D2.3a Non-calcareous quaking mire

Summary

This habitat develops by terrestrialisation of open water through the outgrowth of sodden floating rafts of vegetation and accumulating peat from the margins of acidic lakes and ponds, the whole forming a flat quaking surface. It is widely distributed through Europe, though usually highly localised, with the largest areas reported from the Nordic countries. On the matted carpets of sedges and other vascular plants typical of minerotrophic situations, Sphagna, other mosses and often abundant liverworts develop, thicker stretches sometimes forming irregular ombrotrophic hummocks. The main threat for such mires is drainage, leading quickly and often irreversibly to the development of other habitats, like poor fens. Quaking areas in percolation mires (which have a much higher species richness) need a very long time to regenerate after rewetting if the regulatory mechanism of the peat body has been destroyed by drainage.

Synthesis

There is a strong negative trend in large parts of Europe, especially in Central Europe, but this negative trend is overshadowed by a smaller trend and much larger remaining areas in the boreal countries. Although an assessment for Central Europe would possibly lead to the category Endangered, the average decline in Europe leads to the conclusion Least Concern. However, the trend in quality (assessed under criterion C/D1) is large in Sweden as well, leading to an overall conclusion of Vulnerable (VU) . Eutrophication of water bodys and drainage are the main threats to this habitat type.

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

Sub-habitat types that may require further examination

Non-calcareous quaking mires are widely distributed in Europe and are due to their extreme conditions a relatively homogeneous habitat throughout Europe. Several transitions to calcareous quaking mires and poor fens exist. An assessment on a regional scale would likely lead to much more threatened quaking mires in Central Europe.

Habitat Type

Code and name

D2.3a Non-calcareous quaking mire

Quaking poor fen with *Rhynchospora alba*, *Carex rostrata*, *Scheuchzeria palustris*, *Sphagnum fallax* and *Sphagnum magellanicum* at margins and floating islands of humic lake close to Berzniki, north-eastern Poland in the Puszcza Augustowska lowland (Photo: Petra Hájková).

Quaking poor fen at landslide lake Puchmajerovej jazierko in Kubinska hoľa Mountains of Slovakia, with *Sphagnum fallax*, *Polytrichum commune*, *Warnstorfia fluitans*, *Carex rostrata* and *Drosera anglica* (Photo: Petra Hájková).

Habitat description

Very wet mires with poor fen vegetation. Quaking mires include mires formed by terrestrialization of water bodies which involves formation of floating rafts of peat, typically proceeding from marginal areas towards basin centre, where primary open water pools can remain. Also included in this type are mires without neighbouring water bodies layer but similarly high water saturation leading to quaking conditions occurring in high water throughput percolation mires. The mire basin is always fed by minerotrophic ground water from the catchment area. There is no regular surface patterning connected to water flow. Water quality varies from acidic to moderately acidic. Vegetation is minerotrophic poor fen vegetation including intermediate fen communities (pH below 7). The lack of raised peat domes separate quaking mires from D1.1 Raised bogs, the lack of string patterning and slope from D3.2 Aapa mires and the lack of true rich fen indicator species (*Scorpidium* spp. et al.) from D4.1c Calcareous quaking mires.

Non-calcareous quaking mires are characterized by poor fen to medium rich vegetation including *Calla palustris*, *Carex limosa*, *Carex rostrata*, *Carex aquatilis*, *Eriophorum angustifolium*, *Equisetum fluviatile*, *Menyanthes trifoliata*, *Potentilla palustris*, *Rhynchospora alba*, *Scheuchzeria palustris* and *Utricularia intermedia* among vascular plants. *Sphagnum cuspidatum*, *Sphagnum platyphyllum*, *Sphagnum subsecundum*, *Sphagnum majus* and *Warnstofia spp.* are characteristic among bryophytes. Hepatics are sometimes abundant, most typically *Cladopodiella fluitans*. Floating peat rafts may also form surfaces elevated from water level with for example *Sphagnum fallax* and *Eriophorum vaginatum* or *Molinia caerulea*. When the floating peat raft becomes thick enough nearly ombrotrophic hummock like surfaces with e.g. *Sphagnum magellanicum*, *Andromeda polifolia* and *Vaccinium oxycoccos* can occurr. Even in such cases deep-rooted minerotrophic vascular plants like *Menyanthes trifoliata* can be found. Excluded are stands of vegetation fringing water bodies (see C3.2) unless the vegetation raft is sufficiently extensive to count as a habitat in its own right.

Indicators of good quality:

- water table always at surface; it can always be readily observed
- packing density of peat is low, walk-on leads to characteristic yielding (quaking)
- drainage ditches may affect quaking mires by lowering water level either permanently or increasing fluctuation and, thus, the likeliness of temporal drought or flooding with polluted water
- deteriorating quality is indicated by loss of wet mire area associated species e.g. among birds, increase of trees and bushes, and of hummock vegetation

Characteristic species :

Vascular plants: *Andromeda polifolia, Calla palustris, Carex appropinquata, Carex chordorrhiza, Carex diandra, Carex lasiocarpa, Carex limosa, Carex pauciflora, Carex lepidocarpa, Carex vesicaria, Cicuta virosa, Drosera longifolia, Drosera intermedia, Drosera rotundifolia, Eriophorum angustifolium, Eriophorum gracile, Eriophorum vaginatum, Equisetum fluviatile, Hydrocotyle vulgaris, Menyanthes trifoliata, Molinia caerulea, Nuphar lutea, Pedicularis palustris, Potentilla palustris, Rhynchospora alba, Rhynchospora fusca, Rubus chamaemorus, Scheuchzeria palustris, Typha latifolia, Utricularia intermedia, Utricularia minor, Utricularia vulgaris, Vaccinium oxycoccos, Vaccinium uliginosum*

Bryophytes: *Calliergon cordifolium, Calliergon richardsonii, Calliergon giganteum, Calliergonella cuspidata, Scorpidium revolvens, Scorpidium scorpioides, Sphagnum angustifolium, Sphagnum fallax, Sphagnum denticulatum, Sphagnum cuspidatum, Sphagnum lindbergii, Sphagnum majus, Sphagnum rubellum, Sphagnum magellanicum, Sphagnum platyphyllum, Sphagnum riparium, Sphagnum pulchrum, Sphagnum squarrosum, Sphagnum subsecundum, Sphagnum teres, Straminergon stramineum, Warnstorfia*

exannulata, Warnstorfia fluitans

Birds: *Tringa glareola*

Classification

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

EUNIS:

D2.3 Transition mires and quaking bogs

EuroVegChecklist:
Sphagno-Caricion canescentis (Syn: *Rhynchosporion albae* auct. p.p. - typo excl.; *Caricion lasiocarpae* auct. p.p. – typo excl.)
Caricion fuscae p.p. (marginally – only quaking habitats)
Sphagnion medii Kästner et Flössner 1933 (marginally)
Sphagno-Utricularion T. Müller et Görs 1960 (marginally - in mire complexes only)

Annex 1:
7140 Transition mires and quaking bogs

Emerald:
D2.3 Transition mires and quaking bogs

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?

No

Justification
It is widespread in Europe and occurs in many biogeographical regions. Compared to Poor fens it usually occurs at a smaller scale. The habitat is far more frequent in the North of Europe than in the South. The largest areas are found in Scandinavia and Ireland.

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	24 Km^2	Unknown	Decreasing
Belgium	Present	unknown Km^2	Decreasing	Decreasing
Bulgaria	Present	0.5 Km^2	Decreasing	Decreasing
Czech Republic	Present	10 Km^2	Decreasing	Decreasing
Denmark	Present	20 Km^2	Unknown	Unknown
Estonia	Present	50 Km^2	Unknown	Stable
Finland	Aland Islands: Uncertain Finland mainland: Present	830 Km^2	Decreasing	Decreasing

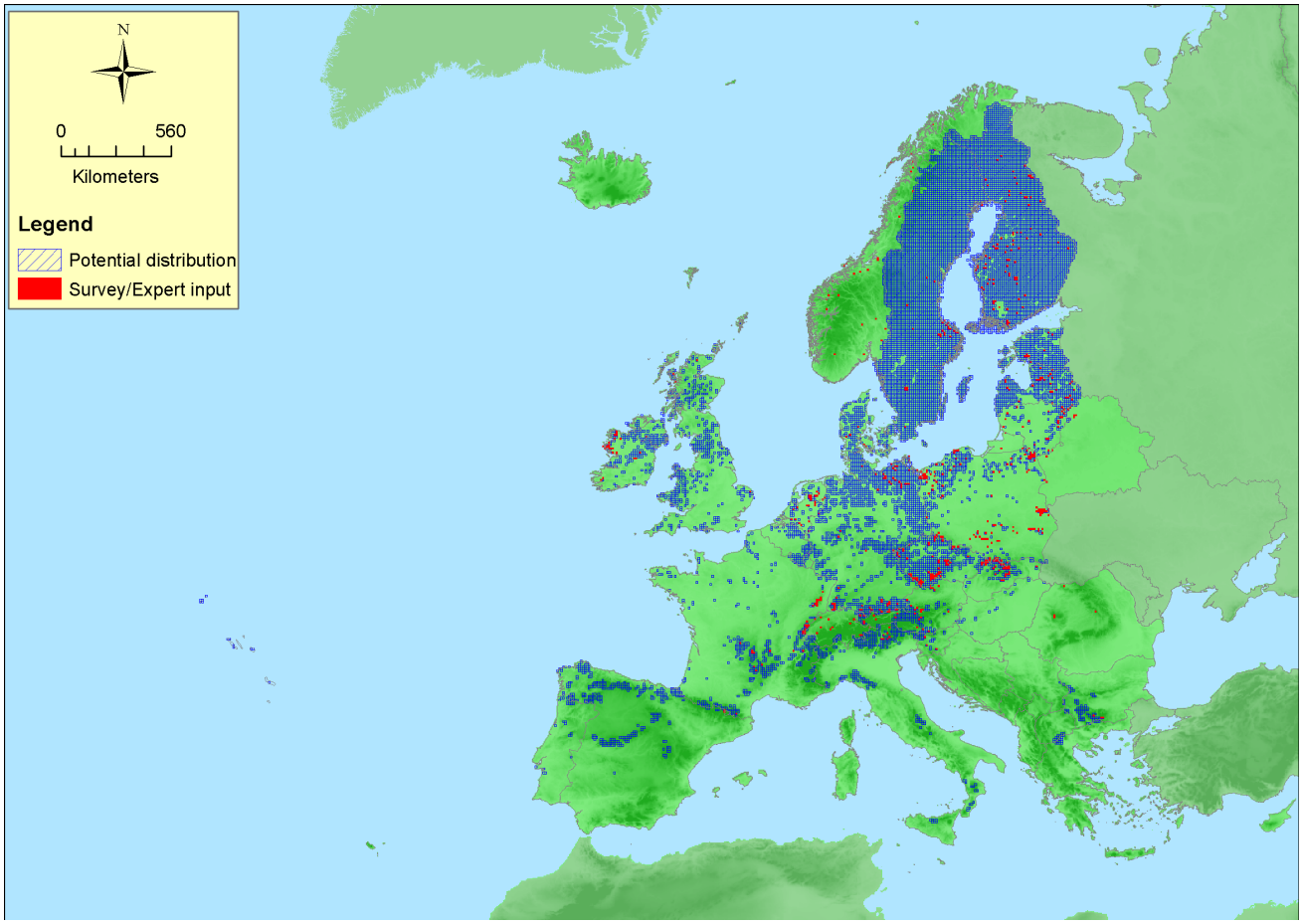
EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
France	Corsica: Uncertain France mainland: Present	12 Km^2	Decreasing	Decreasing
Germany	Present	2 Km^2	Decreasing	Decreasing
Hungary	Present	0.1 Km^2	Decreasing	Decreasing
Ireland	Present	94 Km^2	Unknown	Unknown
Italy	Italy mainland: Present Sardinia: Present Sicily: Present	30 Km^2	Decreasing	Decreasing
Latvia	Present	unknown Km^2	Decreasing	Decreasing
Lithuania	Present	7 Km^2	Decreasing	Decreasing
Netherlands	Present	11 Km^2	Increasing	Stable
Poland	Present	60 Km^2	Decreasing	Stable
Portugal	Portugal mainland: Present	0.2 Km^2	Decreasing	Decreasing
Romania	Present	1 Km^2	Stable	Decreasing
Slovakia	Present	0.5 Km^2	Decreasing	Stable
Spain	Spain mainland: Present	65 Km^2	Decreasing	Decreasing
Sweden	Present	4500 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)
Bosnia and Herzegovina	Present	0.3 Km^2	Stable	Stable
Switzerland	Present	12 Km^2	Stable	Stable

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	9973750 Km^2	13693	about 5500 Km^2	AOO and EOO incl. potential distribution
EU 28+	12156950 Km^2	13711	> 5500 Km^2	AOO and EOO incl. potential distribution

Distribution map



The map is rather incomplete, but the potential distribution is given for the EU28 based on HT7140 distribution. Data from Norway is missing. Data sources: EVA, ART17.

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

Due to the holarctic distribution and the huge mire areas in Eurasia, Europe contains less than 10% of the world distribution.

Trends in quantity

The area of non-calcareous quaking fens decreased dramatically in the last 50 years, especially in Central Europe. Territorial data suggest an increase in the Netherlands due to acidification and succession of calcareous quaking mires (becoming more rain water influenced). Even slight drainage of this mire type will lead to a habitat change towards D 2.2 Poor fen.

- 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 habitat is widespread in Europe.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  Yes
  Justification
  In most sites it occurs in rather small areas, due to specific conditions required.

Trends in quality

Even slight drainage leads soon to a transformation into other habitats. If the water saturation lowers only for a short time in summer, the peat density will grow and the yielding on walk-on will vanish. If the peat gets in contact to oxygen, decomposition will soon permanently hinder new peat expansion.

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

Pressures and threats

The main threat for non-calcareous quaking mires is drainage.

List of pressures and threats

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)
Nutrient enrichment (N, P, organic matter)
Pollution to groundwater (point sources and diffuse sources)
Diffuse groundwater pollution due to agricultural and forestry activities

Natural System modifications

Human induced changes in hydraulic conditions
Landfill, land reclamation and drying out, general
Polderisation
Modification of hydrographic functioning, general
Modifying structures of inland water courses
Modification of standing water bodies

Conservation and management

Efforts have been undertaken in the last decades to restore the hydrological systems of the respective mires. Floating vegetation mats directly depend on water level and water quality of their lake. Under optimal conditions mats of floating sphagnum mosses can grow rapidly. However, quaking areas in percolation mires (with much higher species richness) will need a very long time to regenerate after rewetting if the regulatory mechanism of the peat body has been destroyed by drainage.

List of conservation and management needs

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

Legal protection of habitats and species

Conservation status

Annex I:

7140: ALP FV, ATL U2, BOR U1, CON U1, MAC U1, MED U1, PAN U2

When severely damaged, does the habitat retain the capacity to recover its typical

character and functionality?

Floating vegetation mats directly depend on water level and water quality of their lake and can be relatively easy be restored, if water chemistry and water level of the lake is restored. Quaking areas in percolation mires will need a very long time to regenerate after rewetting if the regulatory mechanism of the peat body are destroyed by drainage.

Effort required

10 years	200+ years
Through intervention	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-20 %	unknown %	unknown %	unknown %
EU 28+	-19 %	unknown %	unknown %	unknown %

An average trend of -20% (-19% for EU28+) in area over the last 50 years has been calculated from quantitative data provided by 18 countries. In Central European countries like Poland, Germany, Switzerland and Hungary the loss has been much higher (up to 90%), but the weighted average of decline is dominated strongly by Scandinavian countries, especially Sweden, with still large remaining areas of non-calcareous quaking mires and negative trends in the order of 20%. The average trend leads to the conclusion Least Concern for both EU28 and EU28+. Reported long-term historical losses are even larger, but too few countries reported these values for calculating average European trends.

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

The habitat is widespread with an EOO, AOO and nimber of locations much larger than the thresholds for criterion B. Therefore the assessment of this criterion leads to the conclusion Least Concern.

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	62 %	50 %	unknown %	unknown %	unknown %	unknown %
EU 28+	62 %	49 %	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 average European degradation in quality (in terms of extent affected, and severity of degradation) has been calculated using quantitative data from 16 countries (2 non-EU). The calculation was also here strongly dominated by Sweden, leading to an average area of 66% negatively affected, with 50% (moderate) severity. The EU28+ value is almost the same. These values lead to the conclusion Vulnerable (VU) for this criterion.

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	LC	LC	VU	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	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	C/D1	Vulnerable	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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