

H4.3 Rock glacier and unvegetated ice-dominated moraine

Summary

These are habitats found in extreme cold at high latitudes and altitudes in Europe. A rock glacier is a mixture of frozen rock detritus and ice of glacial or periglacial origin, forming a tongue-like mass which can flow very slowly under gravity. Ice-dominated moraines are masses of unconsolidated mineral debris found in the vicinity of retreating glaciers. Few organisms have the ability to colonize these particular habitats, because of the low temperatures and the mobility of the substrate so the flora is limited to pioneer plants and lichens, occurring principally on the lateral and terminal borders of the detritus. Invertebrates increase with the developing vegetation cover. The rock glaciers represent a fragile habitat, which can be under stress as a result of tourist and recreational activities, also susceptible to air pollution and climate warming.

Synthesis

There is few information on trends and especially from boreal countries (Norway, Iceland, Sweden) data is lacking. The assessment therefore is based on data from the Alps only (France, Switzerland, Austria), giving it a low reliability. Trend data showed a bit less than 30% declines in area over the last 50 years for the EU28 (leading to the Near Threatened category), and smaller declines for the EU28+. Trends in quality over the same time period lead to a Near Threatened (NT) status for both EU28 and EU28+, while a likely small distribution (AOO, criterion B2) resulted in the same category for the EU28.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Near Threatened	A1, B2, C/D1	Near Threatened	C/D1

Sub-habitat types that may require further examination

No sub-habitats have been distinguished for further analysis.

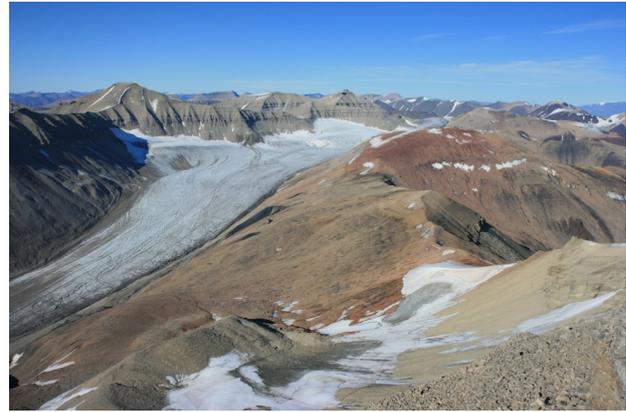
Habitat Type

Code and name

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Temperate glacieret in Medena dolina Valley, High Tatra Mountains, Slovakia.
(Photo: Milan Valachovič).



Rock glacier, Bertillbreen from Pyramiden (935 m), Svalbard (Photo: P. Šmarda).

Habitat description

As indicated by its name, a rock glacier is a mixture of frozen rock detritus and ice. It takes the form of a lobate, spatulate or tongue-like mass of angular boulders, behaving as a lava flow, due to the presence of internal ice that flows very slowly under gravity forces. This movement is 100 to 1000 times slower than in a true glacier. The origin of ice of rock glaciers can be glacial or periglacial; thereby, rock glacier occurs also when permafrost (frozen soil) creeps downslope during thaw periods. This habitat type is endangered by the global warming of the climate. Moraines are glacially formed accumulations of unconsolidated mineral debris. Ice-dominated moraines occur in the vicinity of retreating glaciers. Few organisms have the ability to colonize these particular habitats, because of the low temperatures and the mobility of the substrate. The flora is limited to pioneer plants, lichens and some vascular plants, occurring principally on the lateral and terminal borders of the rock glacier. Active rock glaciers have a very low vegetation cover, while inactive or relict ones are characterized by higher covers (>70%). The diversity of the fauna increases with the vegetation cover; it includes Collembola, spiders, Homoptera, Diptera, parasitoid wasps, ground beetles and aphids. These ice-rich formations are found in altitude or in high latitudes. In Europe, they occur only in the high mountain regions of the Alps, the Pyrenees, the Scandes, and in the arctic region.

Indicators of good quality:

Independently of the poverty of the flora and fauna of this habitat, quality can be estimated by the degree of activity of the rock glacier. An active rock glacier moves because it has ice-rich frozen debris and its internal temperature is low. Inactive and fossil rock glaciers haven't coherent ice-core and stop moving.

Characteristic species:

Algae: *Chlamydomonas nivalis*

Lichens: *Cetraria islandica*, *Rhizocarpon geographicum*

Vascular plants: *Androsace alpina*, *Arabis alpina*, *A. caerulea*, *Artemisia mutellina*, *Cardamine resedifolia*, *Cerastium uniflorum*, *Erigeron uniflorus*, *Gentiana bavarica*, *Geum reptans*, *Leucanthermopsis alpina*, *Linaria alpina*, *Oxyria digyna*, *Poa alpina*, *P. laxa*, *Prizelago alpina*, *Ranunculus glacialis*, *Salix herbacea*, *S. retusa*, *Saxifraga bryoides*, *S. exarata*, *S. oppositifolia*, *S. seguieri*, *Sibbaldia procumbens*

Fauna: Collembola, Homoptera

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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Annex 1:

8340 Permanent glaciers. This Annex 1 habitat type applies to a geographically and altitudinally wider range of snow or ice-dominated habitats. H4.3 is therefore narrower circumscribed than 8340.

Emerald:

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MAES-2:

Sparsely vegetated land

IUCN:

6. Rocky areas

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

Yes

Regions

Alpine

Boreal

Justification

The habitat occurs at highest altitudes of Alpine region and arctic part of Boreal biogeographical region under specific climate and geomorphological conditions.

Geographic occurrence and trends

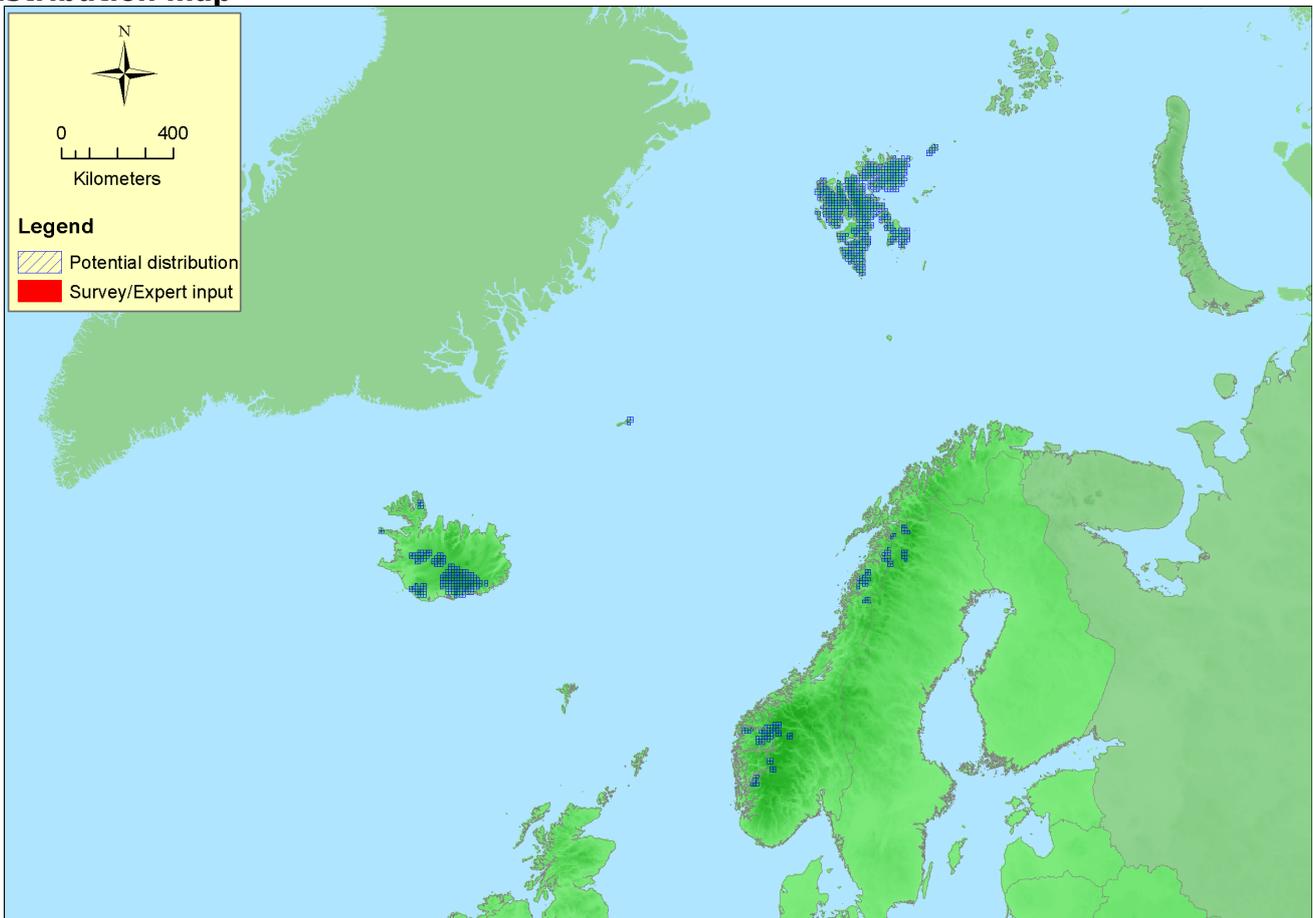
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Austria</i>	Present	125 Km ²	Decreasing	Decreasing
<i>France</i>	France mainland: Present	75 Km ²	Decreasing	Decreasing
<i>Greece</i>	Greece (mainland and other islands): Present	92 Km ²	Stable	Stable
<i>Italy</i>	Italy mainland: Present	82 Km ²	Stable	Stable
<i>Romania</i>	Present	0.2 Km ²	Decreasing	Decreasing
<i>Slovakia</i>	Present	0.1 Km ²	Decreasing	Decreasing
<i>Spain</i>	Spain mainland: Present	2 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)
Switzerland	Present	550 Km ²	Decreasing	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	16650 Km ²	26	Km ²	
EU 28+	2527350 Km ²	946	Km ²	

Distribution map



No data is available. The distribution of glaciers is given as the potential distribution. Data: Art17, BOHN.

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

Distribution in countries (EU28+): AT, CH, DE, ES, FI, FR, GR, IS, IT, NO, PL, RO, SE, SK, SL, SW Outside the Europe 28+ the type is found in Greenland, Russia (Caucasus Mts).

Trends in quantity

The total area has not been calculated. For example true glaciers in Norway are currently retreating and the expected development of climate means that the area of rock glaciers and moraines occupied by that habitat will increase (it makes up more than 10% of the area of true glaciers for the past 200 years) . In the Alps and Pyrenees, this process is much more dynamic. Nevertheless, there are some discrepancy, e.g. between small area in Spain and relatively large in Greece, (Hughes et al. 2003), which could be induced by an unclear understanding of the habitat H4.3 at all. Expected occurrence is also in remainder Alpine countries, such as Slovenia, Germany, and probably also in Bulgaria. Important missing data are from Sweden, Iceland, Norway and other arctic regions.

- Average current trend in quantity (extent)

EU 28: Decreasing

EU 28+: Decreasing

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

Yes

Justification

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

Yes

Justification

In some regions represent the rock glaciers a small relict islands of post glacial time (Pleistocene), partly they are also periglacial forms, such as small glaciers covered by debris and rocks (Hughes et al. 2003).

Trends in quality

Missing data. In accordance to the climate change there are also prerequisites in decreasing of the quality.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

The rock glaciers represent a fragile habitat, which can be under stress as a result of human and environmental activities. Increased leisure, mobility, wealth, easier accessibility of the mountains in Europe (a greater use of the ski areas) induce changes more than ever before. The pressure of human activities, as well as the effects of climate change and global warming on the glaciers will inevitably affect the environment and call for needs to utilise sustainable development strategies in order to control the impact on its environment.

The main pressures are: 1/ climate change and global warming, incl. less snowfall. 2/ raising the temperature due dark rocks covering the ice mass below and absorbing heat. 3/ Mountaineering, tourism, skiing and other leisure activities in mountains. 4/ Acid rains and air pollution.

List of pressures and threats

Human intrusions and disturbances

Mountaineering, rock climbing, speleology

Trampling, overuse

Climate change

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

Droughts and less precipitations

Conservation and management

Management and conservation of rock glaciers is not practically possible, only small threats can be reduced (direct human impact by tourism, leisure activities in mountains, local air pollution etc.

List of conservation and management needs

No measures

No measure known / impossible to carry out specific measures

Measures related to spatial planning

Establish protected areas/sites

Conservation status

Annex 1 type:

8340: ALP U1, BOR U1

(This Annex 1 habitat type applies to a geographically and altitudinally wider range of snow or ice-dominated habitats. H4.3 is therefore narrower circumscribed than 8340. The overall conservation status of permanent glaciers in ALP region is unfavorable-bad (U2), rock glaciers are in relatively better situation).

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

In situation when true glaciers are currently retreating and the expected development of climate (rising temperatures) will continue, the habitat such as rock glaciers and moraines will increase in the localities on northern latitudes or higher altitudes. On the other hand, the rock glaciers and debris with interstitial ice on southern occurrence (Balkan countries, Spain) could disappear at all.

Effort required

50+ years	200+ years
Naturally	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-29 %	unknown %	unknown %	unknown %
EU 28+	-16 %	unknown %	unknown %	unknown %

The average trend has been based on data from only three countries (France, Austria, Switzerland), but these are the countries which reported the largest areas. Important data gaps exist for the boreal countries (Sweden, Norway, Iceland), and additional data from these countries might reduce the negative trend. On long term trends only data from France and Switzerland are available, not allowing a reliable analysis.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km ²	Yes	Yes	unknown	close to 50	Yes	Yes	unknown	unknown
EU 28+	>50000 Km ²	Yes	Yes	unknown	>50	Yes	Yes	unknown	unknown

Although exact distribution data is missing (calculated AOO and EOO are a rough estimate based on occurrence of glaciers), it is likely that the range extent is wide (from Scandinavia to the Alps). Within the EU28 the AOO is however likely to be restricted, slightly above or below 50. Exact data are unknown, and a conservative Near Threatened status is given for criterion B2 for the EU28. Other criteria under B are assessed as 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	73 %	29 %	unknown %	%	unknown %	unknown %
EU 28+	73 %	29 %	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 calculation of trends in quality is based on data from Austria and France only. However, similar trends can be expected for Switzerland, and therefore the same figures are given for the EU28+. Again, important data gaps exist for boreal countries, which may cause an overestimation of threat level. The average figures lead to the conclusion Near Threatened for both EU28 and EU28+.

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	NT	DD	DD	DD	LC	NT	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	A1, B2, C/D1	Near Threatened	C/D1

Confidence in the assessment

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

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