E1.1d Cryptogam- and annual-dominated vegetation on calcareous and ultramafic rock outcrops

Summary

These open pioneer grasslands are dominated by perennial succulents and annuals, with subordinate small tussock grasses and herbs, but often with a very prominent and rich contingent of cryptogams. They are typical of very shallow and skeletal, impoverished, base-rich soils on a wide variety of limestones, dolomites, gypsum and sometimes ultramafic bedrocks, and similar artificial habitats like quarry spoil and wall-tops. They are found from the hemiboreal to the submediterranean, occurring mainly at higher altitudes further south, though extensive only in rather particular situations, like the alvar of Swedish islands and Estonia. Being essentially dependent on environmental stress, the more widespread smaller stands are vulnerable to encroachment around and may depend on extensive grazing or continuing benign disturbance in the wider landscape. Recent historical losses in extent and quality have been widespread.

Synthesis

Based on a short-term reduction in quantity of 44% and 45%, respectively, the habitat type is Vulnerable (VU) both in EU28 and EU28+. Furthermore, a significant reduction in biotic and abiotic quality in the last 50 years results in a Near threatened status (NT).

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

Sub-habitat types that may require further examination

No sub-habitats have been distinguished for further analysis.

Habitat Type

Code and name

E1.1d Cryptogam- and annual-dominated vegetation on calcareous and ultramafic rock outcrops

Stand of the *Crepido pumilae-Allietum alvarensis* (alliance: *Tortello tortuosae-Sedion albi*) over pre-Cambrian flatrock (alvar) on the island of Saaremaa, Estonia (Photo: Jürgen Dengler).

Close-up of the alliance *Alysso alyssoidis-Sedion* with the vernal annuals *Thlaspi perfoliatum, Arenaria serpyllifolia* and *Viola tricolor* on an eroded limestone slope near Klentnice, SE Czech Republic (Photo: Milan Chytrý).

Habitat description

This habitat includes low-grown, open herbaceous communities on very shallow, skeletal soils over

limestone, dolomite, gypsum, serpentine or other base-rich bedrock types. Short-lived vernal therophytes and succulents are the dominant life forms among the vascular plants. The therophyte synusia is often rich in species, however, it is subject to considerable inter-annual dynamics in total abundance and species composition, which depends on specific weather conditions of each year. Typical therophytes include those of the genera *Alyssum, Androsace, Arabis, Arenaria, Cerastium, Erophila, Thlaspi* and *Veronica*. Succulents are represented by various species of *Sedum* and *Sempervivum* (including *Jovibarba*). Geophytes such as *Allium* are also typical. Perennial grasses and forbs are regularly present in this vegetation, but usually with a low cover.

This habitat is one of the few types in Europe, where non-vascular plants typically reach similar or higher cover and often also higher small-scale species richness than the vascular plants. There are many medium-sized to tiny cushions or lawns of acrocarpous mosses, mainly from the family Pottiaceae. Lichens are represented by several larger lobate or fruticose species, but mainly by soil-covering crusts. These crustose species are often colourful, like *Fulgensia* spp. (yellow), *Psora decipiens* (red), *Toninia sedifolia* (bluish) and *Squamarina lentigera* (bright white) and form the so-called coloured lichen synusia.

This habitat usually occurs in small patches on rock outcrops or in slightly disturbed places within calcareous grasslands. Disturbance can be by soil erosion on outcrops and steep slopes, by grazing or trampling. The soils are usually very shallow Lithic, Skeletic, Rendzic, Calcaric or Dolomitic Leptosols, developed on various types of limestone, dolomite or gypsum. In some places, especially on the Balkan Peninsula, this vegetation develops also on ultramafic bedrock (serpentines), which are also base-rich, but with an increased amount of Mg^{2+} rather than Ca^{2+} cations.

This habitat is distributed from the submediterranean to the hemiboreal zones of Europe. In southern Europe it occurs mainly at higher altitudes, while similar sites at lower altitudes support annual vegetation with different species composition, dominated by Mediterranean annual species. Compared to the rocky grasslands of type E1.1g, which typically cover larger areas on slopes, the stands of E1.1d normally grow in more or less plain patches where the erosion is reduced and thus tiny annuals and cryptogams can survive. While such situations in most parts of Europe occur only as small patches within dry grasslands, the so-called alvars in the hemiboreal zone of Europe (mainly the Swedish islands of Öland and Gotland as well as Western Estonia) display this habitat as landscape-dominating feature, partly extending over many square kilometres as in the Great Alvar of Öland. Here, pre-Cambrian limestone flatrocks that are covered only partly and very thin with fine soil, which is subject to strong frost action in winter, create an extraordinary habitat, rich in specialised species, including even some endemic taxa.

While human land use has slightly increased the spatial extent of this habitat type (through clearing forest and creating artificial rocks, such as wall tops), the majority of stands of E1.1d are natural.

Indicators of quality:

These grasslands occur at sites disturbed by natural erosion, grazing, or due to human impact such as trampling. Although very frequent or intense disturbance may be detrimental, especially if coupled with nutrient enrichment, slight disturbance is positive because it reduces overgrowing by competitively stronger grasses and herbs. Some occurrences of this habitat, especially those occurring outside rock outcrops or steep slopes, would decline in the absence of disturbance.

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

- Long-term habitat stability
- High species richness
- Occurrence of rare species
- Dependence on naturally stressful conditions or natural disturbance rather than human-induced

disturbance

· Absence of tall, nutrient-demanding, ruderal and alien species

Characteristic species:

Flora

Vascular plants: *Acinos arvensis, Aethionema saxatile, Allium schoenoprasum* var*. alvarense, Allium sphaerocephalon, Alyssum alyssoides, Androsace elongata, Androsace septentrionalis, Arabidopsis thaliana, Arabis auriculata, Arenaria leptoclados, Arenaria serpyllifolia, Artemisia rupestris, Asperula tenella, Cerastium brachypetalum, Cerastium pumilum, Crepis tectorum* subsp*. pumila, Erophila spathulata, Erophila verna, Festuca oelandica, Galium oelandicum, Helianthemum oelandicum* subsp*. oelandicum, Globularia vulgaris, Gypsophila fastigiata, Hieracium x dichotomum, Holosteum umbellatum, Hornungia petraea, Jovibarba globifera, Medicago minima, Minuartia mesogitana, Petrorhagia saxifraga, Poa bulbosa, Poa compressa, Poa perconcinna, Potentilla argentea* agg*., Potentilla tabernaemontani, Satureja suaveolens, Saxifraga tridactylites, Sedum acre, Sedum album, Sedum sediforme, Sedum sexangulare, Silene uniflora* subsp*. petraea, Sisymbrium supinum, Taraxacum* sect*. Erythrosperma, Thlaspi ochroleucum, Thlaspi perfoliatum, Trigonella monspeliaca, Valeriana tuberosa, Valerianella locusta, Veronica arvensis, Veronica praecox.*

Bryophytes: *Abietinella abietina*, *Athalamia hyalina*, *Barbula convoluta, Bryum caespiticium, Bryum elegans, Ceratodon purpureus, Didymodon fallax, Didymodon ferrugineus, Didymodon rigidulus, Distichium capillaceum, Ditrichum flexicaule, Encalypta rhaptocarpa, Encalypta streptocarpa, Encalypta vulgaris, Homalothecium sericeum, Syntrichia ruralis* agg., *Tortella inclinata, Tortella rigens, Tortella tortuosa, Trichostomum crispulum, Weissia brachycarpa.*

Lichens: *Bacidia bagliettoana*, *Cladonia convoluta*, *Cladonia foliacea*, *Cladonia furcata, Cladonia pocillum, Cladonia rangiformis, Cladonia symphycarpia, Fulgensia bracteata, Fulgensia fulgens, Leptogium schraderi, Mycobilimbia lurida, Peltigera didactyla, Peltigera rufescens, Psora decipiens, Squamarina cartilaginea, Squamarina lentigera, Toninia sedifolia.*

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:

Aethionemion saxatilis Bergmeier et al. 2009

Alysso-Sedion Oberd. et T. Müller in T. Müller 1961

Sedion micrantho-sediformis Rivas-Mart., P. Sánchez et Alcaraz ex P. Sánchez & Alcaraz 1993

Tortello tortuosae-Sedion albi Hallberg ex Dengler & Löbel 2006

Valerianion tuberosae Guinochet 1975

Annex 1:

6110* Rupicolous calcareous or basophilic grasslands of the *Alysso-Sedion albi*

6280* Nordic alvar and precambrian calcareous flatrocks

Emerald:

E1.11 Euro-Siberian rock debris swards

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
Boreal

Justification
While the habitat occurs in tiny patches in most biogeographic regions of Europe, only in the southern part of the Boreal region it is a landscape-dominating feature (the so-called alvars, where the bedrock is at the surface or only few centimetres below).

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	1.2 Km^2	Decreasing	Decreasing
Belgium	Present	0.55 Km^2	Decreasing	Decreasing
Bulgaria	Present	31 Km^2	Decreasing	Decreasing
Croatia	Present	0.7 Km^2	Stable	Stable
Cyprus	Uncertain	Unknown Km^2	Unknown	Unknown
Czech Republic	Present	0.5 Km^2	Decreasing	Decreasing
Denmark	Present	Unknown Km^2	Unknown	Unknown
Estonia	Present	1 Km^2	Unknown	Unknown
Finland	Aland Islands: Present Finland mainland: Present	0.5 Km^2	Decreasing	Decreasing
France	Corsica: Uncertain France mainland: Present	100 Km^2	Decreasing	Decreasing
Germany	Present	5 Km^2	Decreasing	Decreasing
Greece	Crete: Uncertain Greece (mainland and other islands): Present	191 Km^2	Unknown	Decreasing
Hungary	Present	0.5 Km^2	Stable	Stable
Ireland	Uncertain	Unknown Km^2	Unknown	Unknown
Italy	Italy mainland: Present Sardinia: Uncertain Sicily: Uncertain	138 Km^2	Stable	Decreasing
Latvia	Present	0.01 Km^2	Unknown	Decreasing
Lithuania	Present	0.05 Km^2	Unknown	Decreasing
Luxembourg	Uncertain	Unknown Km^2	Unknown	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)
Malta	Uncertain	Unknown Km^2	Unknown	Unknown
Netherlands	Present	0.001 Km^2	Decreasing	Unknown
Poland	Present	0.45 Km^2	Decreasing	Decreasing
Portugal	Madeira: Uncertain Portugal Azores: Uncertain Portugal mainland: Present	5.4 Km^2	Decreasing	Unknown
Romania	Present	0.5 Km^2	Stable	Unknown
Slovakia	Present	0.36 Km^2	Decreasing	Stable
Slovenia	Present	0.2 Km^2	Stable	Stable
Spain	Balearic Islands: Uncertain Canary Islands: Uncertain Spain mainland: Present	123 Km^2	Stable	Unknown
Sweden	Present	26 Km^2	Stable	Unknown
UK	Gibraltar: Uncertain Northern Island: Uncertain United Kingdom: Present	0.5 Km^2	Decreasing	Unknown

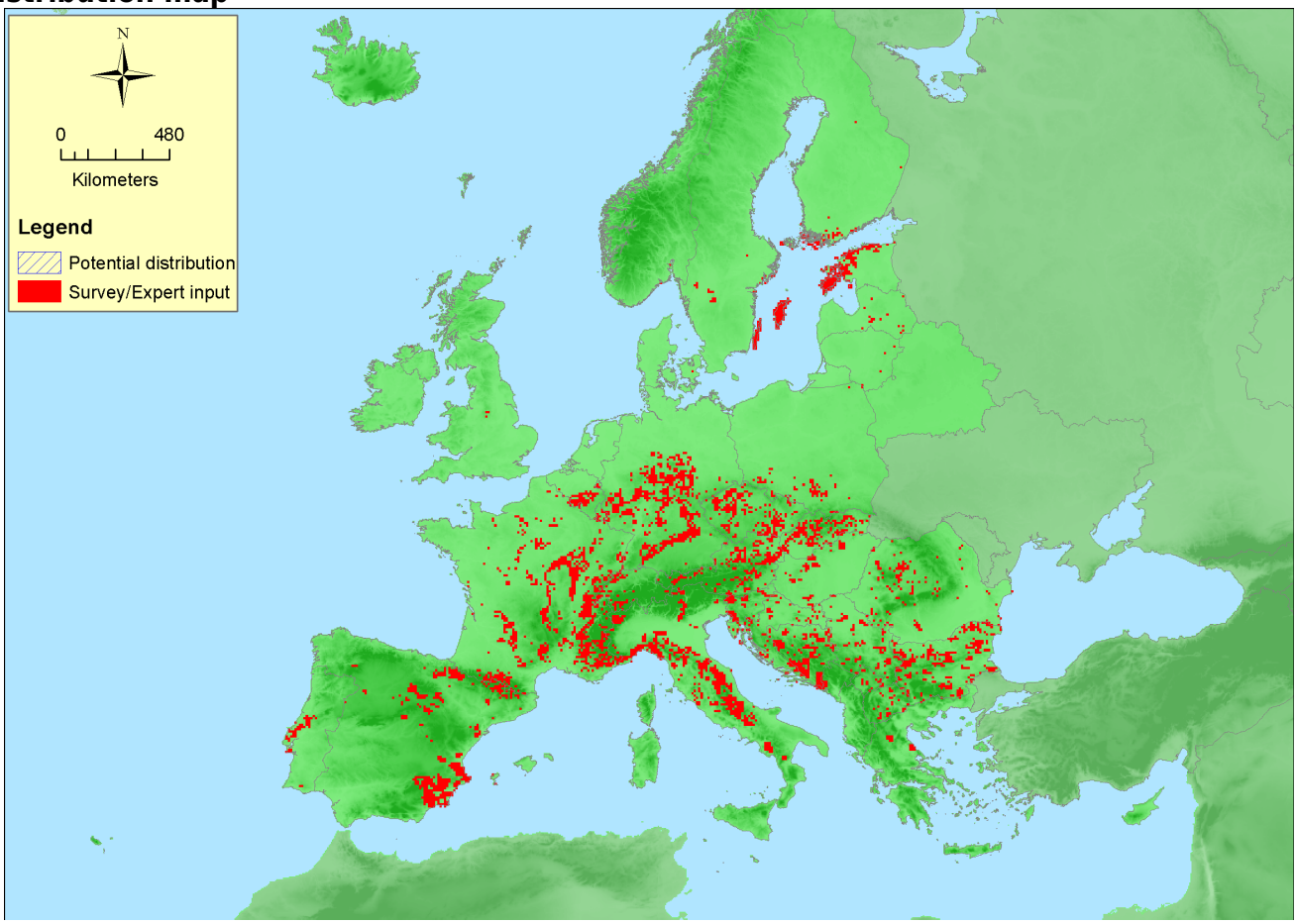
EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Albania	Uncertain	Unknown Km^2	Unknown	Unknown
Andorra	Uncertain	Unknown Km^2	Unknown	Unknown
Bosnia and Herzegovina	Present	30 Km^2	Decreasing	Decreasing
Former Yugoslavian Republic of Macedonia (FYROM)	Uncertain	Unknown Km^2	Unknown	Unknown
Guernsey	Uncertain	Unknown Km^2	Unknown	Unknown
Isle of Man	Uncertain	Unknown Km^2	Unknown	Unknown
Jersey	Uncertain	Unknown Km^2	Unknown	Unknown
Kaliningrad	Uncertain	Unknown Km^2	Unknown	Unknown
Kosovo	Uncertain	Unknown Km^2	Unknown	Unknown
Monaco	Uncertain	Unknown Km^2	Unknown	Unknown
Montenegro	Uncertain	Unknown Km^2	Unknown	Unknown
Norway	Norway Mainland: Present	Unknown Km^2	Unknown	Unknown
San Marino	Uncertain	Unknown Km^2	Unknown	Unknown
Serbia	Uncertain	Unknown Km^2	Unknown	Unknown
Switzerland	Present	5 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)
Vatican City	Uncertain	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
EU 28	6658750 Km^2	3605	680 Km^2	Provided areas for Sweden and Estonia were clearly too low
EU 28+	6658750 Km^2	4008	800 Km^2	

Distribution map



The map is rather complete, but data gaps exist for the west coast of Sweden, southern Norway, Bosnia & Herzegovina, Montenegro and Albania. Data sources: Art17, EVA.

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

90-95%

Trends in quantity

Recent trend EU28: -45% - EU28+: -44% (based on 62% of the total area reported). Long-term trend EU28: -19% - EU28+: -33% (based on 21% of the total area reported). The reliability of the reported long-term trend is low because the calculations are based on only 1/5 of the total territory. For the future, countries assume developments that range from slight increase through stable to moderate further decline.

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

Trends in quality

Within EU28, 58% of the remaining area are degraded with 37% severity. Within EU28+, 57% of the remaining area are degraded with 39% severity.

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

Pressures and threats

As far as the territory of this habitat has been enlarged by clearing of forests and grazing, it suffers from natural succession following abandonment of such traditional pasture systems. To a smaller extent also eutrophication through atmogenic nitrogen input, direct destruction in case of quarries and outdoor sports (rock climbing) can have negative impacts.

List of pressures and threats

Agriculture

Abandonment of pastoral systems, lack of grazing

Mining, extraction of materials and energy production

Open cast mining

Human intrusions and disturbances

Mountaineering & rock climbing

Pollution

Nitrogen-input

Natural biotic and abiotic processes (without catastrophes)

Species composition change (succession)

Conservation and management

Generally, continuation of low-intensity grazing is the recommended measure. However, the majority of stands is rather stable also without management.

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

Conservation status

Annex 1 types:

6110: ALP U1, ATL U1, BLS U1, BOR U1, CON U1, MED U1, PAN U1

6280: BOR U2, CON FV

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

Degraded semi-natural (e.g. in former pasture systems) and anthropogenic stands (e.g. wall tops; railway gravel) can be restored by re-installing the former grazing system and/or cutting down woody encroachment inside the habitat and in its surrounding (if it throws shadow on the site).

Natural and and semi-natural sites that have been degraded by quarrying or leisure activities can recover themselves when the negative impact has stopped, but this will take considerable time.

Effort required

10 years
Naturally and through intervention

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-45 %	Unknown %	Unknown %	-19 %
EU 28+	-44 %	Unknown %	Unknown %	-33 %

The values for A1 and A3 were calculated from the territorial data sheets, which provided trend data for 21 and 10 countries, for the 50-yr and long-term trend, respectively. However, the long-term trends are based on only about 1/5 of the territory and thus not particularly reliable. The provided data were far too incomplete to allow assessment of A2a and A2b.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km^2	Yes	Unknown	unknown	>50	Yes	Unknown	unknown	no
EU 28+	>50000 Km^2	Yes	Unknown	unknown	>50	Yes	Unknown	unknown	no

EOO and AOO are far larger than the thresholds for the criteria B1 and B2. The habitat type has many occurrences in nearly all European countries.

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	58 %	37 %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	57 %	39 %	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 19 countries. No data were available for C/D2 and C/D3. The degradation of 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	VU	DD	DD	LC	DD	DD	DD	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	VU	DD	DD	LC	DD	DD	DD	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
Vulnerable	A1	Vulnerable	A1

Confidence in the assessment

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

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