



The Lörän skogen Marteloscope

Field guide



Njurundakusten

Njurundakusten Conservation Park is SCA's fourth conservation park and comprises 2,300 hectares. It is located in the Municipality of Sundsvall, along the southern Medelpad coastline. The park is adjacent to two marine nature reserves, Salen and Långören.

The Conservation Park comprises an elongated and sometimes narrow area along the southern Medelpad coastline. One of the ideas behind SCA's conservation parks is to strengthen existing nature conservation values. The landscape in the Conservation Park is mostly characterized by a long undeveloped stretch of coastline with flat rocks and distinctive elements of boulders and rubble. The post-glacial land uplift in the area resulted in many bays having been cut off and transformed into freshwater environments. The area features flower-rich shore meadows, pine forests, wetlands, alder swamp and shingles.

Large areas of forest in the Park show marked signs of human activity, since people have lived and farmed the forest here for a long time. The area from Lörudden and southwards had been heavily impacted in recent years by Cyclone Dagmar (December 2011), and Hurricane Ivar during December 2013. The storms caused widespread windfalls.



2,304 ha

Total area

4.3 m³/ha

Annual increment

233 m³/ha

Actual average stock

1,711 ha

Productive forest area

7,200 m³

is the **annual increment** measured over the total forest

5,000 m³

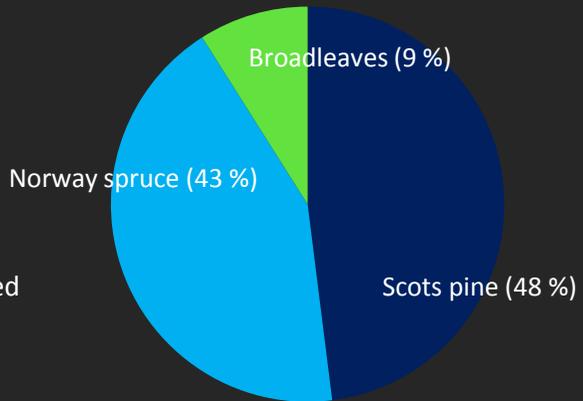
are logged annually

> 60,000

visitors per year

> 39 km

roads and trails



91 %

Conifers

9 %

Broadleaves

At least **210**

species favoured by forest fire

Restoration management



The goal of forest habitat restoration in Lörans skogen is to accelerate the re-development of the characteristic processes and structural features of old natural pine forests shaped by repeated low intensity forest fires. Restoration measures include the creating of lying and standing deadwood, artificial tree scars and curbing the establishment of Norway spruce through prescribed fire or combined measures.

Emulating natural processes

Restoration measures are planned at different spatial scales, being landscape and stand level. The objective of implementing such measures for larger forest areas of SCA targets in particular species conservation.

Ecological landscape planning: An ecological landscape plan designates which areas, in consideration of their nature value, are to be entirely excluded from forest management and in which areas felling should be postponed. Further areas requiring alternative management methods are determined.

Planning at stand level: A prerequisite for effective restoration measures at the stand level is well executed tract planning. Tract planning includes assessing, surveying and single-object planning.

Nature conservation measures are applied at three levels: conservation areas, conservation patches and single-object protection.

Conservation areas are usually larger than one hectare in which felling is postponed, alternative (restoration) methods are used, or the whole area is set-aside. They have high conservation values and include virgin natural forests, older forests rich in broad-leaved trees and different types of swamp forests.

Conservation patches extend from 0.1 up to 1 hectare and mainly consist of edge zones, wet hollows, areas with outcrops of bedrock, rocky cliffs, etc.

Single-objects designated for protection can be among other individual trees (e.g. habitat trees or snags), tree groups and old windthrows. Single object features have an area smaller than 0.1 ha.

Biodiversity concept in figures

65 %

Set-aside forest area

404 ha

Rocky outcrop area

103 ha

Mires

27 ha

Lakes and ponds

1,036 ha

Priority areas for conservation

10 /ha

Target for retention trees

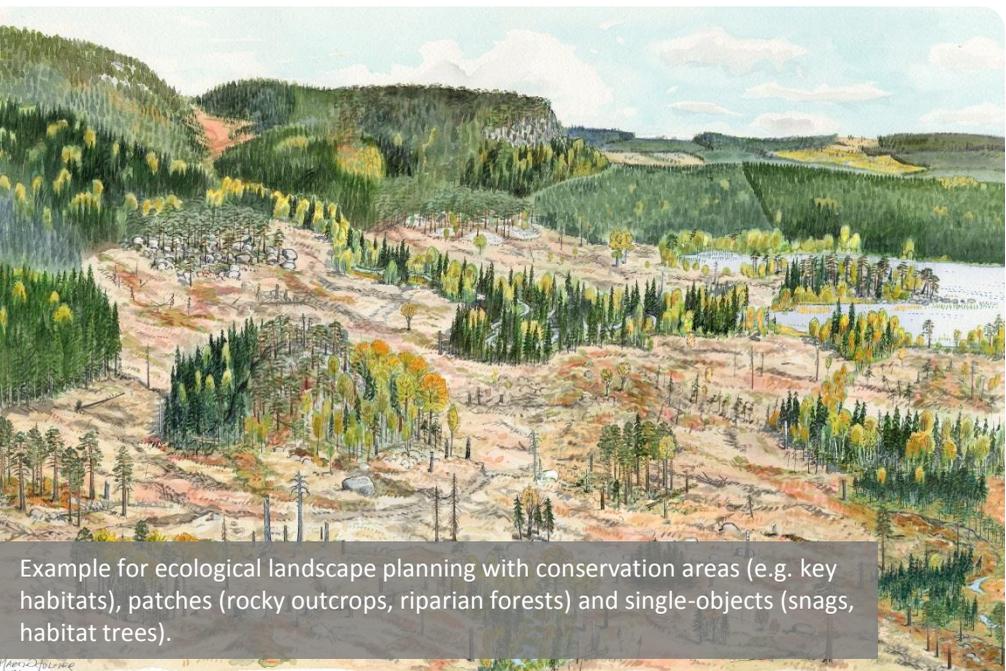
3 m³/ha

Average amount of Scots pine deadwood

Target deadwood

10 % = 10 m³/ha

of Scots pine volume



Example for ecological landscape planning with conservation areas (e.g. key habitats), patches (rocky outcrops, riparian forests) and single-objects (snags, habitat trees).

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, that is 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.



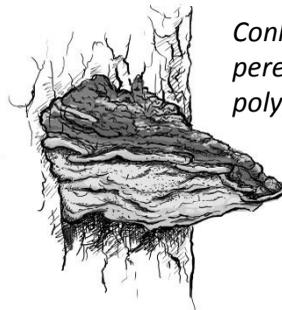
Woodpecker cavities



Fire scars



Broken trunk



Conks of perennial polypores

...and biodiversity



Dryocopus martius



Caprimulgus europaea



Nothorina muricata



Stephanopachys substriatus



Tragosoma deparsarium



Phellinus pini

Site conditions

Altitude:	23 m.a.s.l.
Forest ecological region:	Southern boreal forests
Soil:	Podzol
Site description:	Gravelly, sandy moraine– coarse sand
Mean annual temperature:	3° C
Annual precipitation:	500 mm
Natural forest community:	<i>Vaccinio-Pinetum</i>
Forest type	Vaccinium-Myrtillus pine forest

*Moss vegetation, including feather mosses, is fairly continuous; lichens are common but of lesser importance. Dwarf-shrub vegetation is rather plentiful, consisting mainly of *Vaccinium vitis-idaea*, accompanied in varying degree by *Vaccinium myrtillus*. These forest types occur mainly on moderately dry sandy ground and on glacial ridges, sometimes even on moraine.*

Species: *Vaccinium vitis-idaea*, *Vaccinium uliginosum*, *Vaccinium myrtillus*, *Pleurozium schreberi*

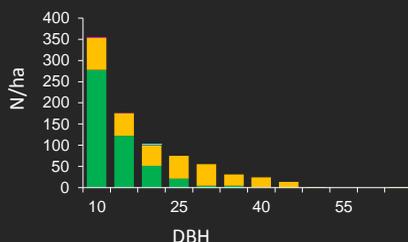


Stand characteristics

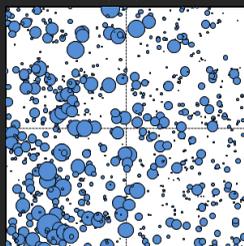
The **Löran skoge n** Marteloscope is located in an old stand of the bilberry-pine type. The age of the older pines ranges between 250-300 years, with partially dense understory formed by Norway spruce due to a lack of recent disturbance events.

Stand data

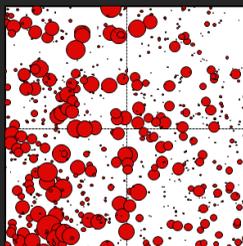
N [stems/ha]	833
BA [m ² /ha]	25.01
Volume [m ³ /ha]	138.45
Habitat value [points]	8,555
Economic value [Euros]	4,932.-



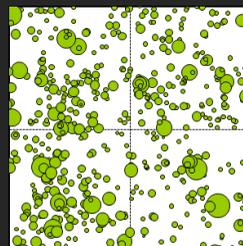
Volume
[m³]



Economic value
[Euro]



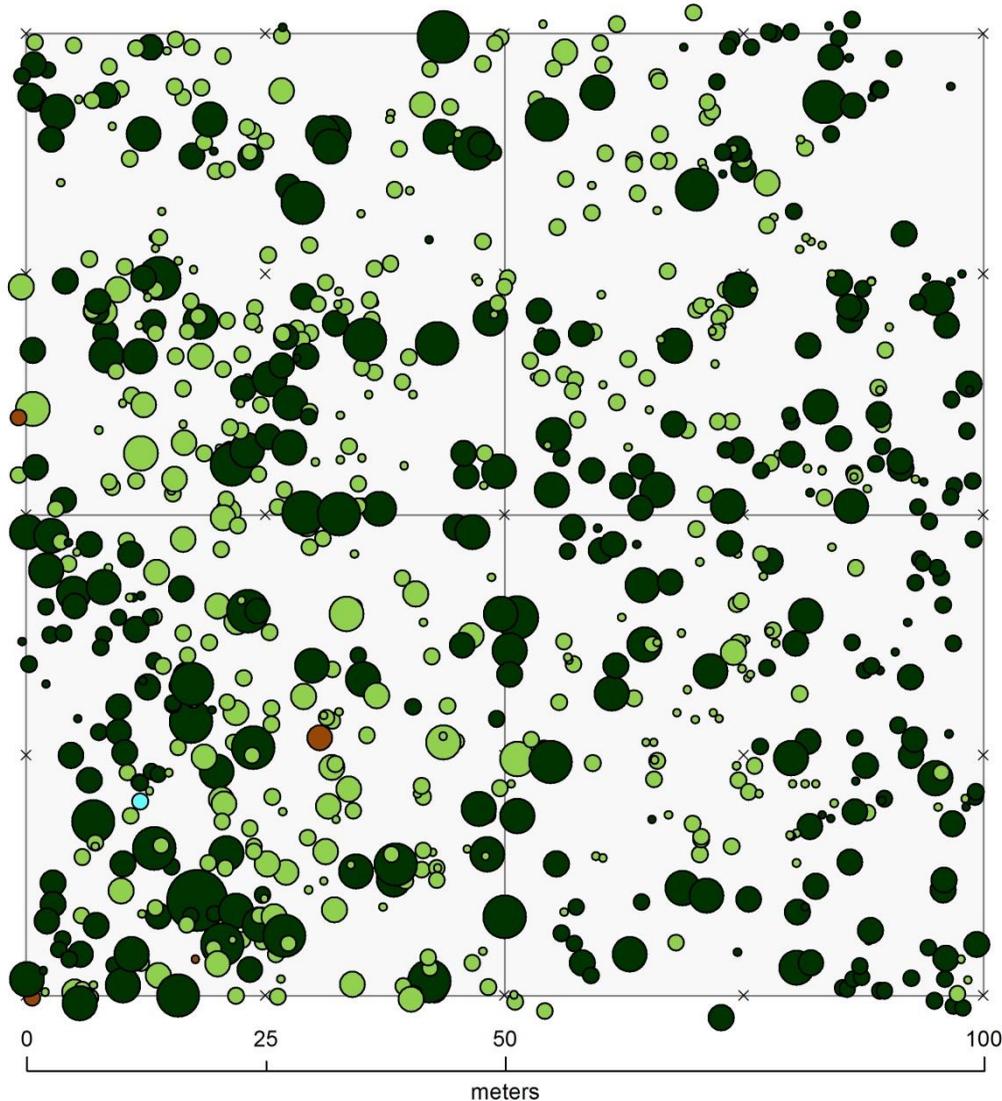
Habitat value
[points]



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 sp.

dbh [cm]

● pine	○ 7,5 - 10,0	○ 40,1 - 50,0
● spruce	○ 10,1 - 20,0	○ 50,1 - 60,0
● birch	○ 20,1 - 30,0	○ 60,1 - 70,0
● rowan	○ 30,1 - 40,0	



Example of interventions

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

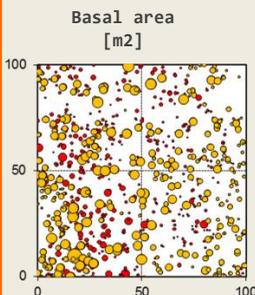
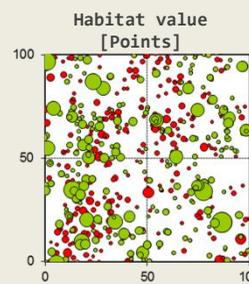
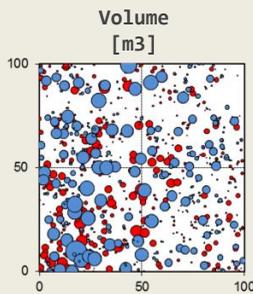
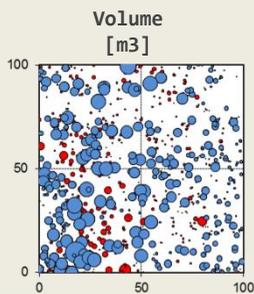
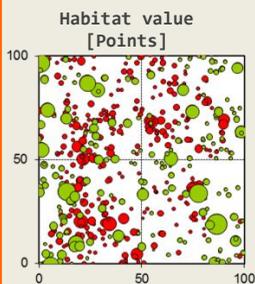
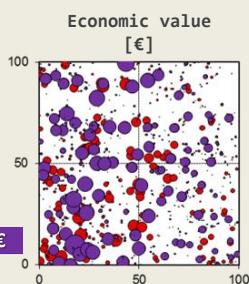
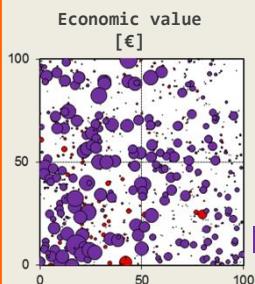
Scenario 1: - Complete removal of Norway spruce and some understorey Scots pine

Scenario 2: - Removal of competitors to old Scots pines, retention of standing deadwood and larger Norway Spruce individuals

Interventions

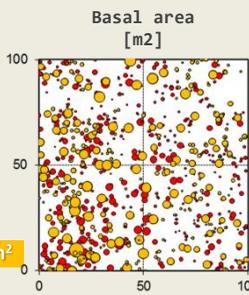
Scenario 1

Scenario 2



Removal
23.2 m³

Removal
54.3 m³



Integrate+ is a demonstration project funded by the German Federal Ministry of 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.



Rydkvist, T., Kraus, D., Schuck, A., Kiehne, J., 2015. The Löran skogen Marteloscope field guide. Integrate+ Technical Paper No. 6. 12 p.

European Forest Institute, 2015

www.integrateplus.org