

## VOLUNTARY BIODIVERSITY CREDITS

### Method for Assessing Current Biodiversity Status (CBS)

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## 1. Objective

This methodology must be used for assessment of project baseline/current biodiversity status at start of the project, and every 5 years throughout the project. The objective of this method is to provide a uniform system for assessment of biodiversity which translates into a classification of biodiversity values.

Field inventory can be carried out in accordance to common practice for biodiversity assessment in Swedish forestry.

## 2. Commonly used methods for biodiversity assessment in Sweden

The Swedish FSC standard contains requirements for nature value assessment (indicator 6.2.1 in the current standard) prior to final harvest, last thinning and construction of a forest road. There is no common standardized natural value assessment methodology in Sweden. The certificate holders use slightly different methods to meet the standard's requirements.

At present, a small number of checklists dominate (around 5-6). All checklists focus on structures (for example, the presence of dead wood and old trees) and can thus be filled in by people without a deeper species knowledge relevant for nature conservation. In almost all checklists, it is possible to note the presence of species, but species inventory is not included as a mandatory item in any checklist. However, the methodology is only one of several factors that can affect the quality of the natural value assessment.

Following checklists are currently commonly used:

- "Skogsbiologerna" checklist, including versions used by forest companies,
- The "Sveaskog-Bergivk" method,
- The "Pancert" method,
- The "Greensway" method, and
- The Swedish Forest Agency checklists

### 3. Biodiversity assessment method requirements for a biodiversity credit project

For the purpose of biodiversity (nature value) assessment in biodiversity credit projects, a method for assessing current biodiversity status has been developed as presented in this document. It is based on the established biodiversity assessment methods used in Swedish forestry today (see above) and the SIS standard<sup>1</sup> developed for Natural Value Inventory (NVI). By using this method in all biodiversity credit projects we can ensure the quality and provide comparability of the data and projects.

### 4. Field inventory

Following parameters are to be assessed and graded into the below point system:

**1. Biotope structures (0-15 points)**

- Occurrence of dead wood (0-5 p)
- Trees with high ecological value (0-5 p)
- Geological and topographical features of high value (e.g. blocks, limestone and hyperite occurrence etc.) (0-5 p)

**2. Biotope elements (0-15 points)**

- Occurrence of consideration requiring biotopes or riparian zones (0-5 p)
- Soil- and vegetation qualities (0-5 p)
- Tree species mix and occurrence of unusual tree species (0-5 p)

**3. Ecological continuity and natural disturbance (0-10 points)**

- Stand variations such as uneven age structure, stand layers, uneven tree cover and open areas, etc. (0-5p)
- Occurrence of and indications of occurrence of repeated natural disturbances (0-5 p)

**4. Occurrence of species of special importance (0-10 points)**

- Occurrence of red listed species (national red list) or occurrence of signal species (0-5 p)
- Occurrence of key species and functionally important species (0-5 p)

The total sum of points valuing the current biodiversity status may range from 0 – 50 points.

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<sup>1</sup> Biodiversity Survey – Implementation, Assessment and Reporting SS 199000:2014, Swedish Standard Institute

## 5. Method

Biodiversity is assessed by applying a combination of circular sample plots (25 m radius), line transects and free search for valuable biotopes or biodiversity elements. The sample plots should be placed in representative areas within the stand with the frequency of 1 plot for each 2 ha (1 plot/2 ha). In very complex stands with large stand variations, more plots/ha may be necessary.

Following parameters must be assessed within each sample plot:

- Dead wood (number and quality)
- Trees of high ecological value (number)
- Tree species mix (%)
- Occurrence of species of special importance (signal species and red listed species) and key species
- Soil- and vegetation qualities

Apart from sample plot inventory, line transect inventory must also be carried out consisting of 100-150 m line transect through the stand. Along the transect, following parameters must be assessed:

- Variation within the stand (e.g. age-class distribution, layering, uneven tree cover and openings)
- Occurrence of and indications for occurrence of repeated natural disturbances
- Geological and topographical features of high value (e.g. blocks, limestone and hyperite occurrence etc.)
- Tree species mix and occurrence of unusual tree species (%)
- Occurrence of species of special importance (signal species or red listed species)
- Occurrence of small areas with high biodiversity or riparian zones

Occurrence of small areas with high biodiversity or riparian zones can also be done by a free search method based on information gathered in advance about the stand's hydrological and/or topological qualities.

Apart from the field inventory, supporting information can be included from sources such as:

- "Artportalen" or similar (<https://www.artportalen.se>),
- "Skogens pärlor" or similar (<https://www.skogsstyrelsen.se/skogensparlor>),
- Current forest management plans, and
- Or results from other inventories.

## 6. Biodiversity credits

The results from inventory of circular plots as well as linear transects shall be weighted into a mean value for the stand. This mean value is then adjusted by the results from the free search for valuable biotopes or biodiversity elements.

The total number of points shall then be translated into the so called **Current Biodiveristy Status (CBS)** as follows:

Points	Current Biodiversity Status (CBS)
0-10	1
11-20	2
21-30	3
31-40	4
41-50	5

## 7. Detailed inventory instructions

The field inventory begins with an overview of the stand's location and conservation value conditions via map layers and/or the relevant forestry plan. At this stage, the species portal (Artportalen) or other public databases with information on red-listed and signal species should also be consulted. Once in the field, the inventory specialist will first get himself/herself an overview of the stand in terms of the area's character, variety and its ecological complexity. Thereafter, circular sample areas are placed in places that can be considered representative of the stand and with a frequency of approximately 1 sample area per 2 ha. In very varied and complex stands, the number of sample areas may need to increase and in managed and very simple stands, a smaller number of plots may suffice.

In each circular sample area (with a radius of 25 m) dead wood, trees of high ecological value, soil and vegetation qualities and species of interest are assessed.

## 8. Grading system – allocation of points

### 8.1. Dead wood

Defined as lying or standing units of dead wood exceeding 15 cm in diameter (except for slow-growing stands on weak soils where all dead wood above 10 cm is counted) and with a minimum length of 1 m.

Description	Points
Dead wood is completely missing in the sample plot.	0
Occasional elements of dead wood.	1
Occasional and scattered occurrence or clear elements of dead wood (decomposing) distributed over several tree species.	2
Clear presence of dead wood (2-4 in the sample surface), most of it created by decay, some variation in decomposition.	3
Clear presence of dead wood (2-4 in the sample surface) of high quality (coarse dimension > 30 cm, favorable placement in the stand, fallen and whole rotting trees) and with variation of decomposition states. Alternatively, abundant occurrence of dead wood of slightly lower quality than for stage above (3).	4
Abundant occurrence of dead wood of several decomposition states, consistently characterized by high ecological quality (coarse dimension, favorable placement in the stand, fallen and whole rotting trees).	5

## 8.2 Trees of high ecological value

Description	Points
Trees of high ecological value are completely missing in the sample plot.	0
Single high ecological value trees occur.	1
A few trees with high ecological value occur - or obvious occurrence of trees with high ecological value but in suboptimal ecological conditions (e. g. coarse deciduous trees or pines in heavily shaded locations).	2
Clear presence (2-4 in the sample plot) of high ecological value trees in the sample plot.	3
Abundant occurrence of trees with ecological value (5 or more), few or no trees with potential to develop into high ecological value trees within 20-30 years.	4
Abundant occurrence of trees with ecological value (5 or more), as well as several trees with potential to develop into high ecological value trees within 20-30 years.	5

## 8.3 Species of interest

Description	Points
No species of interest found, the biotope is judged to be unfavorable for signal- and red-listed species.	0
No species of interest found, however potential for signal- and red-listed species to use this biotope.	1
Single findings of signal type, not red-listed.	2
Single finds of red-listed species or several finds of signal species.	3
Several findings of red-listed species or findings of at least five signal species.	4
Occurrence of at least 4 red-listed species associated with the current biotope.	5



#### 8.4 Presence of key species or functionally important species

Description	Points
No key species or functional species present.	0
Occasional finds of forest key species functional species	1
Scattered finds of key forest species in stands with unfavorable biotope qualities.	2
Scattered finds of key forest species in stands with favorable biotope qualities.	3
Several finds of key forest species (>4), functional species missing	4
Several finds of (>4) key forest species, functional species exist.	5

#### 8.5 Ground and vegetation qualities

Description	Points
Ground and bottom layer vegetation of unfavorable structure.	0
No distinct soil and vegetation qualities.	1
Sparse and scattered soil and vegetation qualities.	2
Scattered elements of favorable soil and vegetation structure (e. g. sparse lowlands with thin humus layer in pine forest, developed low herb vegetation on fresh soil, lime-favored soil vegetation).	3
Clear elements of favorable soil and vegetation structure.	4
Favorable soil and vegetation structure characterizes the entire sample area.	5

## 8.6 Transect inventory parameters

### 8.6.1 Stand variation

Description	Points
No stand variation at all, the stand is even-aged, even spacing between trees, and regularly occurring forest management.	0
Stand variation in the form of layering, a spread of age classes, or open gaps occur occasionally.	1
Scattered or single elements of stand variation.	2
Clear elements of layering <u>or</u> age distribution.	3
Clear element of layering <u>and</u> age distribution.	4
The entire assessed area is consistently characterized by pronounced stand variation in the form of multi-layers, well developed age distribution and with the presence of open areas/gaps in the stand.	5

### 8.6.2 Occurrence and indications of repeated natural disturbances

Description	Points
No signs of natural disturbance.	0
Few or occasional indications of previous natural disturbances such as fire-affected dead wood, storm fells with dead wood, forest grazing etc.	1
Scattered or isolated elements of indications of natural disturbances.	2
Clear ("not having to search") elements of natural disturbance such as fire, storm, flood, forest grazing etc.	3
The whole area is consistently characterized by natural disturbances or is recently affected by fire, insect disturbances, storms without subsequent forestry measures.	4
The whole area is consistently characterized by natural disturbances and is recently affected by fire, insect disturbances, storms without subsequent forestry measures.	5

### 8.6.3 Tree species mixture and occurrence of unusual tree species (in%)

Description	Points
95-100% of the wood stock distributed on a coniferous species.	0
Stand characterized by two coniferous species but with one dominant species (> 50%)	1
Coniferous stands with a certain element of broadleaf trees (5-10% of the stem number)	2
Broad leaf-dominated stands or stands with at least 4 tree species, none of which make up more than 80% of the wood stock.	3
Varied stands with at least 4 tree species and where no tree species constitutes more than 50% of the wood stock, or stands with a clear element of trees unusual for the region.	4
Deciduous stands with at least 3 deciduous tree species, of which none constitutes more than 80% of the wood stock, or coniferous mixed stands with at least 25% deciduous tree mix of several tree species (at least 3), or mixed coniferous stands with a clear element of tree species unusual for the region.	5

### 8.6.4 Occurrence of consideration-requiring biotopes or riparian zones

Description	Points
Small habitats (consideration-requiring biotopes) and riparian zones (towards wetlands, water or arable land) are completely absent.	0
Single elements of non-functional riparian zones or single elements of consideration-requiring biotope with negative impact.	1
Single occurrence of consideration-requiring biotope or functional riparian zone.	2
Single occurrence of both consideration-requiring biotope and functional riparian zone.	3
Several occurrences of consideration-requiring biotopes or functional riparian zones.	4
Several occurrences of consideration-requiring biotopes and functional riparian zones.	5

## 8.6.5 Geological and topographical features of high value

Description	Points
No elements of geological/topographical structures in the stand. (Blocks, boulders, limestone etc)	0
Single elements of geological/topographical structures in the stand of low ecological quality.	1
single elements of geological/topographical structures in the stand of high ecological quality.	2
Several occurrences, or larger areas (> 0.3 ha) with geological/topographical value structures.	3
Several occurrences of high-quality geological/topographical value structures of high quality.	4
Several high-quality geological/topographical value structures occur and with finds of red-listed species linked to these structures.	5