D4.1b Tall-sedge base-rich fen

Summary

These tall-sedge fens are limited to flat landforms where base-rich, nutrient-poor ground waters from springs and seepage lines keep the surface very wet, even in summer. They occur throughout Europe, particularly in the Atlantic and central European lowlands, becoming transitional in species composition northwards to quaking calcareous fens, though sometimes covering large areas in Fennoscandia. An abundance of medium to tall graminoids and tall herbs is characteristic, along with a patchier tier of low plants, and a ground carpet of rich fen bryophytes. Succession towards poor and intermediate fens, reed beds, willow shrubs and tall sedge stands has been observed as a consequence of increasing nutrient availability and hydrological amelioration which are major threats, particularly where the habitat survives within intensive agricultural areas. In some regions its further existence depends on conservation management and, though these fens are slightly more readily restorable than D4.1a Short-sedge fens, they are still hard to recover.

Synthesis

The resulting category Endangered (EN) is indicated by recent area loss (A1) after data simulation (described in the assessment) which gives a realistic loss of more than 50% at the European scale. The threshold for EN category was however exceeded only slightly, and other categories suggest rather the VU or NT category. Obviously, tall-sedge fens are somewhat less threatened than D4.1a Short-sedge fens and the VU category would mirror this difference. On the other hand, placing them into the same EN category makes sense, considering still continuing habitat deterioration, especially in agricultural landscapes of Central, Western and Southern Europe.

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

Sub-habitat types that may require further examination

No sub-habitats have been distinguished for further analysis.

Habitat Type

Code and name

D4.1b Tall-sedge base-rich fen

Tall-sedge base-rich fen with *Carex lasiocarpa, C. limosa, C. panicea, C.*

Tall-sedge base-rich fen with *Carex diandra, C. rostrata, C. limosa, C. dioica,*

hostiana, Schoenus ferrguineus, Rhynchospora alba and brown mosses *(Scorpidium cossonii, S. scorpioides, Campylium stellatum*) at the unmanaged fen Platenes purvs in western Latvia (Photo: Petra Hájková).

Menyathes trifoliata, Pedicularis sceptrum-carolinum, Salix rosmarinifolia and brown mosses (*Scorpidium cossonii, Drepanocladus aduncus, Tomentypnum nitens*) in the managed fen Paraul Dobreanului close to the Bilbor village, Calimani Mountains, Eastern Carpathians, Romania (Photo: Petra Hájková).

Habitat description

Tall-sedge base-rich fens are dominated by the tall to medium-tall graminoids *Cladium mariscus, Juncus subnodulosus, Schoenus ferrugineus* (in subcontinental areas) and *S. nigricans* (in Atlantic and Mediterranean areas). In some stands also *Phragmites australis* occurs, but it does not form dense stands. Small sedges and short-growing herbs also occur in places, but their number and abundance are smaller here than in small-sedge fens. Stands with *Cladium mariscus* can be very dense and species-poor.

These fens typically occur on flat landforms in lowlands and submontane areas near springs with base-rich water, especially where the bedrock is formed of limestone, chalk or marl. They are generally wetter than the other types of base-rich fens and their water table is high also in summer. In places, long-term inundation of the soil surface can result in the occurrence of muddy patches with sparse vegetation after draw-down, which are microhabitats of *Drosera anglica* and the moss *Scorpidium scorpioides*.

Tall-sedge base-rich fens occur across the entire European continent, but they are considerably more common in the Atlantic and boreal regions and in the lowland areas of Central Europe, where they are the main type of base-rich fens.

Based on the palaeoecological evidence, tall-sedge base-rich fens were more common in the Late Pleistocene and early Holocene than today in non-glaciated parts of Europe, but they changed into *Sphagnum* fens after landscape acidification or retreated as a result of terrestrialisation of wetlands in the course of natural succession. In the last two centuries many of these fens have been destroyed due to artificial drainage. Some of these fens are grazed or occasionally cut, but at many sites their vegetation is natural and does not depend on management.

Indicators of good quality:

- Stable hydrological regime
- Absence of overgrazing
- No encroachment of trees or shrubs
- No spread of meadow or reed species

Characteristic species:

Flora: Vascular plants: *Carex davalliana, Carex lasiocarpa, Drosera anglica, Epipactis palustris, Eriophorum latifolium, Eriophorum angustifolium, Eupatorium cannabinum, Hydrocotyle vulgaris, Juncus subnodulosus, Lythrum salicaria, Mentha aquatica, Menyanthes trifoliata, Molinia caerulea, Parnassia palustris, Phragmites australis, Salix cinerea, Salix repens* agg., *Schoenus ferrugineus, Schoenus nigricans*

Mosses: *Bryum pseudotriquetrum, Palustriella commutata, Plagiomnium affine* agg., *Scorpidium scorpioides*

Classification

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

EUNIS:

D4.1 Rich fens, including eutrophic tall-herb fens and calcareous flushes and soaks

EuroVegChecklist:

Caricion davallianae Klika 1934

Saxifrago-Tomentypnion Lapshina 2010

Sphagno-Tomentypnion Dahl 1956 (marginally)

Annex I:

7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae

Emerald:

D4.1 Rich fens, including eutrophic tall-herb fens and calcareous flushes and soaks

MAES-2:

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
Boreal
Continental

Justification
This habitat is typical of the lowlands of northeastern Continental and Boreal Europe.

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	3.9 Km^2	Decreasing	Decreasing
Belgium	Present	0.1 Km^2	-	-
Bulgaria	Present	0.01 Km^2	Decreasing	Decreasing
Croatia	Present	Unknown Km^2	-	-
Czech Republic	Present	0.6 Km^2	Decreasing	Decreasing
Denmark	Present	Unknown Km^2	-	-
Estonia	Present	55 Km^2	Unknown	-
Finland	Finland mainland: Present	0.05 Km^2	Decreasing	Unknown
France	France mainland: Present	125 Km^2	Decreasing	Decreasing
Germany	Present	10 Km^2	Decreasing	Decreasing
Greece	Crete: Present	0.1 Km^2	-	-
Hungary	Present	8.5 Km^2	Unknown	Decreasing
Ireland	Present	90 Km^2	Decreasing	Decreasing
Italy	Italy mainland: Present	13 Km^2	Decreasing	Decreasing
Latvia	Present	2.2 Km^2	Decreasing	Decreasing
Lithuania	Present	1 Km^2	Decreasing	Decreasing
Netherlands	Present	Km^2	Decreasing	-

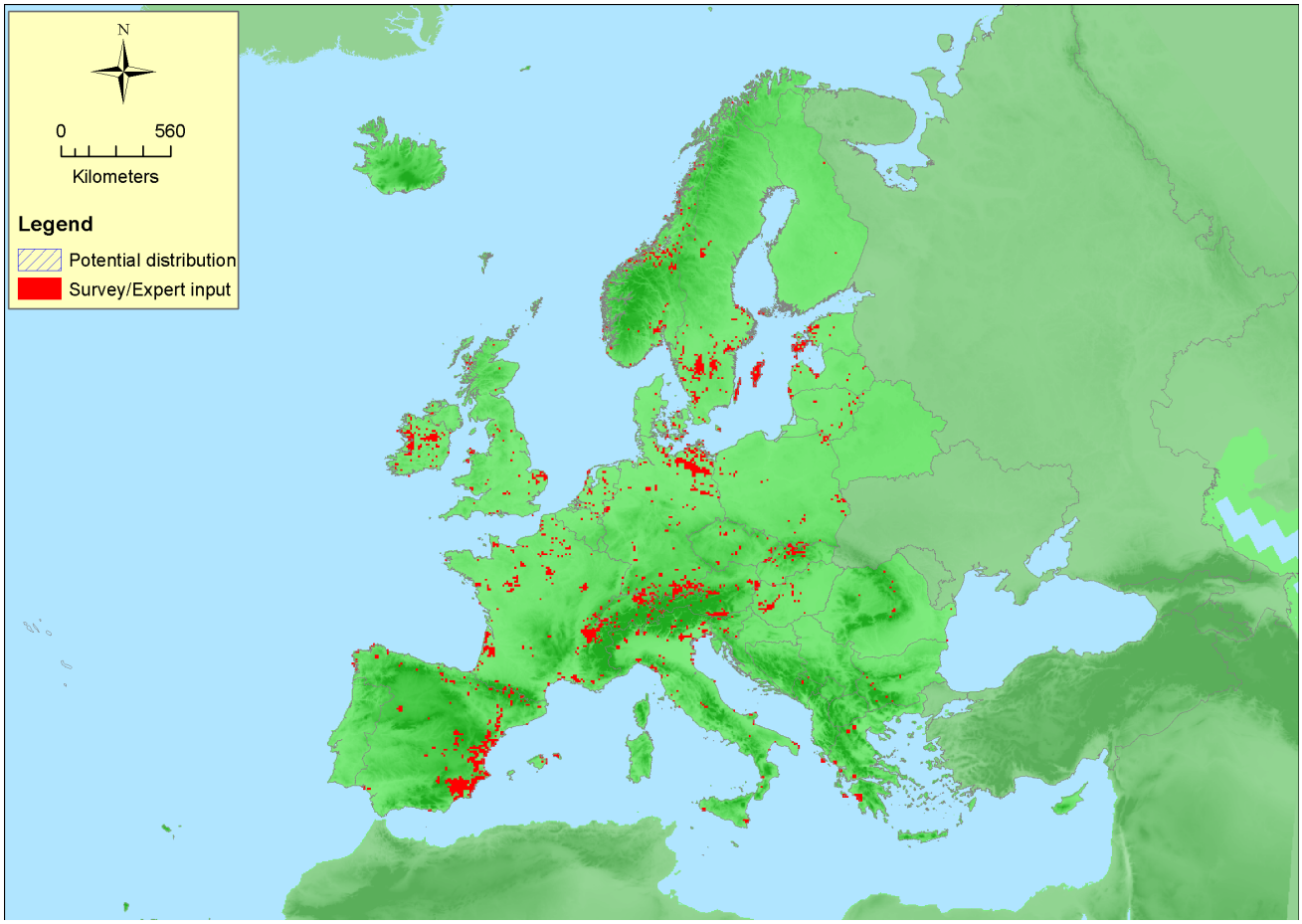
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Poland	Present	45 Km^2	Decreasing	Decreasing
Romania	Present	10 Km^2	Decreasing	Decreasing
Slovakia	Present	10 Km^2	Decreasing	Decreasing
Slovenia	Present	1 Km^2	Decreasing	Decreasing
Spain	Spain mainland: Present	33 Km^2	Decreasing	Decreasing
Sweden	Present	75 Km^2	Decreasing	Unknown
UK	United Kingdom: Present	4.2 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)
Albania	Present	3 Km^2	Decreasing	Decreasing
Bosnia and Herzegovina	Present	15 Km^2	Decreasing	Decreasing
Former Yugoslavian Republic of Macedonia (FYROM)	Present	Unknown Km^2	Decreasing	Unknown
Norway	Norway Mainland: Present	10 Km^2	Decreasing	-
Switzerland	Present	30 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	7465150 Km^2	2054	488 Km^2	
EU 28+	7994350 Km^2	2254	536 Km^2	

Distribution map



The habitat occurs in Ireland, Scandinavia and northern Russia, depending on bedrock (which must have at least slight calcium content) and topography (these are topogenic fens in most cases). Large areas also occur in the lowlands of Poland, Germany, the Baltic states and The Netherlands, where concentration of this habitat may be even higher than in Scandinavia. Locally it occurs also in mountain regions of Central Europe, especially the Alps, and rarely also in southern Europe. The map is rather complete for EU28, but incomplete for Norway and the Balkan countries. Data: Art17, EVA, GBIF.

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

10%

Trends in quantity

During recent decades, most of these fens have disappeared from the agricultural landscapes of Central and Southern Europe, especially because of drainage and peat harvesting. In boreal Europe, these fens are sometimes declining because of succession towards poor fens. Mowing partially counteract effects of drainage and nutrient-triggered succession, so management decline in agricultural landscapes also contributes to loss of this habitat. Generally however, at a European scale, problems with habitat loss are more easily remedied for this habitat than for D4.1a Short-sedge fens.

- Average current trend in quantity (extent)
  EU 28: Decreasing
  EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
  Yes
  Justification
  Loss is still ongoing, especially in Central and Southern Europe. This habitat could be rather widespread in lowlands, so recent rarity may be largely a product of landscape transformations since Middle Ages.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  Yes
  Justification
  The total worldwide area is unknown. The habitat may cover square kilometres in Boreal and Continental lowland landscapes, but its occurrence is local, requiring ceratin levels of calcium (to prevent the development of poor fens), low nutrient availability, continual waterlogging and long-term regional habitat-stability at millenial scale to support the distinctive species pool.

Trends in quality

Quality is still declinining, even in some protected landscapes. Loss of habitat specialists have been repeatedly reported even from protected areas with active management and it is difficult to remedy it. Habitat is undergoing succession towards sphganum-dominated fens poorer in habitats specialists, reed beds or alder and willow carrs.

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

Pressures and threats

The main threats are connected with increasing nutrient input (especially phosphorus) and drainage. Increasing nutrient input (through diffuse groundwater pollution especially) and lowering of the water table leads to succession towards poor or intermediate fens, reed beds (*Phragmites australis*) or tall sedge or tall willow stands. In agricultural regions with improved nutrient availability, succession has been rapid and it is difficult to overcome it only by simple measures. The same succession has been observed also in some regions of Scandinavia, because of climate change and nitrogen deposition. Mowing and other disturbances may reverse undesired successional pathways, but machine-mowing may lead to loss of diversity as well. Overgrazing may also be detrimental. In the past, many of these fens have been harvested for peat and destroyed in most cases, especially in the one-time communist block.

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

Grazing
- Intensive grazing
- Intensive cattle grazing
- Abandonment of pastoral systems, lack of grazing

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)
- Diffuse pollution to surface waters due to agricultural and forestry activities
- Diffuse pollution to surface waters due to transport and infrastructure without connection to canalization/sweepers

Soil pollution and solid waste (excluding discharges)
Other forms of pollution

Natural System modifications

Human induced changes in hydraulic conditions
- Landfill, land reclamation and drying out, general
- Reclamation of land from sea, estuary or marsh
- Canalisation & water deviation
- Modification of hydrographic functioning, general
- Water abstractions from groundwater
- Management of aquatic and bank vegetation for drainage purpose

Other ecosystem modifications
- Anthropogenic reduction of habitat connectivity

Natural biotic and abiotic processes (without catastrophes)

Biocenotic evolution, succession
- Species composition change (succession)

Climate change

Changes in abiotic conditions
- Droughts and less precipitations

Conservation and management

Desirable conservation measures include:

No intervention - in well waterlogged, nutrient-poor fens, especially in high-boreal and some mountain regions.

Mowing - in fens enriched in nutrients or with a lowered water level, in fens invaded by *Phragmites, Calamagrostis, Filipendula* or tall sedges and willows.

Artificial disturbances - if acidicole, late-successional *Sphagnum* species invade, disturbances without nutrient input (e.g., removal of expanding peatmosses) may be applied to support original brown-moss vegetation.

Creating buffer zones filtering nutrients and hydrological buffer zones.

Extensive restoration measures (blocking drainage channels, sod removal, planting *Pedicularis palustris* as a hemiparasite to supress reed and tall sedges) in heavily damaged fens.

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 wetland, freshwater and coastal habitats

Restoring/Improving water quality
Restoring/Improving the hydrological regime
Managing water abstraction

Measures related to spatial planning

Establish protected areas/sites

Legal protection of habitats and species
Manage landscape features

Measures related to urban areas, industry, energy and transport

Urban and industrial waste management

Measures related to special resouce use

Regulating/Management exploitation of natural resources on land

Conservation status

Annex I:

7210: ALP U1, ATL U2, BOR FV, CON U1, MED U1, PAN FV

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

Naturally only if habitat specialists have survived at the site, nutrient availability is not increased and the water regime is unaffected.

Through intervention restoration is extremely difficult as demonstrated by several studies, especially because of problems with nutrient oversupply and iron toxicity.

Effort required

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

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-53 %	-30 %	unknown %	-56 %
EU 28+	-51 %	-30 %	unknown %	-52 %

Declines of 43% (recent trend, EU28) and 50% (historical trend, EU28) are based on estimations of territorial experts, but without including declines in Belgium, Croatia, Denmark, Estonia, Greece, Hungary, Finland, Latvia, Romania and United Kingdom where no reliable trend data ara available. If estimation based on similar countries (in terms of land use and environmental conditions) is applied, the total decline is about 53%, fitting already the EN category. When the same simulation is used for historical trend, historical decline will reach ca 56% (EU28), fitting the VU category.

The overall assessment is hence the EN category, but this value is achieved by expert imputation of missing values by assessors. These imputations however seem robust. The most important countries in the analysis are Sweden, Estonia, Ireland, Spain and Poland (in terms of extent) and The Netherlands (in terms of percentage decline). For Poland, Ireland and The Netherlands, full data were provided. We imputed a decline 20% for Sweden, as for D4.1a Short-sedge fens, considering that the causes of decline are the same in this country (drainage, atmospheric deposition, climate change). An overall decline of more than 50% at the European scale will then appear, if decline in Estonia exceeds 33%. Although tall-sedge fens are better preserved than D4.1a Short-sedge fens in that country (with a reported 80% decline), the value above 33% is very probable, considering extensive drainage and fen harvesting during previous Communist times, especially in northern Estonia. This may be at least comparable with Poland, reporting 35% of area loss; Lithuania (ex-USSR country as well) is reporting 90% loss.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown
EU 28+	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown

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	30 %	60 %	unknown %	unknown %	unknown %	unknown %
EU 28+	30 %	60 %	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 following values are based on territorial data provided by local experts: 30% of extent affected by severity 44% for the EU28. There is, however, no complete data for 14 countries, including Ireland - that reported exceptionally large areas of the habitat with moderate severity of degradation, but not indicating the extent of degradation - and Spain, reporting rather large areas of the habitat and high level of severity, but again without extent. No data comes from Sweden where large areas are also reported. When missing values are imputed based on similarities in land use and climate among countries, 30% extent will stay, but severity will increase up to 60%. All these values fit the NT category.

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. But recent studies indicate ongoing deterioration.

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	VU	DD	VU	LC	LC	LC	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	EN	VU	DD	VU	LC	LC	LC	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
Endangered	A1	Endangered	A1

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

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