E4.4a Arctic-alpine calcareous grassland

Summary

These grasslands occur on shallow, highly calcareous soils on limestone or dolomite slopes and ridges in the alpine or subalpine belts of the high mountains of the nemoral zone, being best developed in the Alps, but occurring also in the Carpathians and Pyrenees, with small fragmentary stands also in the Sudetes and in Scotland. Grasses and sedges dominate, along with numerous small herbs, the cover varying from sparse to complete according to the soil depth. Major pressures are related to changes of abiotic conditions due to climate change, overgrazing as well as abandonment of grazing and outdoor sports and leisure activities, such as mountaineering and the construction of skiing complexes. Over recent historic time, only a slight decrease in both extent and quality have been recorded. The development of suitable management strategies is the key factor for the maintenance of a good conservation status, limiting grazing to the traditional low levels in easily accessible areas and so preventing changes in the vegetation. This can be achieved best in protected areas. Once destroyed or severely damaged the recovery of the habitat type by natural processes will take a very long time.

Synthesis

Despite missing data from Sweden, Norway and some non-EU28 Balkan states, the available data seem to reflect the pan-European situation well. The calculated decreases in quantity and quality are well below the thresholds to qualify for Near Threatened category. The geographic distribution is not restricted (EOO ≥ 50000 km², AOO ≥ 50). The overall red list category is Least Concern.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Least Concern	A1, B1, B2, C/D1	Least Concern	A1, B1, B2, C/D1

Sub-habitat types that may require further examination

Subalpine types may require further examination as they are heavily affected by abandonment of grazing.

Habitat Type

Code and name

E4.4a Arctic-alpine calcareous grassland

Alpine calcareous grassland in the Dolomites, Italy (Photo: John Janssen).

Alpine calcareous grassland with *Carex firma* at Schneealpe, Austria (Photo: David Paternoster).

Habitat description

This type of grasslands occurs in the alpine or subalpine belts of the high mountains of the nemoral zone, being best developed in the Alps but occurring also in boreal Scotland and Scandinavia, in the Carpathians and Pyrenees, and with small fragmentary stands also in the Sudetes. The cover of these grasslands varies considerably between 20 and 100%, depending mainly on soil depth (deeper soils usually support denser vegetation). The dominant species are graminoids such as *Sesleria caerulea*, *S. bielzii, S. tatrae*, *Carex austroalpina*, *C. ferruginea*, *C. firma*, *C. sempervirens*, *Festuca versicolor* or *Kobresia myosuroides*. In the matrix of graminoids numerous non-graminoid herbs occur. On south-facing slopes in the subalpine belt, mountain calcicolous species can be mixed with some species of lowland dry grasslands such as *Carex humilis*. In general, these grasslands are rich in species and colorful at the peak of the growing season. They occur on limestone or dolomite slopes and ridges, most typically on shallow soils of the Rendzic Leptosol type. On steeper slopes these soils are affected by solifluction. Tussocks of the dominating graminoids can act as small dams that prevent downslope movement of fine soil particles, which results in a stairway-like appearance of these grasslands with fine-scale mosaic of patches with soil erosion and accumulation. Calcareous grasslands above the timberline are natural vegetation, occasionally used as summer pastures. Below the timberline, these grasslands occur either as natural vegetation on steep slopes and rock outcrops, or as secondary vegetation of mountain pastures at the sites of potential spruce, larch or beech forests.

Indicators of good quality:

Calcareous grasslands above the timberline are natural vegetation which is generally rather stable. In some places it is disturbed by tourism, e.g. trampling, skiing or building touristic infrastructure, but these negative effects tend to be rather localized. More endangered are the calcareous grasslands below the timberline, which were traditionally grazed by cattle but are currently being abandoned and overgrow by shrubs and trees.

The following characteristics can be considered as indicators of good quality:

- High species richness.
- No encroachment of trees and shrubs.
- No spread of tall-growing herb species after abandonment of grazing.
- In the subalpine belt, continuation of traditional management by grazing.
- Absence of overgrazing that would strongly reduce grassland cover or disturb the soil.
- No signs of disturbance by trampling, skiing or construction works.

Characteristic species*:*

Vascular plants: *Achillea clavenae, Acinos alpinus, Alchemilla hoppeana, Androsace chamaejasme, A. villosa, Anthyllis vulneraria, Aster alpinus, A. bellidiastrum, Astragalus alpinus, A. frigidus, A. penduliflorus, Bartsia alpina, Betonica alopecuros, Biscutella laevigata, Calamagrostis varia, Callianthemum kernerianum, Campanula scheuchzeri, C. thyrsoides, Carex austroalpina, C. baldensis, C. ferruginea, C. firma, C. mucronata, C. ornithopoda, C. sempervirens, Coeloglossum viride, Draba aizoides, Dryas octopetala, Festuca versicolor, Galium anisophyllon, Gentiana clusii, G. verna, Globularia cordifolia, G. nudicaulis, Helianthemum nummularium* subsp. *grandiflorum, Helianthemum oelandicum* subsp. *alpestre, Hieracium villosum, Homogyne discolor, Juncus monanthos, Kobresia myosuroides, Leontopodium alpinum, Minuartia langii, Nigritella nigra, N. rubra, Onobrychis montana, Oxytropis campestris, O. carpatica, O. halleri, Pedicularis foliosa, P. rostratocapitata, P. rostratospicata, Phyteuma orbiculare, P. sieberii, Primula clusiana, P. wulfeniana, Pulsatilla alpina* subsp. *alpina, Ranunculus hybridus, R. thora, Rhinanthus glacialis, Saussurea alpina, S. pygmaea, Saxifraga caesia, paniculata, Scabiosa columbaria, Scorzonera rosea,*

Selaginella selaginoides, Senecio abrotanifolius, Senecio doronicum, Sesleria bielzii, S. caerulea, S. tatrae, Thesium alpinun, Veronica aphylla, V. fruticans, Viola jooi.

Bryophytes: *Plagiochila porelloides, Polytrichum alpinum, Rhytidium rugosum, Tortella tortuosa*

Lichens: *Cetraria islandica*

Classification

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

EUNIS:

E4.4 Calciphilous alpine and subalpine grasslands

EuroVegChecklist:

Oxytropido-Elynion myosuroidis Br.-Bl. 1950

Festucion versicoloris Krajina 1933

Agrostion alpinae Jeník et al. 1980

Seslerion coeruleae Br.-Bl. in Br.-Bl. et Jenny 1926

Caricion austroalpinae Sutter 1962

Caricion ferrugineae G. Br.-Bl. et Br.-Bl. in G. Br.-Bl. 1931

Caricion firmae Gams 1936

Seslerio-Asterion alpini Hadač ex Hadač et al. 1969

Seslerion tatrae Pawlowski 1935 corr. Klika 1955

Festuco saxatilis-Seslerion bielzii (Pawlowski et Walas 1949) Coldea 1984

Laserpitio nestleri-Ranunculion thorae Vigo ex Molero 1981

Primulion intricatae Br.-Bl. ex Vigo 1972

Armerion cantabricae Rivas-Mart. et al. 1984

Annex 1:

6170 Alpine and subalpine calcareous grasslands

Emerald:

E4.4 Calcareous alpine and subalpine grassland

MAES-2:

Grassland

IUCN:

4.4 Temperate grassland

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

Yes

Regions

Alpine

Justification
This type of grasslands is widely distributed in the alpine or subalpine belts of the high mountains of the nemoral zone, being best developed in the Alps but occurring also in Scotland, Scandinavia, the Carpathians and Pyrenees, with small fragmentary stands also in the Sudetes.

Geographic occurrence and trends

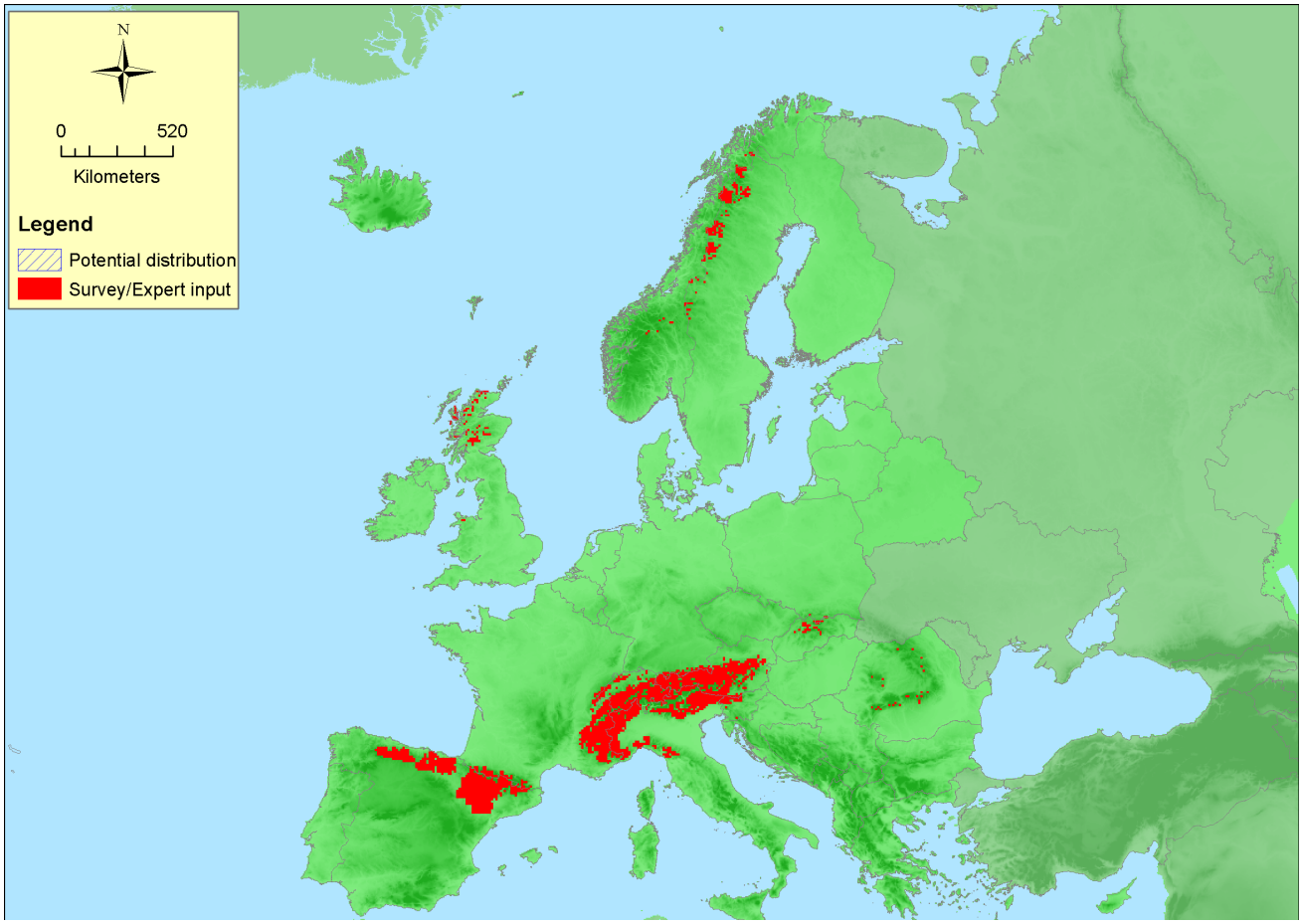
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Austria	Present	1905 Km^2	Decreasing	Decreasing
Czech Republic	Present	0.03 Km^2	Stable	Stable
France	France mainland: Present	2500 Km^2	Decreasing	Decreasing
Germany	Present	280 Km^2	Decreasing	Decreasing
Greece	Greece (mainland and other islands): Present	Km^2	-	-
Ireland	Present	1 Km^2	Unknown	Unknown
Italy	Italy mainland: Present	2946 Km^2	Stable	Unknown
Poland	Present	13.5 Km^2	Decreasing	Stable
Slovakia	Present	8 Km^2	Decreasing	Decreasing
Slovenia	Present	105 Km^2	Stable	Stable
Spain	Spain mainland: Present	106 Km^2	Stable	Unknown
Sweden	Present	Km^2	-	-
UK	United Kingdom: Present	12 Km^2	Stable	Unknown

EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Albania	Present	Km^2	-	-
Andorra	Present	Km^2	-	-
Kosovo	Present	Km^2	-	-
Montenegro	Present	Km^2	-	-
Norway	Norway Mainland: Present	Km^2	-	-
Serbia	Present	Km^2	-	-
Switzerland	Present	1250 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	1111850 Km^2	1793	7876 Km^2	no data from Sweden, Greece
EU 28+	1111850 Km^2	1793	9126 Km^2	no data from Sweden, Greece, Albania, Kosovo, Montenegro, Serbia, Norway

Distribution map



The map is rather complete, with likely data gaps in Norway and the Czech republic. Data sources: EVA, ART17.

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

80%. Outside the EU28 the habitat type is primarily found in Switzerland.

Trends in quantity

Average Trend EU28: -3.7% over the last 50 years

Average Trend EU28+: -5.4% over the last 50 years

The surface of the habitat type was probably maximum around 1850 and since then has been steadily decreasing up to now. Over the last 50 years a relative loss of area of 3.7% and 5.4%, respectively has been reported for EU28 and EU28+ countries. Whereas the area remained more or less stable in Italy, Spain, U.K., Czech Republic or Slovenia, a more serious decline has occurred in Germany, Slovakia and Switzerland. Habitats above the timberline remained more or less stable, but secondary habitats in the subalpine zone were subjected to biocenotic evolution after abandonment of grazing. At a local scale, the loss of habitats was also related to destruction of sites due to construction of skiing complexes. According to the provided national data an ongoing decline looks set to continue in the future due to ongoing abandonment of land-use in the subalpine zone and local overgrazing in easily accessible areas.

- 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 EOO is larger than 50.000 km2. The habitat type is widespread in the alpine biogeographic zone.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The habitat type has large occurences in the subalpine and alpine zone of nemoral mountain regions and the underlying factors for the occurrence of the habitat are not restricted to a limited area or range. The EOO is larger than 50000 km².

Trends in quality

The extent of degradation 20.4% with a severity of degradation of 30.0% in EU28 and 21.4% with 32.4% severity in EU28+. Most of the countries reported a slight decrease in quality over the last 50 years. The degradation was mainly related to biocenotic evolution due to abandonment of grazing practices in the subalpine zone. Furthermore, in some areas overgrazing is also associated with degradation of this habitat type. An ongoing degradation of quality indicators looks set to continue in the future due to the effects of climate change.

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

Pressures and threats

As these grasslands are temperature dependent, a major threat comes from changes of abiotic conditions and species composition due to climate change. Further major threats are related to outdoor sports and leisure activities (e. g. mountaineering) as well as sport and leisure structures, primarily construction of skiing complexes. Especially on easy-to-reach and easy-to-manage sites, the habitats are affected by overgrazing, whereas in the subalpine zone they are frequently affected by biocoenotic evolution due to abandonment of traditional land-use practices.

List of pressures and threats

Agriculture

Grazing
Intensive grazing
Abandonment of pastoral systems, lack of grazing

Human intrusions and disturbances

Outdoor sports and leisure activities, recreational activities
Sport and leisure structures
Skiing complex

Climate change

Changes in abiotic conditions

Conservation and management

To delimit both overgrazing in easily accessible areas and prevent biocoenotic evolution due to cessation of land-use in heavily accessible areas of the subalpine zone it is necessary to develop suitable management strategies. This can probably be achieved best in protected areas. To avoid an ongoing loss of habitats due to construction of skiing complexes and transportation corridors further protected areas have to be established in ecologically sensitive areas.

List of conservation and management needs

Measures related to agriculture and open habitats

Other agriculture-related measures
Maintaining grasslands and other open habitats

Measures related to spatial planning

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

Conservation status

Annex 1 types:

6170: ALP U1, ATL U2, CON U1, MED U1

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

Calcareous grasslands above the timberline are natural vegetation. Once destroyed or severely damaged (e. g. due to construction of skiing complexes), the recovery of the habitat type by natural succession processes will take a very long time. Semi-natural habitats of the subalpine zone with modified species composition due to abandonment of traditional land-use practices need human intervention for restoration. This can be achieved by re-introducing of traditional pastoral systems.

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	-3.7 %	unknown %	unknown %	unknown %
EU 28+	-5.4 %	unknown %	unknown %	unknown %

The values for A1 were calculated from the territorial data sheets. The calculated trend in the last 50 years is a reduction of about 3.7% (EU28) and 5.4% (EU28+), resulting in category Least Concern. No data (%) available or unsufficient data for A2a, A2b and A3.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km^2	Unknown	Unknown	unknown	>50	Unknown	Unknown	unknown	unknown
EU 28+	>50000 Km^2	Unknown	Unknown	unknown	>50	Unknown	Unknown	unknown	unknown

Both values (AOO and EOO) are relatively large and do not meet criterion B. Sub-criteria were not evaluated because the values for EOO and AOO are well above the thresholds.

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	20.4 %	30.0 %	unknown %	unknown %	unknown %	unknown %
EU 28+	21.4 %	32.4 %	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 values for C/D1 were calculated from the territorial data sheets. The calculated figures result in a Least Concern category. No reliable data (%) available for C/D2, C/D3, C1, C2, C3, D1, D2 and D3.

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	DD	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	LC	DD	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
Least Concern	A1, B1, B2, C/D1	Least Concern	A1, B1, B2, C/D1

Confidence in the assessment

Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert knowledge)

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