

E1.1a Pannonian and Pontic sandy steppe

Summary

These are steppe grasslands dominated by perennial tussock-grasses and herbs, with frequent annuals and cryptogams, typical of nutrient-poor, base-rich, sandy soils on plains and dunes through the Pannonian, Pontic and southern Baltic regions. The climate is strongly continental with cold winters, often with long frosts and shallow snow, and hot, droughty summers. Traditionally used for extensive grazing by stock, particularly sheep, abandonment of this management has caused widespread reversion to scrub and woodland, sometimes with alien shrubs and trees. Such grasslands are also vulnerable to eutrophication from atmospheric inputs. Never extensive in the EU, this habitat has seen enormous losses and smaller, fragmentary stands on the margins of the main surviving extent in Hungary remain extremely threatened. Restoration demands clearance of less damaged sites and re-establishment of appropriate grazing or, where the habitat is enriched, soil inversion.

Synthesis

Based on a long-term reduction in quantity of 97%, this habitat type is assessed Critically Endangered (CR) both in EU28 and EU28+. Furthermore, the reduction in quantity during the last 50 years qualifies as endangered (EN), while the reduction in biotic and abiotic quality was not high enough to result in a Red List category.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Critically Endangered	A3	Critically Endangered	A3

Sub-habitat types that may require further examination

The delineation of the habitat in northern and eastern direction should be further examined. Southern Baltic steppic grasslands of the alliance *Koelerion glaucae* were proposed for being included in this habitat by some countries, but in other countries they were considered under different other habitats (E1.9a, E1.9b). Steppic grasslands along the Black Sea (Pontic) have been mainly considered under E1.2b, but transitional situations with habitat E1.1a occur, for example in the so-called standing stone areas near Varna, in northern Bulgaria.

Habitat Type

Code and name

E1.1a Pannonian and Pontic sandy steppe



Within the EU28+, Pannonian and Pontic sandy steppes are most widespread in Central Hungary (Photo: Wolfgang Willner).



A typical stand of the alliance *Festucion vaginatae* with the dominant tussock grasses *Festuca vaginata* and *Stipa borysthena* in Central Hungary (Photo: J. Dengler).

Habitat description

Sandy steppe grasslands of the Pannonian and Pontic regions, dominated by drought-tolerant, tussock-forming perennial grasses such as *Festuca vaginata*, *Koeleria glauca* and *Stipa borysthena*, in eastern Europe also by *Festuca beckeri*. Besides these grasses, perennial herbs are common in these grasslands, many of them with a deep root system developed as an adaptation to periodical drought events occurring on sandy substrates. Short-lived vernal therophytes, bryophytes and lichens are also frequent. Vegetation is sparse, with a maximum cover of 75%. These grasslands of the order *Festuco-Sedetalia acris* grow on poorer developed soils than the oceanic and sub-oceanic grasslands of habitat E1.9a. This type is also more continentally distributed (drier climate) and associated with higher soil pH often well above 7, because under continental conditions the soils are much less leached than in more Atlantic climate. In most cases they also have a higher species richness. Frequent occurring continental species are *Alyssum tortuosum*, *Astragalus arenarius*, *Dianthus arenarius*, *Dianthus serotinus*, *Erysimum canum*, *Euphorbia seguieriana*, *Gypsophila fastigiata*, *Helichrysum arenarium*, *Jurinea cyanoides* and *Secale sylvestre*.

Sandy steppes occur on sandy plains and dunes with variable content of exchangeable cations, both of acidic and basic reaction. On acidic sand, transitions to sub-oceanic sandy grasslands (E1.9b) occur, especially in the western parts of this habitat's range. Soils are poor in humus, belonging to the Arenosol type. Pannonian and Pontic sandy steppe occurs in lowlands with a pronounced continental climate characterized by warm and dry summer and cold winter, often with very shallow snow cover combined with long periods of frost. The surface layer of sand can warm up quickly during sunny days in summer, while the sandy substrate has a low water-holding capacity resulting in drought stress. Extreme drought events occurring in return intervals of several years can result in changes in species composition and relative cover of dominant species.

There are two main areas of distribution of these continental sandy steppes in Europe. One is the Pontic region including the steppe and forest-steppe zone of Ukraine and southern Russia (alliance *Festucion beckeri*), extending to the Danube valley in Romania and Bulgaria. The other is the Pannonian region including the Great Hungarian Plain (Alföld) and some adjacent lowland and hilly regions. Here the highest concentration of these grasslands is in central Hungary on the plains between the Danube and Tisza rivers (alliance *Festucion vaginatae*). Apart from these vicarious alliances dominated by perennial tussock grasses, there are two therophyte-dominated alliances of initial disturbed sites, namely the *Sileno conicae-Cerastion semidecandri* in the range of the *Koelerion glaucae* and the *Bassio laniflorae-Bromion tectorum* in the range of the *Festucion vaginatae*.

Stands of the alliance *Koelerion glaucae* can be found also on base rich sand in some areas in Poland,

eastern Germany and the middle Rhine valley in western Germany, as well as in the Southern Baltic region (Öland, Finish south coast), but there is some discussion whether such stands should be included under E1.1a or E1.9a. In the Red List typology they have been included in habitat E1.9a, as it was indicated by most national experts from these region that it was not possible to distinguish these vegetation types as different habitats. The habitat type is absent from western Europe, high mountains and more northern regions.

Sandy steppes were used for extensive grazing by domestic livestock, especially sheep. This land-use resulted in extension of their area at the expense of forest, however, after cessation of traditional management many former sand-steppe areas are becoming overgrown by encroaching shrubs and trees such as *Pinus sylvestris* and *Robinia pseudoacacia*.

Indicators of good quality:

In Europe sandy steppes contain several species of continental distribution that occur at the western limit of their distribution range. Most valuable are extensive stands of sand steppe on inland dunes or plains with open vegetation without alien or nutrient-demanding species. Sand steppe can develop on abandoned fields adjacent to preserved remnants of natural vegetation, however, alien species may be common in these secondary grasslands. The main threats to this habitat are overgrowing by trees and shrubs after cessation of grazing, spread of alien species such as *Robinia pseudoacacia* or *Asclepias syriaca*, and increasing dominance of nutrient-demanding species due to atmospheric deposition.

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

- Occurrence of rare species, especially those of continental distribution.
- Absence of nutrient-demanding and mesophilous species.
- Open character of vegetation.
- Absence of alien species.
- Absence of trees and shrubs.
- Large spatial extent of grassland stands.
- Continuation of traditional low-intensity grazing management.

Characteristic species:

Flora

Vascular plants: *Alkanna tinctoria*, *Alyssum montanum* subsp. *gmelinii*, *Alyssum tortuosum*, *Anchusa ochroleuca*, *Androsace septentrionalis*, *Artemisia campestris*, *Astragalus arenarius*, *Astragalus onobrychis*, *Astragalus varius*, *Bassia laniflora*, *Bromus tectorum*, *Carex ligerica*, *Centaurea arenaria* subsp. *tauscheri*, *Cerastium semidecandrum*, *Chondrilla juncea*, *Colchicum arenarium*, *Dianthus arenarius*, *Dianthus borbasii*, *Dianthus diutinus*, *Dianthus serotinus*, *Euphorbia seguieriana*, *Festuca beckeri*, *Festuca polesica*, *Festuca psammophila*, *Festuca tomanii*, *Festuca vaginata*, *Festuca wagneri*, *Gypsophila fastigiata*, *Gypsophila paniculata*, *Helichrysum arenarium*, *Hieracium echioides*, *Hieracium umbellatum*, *Holosteum umbellatum*, *Jasione montana*, *Jurinea cyanoides*, *Kochia laniflora*, *Koeleria glauca*, *Linaria genistifolia*, *Myosotis stricta*, *Onosma arenaria*, *Peucedanum arenarium*, *Pulsatilla pratensis* subsp. *pratensis*, *Secale sylvestre*, *Sedum acre*, *Sedum sexangulare*, *Sedum rupestre*, *Sedum urvillei*, *Silene conica*, *Silene chlorantha*, *Silene otites*, *Stipa borysthena*, *Thymus serpyllum*, *Tragopogon floccosus*, *Veronica dillenii*, *Veronica praecox*, *Veronica verna*.

Bryophytes: *Abietinella abietina*, *Ceratodon purpureus*, *Racomitrium canescens* agg., *Syntrichia ruralis* agg.

Lichens: *Cetraria aculeata*, *Cetraria ericetorum*, *Cetraria islandica*, *Cladonia ciliata*, *Cladonia foliacea*, *Cladonia gracilis*, *Cladonia rangiformis*, *Cladonia scabriuscula*, *Diploschistes muscorum*, *Flavocetraria cucculata*, *Flavocetraria nivalis*.

Fauna

Reptiles: *Podarcis taurica*.

Insects: *Oedipoda caerulescens*.

Classification

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

EUNIS:

E1.1 Pioneer and open perennial grasslands of inland sands and rocky terrain

EuroVegChecklist (alliances):

Festucion vaginatae Soó 1929

Festucion beckeri Vicherek 1972

Bassio laniflorae-Bromion tectorum Borhidi 1996

Koelerion glaucae Volk 1931 (partly)

Sileno conicae-Cerastion semidecandri Korneck 1974 (partly)

Annex 1:

6250 Pannonic loessic steppic grasslands (partly)

6260* Pannonic sand steppes

Emerald:

E1.12 Euro-Siberian pioneer calcareous sand swards

E1.2 Perennial calcareous grassland and basic steppes

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

Pannonian

Steppic

Justification

The habitat type is the typical element where there are dry nutrient-poor sands in the Pannonian and Steppic biogeographic regions where it is best developed.

Geographic occurrence and trends

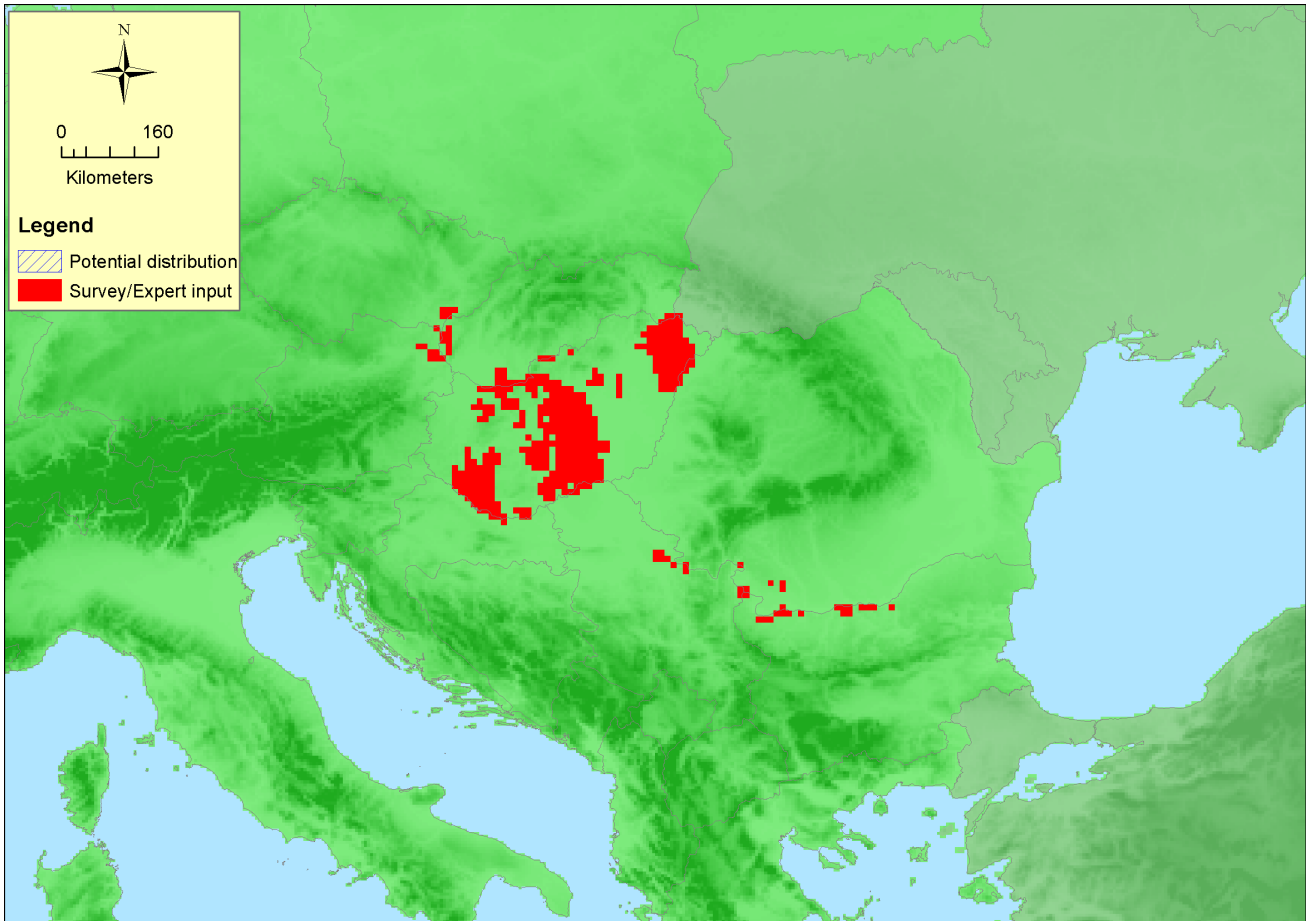
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Austria</i>	Present	2.9 Km ²	Decreasing	Decreasing
<i>Bulgaria</i>	Present	0.63 Km ²	Decreasing	Decreasing
<i>Croatia</i>	Present	0.14 Km ²	Decreasing	Decreasing
<i>Czech Republic</i>	Present	1 Km ²	Decreasing	Decreasing
<i>Greece</i>	Greece (mainland and other islands): Present	Unknown Km ²	Unknown	Unknown
<i>Hungary</i>	Present	400 Km ²	Decreasing	Decreasing
<i>Romania</i>	Present	10 Km ²	Stable	Decreasing
<i>Slovakia</i>	Present	1 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>Albania</i>	Uncertain	Km ²	-	-
<i>Former Yugoslavian Republic of Macedonia (FYROM)</i>	Uncertain	Km ²	-	-
<i>Serbia</i>	Present	Unknown 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
<i>EU 28</i>	250050 Km ²	423	550 Km ²	
<i>EU 28+</i>	250050 Km ²	428	600 Km ²	

Distribution map



Map is rather complete for the EU28, although there is some discussion on distribution (and classification of habitats) further northwards, but likely misses data in Serbia and southwards up to northern Greece. Data sources: Art17, EVA.

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

50%

Trends in quantity

Recent trend EU28: -66% - EU28+: -66% (based on 100% of the total area reported). Long-term trend EU28: -97% - EU28+: -97% (based on 99.5% of the total area reported). The trends are rather consistent among the countries with well-founded data. For the future, most countries expect something between slight decrease and stability.

- 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
EEO is >> 50,000 km².
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
No
Justification
EEO is >> 50,000 km².

Trends in quality

Within EU28, 31% of the remaining area are degraded with 33% severity, while within EU28+ 31% of the remaining area are degraded with 33% severity.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

The main threats throughout the distribution range are abandonment of traditional pastoral systems and thus lack of grazing, sometimes combined with atmospheric nitrogen input. This then leads to a natural succession towards forests (typically pine forests) or towards less-specialized sandy grasslands on better developed soils (here considered as E1.9a). Afforestation as well as expansion of invasive native (e.g. *Calamagrostis epigejos*) and non-native (e.g. *Asclepias syriaca*) species also often play a role. By contrast, sand extraction, leisure activities (human trampling or motocross) or regulation of river courses are relevant courses of threat only locally, but they can be important in countries where the area of the habitat type is already small.

List of pressures and threats

Agriculture

Abandonment of pastoral systems, lack of grazing

Pollution

Nitrogen-input

Invasive, other problematic species and genes

Invasive non-native species

Problematic native species

Natural biotic and abiotic processes (without catastrophes)

Biocenotic evolution, succession

Conservation and management

Since the areas of this habitat type are often small to tiny, they should be protected legally as far as possible. The most important management activity is the maintenance or re-establishment of low-intensity grazing, typically by sheep. However, if the sites are still large and not eutrophicated at all, they can remain +/- stable for rather long periods even without grazing. If the habitat has been encroached by or planted with woody species or is affected by invasive species, their removal can be a promising measure, provided that eutrophication has not taken place in parallel. When sites are eutrophicated they hardly can be restored, except by putting nutrient-poor sand from the deeper horizons to the top. The latter approach has been impressively successful in pilot studies, but normally the high costs exclude the application at a larger extent.

List of conservation and management needs

No measures

No measures needed for the conservation of the habitat/species

Measures related to agriculture and open habitats

Maintaining grasslands and other open habitats

Measures related to spatial planning

Establish protected areas/sites

Measures related to hunting, taking and fishing and species management

Specific single species or species group management measures

Conservation status

6250: CON U1, PAN U2

6260: CON U2, PAN U1

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

If the habitat is destroyed/deteriorated, it normally can only recover through intervention (removing woody or invasive species, re-establishment of low-intensity grazing). The only exception is the damage via sand extraction, where the habitat can easily recover when the extraction is stopped, provided no eutrophication took place meanwhile.

Effort required

10 years
Through intervention

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-66 %	Unknown %	Unknown %	-97 %
EU 28+	-66 %	Unknown %	Unknown %	-97 %

The values for A1 are calculated from the territorial data sheets, which were available for 9 countries. The provided data were far too incomplete to allow assessment of A2a and A2b. The analysis is strongly dominated by data from Hungary which covers most of the area.

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	No	>50	Yes	Yes	No	No
EU 28+	>50000 Km ²	Yes	Yes	No	>50	Yes	Yes	No	No

EOO and AOO are much larger than the thresholds for the criteria B1 and B2.

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	31 %	33 %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	31 %	33 %	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 data for C/D1 were calculated from the territorial data sheets, which provided assessments for 7 countries. No data were available for C/D2 and C/D3. The degradation quality refers to both biotic features and abiotic circumstances.

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	EN	DD	DD	CR	LC	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	EN	DD	DD	CR	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
Critically Endangered	A3	Critically Endangered	A3

Confidence in the assessment

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

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