The Rosskopf Marteloscope

Field guide

UNI FREIBURG

Freiburg IM BREISGAU

Freiburg City Forest

Freiburg, often referred to as the “green city”, is located in the Upper Rhine valley adjacent to the Black Forest in the East. The forest of Freiburg covers an area of 5,200 ha thus being exceptionally large for a communal forest. Around 60 % of the forest are located in the mountainous regions of the Black Forest while 40 %, entitled ‘Mooswald,’ are found in the lowlands of the Rhine valley. The forest area extends from 200 in the valley to nearly 1,300 m.a.s.l. The Freiburg City Forest is dominated by the decidious tree species beech and oak, while Norway spruce, Silver and Douglas fir constitute the most common conifers. It has been Forest Stewardship Council (FSC) certified already as early as 1999.

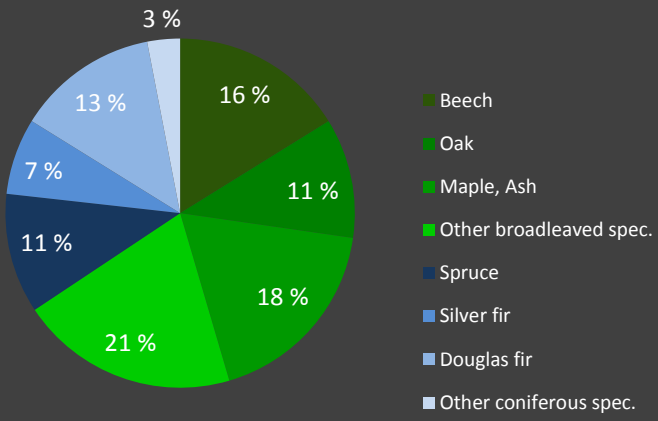
The mountain forests are typically mixed stands and characterized by high increment and standing volume. Dominant species are beech, Norway spruce, Silver and Douglas fir while a broad variety of other tree species can be found depending on exposition. Forest management often proves to be challenging due to steep slopes and limited accessibility. Above 800 m.a.s.l. harvesting is reduced due to high importance of protective functions.

....in figures

4,831 ha
Total forest area

8.7 m³/ha
Annual increment

369 m³/ha
Actual average stock



67 %
Broadleaves

33 %
Conifers

7.5 m³/ha
is the annual cutting rate

86 %
of forest area are single tree harvest and group selection stands

36,000 m³
is the total annual cutting rate

11 %
of total forest area are managed as continuous cover forests

4,000 m³
of fuelwood is sold to residents of Freiburg

Biodiversity concept

Aim in the Freiburg City Forest is to build multi-layered mixed forests. Integrative forest management is practiced giving emphasis to the preservation of veteran trees and accumulation of deadwood. The city's deadwood concept also foresees multiple set-aside areas of varying sizes in which no harvesting takes place. They are distributed across the whole city forest area.

Forest management in the Freiburg City Forest aims at incorporating nature and species conservation goals and the protection of natural development processes to its commercially used forests.

Already in 1994, the enterprise set aside a forest reserve and adopted a deadwood concept (1996).

46 so-called *'deadwood areas'* of around 1 ha have so far been designated for natural development with a spacing of about 1 km.

The selection of these set-aside areas is based on the presence of rare and/or protected species, the age of a stand or tree group, habitat continuity and the display of rare or important microhabitat structures.

The network of set-asides is complemented by 60 so called *'veteran and dead tree groups'* of 0.1 - 0.3 ha in size. Those serve as so called *'stepping stones'*. They should display special tree microhabitats such as large tree cavities, aeries or already recorded breeding or resting areas of protected species.

Spatial distribution of tree microhabitats plays a key role as driver of biodiversity. Therefore the city forest has given high importance to the connectivity of the different area elements. In addition individual habitat trees displaying valuable tree microhabitats are protected in regularly managed forests.

The Freiburg City Forest has also designated 5 '*reference areas*' with an average size of 22 ha in the course of FSC-certification. Due to their size they allow for observing and learning about natural develoment processes in forests.

12 ha
Total size of 60 habitat tree groups

36 ha
Size of set-aside forest reserves

90 ha
Total size of 46 deadwood areas

109 ha
Total size of 5 large reference areas

870 ha
Forest stands > 100 years

10.9 %
of total forest area are set-aside

44.3 %
are designated as Natura 2000 sites

19.2 m³/ha
Average amount of deadwood

Habitat structures

Large quantities of deadwood and a high density of old microhabitat-bearing trees are characteristic elements of natural forests, especially of the old-growth phases. These phases are often absent or rare in managed forests, even in forests under close-to-nature management. Also in selective harvests and thinnings, 'defective' trees referring to these old-growth phases (hollow, dead and languishing trees) are often removed. Yet, an important share of forest biodiversity is strictly or primarily dependent on these elements for their survival, especially 'saproxylic' species, those are species depending on deadwood.

Most species dependent of old-growth-elements and phases have become threatened. Conservation of biodiversity in commercial forest stands is mainly a question of conservation of adequate amounts of deadwood and retention of such microhabitat structures.

Splintered trunk

Bark loss

Conks of polypores

Woodpecker feeding holes

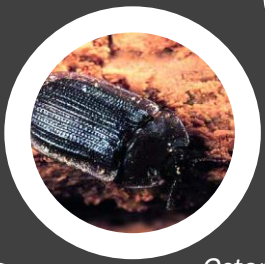
….and Biodiversity

Dryocopus martius

Aegolius funereus

Fomitopsis pinicola

Myotis bechsteinii



Ostoma ferruginea

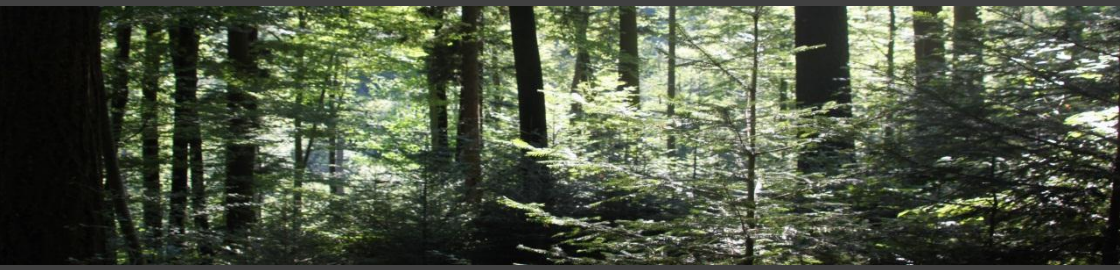
Hericium flagellum

Site conditions

Altitude:	**400 m.a.s.l.**
Forest ecological region:	**Black Forest**
Geology/ Bedrock:	**Paragneiss** (metamorphic)
Soil types:	**Brown earth**, formed by sandy solifluction soils and periglacial formed loose rock formation
Mean annual temperature:	**10.4 °C**
Annual precipitation:	**934 mm**
Natural forest community:	***Luzulo-Fagetum*** with Silver fir

Luzulo-Fagetum beech forests occur mostly in areas with acid and nutrient-poor soils. They are most commonly found in continental rainfall-rich regions.

The forest canopy in the Rosskopf M-scope is presently dominated by Pseudotsuga menziesii (Douglas fir) originating from planting, Abies alba (Silver fir) and Fagus sylvativa (beech). Natural regeneration is dominated by Silver fir and beech. Floral diversity is rather poor.

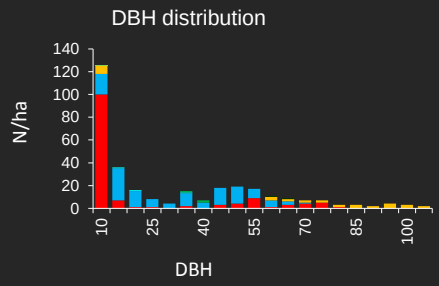


Stand characteristics

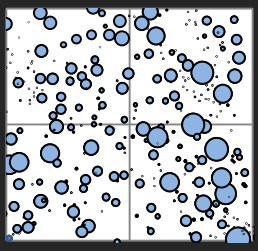
The **Rosskopf** Marteloscope comprises of a multi-layered, about 105 years old stand, consisting mainly of Silver fir, Beech and Douglas fir. Some of the Douglas firs having reached the target diameter were already harvested in the course of past management operations.

Stand data

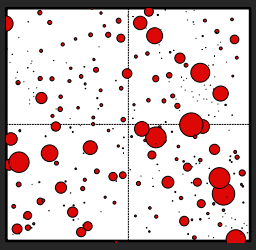
N [stems/ha]	313
BA [m²/ha]	39.3
Volume [m³/ha]	629.2
Habitat value [points]	2,637
Economic value [Euro]	32,675



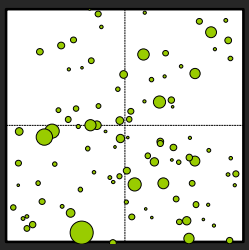
Volume [m³]



Economic value [Euro]



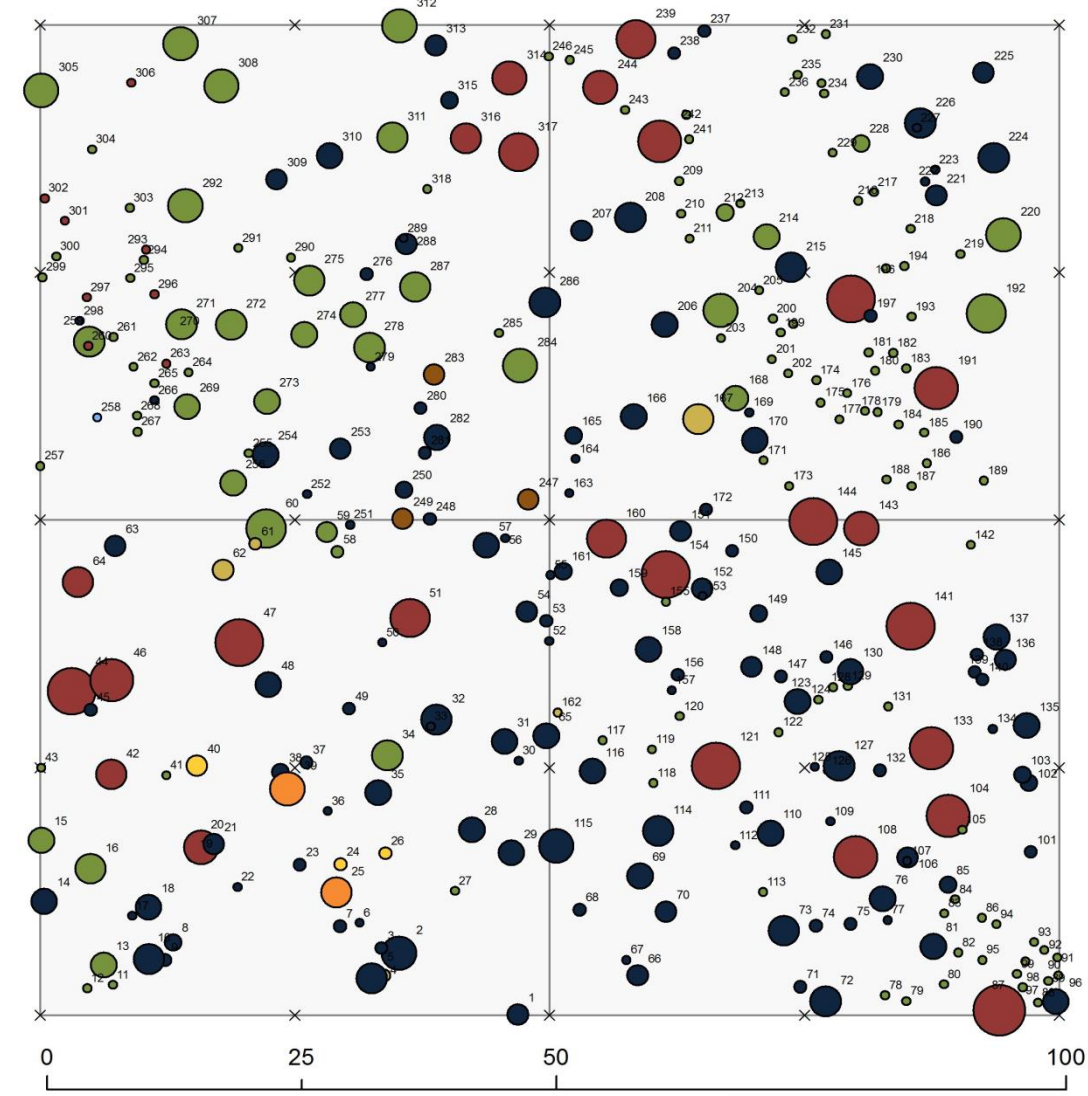
Habitat value [points]



The **economic value (in €)** is estimated for each tree based on volume, stem quality and corresponding local timber price lists.

The **habitat value (in points)** is assessed for each tree based on tree microhabitats, taking into account rarity of each habitat and duration for it to develop.

The evaluation of the habitat value is based on a comprehensive catalogue of tree microhabitats. It comprises 23 saproxylic and epixylic features such as cavities, large dead branches, cracks and loose bark, epiphytes, sap runs, or trunk rot characteristics. Tree microhabitats are of prime importance for specialized and often endangered forest species of flora and fauna.



Tree species

- Beech
- Silver fir
- Douglas fir
- Scots pine
- Spruce
- Oak
- Paulownia tree
- Dead tree

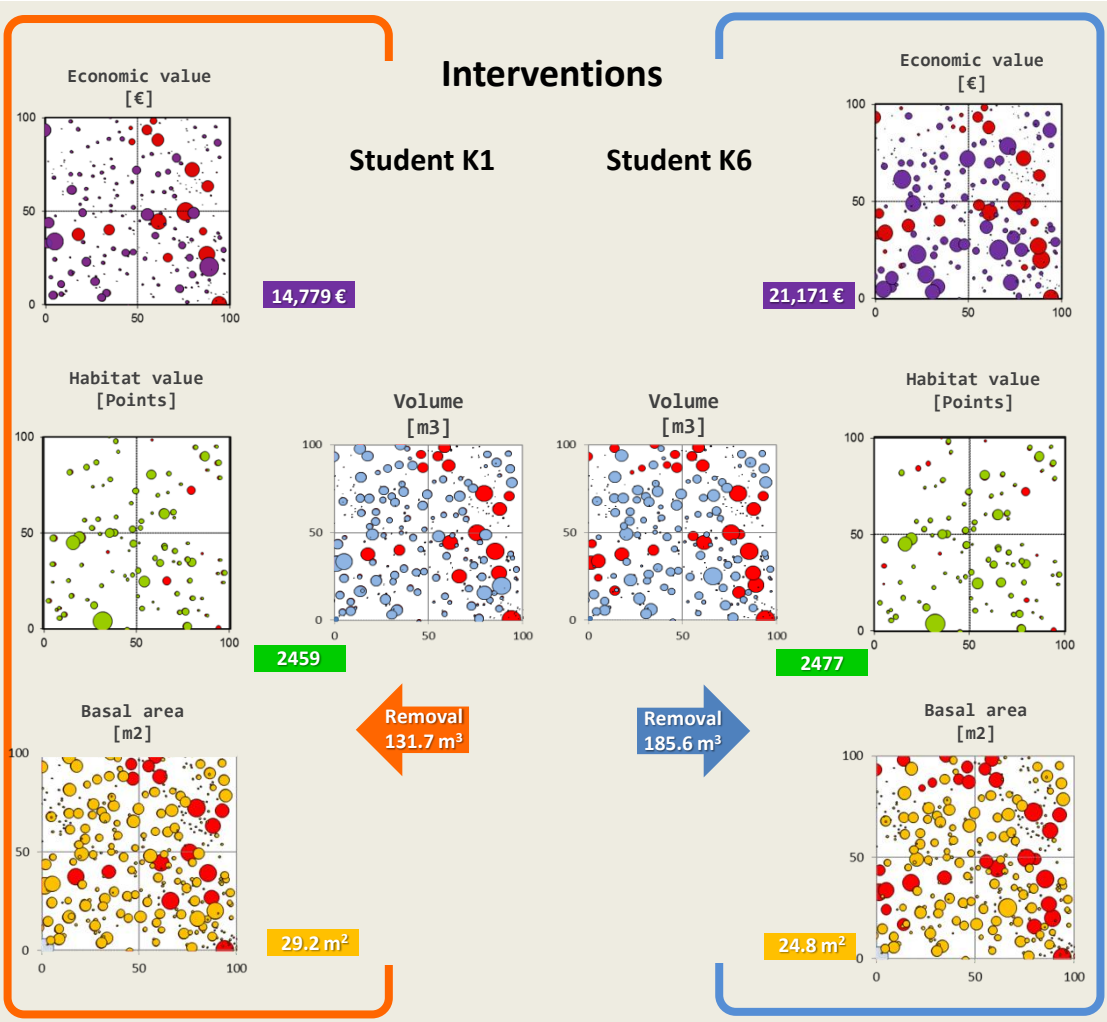
DBH (cm)

- 7,5 - 15,0
- 15,1 - 25,0
- 25,1 - 35,0
- 35,1 - 45,0
- 45,1 - 55,0
- 55,1 - 65,0
- 65,1 - 75,0
- 75,1 - 85,0
- 85,1 - 95,0
- 95,1 - 105,0
- 105,1 - 115,0

N

Example of interventions

A comparison of two interventions is shown as a result of a virtual tree selection exercise in the Marteloscope Rosskopf. They highlight the different outcomes regarding economic and habitat values as well as the effects on the forest structure (basal area).



Integrate+ is a demonstration project funded by the German Federal Ministry for Food and Agriculture (BMEL) to establish a European network of demonstration sites for the integration of biodiversity conservation into forest management.

The Integrate+ project runs from December 2013 to December 2016 and builds on a partner network from research and practice with a focus on implementation of integrative management and enhancing transnational exchange of experiences.

Kraus, D., Schuck, A., Schmitt, A., Pyttel, P., 2015. The Rosskopf Marteloscope field guide. Integrate+ Technical Paper No. 3. 12 p.

European Forest Institute, 2015

www.integrateplus.org