G3.A Picea taiga woodland

Summary

This habitat comprises mesic to herb-rich woodland on mineral soils through the boreal and boreonemoral zones, often dominated by *Picea abies* but sometimes by *Pinus sylvestris* or *Betula pendula* or mixtures of these trees. Broadleaved trees can also occur and though, under natural conditions, forest succession will lead to the development of a *Picea* forest, the proportions of tree species are nowadays largely regulated by forestry. The soils are usually podzolic with mor humus but sometimes more mesic with mull and the associated shrubs, dwarf shrubs, herbs and bryophytes all reflect these differences as well as the regional climate. Many of the threats relate to forestry: cuttings, removal of dead and dying trees, thinning of tree layer, lack of natural stand dynamics and soil amelioration are likely to lead to forests with an even stand structure, shortage of old trees, missing deadwood and deadwood continuum as well as to simplified tree species composition. In the northern parts of Fennoscandia and in Latvia overgrazing is a threat and in Norway infrastructure development. In the future climate change is likely to influence this habitat. Conservation measures can include establishing protected areas/sites for succession, restoring/improving forest habitats and adaptation of forest management.

Synthesis

The habitat is assessed as Least Concern (LC) under criterion A1 (decline in quantity) in both EU28 and EU28+, as there has been a small increase in its quantity over the last 50 years. The area of the habitat is currently stable or increasing in the Nordic countries, but declining in the Baltic countries. However, in the same period there has been a reduction in the quality of this habitat, affecting 52% of its extent with moderate severity, and the habitat therefore is assessed as Near Threatened (NT) under criterion C/D1. The habitat quality continues to decrease throughout Europe. The assessment for EU28+ is the same as for EU28, but as Norway holds a relatively large part of the habitat's area, the result for the EU28+ is more uncertain. Most of the quality degradation has occurred already before the 1960's, and long-term trends may lead to a more trheatened status, but data on these decline are not available.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Near Threatened	C/D1	Near Threatened	C/D1

Sub-habitat types that may require further examination

Boreal herb-rich forests with *Picea abies* on brown soils (related to Annex 1 type 9050) are floristically diverse forests, which contain many vegetation types, of which many are potentially threatened.

Habitat Type

Code and name

G3.A Picea taiga woodland

Norwegian spruce forest near Tolga (Photo: Yngve Regdal, NIBIO).

Habitat description

This habitat comprises of mesic to herb-rich forest vegetation on mineral soils in the boreal and boreonemoral zones. The soils are often podzolic, but other soil types occur and the humus is raw or mull. The canopy is often dominated by *Picea abies* but, despite the name of the habitat, stands dominated by *Pinus sylvestris* or *Betula pendula* or mixtures of these trees are also common. Other tree species include *Alnus incana, Betula pubescens, Populus tremula, Salix caprea, Sorbus aucuparia*, and in the boreonemoral and southern boreal subzones also *Acer platanoides, Alnus glutinosa, Quercus robur, Tilia cordata, Ulmus glabra and Ulmus laevis*. Under natural conditions, forest succession will lead to the development of a *Picea abies* forest, but the proportions of tree species are nowadays largely regulated by forestry. The shrub layer is best developed in moist herb-rich stands, where *Frangula alnus, Lonicera xylosteum, Prunus padus, Ribes* spp., *Rubus idaeus* and other shrubs can form dense thickets. On mesic sites, by contrast, the only true shrubs are *Juniperus communis, Salix caprea* and other *Salix* spp. Understorey vegetation varies from the dwarf shrub and feather moss dominated vegetation in mesic situations to the most luxurious and species-rich herb dominated vegetation. In mesic situations, *Vaccinium myrtillus* usually dominates, followed by *Vaccinium vitis-idaea, Linnaea borealis* and, in the middle and northern boreal subzones, even *Empetrum nigrum, Ledum palustre and Vaccinium uliginosum*. The commonest herbs are *Convallaria majalis, Dryopteris carthusiana, Epilobium angustifolium, Maianthemum bifolium, Melampyrum pratense, Melampyrum sylvaticum, Pteridium aquilinum, Solidago virgaurea* and *Trientalis europaea*, while species like *Lathyrus vernus* and *Oxalis acetosella* grow on slightly more nutrient-rich soils. *Calamagrostis arundinacea* and *Deschampsia flexuosa* are the most abundant grasses on mesic sites. Common graminoids also include *Carex digitata, Carex globularis, Deschampsia cespitosa, Luzula pilosa* and *Melica nutans*. There is great compositional variation in the herb layer of the richer sites, depending on the geographic location, soil moisture, soil nutrient status and canopy composition. In general, the number of herb species is high, and there are also many graminoids, but dwarf shrubs are few or non-existent. However, the number of vascular species decreases towards the north of the range. In addition to species thriving on mesic sites, examples of typical herb species are *Aegopodium podagraria, Anemone nemorosa, Angelica sylvestris, Anthriscus sylvestris, Athyrium filix-femina, Cirsium helenioides, Cornus suecica, Corydalis solida, Dryopteris carthusiana, Dryopteris expansa, Filipendula ulmaria, Fragaria vesca, Galium boreale, Geranium sylvaticum, Geum rivale, Gymnocarpium dryopteris, Hepatica nobilis, Matteuccia struthiopteris, Paris quadrifolia, Pulmonaria obscura, Ranunculus auricomus, Ranunculus fallax, Stellaria nemorum*, and common grasses are *Agrostis capillaris, Calamagrostis purpurea, Melica nutans, Milium effusum* and *Poa nemoralis*. On mesic sites the moss layer is usually continuous and dominated by feather mosses like *Pleurozium schreberi and Hylocomium splendens*. Other common species are *Dicranum fuscescens, D. majus, D. polysetum, D. scoparium, Polytrichum commune, Ptilium crista-castrensis* and on slightly more nutrient-rich sites *Climacium dendroides, Rhodobryum roseum* and *Rhytidiadelphus triquetrus*. The abundance and number of liverwort species, like *Barbilophozia lycopodioides*, increases towards north. On mesic sites there may even be some terricolous lichens. On herb-rich sites, the cover of

the moss layer is usually small, and feather mosses are scarce. Instead, there is a rich flora of nutrient-demanding mosses and liverworts like *Brachythecium spp., Cirriphyllum piliferum, Plagiochila asplenioides, Plagiomnium* spp., *Plagiothecium* spp., *Pseudobryum cinclidioides* and *Rhizomnium* spp. After a major disturbance such as windfall, forest fire or regeneration cutting, herbs and grasses increase, *Vaccinium myrtillus* declines and bryophytes decrease.

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 such as treefall openings 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 man-induced very high population levels of ungulates

Characteristic species:

Tree canopy: *Acer platanoides, Alnus glutinosa, A.incana, Betula pendula, B. pubescens, Picea abies, Pinus sylvestris, Populus tremula, Salix caprea, Sorbus aucuparia, Tilia cordata*.

Shrubs: Corylus avellana, Daphne mezereum, Frangula alnus, Juniperus communis, Lonicera xylosteum, Prunus padus, Ribes spp., Rosa majalis, Rubus idaeus, Salix spp.

Field layer: Dwarf shrubs: *Vaccinium myrtillus, V. vitis-idaea, Huperzia selago, Linnaea borealis, Lycopodium annotinum, L. clavatum.* Herbs: *Actaea erythrocarpa, Actaea spicata, Aegopodium podagraria, Anemone nemorosa, Angelica sylvestris, Anthriscus sylvestris, Athyrium filix-femina, Circaea alpina, Cirsium helenioides, Convallaria majalis, Cornus suecica, Corydalis solida, Dryopteris carthusiana, Dryopteris expansa, Epilobium angustifolium, Equisetum sylvestris, Filipendula ulmaria, Fragaria vesca, Gagea lutea, Geranium sylvaticum, Geum rivale, Gymnocarpium dryopteris, Hepatica nobilis, Lathyrus vernus, Maianthemum bifolium, Matteuccia struthiopteris, Melampyrum pratense, Melampyrum sylvaticum, Oxalis acetosella, Paris quadrifolia, Pteridium aquilinum, Pulmonaria obscura, Pyrola minor, Pyrola rotundifolia, Ranunculus auricomus, Ranunculus fallax, Rubus saxatilis, Solidago virgaurea, Stellaria nemorum, Trientalis europaea, Orthilia secunda, Viola riviniana.* Graminoids: *Agrostis capillaris, Calamagrostis arundinacea, Calamagrostis purpurea, Carex digitata, Carex globularis, Deschampsia cespitosa, Deschampsia flexuosa, Luzula pilosa, Melica nutans, Milium effusum, Poa nemoralis.*

Mosses and liverworts: *Aulacomnium palustre, Barbilophozia lycopodioides, Brachythecium spp., Cirriphyllum piliferum, Climacium dendroides, Dicranum fuscescens, D. polysetum, D. majus, D. scoparium, Hylocomium splendens, Polytrichum commune, Plagiochila asplenioides, Plagiomnium spp., Plagiothecium spp., Pleurozium schreberi, Pseudobryum cinclidioides, Ptilium crista-castrensis, Rhizomnium spp., Rhodobryum roseum, Rhytidiadelphus triquetrus, Spagnum centrale, Sphagnum russowii, Sphagnum girgensohnii, Sphagnum squarrosum.*

Birds: Forests dominated by *Picea abies: Carduelis spinus, Erithacus rubecula, Loxia curvirostris, Parus ater, Phylloscopus collybita, Regulus regulus, Turdus philomelos.* Deciduous forests*: Hippolais icterina, Oriolus oriolus, Parus caeruleus, Phylloscopus sibilatrix, Scolopax rusticola, Sylvia atricapilla, Sylvia borin, Troglodytes troglodytes, Turdus merula.* 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:

Piceion excelsae Pawlowski et al. 1928

Aconito septentrionalis-Piceion obovatae Solomeshch et al. ex Martynenko et al. 2008

Empetro-Piceion obovatae Morozova et al. 2008

Annex I:

9010 Western taiga

9050 Fennoscandian herb-rich forests with Picea abies

Emerald:

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MAES-2:

Woodland and forest

IUCN:

1.1 Boreal forest

EFT:

1.1 Spruce-dominated boreal forest

VME:

D1 Western boreal spruce forests

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

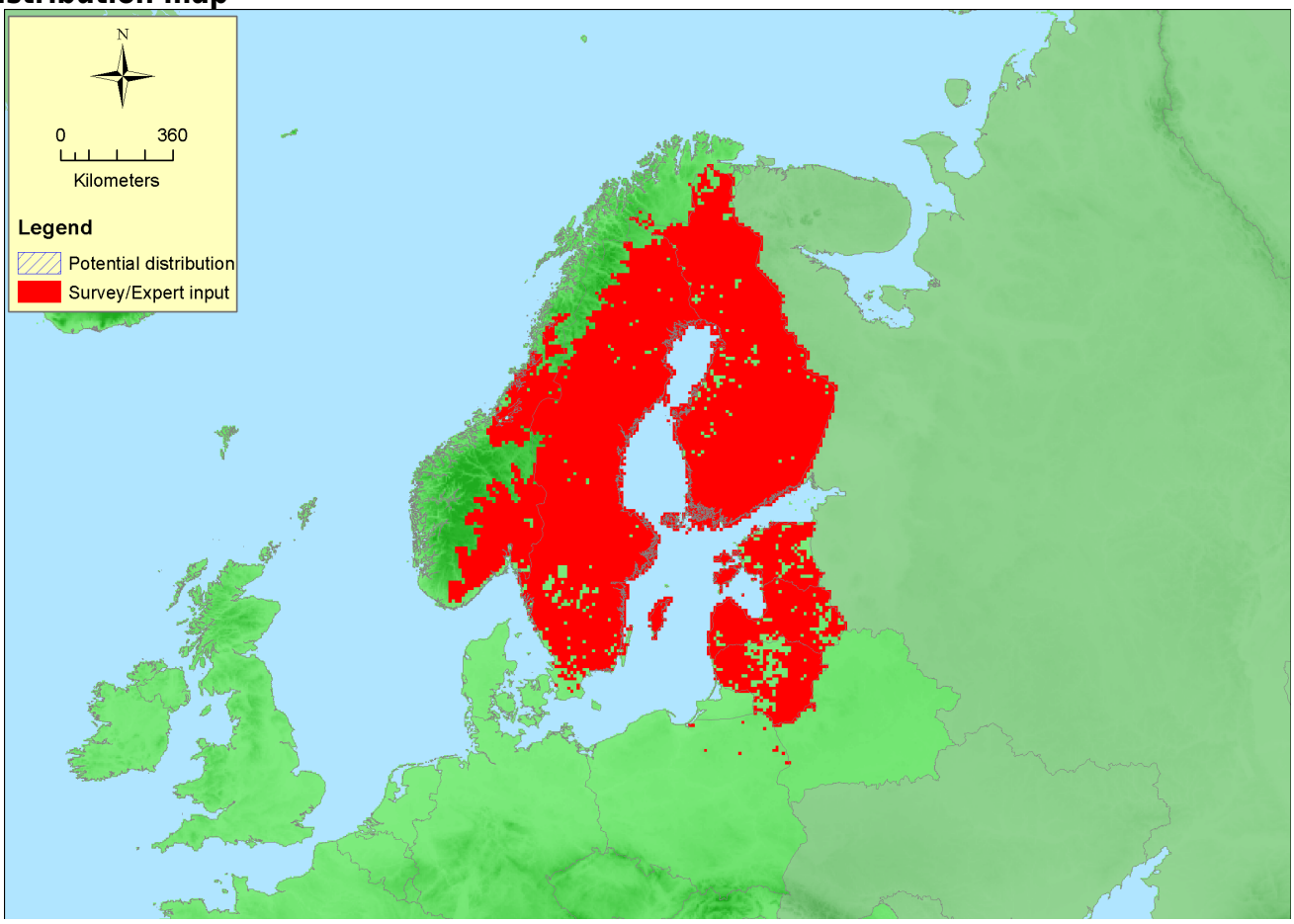
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Estonia	Present	260 Km^2	Decreasing	Unknown
Finland	Aland Islands: Present Finland mainland: Present	103428 Km^2	Increasing	Decreasing
Latvia	Present	6177 Km^2	Decreasing	Decreasing
Lithuania	Present	4000 Km^2	Decreasing	Decreasing
Poland	Present	23 Km^2	Unknown	Unknown
Sweden	Present	171741 Km^2	Stable	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	55500 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	1509200 Km^2	9283	285629 Km^2	
EU 28+	1699200 Km^2	10284	341129 Km^2	

Distribution map



The map is rather complete. Data sources: Art17, EVA, BOHN.

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

Less than 50 % of the habitat is located within EU 28. A majority of the habitat lies within Russia. There is a relatively large area of the habitat also in Norway.

Trends in quantity

The habitat area has increased +8 % in EU28 and +6 % in EU28+ over the last 50 years, based on calculations using data from Finland, Lithuania, Sweden and Norway. The greatest increase (+25 %) has occurred in Finland. Data on the extent of trend in quantity are missing for Estonia, Latvia and Poland. In the future the habitat will decrease in Latvia, be stable in Estonia, increase in Finland and weakly increase in Norway. The main reason for the increase is that some of the area of the type G3.B Pinus sylvestris taiga forest is transforming to this type as its sites of occupancy are becoming more mesic. This phenomenon has been recognized in Finland, but there in no evidence of its causes. There are no historical data for 250-50 years ago.

- Average current trend in quantity (extent)
  EU 28: Increasing
  EU 28+: Increasing
- 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 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 Europe.

Trends in quality

The extent of degradation in the past 50 years in the EU 28 region is 52 %, and the severity of degradation is 36 %, based on trend data from Finland, Sweden and Lithuania, as trend data from other countries are missing. However, all countries reported a decreasing trend. Calculation of degradation of quality for EU28+ is more unreliable, because trend data from Norway were missing, and a large area of this habitat occurs there (about 20% of the EU28 area). 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, disturbance caused by forest cuttings and soil amelioration, lack of natural stand dynamics 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+: Unknown

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 likely to lead to forests with even stand structure, shortage of old trees, missing deadwood and deadwood continuum as well as to simplified tree species composition. In the northern parts of Fennoscandia and in Latvia overgrazing is a threat. In Norway infrastructure development can also affect this habitat. In the future climate change is likely to influence this habitat.

List of pressures and threats

Sylviculture, forestry

Forestry clearance
Removal of dead and dying trees
Thinning of tree layer
Forestry activities not referred to above

Climate change

Habitat shifting and alteration

Conservation and management

Current most common approaches are establishing protected areas/sites, establishing wilderness areas/allowing succession, restoring/improving forest habitats and adaptation of forest management. Additional actions needed are 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), further improving methods for conservation/nature management in managed forests (e.g. regarding deadwood) and control of overgrazing.

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

9010: ALP U1, BOR U2, CON U2

9050: ALP U1, 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 planting trees or sowing tree seeds, planting large pieces of humus layer with attached vegetation 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	+8 %	unknown %	unknown %	unknown %
EU 28+	+6 %	unknown %	unknown %	unknown %

During the past 50 years there has been a 8 % and 6 % increase in the quantity of this habitat in the EU 28 and EU 28+, respectively. The habitat is, therefore, assessed as Least Concern under criterion A1 for both areas. The calculations were based on territorial data. Data on change in quantity are available from Finland, Lithuania, Sweden and Norway only. Data on quantitative trends in Estonia, Latvia and Poland are 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. Its extent of occurrence (EOO) is larger than 50,000 km2, and its area of occupancy (AOO) is larger than 50. 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	52 %	36 %	unknown %	unknown %	unknown %	unknown %
EU 28+	52 %	36 %	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%

During the past 50 years, 52% of the habitat area in the EU28 was affected by a reduction in quality with 36% relative severity, and the habitat is therefore assessed as Near Threatened (NT) under criteria C/D1. The type of quality degradation usually was both abiotic and biotic. 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, and therefore the same EU28+ result (Near Threatened) is more uncertain than for the EU28. Most of the quality degradation has occurred already before the 1960's, but data on these decline are not available.

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	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	LC	LC	NT	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
Near Threatened	C/D1	Near Threatened	C/D1

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

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