipment (sport or attractions) under 1% with average afforestation of 70%. The so called breeding areas are extracted from the created model. These areas are of high suitability rate (class 1-4 according to the model), are ≥40 km^2 and are not fragmented.
- A lair suitable habitat is forest (including closed canopy bushes) or rock massif of minimum 1,5 km distance from the closest settlement, building, tourist or sport facilities or any other kind of urbanized territory of 500 m distance from the closest road (a dirt road, forest road etc). All areas which are ≥1,5 km distance from human buildings and ≥500 m distance from the closest road are extracted from the created model.

The affected population from development plans and projects is defined by the size and the carrying capacity of affected habitats.

Parameter 3.1. Food base

The food base is assessed by setting test grounds in typical forest, herbaceous and mosaic habitats. A minimum of 10 test grounds are set within each range of 40 км^2 or 40 000 ha (average not overlapping individual territory) of suitable habitats for each monitoring period. For each test ground the Food base index is calculated:

SIfood=R.(SIV1.SIV2. SIV3…….SIVn)1/n) with values from 0 till 1.

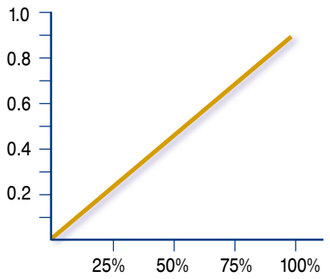
The Index is rendering an account of plant species diversity and their coverage for each test ground:

- The Diversity – R reflects presence/absence of 2 or more significant plant species from each type (herbaceous, bushes or ligneous). The vegetable food accessibility is calculated by utilization of phytosociological data of specific plant communities. In the calculation only plants present in the bear food diet with frequency of ≥5% and

in volume ≥0.5% according to Gunchev (1989) are taken into account. When a ligneous species of bear importance is found an assessment rate of 0.5 is given for the region. For two or more species the assessment rate is 1.00.

- The Coverage – SIV1, SIV2, SIV3 …SIn is described in % of herbaceous and bush species of bear importance OR of ligneous species of bear importance with over 40% of fruit abundance. The coverage of each species is calculated on proportional basis from 0% till 100% (figure 1).

Figure 1. Correlation of coverage in percents – coefficient



An average value is calculated for all test grounds in the selected region

Parameter 3.2. Habitat fragmentation

Artificial barriers for bear migration are:

- Electric fences
- Buildings and the fenced areas around them;
- Linear infrastructure – roads and traffic with more than 2400 motor vehicles per day, busy railways, insuperable road and railway infrastructures
- Territories with intensive agriculture and stock breeding (including intensive game breeding)
- Territories with building or any other artificial infrastructure (sport or attractions) density of more than 10% OR road and path density of more than 1,5km/km^2
- Water bodies wider than 200m;
- Territories with intensive human presence: continuous (more than 5 persons on a 1 km^2) or periodic and intensive (over 1 month in a year with more than 50 people per 1 km^2) human presence;

Fragmented habitats are characterized by patches of suitable habitats with sizes less than 40 km^2 (40 000 ha) and a contact zone with neighboring suitable habitats under 50% of the length of their outward perimeter.

Parameter 3.5. Presence of bio-corridors between suitable habitats

A bio-corridor is fragmented if:

- The forest vegetation is disconnected with more than 500 m of open spaces (arable lands) or more than 1 km (alpine meadows)
- More than 5% of its width is interrupted by natural of artificial barriers for migration. When building a linear infrastructure that crosses a bio-corridor there must be suitable bear passes (underpass – viaduct, overpass – road tunnel or green bridge) at every 800 m.

Parameter 4.2. Human activities in forests and adjacent areas

Human activities in forests and neighboring territories which affect the populations and the habitats such as

- Hunting
- Forestry
- Tourism: trails, ski roads and slopes etc.
- Gathering of herbs, mushrooms and wild fruits

As habitat harmful impact is considered each impact which leads to continuous (more than 1 person per 1 km^2) or periodical and intensive (over 1 month per year with more than 10 persons per 1 km^2) human presence.

Parameter 4.3. Disturbance by motor vehicles and other motorized means of transport

Other motorized means of transportation are all types of means of transportation driven by a motor which do not fall in the definition for motor vehicles according to the Law on Roads.

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