G3.B Pinus sylvestris taiga woodland

Summary

This is woodland of sub-xeric, xeric and barren sites on mineral soils occurring widely the boreal and boreonemoral zones, usually on podzolic soils with raw humus. The tree canopy is almost always dominated by *Pinus sylvestris*, but mixed forests and even stands dominated by *Betula pendula, B. pubescens* or *Picea abies* can be found. Shrubs tend to be sparse but there is typically a heathy dwarf shrub, a thin sometimes almost absent field layer and an extensive moss or lichen carpet. After wildfires or cutting, the proportions of the field and ground layer change. During the last 50 years the habitat has declined, as a part of its area has transformed into *Picea taiga* woodland and sub-xeric or xeric sites have become more mesic and lichens have suffered. Many threats are linked to forestry: lack of dead wood and breakage of dead wood continuum, decrease in number of large trees, changes in stand age distribution, disturbance caused by forest cuttings and soil amelioration, eutrophication, lack of forest fires and in the northern boreal subzone reindeer grazing. Climate change is probably already having an influence. Protected areas, improved forestry and control of grazing are conservation needs.

Synthesis

The habitat is assessed as Least Concern (LC) under criterion A1 in both EU28 and EU28+, as there has been only a small decline in its quantity within the last 50 years. The area of the habitat is currently stable in some and declining in other countries of Europe. There has also been a slight reduction in the quality of this habitat, leading to the same category (Least Concern) under criterion C/D1. The habitat quality continues to decrease throughout Europe. A more severe decline in quality has occurred already before the 1960's, but data on this decline are not available.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Least Concern	-	Least Concern	-

Sub-habitat types that may require further examination

Lichen-rich, sun-exposed esker forests (Annex 1 type 9060), pine forests on calcareous soils and pine forests on ultramafic soils are rare, possibly endangered subtypes with specialist flora and fauna.

Habitat Type

Code and name

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Pinus sylvestris forest with Cladonia. Kihnu, Estonia (Photo: John Janssen).

Lichen dominated pine forest. Åmot, Norway (Photo: Johnny Hofsten, NIBIO).

Habitat description

This is forest vegetation of sub-xeric, xeric and barren sites on mineral soils in the boreal and boreonemoral zones. The soils are usually podzolic with a raw humus layer. The tree canopy is almost always dominated by *Pinus sylvestris*, but mixed forests and even stands dominated by *Betula pendula, B. pubescens* or *Picea abies* can be found. Canopy composition is nowadays usually regulated by forestry. *Alnus incana, Populus tremula, Salix caprea* and *Sorbus aucuparia* may occur as individual trees usually on sub-xeric sites. *Juniperus communis* is common, but other shrubs, like *Salix phylicifolia* and *S. starkeana*, rarely occur. The understorey vegetation is dominated by dwarf shrubs, the most abundant species being *Calluna vulgaris, Empetrum nigrum, Vaccinium myrtillus* and *V. vitis-idaea*. In the middle and northern boreal subzones *V. uliginosum, Diphasiastrum complanatum* and *Ledum palustre* are common. Towards the north, the abundance of *V. myrtillus* and *E. nigrum* increases and the abundance of *V. vitis-idaea* decreases. Herb and grass species are few, and they are usually entirely missing from barren sites. *Convallaria majalis, Epilobium angustifolium, Maianthemum bifolium , Pteridium aquilinum, Solidago virgaurea* and *Trientalis europaea* are the most common herbs, but their small and pale shoots are often sterile. *Antennaria dioica* thrives on xeric sites. Graminoids include *Calamagrostis epigejos, Deschampsia flexuosa, Festuca ovina* and *Luzula pilosa*, but they are seldom abundant. In stands of this forest type on eskers there is some specialist flora, e.g. *Oxytropis campestris* and *Thymys serpyllum*. The ground layer is continuous. On sub-xeric sites, it is dominated by feather mosses, on barren sites by lichens. The number of moss, liverwort and lichen species increases towards the northern boreal subzone. The most dominant moss species are *Hylocomium splendens and Pleurozium schreberi*, followed by *Dicranum polysetum, D. scoparium* and *Polytrichum juniperinum*. In the northern boreal subzone, *Dicranum drummondii* and *D. fuscescens* are also common. Dominant lichens include *Cladina arbuscula, C. mitis, C. rangiferina, C. stellaris, Cetraria islandica* and *Stereocaulon* spp. In addition, on xeric and barren sites there usually are numerous *Cladonia* species. After a major disturbance such as forest fire, windfall or regeneration cutting, grasses usually increase moderately, bryophytes decrease and lichens increase.

Indicators of good quality:

• Natural composition of canopy

• Structural diversity/ -complexity with (semi)natural age structure or completeness of layers

• Typical flora and fauna composition of the region

• Presence of old trees and a variety of dead wood (lying or standing) and the associated flora, fauna and fungi

• Presence of natural disturbance with natural regeneration

• Long historical continuity (ancient woodland) with high species diversity

• Survival of larger stands of forest without anthropogenic fragmentation and isolation (to support fauna which need large undisturbed forests)

• Absence of non-native species in all layers (flora & fauna)

• No signs of eutrophication or pollution

• No signs of acidification (relevant mainly for oligotrophic or acidic types)

• No man-induced very high population levels of ungulates

Characteristic species:

Tree canopy: *Alnus incana, Betula pendula, B. pubescens, Picea abies, Pinus sylvestris, Populus tremula,*

Sorbus aucuparia.

Shrubs: *Juniperus communis, Salix phylicifolia, Salix starkeana.*

Field layer: Dwarf shrubs: *Arctostaphylos alpina, Arctostaphylos uva-ursi, Betula nana, Calluna vulgaris, Diphasiastrum complanatum, Empetrum nigrum, Ledum palustre, Linnaea borealis, Phyllodoce caerulea, Vaccinium myrtillus, V. uliginosum, V. vitis-idaea*. Herbs: *Antennaria dioica, Convallaria majalis, Epilobium angustifolium, Maianthemum bifolium, Melampyrum pratense, Pteridium aquilinum, Solidago virgaurea,Trientalis europaea.* Graminoids: *Calamagrostis epigejos, Calamagrostis lapponica, Deschampsia flexuosa, Festuca ovina, Luzula pilosa.*

Mosses and liverworts: *Dicranum drummondii, Dicranum fuscescens, Dicranum polysetum, Dicranum scoparium, Hylocomium splendens, Pleurozium schreberi, Polytrichum juniperinum, Polytrichum piliferum, Ptilidium ciliare, Ptilium crista-castrensis.*

Lichens: *Cetraria ericetorum, C. islandica, Cladina arbuscula, C. mitis, C. rangiferina, C. stellaris, Cladonia spp., Flavocetraria nivalis, Nephroma arcticum, Stereocaulon* spp.

Birds: *Caprimulgus europaeus, Falco columbarius, Loxia pytyopsittacus, Lullula arborea, Phoenicurus phoenicurus. Old growth forests: Certhia familiaris, Dryocopus martius, Parus cinctus, Perisoreus infaustus, Phylloscopus trochiloides, Pinicola enucleator, Picoides tridactylus, Tetrao urogallus, Turdus viscivorus.*

Classification

This habitat may be equivalent to, or broader than, or narrower than the habitats or ecosystems in the following typologies.

EUNIS:

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EuroVegChecklist alliances:

Dicrano-Pinion (Libbert 1933) W. Matuszkiewicz 1962

Cladonio stellaris-Pinion sylvestris Kielland-Lund ex Ermakov et Morozova 2011

Annex I:

9010 Western taiga

9060 Coniferous forests on, or connected to, glaciofluvial eskers

Emerald:

? G1.918 Eurasian boreal Betula woods

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MAES-2:

Woodland and forest

IUCN:

1.1 Boreal forest

EFT:

1.2 Pine and pine-birch boreal forest

EVM:

D5.1 Northern boreal pine forests, Middle & southern boreal to hemiboreal pine forest

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?
Yes

Regions
Boreal

Justification
The habitat represents an outstanding example of typical characteristics of the boreal region. It covers a large area and contains typical species and communities of the region.

Geographic occurrence and trends

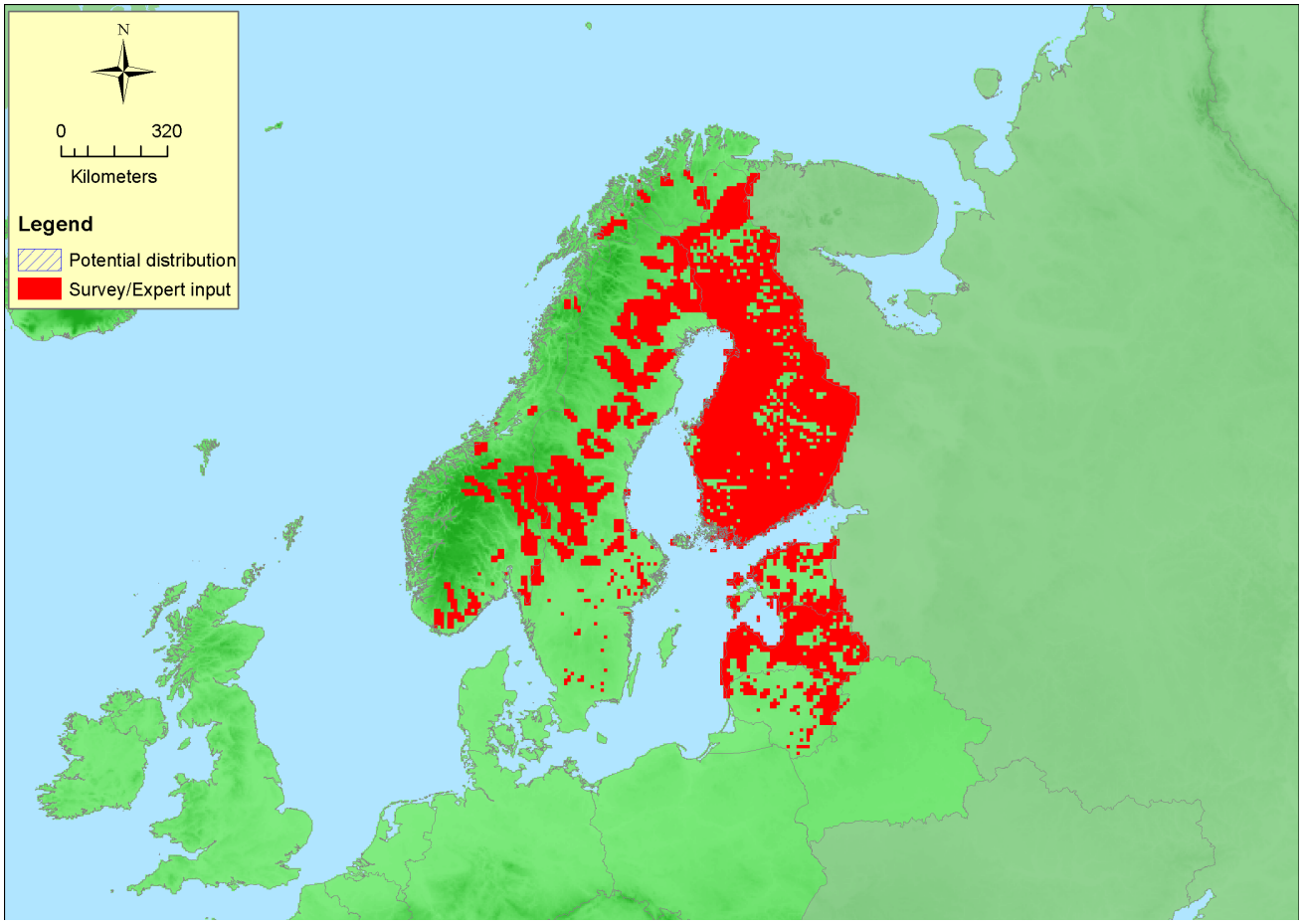
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Estonia	Present	440 Km^2	Decreasing	Unknown
Finland	Aland Islands: Present Finland mainland: Present	45645 Km^2	Decreasing	Decreasing
Latvia	Present	8690 Km^2	Decreasing	Decreasing
Lithuania	Present	1100 Km^2	Decreasing	Decreasing
Poland	Present	250 Km^2	Unknown	Unknown
Sweden	Present	68355 Km^2	Decreasing	Decreasing

EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Norway	Norway Mainland: Present	39395 Km^2	Stable	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	1307350 Km^2	5153	124480 Km^2	
EU 28+	1633100 Km^2	5586	163875 Km^2	

Distribution map



The map is rather good, but the coverage in Sweden and Norway is possibly incomplete. Data sources: Art17, EVA, BOHN.

How much of the current distribution of the habitat type lies within the EU 28?

Less than 50 %. The largest part of this habitat lies within Russia. A large part of the habitat is also located in Norway and Belarus.

Trends in quantity

The habitat area has decreased -13% in EU 28 and -10% in EU28+ over the last 50 years, based on calculations using data from Finland, Lithuania, Sweden and Norway. The larget decrease (-24%) has occurred in Finland. Data on the extent of trend in quantity are missing for Estonia, Latvia and Poland. There are no historical data for 250-50 years ago. In the future the habitat is expected to decrease in Latvia, Estonia and Finland, be stable in Sweden and weakly increase in Norway. Most of the decrease comes from transformation of this type into G3.A Picea taiga woodland. It is a recognized eutrophication phenomenon in Finland, but there is no evidence on its causes. It has been suggested to be caused by multiple factors, like lack of forest fires, increased shading, increased nutrient circulation as a result of forest cuttings, nitrogen deposition, climate change and reindeer grazing (northern boreal subzone). In Finland a possible reason in the southern and middle boreal subzones might also be that a large part of forest soils have been in a process of recovery from an intensive use for slash-and-burn cultivation and cattle grazing (ca. years 1550-1900), which was known to weaken the nutrient status of the soil.

- Average current trend in quantity (extent)
  EU 28: Decreasing
  EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
  No

Justification
The habitat has a very large area and a wide distribution in the Northern Europe.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The habitat has a very large area and a wide distribution in the Northern Europe.

Trends in quality

The extent of degradation in the past 50 years in the EU28 region is 44%, and the severity of degradation is 33%, based on trend data from Finland, Sweden and Lithuania, as trend data from other countries are missing. However, all countries reported a decreasing trend. The same calculation of reduction of quality is less certain for EU28+, because trend data for Norway were missing, and a relatively large area of this habitat is found there. The degradation has been both biotic and abiotic. The most important forms of degradation are lack of dead wood and breakage of dead wood continuum, decrease in number of of large trees, changes in stand age distribution, eutrophication, disturbance caused by forest cuttings and soil amelioration, lack of forest fires and in the northern boreal subzone ecosystem changes caused by reindeer grazing. Changes caused by climate change are already possible, especially in the northern boreal subzone.

- Average current trend in quality
  EU 28: Decreasing
  EU 28+: Decreasing

Pressures and threats

Many of the threats have a connection with forestry. Regeneration cuttings, removal of dead and dying trees, thinning of tree layer, lack of natural stand dynamics and soil amelioration are leading to forests with even stand structure, shortage of old trees, missing deadwood and deadwood continuum as well as to simplified tree species composition. Especially on xeric and barren sites, eutrophication is a common problem. It might be caused by increased shading, increased nutrient cycling due to forestry, N deposition, lack of forest fires and/or climate change, but there is no evidence on influence of any of the suggested reasons so far. In the northern boreal subzone and in Latvia overgrazing is a threat. In Norway infrastructure development can affect this habitat.

List of pressures and threats

Sylviculture, forestry

Forestry clearance
Removal of dead and dying trees
Thinning of tree layer

Natural System modifications

Lack of fires

Climate change

Habitat shifting and alteration

Conservation and management

Current most common approaches involve establishing protected areas/sites, establishing wilderness areas/allowing succession, restoring/improving forest habitats and adaptation of forest management. Additional actions needed include further optimizing the use of funds for conservation (what kind of areas

are chosen for conservation and where, conservation of all successional stages (protection of natural old forests, creating (simulated) young successional stages of natural forests), increasing prescribed burning and simulated forest fires, further developing methods for conservation/nature management in managed forests (e.g. deadwood), control of overgrazing and control of climate change.

List of conservation and management needs

Measures related to forests and wooded habitats

Restoring/Improving forest habitats
Adapt forest management

Measures related to spatial planning

Establish protected areas/sites
Establishing wilderness areas/allowing succession

Conservation status

Annex 1:

9010: ALP U1, BOR U2, CON U2

9060: BOR U2

When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

The habitat has a capacity to recover naturally after a severe damage, but a full recovery including deadwood and species which are dependent on it will take a very long time. The rate of recovery is also dependent on the extent of the damaged area. Measures like prescribed burning, planting trees or sowing tree seeds and adding artificial deadwood is likely to fasten the process considerably.

Effort required

50+ years	200+ years
Through intervention	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-13 %	unknown %	unknown %	unknown %
EU 28+	-10 %	unknown %	unknown %	unknown %

During the past 50 years there has been a 13 % and 10 % reduction in the quantity of this habitat in the EU28 and EU28+ regions, respectively. The habitat is, therefore, assessed as Least Concern under criterion A1 for both regions. The calculations were based on quantitative data from Finland, Lithuania, Sweden and Norway. Data on quantitative trends in Estonia, Latvia and Poland were missing. There are no data on future or historic reductions for this habitat type.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km^2	Yes	Unknown	unknown	>50	Yes	Unknown	unknown	No
EU 28+	>50000 Km^2	Yes	Unknown	unknown	>50	Yes	Unknown	unknown	No

This habitat is very widely distributed and occupies a very large area in numerous locations. Therefore it is assessed as Least Concern under criterion B.

Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	44 %	33 %	unknown %	unknown %	unknown %	unknown %
EU 28+	44 %	33 %	unknown %	unknown %	unknown %	unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%
EU 28+	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%

In the past 50 years, 44% of the habitat area in the EU28 was affected by a reduction in quality with 33 % relative severity, and the habitat is therefore assessed as Least Concern under criteria C/D1. The type of quality degradation usually was both abiotic and biotic. A majority of the area with reduced quality was affected with slight severity. There are trend data on qualitative degradation from Finland, Lithuania and Sweden only. Data from Estonia, Latvia, Norway and Poland are missing. A relatively large part of the area of this type lies within Norway, from where data are lacking, and therefore the provided figures for this habitat iin the EU28+ are less certain. Over a longer time-frame (before the 1960's) a much more severe decline in quality occurred, but no quantitative data are available. In Finland for example systematic forestry started in the late 19th century, and thinnings were based on cutting of the largest and most valuable trees, leading to a decline in the habitat's quality.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	unknown
EU 28+	unknown

There is no analysis available of the probability of collapse of this habitat, which is therefore assessed as Data Deficient under Criterion E.

Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	LC	DD	DD	DD	LC	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Least Concern	-	Least Concern	-

Confidence in the assessment
High (mainly based on quantitative data sources and/or scientific literature)

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