

H5.1a Fjell field

Summary

Fjell field occurs on very exposed summits, ridges and slopes of mountains in the boreal and arctic zones, blown clear of snow in winter and with shallow stony soils, nutrient-poor and usually acidic, that are susceptible to freeze-thaw and sorting. The vegetation is determined by the strong winds and cold and dominated by bryophytes and fruticose lichens. The habitat is generally beyond the limit of pastoral farming but can be grazed by wild herbivores. These sometimes cause excessive trampling but bigger threats come from skiing developments, other mountain recreation, air pollution and climatic warming.

Synthesis

The habitat has been assessed as Near Threatened (NT) for the EU28 based on large declines in quality, mostly resulting from intensive grazing of wind-exposed mountain heaths by reindeer, nitrogen pollution and (more generally) climate change. The assessment has a large amount of uncertainty, however, due to uncertainties in the provided data. For the EU28+ (where a much larger amount of the habitat occurs in Norway) the situation is expected to be relatively better, leading to the conclusion Least Concern (LC).

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

Sub-habitat types that may require further examination

Moss and lichen dominated mountain summits, ridges and exposed slopes (fjell fields) have many subtypes in the area of distribution due to the relatively broad habitat definition. In the UK it varies from habitats with extensive mats of *Racomitrium*, with scattered tufts of *Juncus trifidus*, to bare stony fjell-fields and very short, rare species-rich turfs. Besides, the habitat forms transitions to several arctic habitats, like tundra, and mountain grassland habitats on siliceous substrates or calcareous substrates.

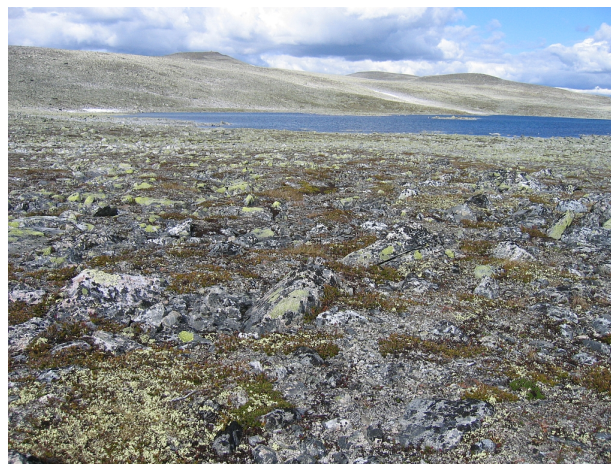
Habitat Type

Code and name

H5.1a Fjell field



Fjell field at the top of Snøhetta, the highest mountain in the Dovrefjell National Park, Norway (Photo: Daniel Dítě).



Fjell field in the alpine belt of Norway, where the vegetation is steered by frost, wind and snow cover. Important species are *Cetraria nivalis*, *Juncus trifidus* and *Salix herbacea* (Photo: Anders Bryn, Skog og landskap).

Habitat description

This habitat occurs on mountain summits, ridges and slopes of the mountains in the boreal zone. Herb layer is sparse and short, including graminoids such as *Carex bigelowii*, *Deschampsia flexuosa*, *Festuca ovina* agg. and *Juncus trifidus*, dicot herbs *Hieracium alpinum* agg. and *Lychnis alpina*, and dwarf shrubs such as *Arctostaphylos alpina*, *A. uva-ursi*, *Empetrum nigrum* agg. and *Loiseleuria procumbens*. The vegetation is dominated by fruticose lichens, especially those of the genera *Cladonia* (*Cladina*) and *Cetraria* (incl. *Flavocetraria*), and bryophytes.

This vegetation is distributed in the alpine belt of the Scandinavian mountains and also at lower altitudes in northern Scandinavia and Scotland. It is confined to convex landforms affected by strong winds, which blow off snow and fine soil particles. Therefore the vegetation is exposed to winter climatic extremes, which are tolerated only by arctic-alpine cryptograms and a few adapted species of vascular plants. Soils are shallow, stony and often affected by cryoturbation. They are drier than soils in other landforms of arctic and alpine landscapes, poor in nutrients, with low microbial activity, and usually – but not always – acidic.

Compared to the polar deserts (type H5.1b) the summer temperatures on fjell fields are higher. The volcanic sparsely vegetated ash fields of Iceland are included as a separate, somewhat similar type as well (habitat H5.1c). Besides, similarities exist with tundra vegetation dominated by *Racomitrium* species in the arctic region. In the temperate mountains of Europe this kind of sparsely-vegetated summits in most cases are part of the mountain grassland communities on siliceous substrates (habitat E4.3b) or calcareous substrates (habitat E4.4a, E4.4b), or may be considered under limestone pavements (habitat H3.5a).

Indicators of good quality:

This is natural vegetation occurring mostly in remote areas which are under limited human influence. It is generally rather stable. Locally these habitats can be overgrazed by reindeer. The following characteristics can be considered as indicators of good quality:

- No signs of overgrazing
- No disturbance by man
- Presence of thick lichen carpets

Characteristic species:

Vascular plants: *Antennaria alpina* subsp. *borealis*, *Arctostaphylos alpinus*, *A. uva-ursi*, *Carex bigelowii*, *Deschampsia flexuosa*, *Diapensia lapponica*, *Empetrum nigrum* agg., *Festuca ovina* agg., *Hieracium alpinum* agg., *Juncus trifidus*, *Loiseleuria procumbens*, *Luzula spicata*, *Lychnis alpina*

Bryophytes: *Dicranum elongatum*, *D. fuscescens*, *Gymnomitrium coralloides*, *Polytrichum juniperinum*, *P. piliferum*, *Prasanthus suecicus*, *Racomitrium lanuginosum*

Lichens: *Alectoria ochroleuca*, *A. nigricans*, *Bryocaulon divergens*, *Cetraria cucullata*, *C. islandica*, *C. nivalis*, *Cladonia amaurocraea*, *C. coccifera*, *C. gracilis*, *C. mitis*, *C. rangiferina*, *C. stellaris*, *C. uncialis*, *Stereocaulon paschale*, *Thamnolia vermicularis*

Classification

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

EUNIS:

E4.2 Moss and lichen dominated mountain summits, ridges and exposed slopes (fjell fields)

H5.1 Fjell fields and other freeze-thaw features with very sparse or no vegetation

EuroVeg Checklist (alliances):

Carici-Juncion trifidi Nordhagen 1943

Cladonio-Viscarion alpinae Daniëls 1982

Kobresio-Dryadion Nordhagen 1943

Cochleariopsion groenlandicae Hadač 1989

Luzulion arcuatae Elvebakk 1985 (is incl. in *Ranunculo-Oxyrion didynae* Nordhagen 1943)

Annex 1:

--

Emerald:

--

MAES-2:

Sparsely or unvegetated land

IUCN:

6 Rocky areas

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

Yes

Regions

Boreal

Justification

The habitat is restricted to alpine mountains in the boreal region.

Geographic occurrence and trends

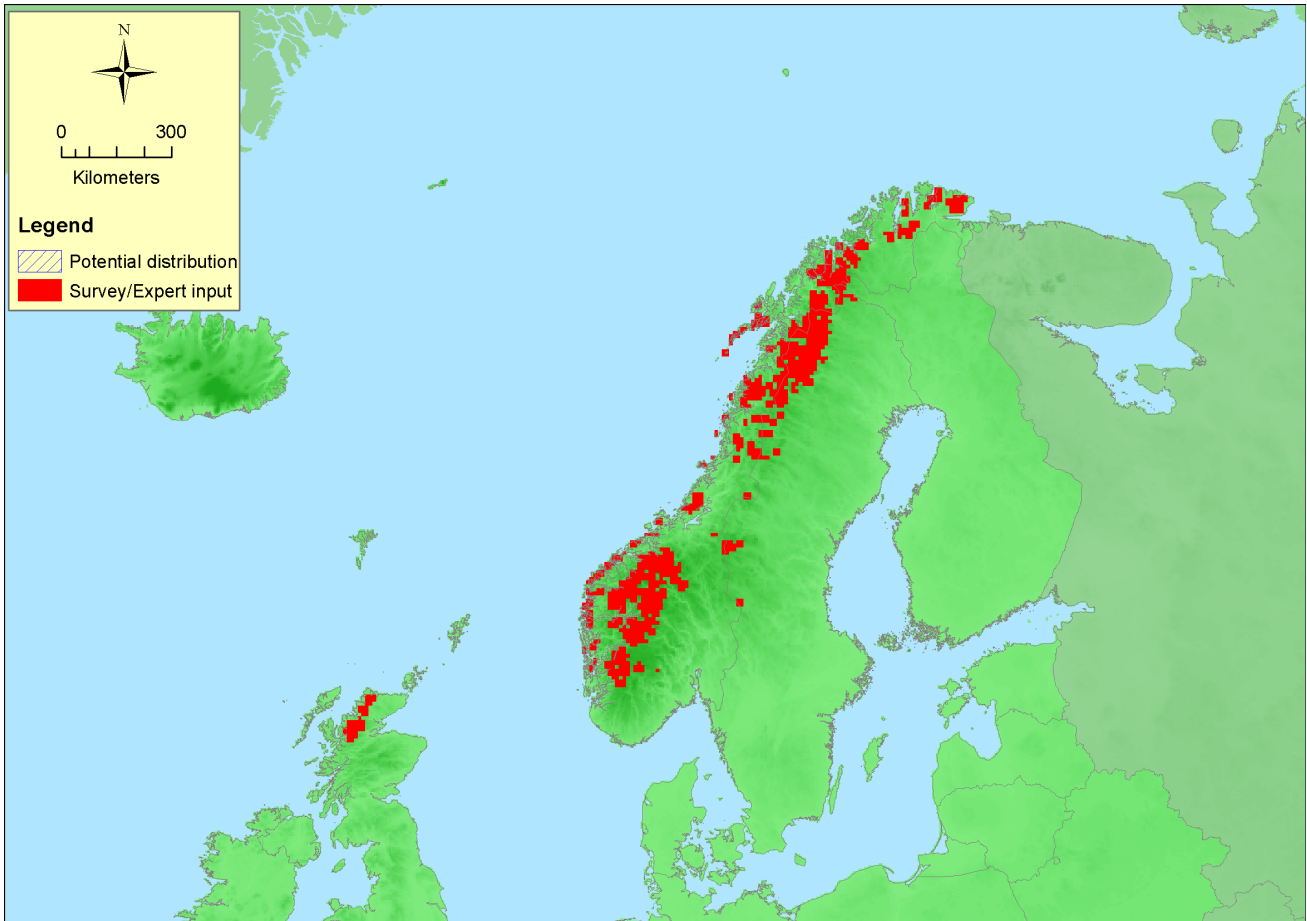
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Finland</i>	Finland mainland: Present	290 Km ²	Stable	Decreasing
<i>Sweden</i>	Present	Unknown Km ²	Unknown	Unknown
<i>UK</i>	United Kingdom: Present	380 Km ²	Stable	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)
<i>Norway</i>	Norway Mainland: Present	4752 Km ²	Unknown	Unknown

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	530000 Km ²	319	>700 Km ²	Finland data includes wind-exposed heath
EU 28+	818400 Km ²	1090	>5500 Km ²	

Distribution map



The map may provide an overestimate, but lacks data from Finland. Data sources: BOHN.

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

About 25%. In the EU28 the habitat occurs only in Finland, Sweden and the northern UK. In the EU28+ the habitat is mainly found in Norway, and outside Europe in Greenland (DK).

Trends in quantity

The trend in quantity is difficult to estimate. The experts from UK and Finland consider the trend as stable and we interpolate this opinion to the whole habitat.

- Average current trend in quantity (extent)

EU 28: Stable

EU 28+: Stable

- Does the habitat type have a small natural range following regression?

No

Justification

The geographical range of the habitat (EOO) is wide in the boreal biogeographical region.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

Justification

The habitat occurs in large patches in the boreal mountains.

Trends in quality

The trends in quality are more difficult to estimate than the trends in quantity. Both the UK and Finland report a negative trend, where in Finland "wind exposed heath" is included. This sub-habitat has the largest area and most severe decrease in quality due to reindeer grazing. The average results in a large

decrease, however it is not 100% certain that this subtype should be included in the habitat. For the EU28+ the situation is likely to be better, as no or little negative changes have to be expected from Norway (which covers by far the largest area).

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

Pressures and threats

The habitat without impact of human and animals showed relatively stable status. The main significant pressures are (1) Intensive grazing and trampling of wind-exposed mountain heaths by reindeers (and other animals, e.g. sheeps), (2) airborne nitrogen pollution, but also probably eutrophication from sheep urine/droppings, (3) outdoor sports and leisure activities, recreational activities, and (4) climate change.

List of pressures and threats

Agriculture

Intensive grazing

Human intrusions and disturbances

Other sport / Leisure complexes
Trampling, overuse

Pollution

Nitrogen-input

Climate change

Temperature changes (e.g. rise of temperature & extremes)

Conservation and management

For this habitats it is the best regime to control intensity of pasture (reindeer, etc.) and frequency of people inputs. The fjell fields are relatively stable habitats when the climatic conditions do not change and human activities are under control.

List of conservation and management needs

Measures related to spatial planning

Establish protected areas/sites
Legal protection of habitats and species
Manage landscape features

Conservation status

Annex 1:

No relationship

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

The natural recovery of habitats with sparse vegetation is very slow. It can even be lower than in the related mountain heath or birch forest due to hard environmental (soil, temperature) conditions and available amount of propagules (e.g. seeds). This process requires a lot of time, it is a long-term process.

Effort required

200+ years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-2.9 %	Unknown %	Unknown %	Unknown %
EU 28+	0 %	Unknown %	Unknown %	Unknown %

The average EU28 rate of decline has been calculated using data from the UK and Finland. The EU28+ is expected to be close to zero, due to the large (mainly unaffected) area in Norway. Some decline is expected in future, mainly as a result of climate change and increased nitrogen pollution, but the amount cannot be quantified.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	> 50,000 Km ²	Yes	No	No	>50	Yes	No	No	No
EU 28+	> 50,000 Km ²	No	No	No	>50	No	No	No	No

The AOO and EOO and number of location largely exceed the thresholds for criteria under B, leading to the conclusion Least Concern.

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 %	30 %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	<52 %	<30 %	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%

The territorial data from the UK and Finland resulted in an average negatively affected area of 52% with 30% severity, leading to the conclusion Vulnerable (VU) for criterion C/D1. The decline in quality relates to both abiotic (UK) and biotic (Finland) changes, and therefore no split for C or D has been made. Future or

long-term historical declines in quality are unknown. It is likely that for EU28+ (where a much larger amount of the habitat is present) the situation is better, leading to the expert conclusion of Least Concern (LC).

There is some uncertainty about the calculated trend in quality for the EU28, as Finland reported mainly negative trends for "wind exposed mountain heath" (it is not 100% certain that this subhabitat should be included under "Fjell fields") and UK based the data on the broader defined Annex 1-type 6150. Therefore the overall confidence in the assessment is low.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

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

There is no quantitative analysis available that estimates the probability of collapse of this habitat type.

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	LC	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	Least Concern	-

Confidence in the assessment

Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

Assessors

M. Valachovič

Contributors

Type description: M. Chytrý

Territorial data: A. Averis, B. Averis, T. Kontula

Working Group Sparsely Vegetated Habitats: G. Giusso Del Galdo, F. Essl, A. Mikolajczak, D. Paternoster, M. Valachovič, M. Valderrabano

Reviewers

J. Janssen

Date of assessment

04/11/2015

Date of review

14/05/2016

References

Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D. and Yeo, M. 2004. *An Illustrated Guide to British*

Upland Vegetation. Joint Nature Conservation Committee. Peterborough. 454 p.

Daniëls, F. J. A. 1982. Vegetation of the Angmagssalik District, Southeast Greenland, IV. Shrub, dwarf shrub, and terricolous lichens. *Meddelelser om Grønland. Bioscience* 10: 1-78.

Dierssen, K. 1996. *Vegetation Nordeuropas*. Verlag Eugen Ulmer, Stuttgart. 832 p.

Nordhagen, R. 1943. Sikilsdalen og Norges fjellbeiter. En plantesosiologisk monografi. *Bergens Museums Skrifter* 22: 1-607.

Norokorpi, Y., Eeronheimo, H., Eurola, S., Heikkinen, R., Johansson, P., Kumpula, J., Mäkelä, K., Neuvonen, S., Sihvo, J., Tynys, S. and Virtanen, R. 2008. Tunturit Suomen luontotyyppien uhanalaisuus (Assessment of Threatened Habitat Types in Finland), pp. 467-541. In: Raunio, A., Schulman, A. and Kontula, T. eds. *Suomen luontotyyppien uhanalaisuus: Osa 2: Luontotyyppien kuvaukset*. Suomen ympäristökeskus, Helsinki, Finnish Environment Institute, Helsinki, 572 p.

Rodwell, J.S. 1992 ed. *British Plant Communities, Vol. 2, Mires and Heaths*. Cambridge University Press, 628 p.