

E2.2 Low and medium altitude hay meadow

Summary

This is the most common and widespread kind of traditionally managed meadow throughout the lowlands and foothills of temperate 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, ploughed and 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. Losses in extent and quality are now very widespread across Europe, with stabilisation in only a minority of 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, even in eastern Europe, 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

Reliable estimates of decline in extent in recent historical time (A1) provide clear justification for an assessment of Vulnerable. A close to severe decline in quality over 50% of the extent over the same time period (C/D1) more than confirms this and suggests that a higher category of Endangered is being approached.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1, A3, C/D1	Vulnerable	A1, A3, C/D1

Sub-habitat types that may require further examination

This is a very diverse habitat with sub-types in different climatic regions, at different altitudes and on soils of different base-status. These are varyingly threatened by changes in a wide range of pastoral traditions.

Habitat Type

Code and name

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Arrhenatherum-grassland with *Knautia arvensis*, Upper Franconia, Bavaria, Germany (Photo: Jürgen Dengler).



Mowing Roma people in a low altitude hay meadow near Talmaciu, Transylvania, Romania (Photo: John Janssen).

Habitat description

This habitat includes grasslands mown for hay occurring on deep, well-drained, mesic soils throughout much of Europe, especially in the nemoral and boreo-nemoral zones where they are found from low to medium altitudes. In southern Europe they are confined to precipitation-rich areas at higher altitudes, occurring in the mountains of the northern half of the Iberian Peninsula, the Apennines and the supra-Mediterranean zone of the Balkan Peninsula. These meadows are typically fertilized by dung, only lightly by chemical fertilisers, and mown once or twice a year for hay, rather than silage, with light spring and/or aftermath grazing in some places.

They are dominated by productive grasses such as *Arrhenatherum elatius*, *Briza media*, *Dactylis glomerata*, *Festuca pratensis*, *F. rubra*, *Poa pratensis* and *Trisetum flavescens*, dicotyledonous herbs, particular rosette plants with taller flowering stems, including *Crepis biennis*, *Heracleum sphondylium*, *Knautia arvensis* agg., *Leucanthemum vulgare* agg., *Pimpinella major*, *Plantago lanceolata* and *Rumex acetosa*, and clonal geophytes such as *Geranium pratense* and *Sanguisorba officinalis*. Species-richness can be high, especially in types where low-input management has been consistent over long periods of time. Such grasslands also better reflect regional differences in climate and local variations in soil, whether to more base-rich or acidic substrates, or to moister or drought-prone situations. Transitions to E2.1a Mesic permanent pastures are widespread in the lowlands, especially where there is a shift from mowing to more consistent grazing which favours a lower structure, the elimination of more palatable grasses and the prevention of flowering among taller rosette hemicryptophytes.

Although the meadows of this type are still widespread through the nemoral and boreo-nemoral zones, they have been declining for many decades either because of such conversion to intensively grazed pastures or through heavy fertilizing and reseeding for crops of silage which can be cut three or more times a year. In landscapes dominated by intensive agriculture, this habitat often survives best on road verges that are cut annually for amenity reasons but, where coarse perennials or weeds invade such situations, the vegetation does not belong to this habitat. Abandonment and subsequent encroachment of shrubs and trees is also widespread.

Indicators of good quality:

- Continuation of traditional management with one or two hay cuts per year
- Light or no spring and/or aftermath grazing
- High species richness
- Absence of patches dominated by nutrient-demanding, tall-growing competitive dicotyledonous herbs
- Absence of alien plant species
- No encroachment of trees and shrubs
- Absence of heavy grazing
- No increase of fertility with addition of chemical fertilisers

Characteristic species:

Flora: Vascular plants : *Achillea millefolium* agg., *Agrostis capillaris*, *Anthoxanthum odoratum*, *Arrhenatherum elatius*, *Avenula pubescens*, *Briza media*, *Campanula patula*, *Centaurea jacea*, *C. nigra*, *Cerastium holosteoides*, *Crepis biennis*, *Cynosurus cristatus*, *Dactylis glomerata*, *Daucus carota*, *Festuca pratensis*, *F. rubra*, *Galium album*, *Geranium pratense*, *Holcus lanatus*, *Knautia arvensis* agg., *Lathyrus pratensis*, *Leontodon autumnalia*, *L. hispidus*, *Leucanthemum vulgare* agg., *Lolium perenne*, *Lotus corniculatus*, *Luzula campestris* agg., *Pimpinella major*, *Plantago lanceolata*, *Poa pratensis*, *P. trivialis*, *Prunella vulgaris*, *Ranunculus acris*, *R. bulbosus*, *Rumex acetosa*, *Salvia pratensis*, *Trifolium dubium*, *T. pratense*, *T. repens*, *Taraxacum* sect. *Taraxacum*, *Trisetum flavescens*, *Veronica chamaedrys*, *Vicia cracca*.

Mosses: *Brachythecium rutabulum*, *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:

Arrhenatherion elatioris Luquet 1926

Brachypodio-Centaureion nemoralis Br.-Bl. 1967

Chrysopogono-Danthonion Kojić 1957

Ranunculo neapolitani-Arrhenatherion elatioris Allegrezza et Biondi 2011

Rumicion thyrsoflori Micevski ex Čarni et Mucina 2013

Cynosurion cristati Tx 1947 (mainly pastures)

Annex I:

6270 Fennoscandian lowland species-rich dry to mesic grasslands (partly)

6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

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 in the lowlands and foothills of Europe whose general characteristics relate more to long histories of mowing for a hay crop on soils of good quality.

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	175 Km ²	Decreasing	Decreasing
<i>Belgium</i>	Present	153 Km ²	Decreasing	Decreasing
<i>Bulgaria</i>	Present	48 Km ²	Decreasing	Decreasing
<i>Czech Republic</i>	Present	1907 Km ²	Decreasing	Decreasing
<i>Estonia</i>	Present	33 Km ²	Decreasing	Unknown
<i>Finland</i>	Finland mainland: Present	1 Km ²	Decreasing	Decreasing
<i>France</i>	France mainland: Present	7500 Km ²	Decreasing	Decreasing
<i>Germany</i>	Present	1640 Km ²	Decreasing	Decreasing
<i>Greece</i>	Crete: Present	10 Km ²	Unknown	Decreasing
<i>Hungary</i>	Present	200-250 Km ²	Decreasing	Decreasing
<i>Ireland</i>	Present	1.4-2.9 Km ²	Unknown	Decreasing
<i>Italy</i>	Sardinia: Present	2410 Km ²	Decreasing	Decreasing
<i>Latvia</i>	Present	53 Km ²	Decreasing	Decreasing
<i>Lithuania</i>	Present	190-200 Km ²	Decreasing	Decreasing
<i>Netherlands</i>	Present	6 Km ²	Decreasing	Decreasing
<i>Poland</i>	Present	6375 Km ²	Decreasing	Decreasing
<i>Portugal</i>	Portugal mainland: Present	84 Km ²	Decreasing	Unknown
<i>Romania</i>	Present	105 Km ²	Stable	Stable
<i>Slovakia</i>	Present	3000 Km ²	Stable	Decreasing
<i>Slovenia</i>	Present	327 Km ²	Decreasing	Stable
<i>Spain</i>	Spain mainland: Present	625 Km ²	Decreasing	Unknown
<i>Sweden</i>	Uncertain	unknown Km ²	Unknown	Unknown
<i>UK</i>	United Kingdom: Present	<100 Km ²	Decreasing	Decreasing

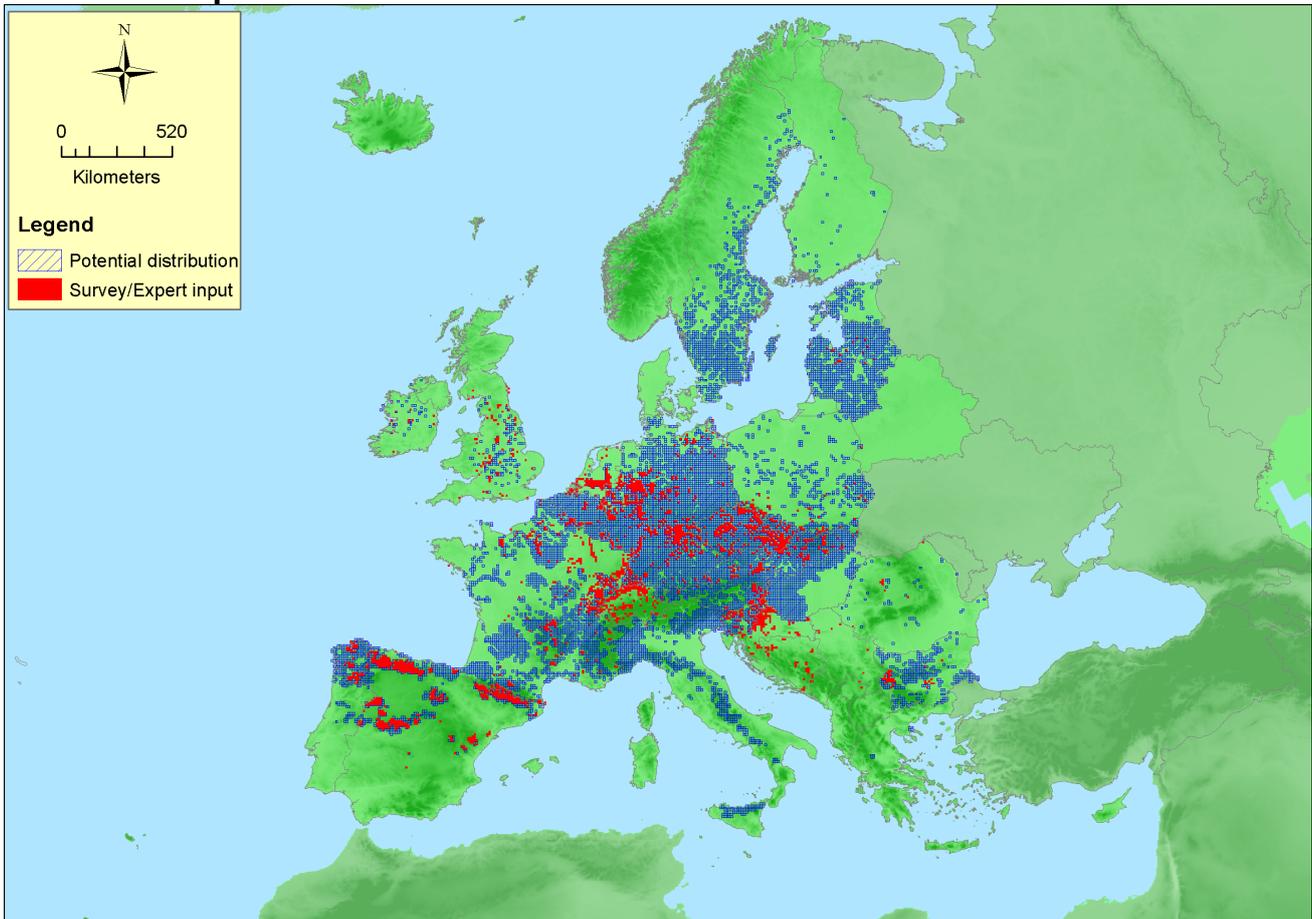
EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Bosnia and Herzegovina</i>	Present	200 Km ²	Decreasing	Decreasing
<i>Former Yugoslavian Republic of Macedonia (FYROM)</i>	Present	250 Km ²	Decreasing	Unknown
<i>Kaliningrad</i>	Uncertain	Km ²	-	-
<i>Kosovo</i>	Present	unknown Km ²	Decreasing	Decreasing
<i>Montenegro</i>	Uncertain	Km ²	-	-
<i>Norway</i>	Norway Mainland: Uncertain	Km ²	-	-
<i>Serbia</i>	Uncertain	Km ²	-	-

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	1000-1500 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	7203550 Km ²	14420	27373 Km ²	Data missing from Luxembourg and Sweden within the EU, from Norway, Serbia & Russia outside the EU.
EU 28+	7203550 Km ²	14641	28823 Km ²	

Distribution map



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

Over 95%.

Trends in quantity

Where data/estimates are available (for under half of the countries), the picture is of long-term losses of up to 75% and over, particularly in Germany, Hungary, the UK and Switzerland. Rarely, losses are small (Bulgaria) or the situation has remained stable (Romania). Over the past 50 years, almost every country records losses, generally over 30%, often approaching 50%, sometimes (as in Germany, the UK, Switzerland, Finland, Latvia and Poland) over 75%. Often, decreases are expected to continue in the future, though in the Czech Republic, Romania, Switzerland and Ireland, the situation is stabilising.

- 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 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 habitat has a potentially very widespread and extensive range as a replacement maintained by mowing, often with some grazing, for many kinds cleared temperate forest.

Trends in quality

Generally, across all countries, there has been a moderate to severe decline in biotic and abiotic quality in over 30% of this habitat over the past 50 years, sometimes over 75% of the extent. In a few countries (Slovenia, Romania, Switzerland, Estonia), the situation has stabilised, but generally decline in quality is continuing and, in the few cases where a future estimate has been made, the decline is expected to continue.

- 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. A move away from traditional hay-making, with some spring and autumn grazing and fertilizing only by animal dung, has occurred all across Europe, beginning in the west and speeding 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 and there is also some conversion to forestry. Particularly towards eastern and northern Europe, and especially in foothills, 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

Agricultural intensification

Grassland removal for arable land

Mowing / Cutting of grassland

Abandonment / Lack of mowing

Sylviculture, forestry

Forest planting on open ground

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 I:

6270: ALP U2, BOR U2, CON U2

6510: ALP U2, ATL U2, BLS FV, BOR U2, CON U2, MED U2, PAN U1, STE FV

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. More successful on meadows which still retain some measure of floristic diversity but, even where success 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	-43 %	unknown %	unknown %	-50 %
EU 28+	-48 %	unknown %	unknown %	-50 %

The actual recent past extent is often unknown or back-calculated from the usually reliable present extent data and an expert estimate of loss. Also, the recent time period over which this calculation/estimate is made varies from 20-60 years. Despite this, there is clearly sufficient recent loss for an assessment of Vulnerable (VU). For countries providing an estimate of longer term historical loss (Bulgaria, Hungary, Germany, Austria, Czech Republic, UK, Switzerland), this is estimated as a range which can extend to over 90%, average over 50% which would give an assessment of Vulnerable (VU) as well. Future losses are expected but with no reliable quantification.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	7137600 Km ²	Yes	Yes	No	>50	Yes	Yes	No	No
EU 28+	7137600 Km ²	Yes	Yes	No	>50	Yes	Yes	No	No

The EOO is calculated from the map and an exact figure for AOO is lacking but it is certainly more than the threshold. Although together these would suggest an assessment of LC, the prospect of continuing loss in both extent and biotic and abiotic quality across much of Europe, together with widespread continuing threats from agricultural improvement and abandonment, all suggest a higher category of threat is appropriate.

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	54 %	71 %	unknown %	unknown %	unknown %	unknown %
EU 28+	55 %	76 %	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 combination of generally at least moderate decline in quality across usually more than half of the extent of the territories making returns for this criterion, result in a category of Vulnerable (VU), close to Endangered (EN). Reduction in quality is always biotic, generally also abiotic. There are insufficient data for a reliable longer historical estimate of loss in quality but the assumption is generally that the decline began before 50 years ago, especially in western Europe. Despite some amelioration of threat in some territories, the general likely picture for the future is one of continuing loss.

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	VU	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	VU	DD	DD	VU	LC	LC	LC	VU	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
Vulnerable	A1, A3, C/D1	Vulnerable	A1, A3, 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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