

E2.3 Mountain hay meadow

Summary

This is the typical kind of traditionally managed meadow throughout the mountains of northern and central Europe, with many local types differing according to regional climate, terrain and mowing traditions. Often species-rich with distinctive scarce and rare plants, it can withstand some changes in mowing regime and temporary shifts towards pasture management but it is vulnerable to any kind of substantial change in farming practice, particularly fertilising with slurry or chemicals rather than animal dung. It is also often more heavily grazed in spring and autumn and/or reseeded, and the more productive but species-poor herbage cut more frequently each summer for silage. Such a change has been much encouraged in recent decades by agricultural subsidies. In other cases, especially towards northern and eastern Europe, traditional meadows have been abandoned and succeeded to scrub and woodland. Substantial losses in extent and quality are now widespread with the prospect of stabilisation in only a few countries. Often once part of wider agricultural landscapes with distinctive associated pastures, vernacular architecture, place names and farming festivals, good examples of the habitat now often survive more fragmentarily, and only with financial support for conservation management. Restoration needs thoughtful intervention and is difficult once soil fertility has reached high levels or scrub invasion is advanced.

Synthesis

An overall assessment of Vulnerable (VU) is based on the average loss in extent over recent historical time (A1) and over the longer time period (A3), with recent reduction in quality (C/D1) providing a Near Threatened (NT) rating.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1, A3	Vulnerable	A1, A3

Sub-habitat types that may require further examination

This is a diverse habitat with sub-types in different climatic regions. These are varyingly threatened by changes in a wide range of local traditions of mowing for hay.

Habitat Type

Code and name

E2.3 Mountain hay meadow



Mountain hay meadow with *Dianthus superbus* & *Cirsium helenioides* in the



Traditional farmer standing in his mountain hay meadow, Ravenstonedale, UK

Habitat description

This habitat is characteristic of deep, well-drained, mesic soils through the sub-montane and montane zones of northern and central Europe, being favoured by an oceanic rather than continental climate and, at southern latitudes, more limited to high mountains. It is especially well developed in the Alps and Carpathians but extends also into Scandinavia and the United Kingdom and the Pyrenees and Balkan Peninsula. A shorter and/or cooler growing season at higher altitudes results in less productive growth than in lowland meadows on similar soils and often only one hay crop a year. Spring and aftermath grazing occurs in some regions. These meadows have traditionally been fertilized by dung and so tend to be more frequent near settlements, farms and mountain huts where grazing stock were available and carting easier. Typically, chemical fertilisers are not used.

These meadows share many species of medium-tall grasses and herbs with mown grasslands of lower altitudes but the distinctive character is provided by such plants as *Trisetum flavescens*, *Polygonum bistorta*, *Geranium sylvaticum*, *Cirsium helenioides*, *Trollius europaeus*, *Alchemilla vulgaris* agg. Some of these plants occur both in these meadows and in the more open woodlands of the montane belt from which they were probably originally derived.

Distinctive sub-types of mountain hay meadows reflect regional contrasts in climate from the more oceanic north and west of Europe (with *Lathyrus linifolius*, *Poa chaixii*, *Anemone nemorosa*, *Crepis mollis*), the sub-Continental central European mountains (*Meum athamanticum*, *Galium hercynicum*, *Arnica montana*), the Jura and Alps (*Rumex alpestris*, *Pleum alpinum*, *Poa alpina*, *Campanula scheuchzeri*, *Myosotis alpestris*, *Rhinanthus alectorolophus*) and the Tatra and west Carpathians (*Alchemilla walasii*, *A. crinita*, *Cardaminopsis halleri*).

Indicators of good quality:

- High species-richness
- Occurrence of regionally distinctive rare plants
- Continuation of traditional management with one or two hay cuts per year, optionally with light aftermath grazing
- Absence of heavy grazing
- No encroachment of trees and shrubs
- Absence of patches dominated by nutrient-demanding, tall-growing competitive herbs and grasses
- Absence of alien plant species

Characteristic species:

Vascular plants: *Agrostis capillaris*, *Alchemilla vulgaris* agg., *Anthoxanthum odoratum*, *Astrantia major*, *Bistorta major*, *Briza media*, *Campanula patula*, *Cardaminopsis halleri*, *Centaurea phrygia* agg., *Cirsium helenioides*, *Crepis mollis*, *Dactylis glomerata*, *Festuca rubra* agg., *Geranium sylvaticum*, *Hypericum maculatum*, *Lathyrus pratensis*, *Meum athamanticum*, *Narcissus poeticus*, *Phleum rhaeticum*, *Phyteuma spicatum*, *Pimpinella major*, *Poa chaixii*, *Polygonum bistorta*, *Primula elatior*, *Rumex acetosa*, *Trifolium pratense*, *Trisetum flavescens*, *Trollius europaeus*, *Phleum rhaeticum*.

Mosses: *Plagiomnium affine* agg., *Rhytidiadelphus squarrosus*

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:

Phyteumo-Trisetion flavescentis Hundt ex Passarge 1969

Trisetio flavescentis-Polygonion bistortae Br.-Bl. Et Tx. Ex Marschall 1947

Violion cornutae Nègre 1972

Panicion serbicae Lakušić 1966

Annex 1:

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Emerald:

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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?

No

Justification

It is a widespread type through the European mountains and its general character is determined by the combination of montane climate and traditional management.

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	55 Km ²	Decreasing	Decreasing
<i>Belgium</i>	Present	unknown Km ²	Decreasing	Decreasing
<i>Bulgaria</i>	Present	479 Km ²	Decreasing	Decreasing
<i>Croatia</i>	Present	2 Km ²	Decreasing	Decreasing
<i>Czech Republic</i>	Present	160 Km ²	Stable	Decreasing
<i>France</i>	France mainland: Present	1000 Km ²	Decreasing	Decreasing
<i>Germany</i>	Present	190 Km ²	Decreasing	Decreasing
<i>Hungary</i>	Present	20 Km ²	Decreasing	Decreasing
<i>Italy</i>	Italy mainland: Present	1126 Km ²	Decreasing	Decreasing
<i>Poland</i>	Present	168 Km ²	Decreasing	Stable
<i>Romania</i>	Present	120 Km ²	Stable	Stable
<i>Slovakia</i>	Present	13 Km ²	Decreasing	Decreasing
<i>Slovenia</i>	Present	102 Km ²	Decreasing	Decreasing

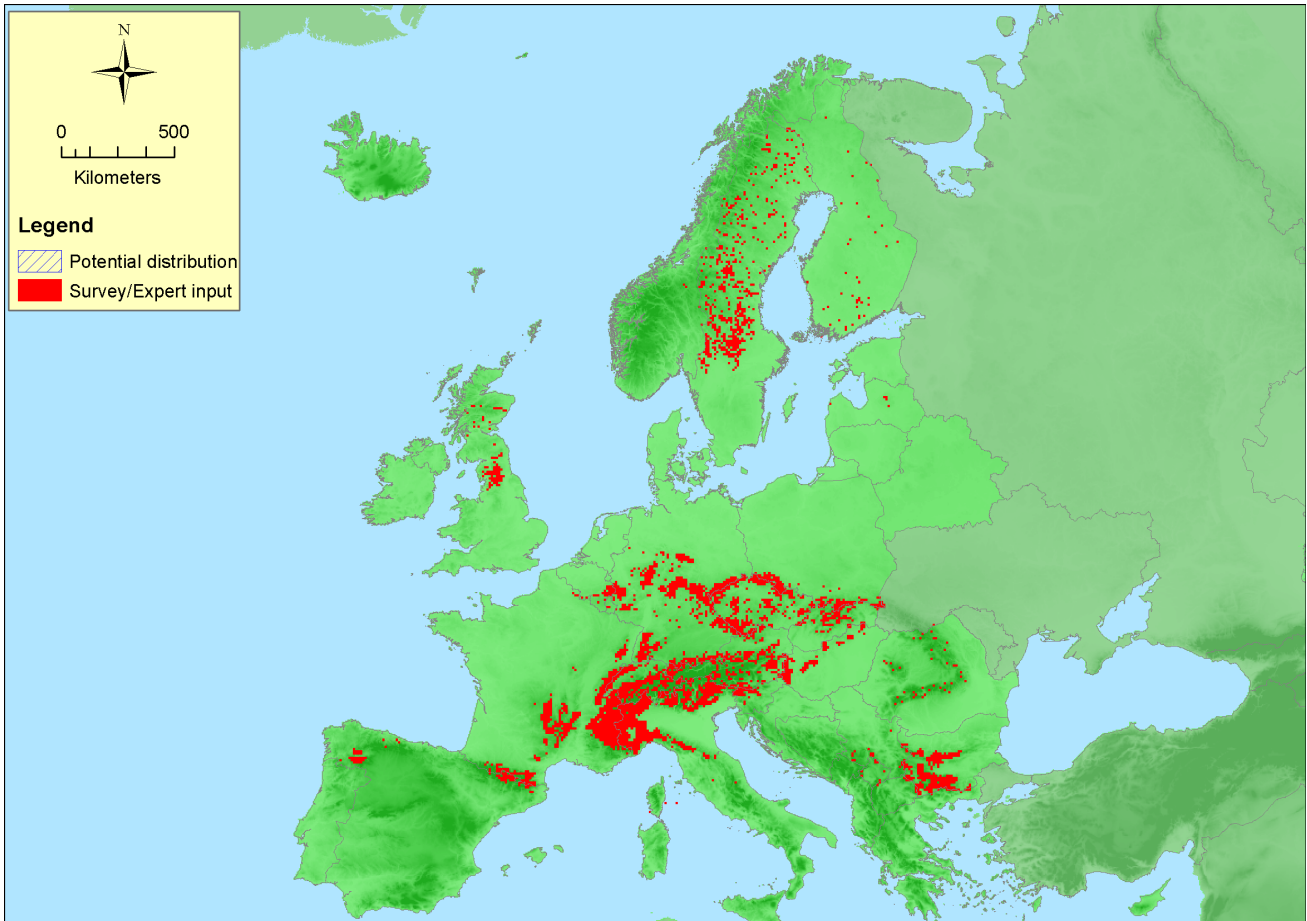
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Spain</i>	Spain mainland: Present	15 Km ²	Decreasing	Unknown
<i>Sweden</i>	Present	unknown Km ²	Unknown	Unknown
<i>UK</i>	United Kingdom: Present	9 Km ²	Decreasing	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)
<i>Bosnia and Herzegovina</i>	Present	80 Km ²	Decreasing	Decreasing
<i>Kosovo</i>	Present	unknown Km ²	Decreasing	Decreasing
<i>Montenegro</i>	Uncertain	Km ²	-	-
<i>Norway</i>	Norway Mainland: Present	2918 Km ²	Decreasing	Decreasing
<i>Switzerland</i>	Present	600-800 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
<i>EU 28</i>	5775850 Km ²	3331	4359 Km ²	Among all the countries returning an assessment, only Belgium (Flanders) records an unknown present extent.
<i>EU 28+</i>	5775850 Km ²	3508	8057 Km ²	The very large extent from Norway much affects this total

Distribution map



The map is quite good but shows too much in Sweden, too little in Norway and Romania.

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

About 55%

Trends in quantity

Where data/estimates are available (for about half the countries), generally substantial losses, almost always over 30%, in some cases (Germany and the UK), over 80%, have been recorded over the long-term historical period, largely due to shifts in farming practice, notably a move towards intensification of grass production. In almost all countries this rate of loss has been maintained over the past 50 years or increased. Only rarely has the rate decreased (Switzerland) or the situation stabilised (Romania). In Norway a 50-80% decrease in all hay meadows has been recorded in recent historic time. Where an estimate of future trends has been made, about 2/3 of the countries, losses are expected to continue, though, in the few cases where figures are given at somewhat slower pace than before.

- 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 reduction in extent is substantial but widespread through the European mountains so the overall range is largely unchanged.

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

No

Justification

The potential distribution of this habitat within the EOO is strictly controlled by the dependency on a harsh climate, with a short growing season and low summer temperatures, and a low-input mowing regime. These conditions have been met throughout mountains of north and central Europe.

Trends in quality

All but one country (Spain) records usually at least moderate, sometimes severe reduction in biotic and abiotic quality over recent time, affecting almost always over 30%, sometimes over 50%, of the current extent. Except in Switzerland and Romania, where conditions are stable, this loss is ongoing. In the few countries where an assessment of future prospects has been made, this trend is thought likely to continue, particularly because of abandonment of hay meadow management.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

The habitat has been much changed by shifts in farming practice and land-use all across Europe. A move away from traditional hay-making, with some spring and autumn grazing and fertilizing only by animal dung, began in the west and speeded greatly after World War 2, much increased in extent and intensity in recent decades through EU financial support. Addition of chemical fertilizers, top-sowing, cultivation and re-seeding has decreased the species-richness and regional diversity of this habitat across large parts of north-western Europe producing very species-poor crops dominated by *Lolium perenne* and other highly productive and competitive grasses and clovers. These are now generally cut for silage, sometimes several crops a year, and often more intensively grazed in spring and autumn. In other cases, meadows have been converted to intensively-managed permanent pasture or ploughed up for arable cropping. Particularly in the mountains of eastern and northern Europe abandonment of traditional grazing in these meadows is common, with development of rank grasslands, scrub and woodland. Often this habitat persists now only in protected areas with some financial subsidy for the maintenance of traditional hay-making. Except in such cases and where there are local restoration programmes, there is no sign of any reduction in threats.

List of pressures and threats

Agriculture

- Modification of cultivation practices
 - Crop change
 - Grassland removal for arable land
- Mowing / Cutting of grassland
 - Abandonment / Lack of mowing
- Grazing
 - Intensive grazing

Pollution

- Air pollution, air-borne pollutants
- Nitrogen-input

Conservation and management

Conservation of this habitat is directed towards maintaining as many of the traditional elements of farming practice as possible: relief from grazing in late spring, cutting of hay in summer, use of only dung, urine,

lime and mild phosphates as fertilisers. This usually means payments to farmers for income foregone since these days hay cropping is uneconomic, especially at the often reduced levels of productivity in traditional meadows, and various schemes of agri-environment funding have been implemented to administer this financial support. Where damaged, restoration aims, one way and another, to reinstate elements of traditional practice: repeated cuts of existing herbage to reduce soil fertility, reduced levels of spring grazing, later cutting of the hay or haylage crop and strewing of green hay cut from remaining better quality meadows to seed in distinctive species.

List of conservation and management needs

Measures related to agriculture and open habitats

Maintaining grasslands and other open habitats

Conservation status

Annex 1 types:

6520: ALP U2, ATL U2, BOR U2, CON U2, MED U2, PAN U1

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

Restoration is often hindered by the accumulated fertility (especially of bound phosphate) in the soils; by the lack of a market for hay; the lack of suitable stock or of pasture when the hay-fields are closed; and by the loss of social memory among ageing farmers and changing communities. Restoration is more successful on meadows which still retain some measure of floristic diversity but, even where restoration is better, the wider fabric of traditional farming with its landscape-scale diversity, vernacular architecture, field names and festivals has often disintegrated.

Effort required

20 years
Through intervention

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	26-39 %	unknown %	unknown %	10-90 %
EU 28+	21-65 %	unknown %	unknown %	10-90 %

The recent historic reduction in extent is well supported, often from expert knowledge, occasionally from survey data, though estimates of previous extent are often based on back calculation from present extent and an estimate of recent % loss. The average loss calculation gives a category of VU but the range of loss varies greatly from country to country and larger losses (as in Slovakia, Germany, Spain, Austria, the Czech Republic, UK) usually now leave a small residual extent. The exception to this is Norway where very large losses still leave a large extent and, though the Norwegian Red List gives an assessment of EN, with other smaller EU28+ losses, the average assessment here is still VU. The often very considerable longer term losses average at over 50%, supporting this assessment. Only a few quantitative estimates of future loss are provided and an average cannot be calculated but the range is from 10-50%.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	5697200 Km ²	Yes	Yes	unknown	>50	Yes	Yes	unknown	unknown
EU 28+	5697200 Km ²	Yes	Yes	unknown	>50	Yes	Yes	unknown	unknown

The habitat has a large overall range, occurring in many of the north and central European mountains and an AOO over 50, so that the main thresholds for Criterion B1 are not met, although there is continuing biotic and abiotic decline (B1aii) right across the extent and continuing threat (B1aiii).

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	35 %	40-60 %	unknown %	unknown %	unknown %	unknown %
EU 28+	36 %	40-68 %	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%

Over half the countries provided sufficient data for a calculation of general decline in quality, the values giving an overall evaluation of NT, higher country figures occasionally with a combination of severity and extent reaching the VU threshold. Norway reports a loss in quality of 50-80% severity but the extent affected was not recorded.

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	VU	DD	DD	VU	LC	LC	LC	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	VU	DD	DD	VU	LC	LC	LC	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria	
EU 28	EU 28+

Overall Category & Criteria			
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1, A3	Vulnerable	A1, A3

Confidence in the assessment

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

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References

- Dierschke, H. 1981. Syntaxonomische Gliederung der Bergwiesen Mitteleuropas (*Polygono-Trisetion*). Berichte der Internationalen Symposien der Internationalen Vereinigung für Vegetationskunde 1981, 311-41.
- Mucina L., Grabherr G. & Ellmauer T. 1993. Die Pflanzengesellschaften Österreichs, Teil I: Anthropogene Vegetation. Verlag Gustav Fischer, Jena.
- Rodwell, J.S. 2015. Half-hidden in the herbage; A farmer's diary from Northern England. *Stratiotes*: 48, 33-48.
- Schaminée, J.H.J. (1993). Subalpine heathlands and adjacent plant communities of the Monts du Forez (Massif central, France). PhD thesis, University of Nijmegen.
- Tüxen R. & Böttcher H. 1969. Weide- und Wiesen-Gesellschaften (Molinio-Arrhenatheretea) in Südwest-Island. Berichte aus der Forschungsstelle Nedri As, Hveragedrði (Island) Nr 1.