

## D2.2b Relict mire of Mediterranean mountains

### Summary

In the montane and sub-alpine belts of the Spanish Sierra Nevada, Corsica, and the Western Balkan peninsula (and also the High Atlas of Morocco), this type of oligo- to mesotrophic mire occurs on the waterlogged margins of glacial lakes and around streams. It develops on blankets of thin peat over siliceous bedrocks, kept constantly wet and cool (covered by snow in the high Balkan mountains for much of the year) and providing a splash of green in prevailing dry landscapes. The vegetation is dominated by small sedges or graminoids often with distinctive endemics, some of them considered Tertiary relicts. Being highly fragile, the habitat is vulnerable to any damage to the hydrological system and has been subject to tourist infrastructure development. Climate warming would obviously threaten its dependence of cold, wet conditions. Strict legal protection is necessary to ensure its survival.

### Synthesis

Relatively few quantitative data on trends in quality and quantity are available, but the information provided indicates relatively small declines in these parameters. However, overall the habitat is assessed to be Vulnerable (VU) within the EU28, because of the small distribution area (AOO) in combination with expected changes in hydrological functioning as a result of climate change (changes in temperature and precipitation patterns). For the EU28+ the AOO is slightly higher, resulting in the category Near Threatened (NT). There is no quantitative data or model available for future trends, but it would be worth to carry out a model for this restricted and fragile habitat.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	B2	Near Threatened	B2

### Sub-habitat types that may require further examination

It is clear from the distribution that three different sub-habitats can be distinguished with a different group of endemic species: one for the Sierra Nevada, one for Corsica and one for the Balkan peninsula.

### Habitat Type

#### Code and name

D2.2b Relict mire of Mediterranean mountains



*Narthecium reverchonii* with brown mosses on Corsica (Photo: John Janssen).



*Narthecion scardici* in high mountains in Albania (Photo: Michele de Sanctis).

## Habitat description

Oligo- to mesotrophic mires of the montane and subalpine belts of Mediterranean mountains of the High Atlas (Morocco), Sierra Nevada and Corse, and of high mountains (above 1900 m altitude) of the Western Balkan peninsula. These mires occur on the edges of glacial lakes and around mountain streams, forming waterlogged 'blankets' in relatively flat areas with impermeable soils, where a peat layer has developed on siliceous bedrocks. The type is differentiated from mires and grasslands with a similar physiognomy in the Alps, Pyrenees and rest of the Balkan by the presence and dominance of narrow-endemic relict species, and by the lower frequency of *Sphagnum* species. The sites of this habitat in the South-European mountains are characterised by relative cold and humid conditions, creating a distinct green habitat in a dry landscape. Water supply and temperature vary relatively little during the year, compared to surrounding habitats. In the high mountains of the Balkan this habitat is covered by snow most of the year.

The mires are bordered by streams, springs and lakes on the lower edges, and by moist grasslands with *Nardus stricta* (E3.2b) on the drier edges. The habitat is dominated by *Carex nigra* ssp. *intricata* in the Sierra Nevada and Corse, and by *Carex nigra* var. *macedonica* in the Balkan. In Spain also *Festuca frigida* may dominate, while in Corse along streams *Trichophorum cespitosum* may be dominant. Common species in both Mediterranean regions are *Carex echinata*, *Carex nevadensis*, *Agrostis canina* and *Viola palustris*. Different characteristic endemic species are found in the different regions. For several genera, vicariant endemic species are found in the different mountain regions. Such species are considered tertiary relicts. Examples in these mires are *Pinguicula nevadensis*, *Pinguicula corsica* and *Pinguicula balcanica*, and also *Narthecium reverchonii* (Corse) and *Narthecium scardicum* (Balkan). Some of the characteristic species also grow outside the mires, like *Pinguicula corsica* and *Narthecium reverchonii* along waterfalls on wet rocks. Together with the adjacent *Nardus* grasslands of E3.2b, these conspicuous habitats are called *Pozzines* in Corse and *Borreguiles* in the Sierra Nevada.

Indicators of good quality:

In wet conditions these grasslands are relatively stable. Desiccation causes a succession towards *Nardus* grasslands of E3.2b. Abandonment leads to the development of tall herb vegetation. The type may expand slowly by vegetation succession in open water. Indicators of good quality are:

- presence of endemic species
- high vegetation cover
- low cover of (encroaching) tall herbs and shrubs
- situated in a gradient from water to drier grassland

Characteristic species:

Vascular plants:

Corsica: *Agrostis canina*, *Bellis bernardii*, *Bellium nivale*, *Carex echinata*, *Carex nevadensis*, *Carex nigra* ssp. *intricata*, *Carex ovalis*, *Carex pallescens*, *Danthonia decumbens*, *Drosera rotundifolia*, *Juncus requienii*, *Pinguicula corsica*, *Poa supina*, *Polygala serpyllifolia*, *Potentilla anglica* ssp. *nesogenes*, *Potentilla erecta*, *Ranunculus cordiger*, *Trichophorum cespitosum* (dom.), *Viola palustris*.

Sierra Nevada : *Agrostis canina* ssp. *granatensis*, *Carex echinata*, *Carex nevadensis*, *Carex nigra* ssp. *intricata*, *Eleocharis quinqueflora*, *Festuca frigida*, *Gentiana pneumonanthe* ssp. *depressa*, *Juncus alpestris*, *Leontodon microcephalus*, *Pinguicula nevadensis*, *Ranunculus angustifolius* ssp. *alismoides*, *Veronica turbicola*, *Viola palustris*.

Balkan: *Calicocorsus stipitatus* (= *Wilemetia stipitata*), *Carex bulgarica*, *Carex nigra* var. *macedonica* (= *C. macedonica*), *Cirsium heterotrichum*, *Crocus veluchensis*, *Dactylorhiza cordigera* subsp. *bosniaca*, *Gentiana pyrenaica*, *Gentianella bulgarica*, *Leontodon riloensis*, *Narthecium scardicum*, *Pinguicula balcanica*, *Plantago gentianoides*, *Primula deorum*, *P. farinosa* subsp. *exigua*, *Gymnadenia* (*Pseudorchis*)

*frivaldii*, *Silene asterias* (in Bulgaria often growing in *Calthion palustris*), *Soldanella pindicola*.

## Classification

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

Annex 1:

No clear relationship with Annex I-types exists. In France this habitat type has been related to type 6170, in Spain to 6160. The distinction of a separate Natura 2000 habitat type next to these two would be preferable, possibly in combination with the adjacent moist grasslands of E3.2b.

EuroVegChecklist:

*Bellidio-Bellion nivalis* Gamisans 1975 (= *Caricion intricatae* Quézel 1953)

*Festucion frigidae* Rivas-Mart. et al. 2002

*Nartheccion scardici* Lakušić 1970

Emerald:

D2.226 Peri-Danubian black-white-star sedge fens

MAES:

Wetlands

IUCN:

5.4. Bogs, Marshes, Swamps, Fens, Peatlands

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

Yes

Regions

Mediterranean

Justification

These mires are typical of Mediterranean mountains as they contain many relict species which survived here during the Ice ages and developed as a separate species due to isolation.

## 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>Bulgaria</i>	Present	1.3 Km <sup>2</sup>	Decreasing	Decreasing
<i>France</i>	Corsica: Present	1.3 Km <sup>2</sup>	Stable	Stable
<i>Spain</i>	Spain mainland: Present	51 Km <sup>2</sup>	Decreasing	Decreasing

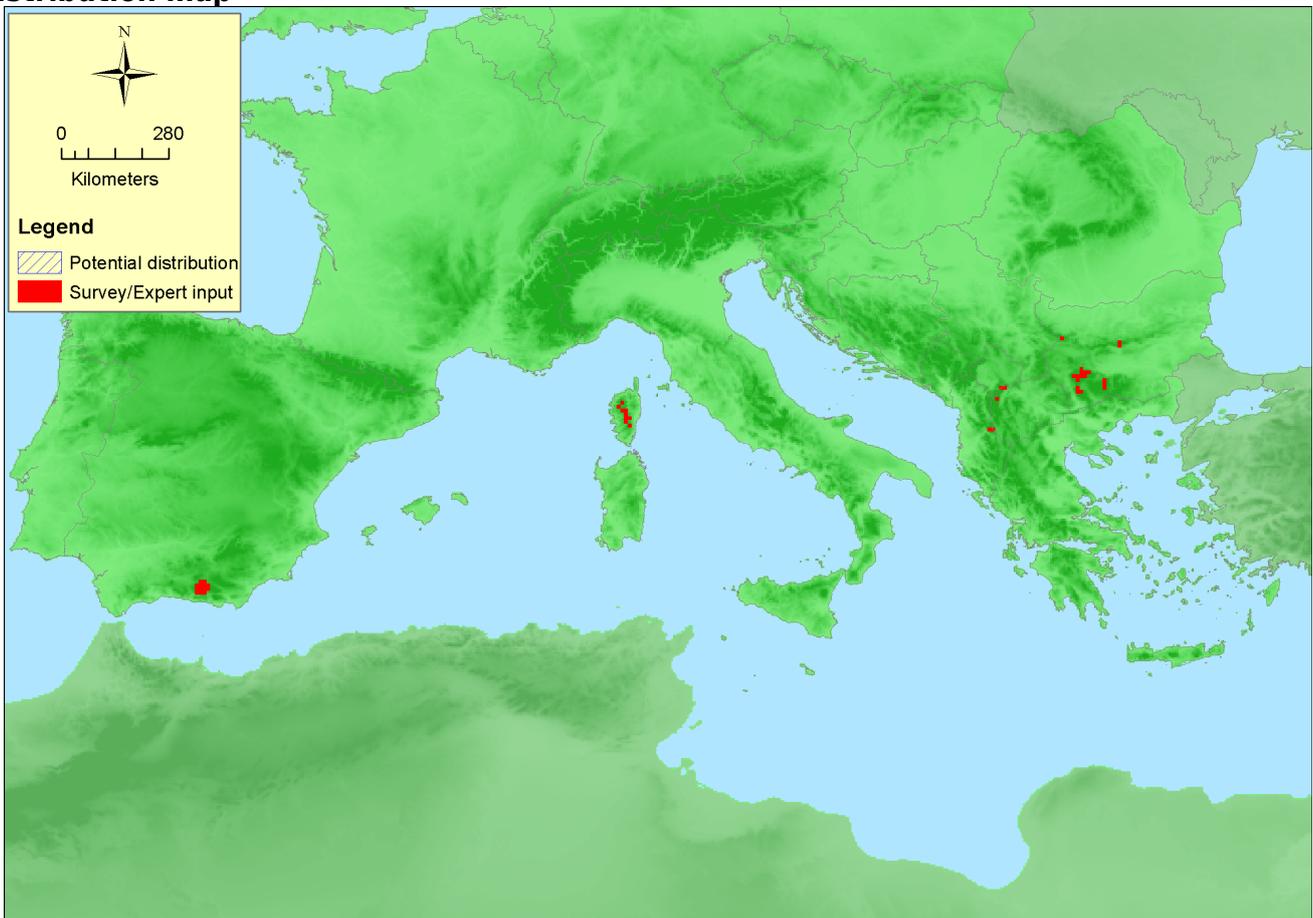
EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Albania</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Bosnia and Herzegovina</i>	Uncertain	Km <sup>2</sup>	-	-

EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Former Yugoslavian Republic of Macedonia (FYROM)	Present	unknown Km <sup>2</sup>	Decreasing	Decreasing
Kosovo	Present	Unknown Km <sup>2</sup>	Stable	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	436850 Km <sup>2</sup>	40	55 Km <sup>2</sup>	
EU 28+	487800 Km <sup>2</sup>	45	>55 Km <sup>2</sup>	not exactly determined

### Distribution map



The map is rather complete in its range, but data gaps may exist on the Balkan in Albania, Kosovo and Macedonia. Data sources: EVA, NAT, EXP, LIT.

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

About 60%. Besides the occurrences given in the distribution map, the habitat is also present in the High Atlas of Morocco. The distribution on the Balkan (EU28+ countries) is an underestimation due to lack of data.

### Trends in quantity

There is too few data to calculate average European trends, especially for the EU28+. However, the

reported trends are all inbetween 0 to 10% decline, and therefore the overall trend is assessed to be about 5-10% decline, both for the EU28 as for EU28+.

- 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 range is relatively large, even when the habitat occurs in few locations within that range.

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

Yes

*Justification*

The habitat always occurs in relatively small patches, where specific ecological conditions are met.

## **Trends in quality**

Although few quantitative data are available, overall the countries report small declines in quality (both in extent affected and in severity).

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

## **Pressures and threats**

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The pressures reported from different countries can be summarised under the categories changes in hydrology (incl. drainage), human pressures (fore example increasing infrastructures related to ski practices, and other pressure from tourism and recreation), pollution of surface water, succession, and climate change.

### **List of pressures and threats**

#### **Human intrusions and disturbances**

Outdoor sports and leisure activities, recreational activities

#### **Pollution**

Pollution to surface waters (limnic, terrestrial, marine & brackish)

#### **Natural System modifications**

Human induced changes in hydraulic conditions

#### **Natural biotic and abiotic processes (without catastrophes)**

Biocenotic evolution, succession

#### **Climate change**

Changes in abiotic conditions

## **Conservation and management**

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The relict mires are very fragile habitats, being dependent on wet conditions in a dry climate. The main conservation need is the maintenance of the hydrological functioning and the prevention of disturbance by human activities. A strict legal protection would help a lot, and therefore distinction as a separate mire type under the Habitat's Directive is also needed. As there are many narrow endemic species in this

habitat, soem specific restoration measures for species may be applicable.

## List of conservation and management needs

### Measures related to wetland, freshwater and coastal habitats

Restoring/Improving the hydrological regime  
Managing water abstraction

### 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

No corresponding Annex I types.

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

This is a fragile habitat, which is likely to need a long term period for recovery.

## Effort required

10 years	20 years	50+ years	200+ years
Through intervention	Through intervention	Naturally	Naturally

## Red List Assessment

### Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-5/10 %	unknown %	unknown %	unknown %
EU 28+	-5/10 %	unknown %	unknown %	unknown %

The overall trend for both EU28 and EU28+ countries is between 5 and 10%.

### Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km <sup>2</sup>	Unknown	Yes	No	40	Unknown	Yes	No	No
EU 28+	>50000 Km <sup>2</sup>	Unknown	Yes	No	>45	Unknown	Yes	No	No

The AOO for the EU28 is below the threshold for criterion B. For the EU28+ the AOO is probably an underestimation due to data gaps in the Balkan countries, and it is likely that the AOO for EU28+ is slightly larger than 50. Climate change is assumed to be a serious threat for the near future, as changes in precipitation and temperature may cause a decline in quality or quantity in the next decades.

### 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	small %	slight %	unknown %	unknown %	unknown %	unknown %
EU 28+	small %	slight %	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 are insufficient for a quantitative assessment of changes in quality, but the overall negative decline is small both in extent affected and severity of decline. It is unknown what changes may be caused by climate change in the future, but it may turn out to be a serious threat.

### 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	VU	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	NT	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
Vulnerable	B2	Near Threatened	B2

### Confidence in the assessment

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

### Assessors

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### **Reviewers**

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### **Date of review**

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### **References**

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