# G1.8 Acidophilous Quercus woodland

## Summary

These are *Quercus robur/petraea*-dominated woodlands typical of acidic, free draining soils with mor humus on siliceous rocks and superficials found through the nemoral zone, though often now fragmentary and scattered in a prevailingly agricultural semi-natural landscape. Associated trees and shrubs are few and the field layer is generally species-poor with calcifuge sub-shrubs, herbs and cryptogams most characteristic and lending a heathy appearance. Regional variations in the flora in relation to climatic differences can be seen in each of the layers of the vegetation, most strikingly along the extreme Atlantic fringe where there can be an extraordinary richness of ferns and cryptogams. Competition from *Fagus* to the west and *Pinus sylvestris* to the east can cause succssional change and the other main threats are forestry measures, air pollution/eutrophication, invasive non-native species and grazing by sheep and deer.

## Synthesis

The habitat is Vulnerable (VU) despite its large range and stable area (criterion A) because about 70% of its area shows a reduction in quality of more than 60% (criterion C/D). Accordingly, its most important Annex I type 9190 (Old acidophilous oak woods with Quercus robur on sandy plains) has conservation status unfavourable-bad in the atlantic and continental biogeographic region.

| 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

G1.8 is a rather artificial forest type including oak-dominated woodlands on nutrient-poor soils in regions differing widely in climatic conditions, ranging from hyperoceanic to mediterranean-atlantic and continental, each region with specific forest types. Annex I type 9190 (old acidophilous oak woods) represents the most typical atlantic oak woodlands; 91A0 (Old sessile oak woods with Ilex and Blechnum in the British Isles) is an important sub-habitat for eu-atlantic bryophytes and ferns typical for the westernmost fringe of Europe while 9230 (Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica)* is an important sub-habitat in western France and the atlantic Iberian peninsula with elements of type G1.7a (Temperate and submediterranean thermophilous deciduous woodland).

## Habitat Type

### Code and name

G1.8 Acidophilous Quercus woodland

Netherlands, Natura 2000 site Drentse Aa, habitat type H9190 (Photo: John Janssen).



Germany, North Rhine-Westfalia, Natura 2000 site Diersfordter Wald/Schnepfenberg (Photo: Rienk-Jan Bijlsma).

## Habitat description

These are oak-dominated woodlands typical of acidic, free draining soils with mor humus on sandstones, lime-poor metamorphic and igneous rocks and sandy and gravelly soils through the nemoral zone. Extending from the Atlantic fringe of northern Portugal and Spain, across north-west and central Europe into southern Scandinavia, the northern Balkans and on into Russia, the habitat occurs often very fragmentary and scattered now in the prevailingly agricultural semi-natural landscape. Variations in climate across this wide overall range, from extreme Atlantic on the western fringes of Ireland and the British Isles, Lusitanian in northern Iberia, through Continental to Boreal in the east and sub-Mediterranean in the south, have an effect on the associated flora, even though this is not in general very rich.

 The characteristic oaks here are *Quercus robur* and *Q. petraea*, often occurring with a subordinate proportion of *Betula pendula* and/or *B. pubescens*, which can be pioneers in this habitat following fire or clear-felling, are relatively short-lived survivors in mature forest and which have been selected against in the coppice manage-ment or timber extraction often imposed on these woodlands. Through much of the range in central and north-western Europe, *Fagus sylvatica* is a potential competitor for canopy dominance even on mineral-poor, sandy soils. On acidic, mineral-rich soils with moder humus co-dominant Fagus-Quercus canopies are better classified under G1.6b *Fagus* woodland on acid soils. On highly acidic soils to the Boreal east of the range, *Pinus sylvestris* replaces the oaks as the dominant tree in woodlands with much the same field layer. In central European mountain ranges on shallow siliceous soils Pinus sylvestris can also be present in the canopy in lower proportions. Overall, other associated trees and shrubs are typically very few in this habitat: *Sorbus aucuparia* and *Frangula alnus* occur through much of the range, *Castanea sativa, Sorbus torminalis* and *Pyrus cordata* in the Sub-Atlantic heartland *a*nd, to the west, *Ilex aquifolium* can be abundant.

 The field layer is generally rather species-poor with calcifuge sub-shrubs, herbs and cryptogams most characteristic and lending a heathy appearance, especially under lighter shade and where grazing is absent. Constant through much of the range are *Vaccinium myrtillus, Calluna vulgaris (in more open places), Deschampsia flexuosa, Agrostis capillaris, Anthoxanthum odoratum, Festuca ovina agg., Holcus mollis, Carex pilulifera, Potentilla erecta, Hieracium sabaudum*, this sometimes tall and dense on less shallow soils. The commonest bryophytes overall are *Polytrichum formosum, Hypnum jutlandicum, Pleurozium schreberi* and *Leucobryum glaucum.*

 Regional variations in the flora in relation to climatic differences can be seen in each of the layers of the vegetation moving away from the Sub-Atlantic woodlands of central and western France, the lower Rhineland and north-east Italy/south-west Switzerland. In the more Atlantic climate of the north-west, there is a further contingent of herbs such as *Galium saxatile, Teucrium scorodonia, Hypericum pulchrum, Luzula sylvatica* and *Blechnum spicant* and to the western seaboard of Ireland and the UK an extraordinary

additional richness in cryptogams and ferns which, with annual precipitation up to 3000 mm, lends this habitat a great luxuriance. It is this vegetation which forms the richer core of Annex 1 91A0 Sessile Oakwoods in the British Isles.

On the Atlantic fringe of Portugal and Spain, with annual precipitation up to 2000 mm but with warmer summers and milder winters, *Quercus petraea* tends to be less prominent than further north but there is often some *Q. pyrenaica* along with *Betula pubescens* spp. *celtiberica* and *Arbutus unedo. Cytisus scoparius, Ulex gallii* and *Erica arborea* enrich the sub-shrub layer, with the lianas *Rubia peregrina* and *Tamus communis.* Herbs such as *Pseudarrhenatherum longifolium, Potentilla montana, Daboecia cantabrica, Crepis lampsanoides, Luzula forsteri, Euphorbia dulcis, Melitis melissophyllum, Silene nutans, Polygonatum odoratum, Galium rotundifolium, Arenaria montana, Genista florida, Rumex papillaris* give a South Atlantic or more Mediterranean feel to the flora.

In northern Europe and southern Scandinavia, some Eurasian Temperate and Boreal species such as *Vaccinium vitis-idaea, Maianthemum bifolium* and *Luzula pilosa* begin to appear in these woodlands and examples on the Baltic-North Sea plain form the core of the Annex 1 9190 Old acidophilous oakwoods with *Quercus robur* on sandy plains.

Further east, through Germany, Poland, Belarus, Ukraine and into Russia, where *Pinus sylvestris* begins to challenge the dominance of *Quercus* spp. on impoverished acid soils, *Juniperus communis* and *Euonymus verrucosa* are additional woody species and, among the herbs, *Trientalis europaea, Rubus saxatilis, Pyrola rotundifolia, Orthilia secunda, Calamagrostis arundinacea*. At the extreme east of the range, where there is usually less than 800mm precipitation and winter temperatures down to -12°C, *Carex digitata, Galium schultesii* and *Chamaecytisus ruthenicus* are characteristic. Among the bryophytes *Dicranum polysetum, Eurhynchium angustirete* and *Rhodobryum roseum* are distinctive here.

Further south, at the eastern sub-Mediterranean limit of this habitat in Austria, the northern Balkans and Romania, the warmer climate is reflected in the appearance of *Quercus cerris, Q. dalechampii* and *Q. polycarpa* in the canopy, *Pyrus communis* and *Euonymus verrucosa* among the shrubs and *Genista tinctoria, G. germanica, Cytisus nigricans, Rubus hirtus* and *Vincetoxicum hirundinaria* in the herb layer. Castanea sativa woods are inlcuded in this forest type as well because of their  species-poor and calcifuge vegetation.

Indicators of good quality:

- Sufficient proportion of historically old (ancient) woodland with corresponding species diversity
- Presence of old trees and a variety of dead wood (lying and standing) and the associated flora, fauna and fungi
- Sufficient structural diversity/ complexity including (semi)natural age structure
- Maintenance of humidity beneath an intact canopy where a rich fern and bryophyte component is typical (e.g. for Annex 1 91A0)
- Typical flora and fauna composition of the region
- Absence of non-native tree species (such as *Pseudotsuga menziesii*) and absence of invasive aliens in all layers (fauna, flora)
- No signs of eutrophication or pollution with e.g. pronounced invasion on nutrient-demanding herbs
- Presence of gradients or mosaics with heathland or acidic grassland at the landscape level (not isolated within plantation forests).

Characteristic species:

Tree layer: *Quercus robur, Quercus petraea* agg., *Sorbus aucuparia, Frangula alnus, Betula pendula, B. pubescens;* Shrub layer: *Ilex aquifolium, Frangula alnus;* Herb layer: *Deschampsia flexuosa, Hieracium sabaudum, H. lachenalii, Dryopteris carthusiana, Pteridium aquilinum, Rubus fruticosus agg., Vaccinium myrtillus, Holcus mollis, Molinia caerulea, Festuca ovina agg., Agrostis capillaris, Melampyrum pratense,*

*Anthoxanthum odoratum*; Moss layer*: Dicranum scoparium, Hypnum jutlandicum, Leucobryum glaucum, Pleurozium schreberi, Polytrichum formosum, Rhytidiadelphus loreus.*

## Classification

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

EUNIS:

G1.8 Acidophilous [Quercus]-dominated woodland

EuroVeg checklist:

*Quercion petraeae* Issler 1931

*Convallario majalis-Quercion roboris* Shevchyk et Solomakha in Shevchyk et al. 1996

*Erythronio-Quercion petraeae* Ubaldi et al. 1988

*Hymenophyllo-Quercion petraeae* Pallas 2000

*Molinio-Quercion roboris* Scamoni et Passarge 1959

*Quercion roboris* Malcuit 1929

*Quercion robori-pyrenaicae* (Braun-Blanquet et al. in P. da Silva et al. 1950 corr. Br.-Bl. et al. 1956) Rivas-Martínez 1975

*Vaccinio myrtilli-Quercion petraeae* Pallas 1996

*Agrostio-Quercion petraeae* Scamoni et Passarge 1959

*Castaneo-Quercion petraeae* Soó 1964

*Quercion pyrenaicae* Rivas Goday ex Rivas.-Mart. 1964

Annex I:

9190 Old acidophilous oak woods with Quercus robur on sandy plains

91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

9230 Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*

9260 Castanea sativa woods (*may relate to other Red List types as well*)

Emerald:

G1.8 Acidophilous Quercus dominated woodland

MAES-2:

Woodland and forest

IUCN:

1.1 Boreal Forest

1.4 Temperate Forest

EFT::

4.1 Acidophylous oakwood, 4.2 Oak-birch forest, 8.7 Chestnut forest

VME:

F1 Species-poor acidophilous oak and mixed oak forests

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

<u>Regions</u>
Atlantic
Continental

<u>Justification</u>
For the Subatlantic region oak forests on nutrient poor sands associated with extensive heathlands and drift sands (ranging from Flanders to Southern Denmark and eastwards to Poland) have been used for centuries as coppice providing fire wood and oak bark for leather tanning. After about 1930 these uses have been abandoned and the coppices were then transformed to high forest or neglected and in succession towards G1.6b Fagus woodland on acid soils. Atlantic oakwoods in the west of Britain and Ireland are characterised by hyperoceanic bryophytes, many of which have an affinity with the tropics.

## 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 | 8 Km$^2$ | Stable | Stable |
| Belgium | Present | 500 Km$^2$ | Stable | Unknown |
| Croatia | Present | 1694 Km$^2$ | Increasing | Stable |
| Czech Republic | Present | 816 Km$^2$ | Stable | Decreasing |
| Denmark | Present | 38 Km$^2$ | Unknown | Stable |
| Finland | Finland mainland: Present | 1 Km$^2$ | Decreasing | Stable |
| France | France mainland: Present | 5421 Km$^2$ | Increasing | Decreasing |
| Germany | Present | Unknown Km$^2$ | Stable | Decreasing |
| Hungary | Present | 35 Km$^2$ | Stable | Stable |
| Ireland | Present | 42 Km$^2$ | Increasing | Stable |
| Italy | Italy mainland: Present | 49 Km$^2$ | Decreasing | Decreasing |
| Lithuania | Present | 10 Km$^2$ | Stable | Decreasing |
| Luxembourg | Present | Unknown Km$^2$ | Unknown | Unknown |
| Netherlands | Present | 703 Km$^2$ | Increasing | Increasing |
| Poland | Present | 450 Km$^2$ | Decreasing | Decreasing |
| Portugal | Portugal mainland: Present | 356 Km$^2$ | Increasing | Unknown |
| Romania | Present | 25 Km$^2$ | Stable | Stable |
| Slovakia | Present | 13 Km$^2$ | Stable | Decreasing |
| Slovenia | Present | 356 Km$^2$ | Stable | Stable |
| Spain | Spain mainland: Present | 7580 Km$^2$ | Decreasing | Stable |
| Sweden | Present | 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) |
|---|---|---|---|---|
| *UK* | Northern Island: Present United Kingdom: Present | 1750 Km$^2$ | Stable | 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 | 630 Km$^2$ | Stable | Stable |
| *Norway* | Norway Mainland: Present | 413 Km$^2$ | Stable | Stable |
| *Switzerland* | Present | 150 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* | 6300200 Km$^2$ | 8327 | 21589 Km$^2$ | including estimates for Germany (1200) and Sweden (500) ; Macedonia is not included |
| *EU 28+* | 6300200 Km$^2$ | 8786 | 22782 Km$^2$ | based on additional areas in Switzerland, Norway and Bosnia-Herzegovina |

## Distribution map
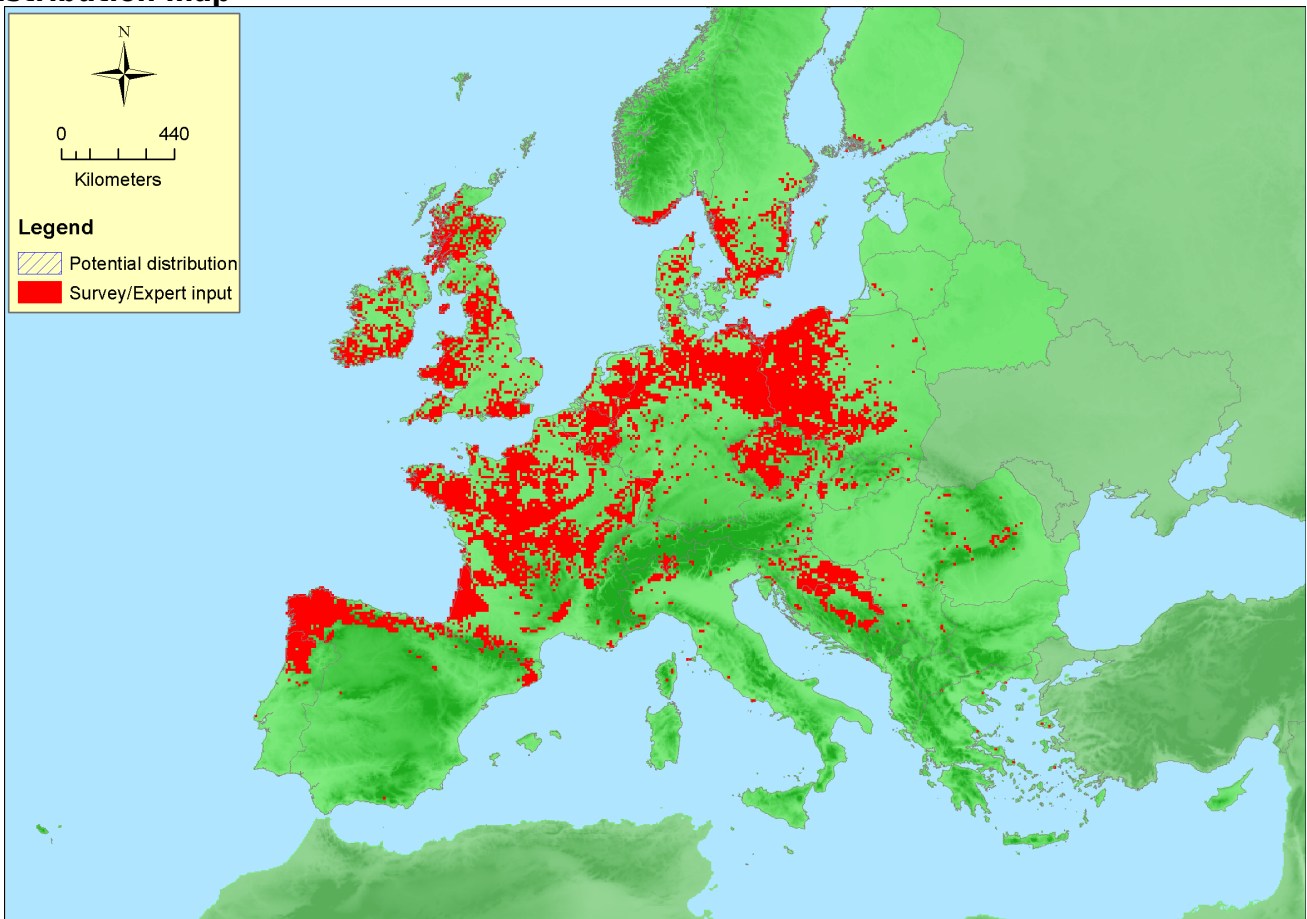
Map is rather complete, but maybe too widespread in South-Eastern Europe. Data sources: EVA, Art17, BOHN, NAT.

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

95% (assuming that the area within EU 28+ corresponds to its total area)

## Trends in quantity

Overall calculated trend (for a rather small number of countries) appears stable (+1% change). Decreases in area in Poland and Spain are compensated by increasing areas in Croatia, France and Portugal. A stable trend is also reported for countries without quantitative present historical data (England, Germany). Countries with relatively small areas appear to show (slight) negative trends.

- Average current trend in quantity (extent)
  EU 28: Stable
  EU 28+: Stable
- Does the habitat type have a small natural range following regression?
  No
  *Justification*
  The habitat has EOO much larger than 50,000 km2. However, many oak forests show hardly any rejuvenation and are or will be replaced by more shade-tolerant species such as beech when succession is allowed to proceed.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  *Justification*
  The habitat has a broad natural range on nutrient-poor soils.

## Trends in quality

Generally decreasing based on countries with substantial areas (France, Czech Republic, Germany, England, Spain, Poland) but reported as stable for Croatia and Spain; only increasing in the Netherlands (as a result of aging of former coppice woodlands)

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

## Pressures and threats

Main threats in countries with substantial areas are: B02 forestry measures (including dead wood removal), H04 air pollution/eutrophication (very relevant on acidic, nutrient-poor soils), K02.01 natural succession (very relevant in oak-dominated woodlands, especially by Fagus) and I01 invasive non-native species (Rhododendron, Prunus serotina). Damage by sheep/deer and overgrazing may be an additional threat (but not just grazing) as well as urbanisation. Climate change is only reported by France.

### List of pressures and threats

**Sylviculture, forestry**

    Forest and Plantation management & use

**Pollution**

    Air pollution, air-borne pollutants
        Acid rain
        Nitrogen-input

**Invasive, other problematic species and genes**

Invasive non-native species

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

Species composition change (succession)

## Conservation and management

Woodlands still dominated by Quercus robur or Q. petraea in the tree layer have mostly been planted and explicitly managed as oak dominated woodland in the past. Due to failure of natural rejuvenation of these oak species, current oak woodlands must be managed intensively to avoid encroachment of more shade-tolerant and competitive tree species such as beech. Loss of area by natural succession can be compensated by (natural) conversion of pine afforestations to oak woodland and by succession of abandoned agricultural areas.

### List of conservation and management needs

**Measures related to forests and wooded habitats**

Restoring/Improving forest habitats

### Conservation status

Annex I types:

9190: ATL U2, BOR U2, CON U2, PAN U1

91A0: ATL U2

9230: ATL XX, MED XX

9260: ALP U1, ATL U1, CON U1, MED U2

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

Natural rejuvenation of the dominant oak species generally requires relatively large open areas (much larger than natural canopy gaps) associated with (historical) disturbances (heathlands, pine afforestations in secondary succession, abandoned fields etc.). However, this is only possible in the presence of sufficient mature oak trees providing the acorns. Severely damaged woodlands without such seed sources must be replanted and require +100 year to recover. Since the herb layer contains many species in common with heathland and poor grassland (often with persistent seed bank) recovery for these particular species is relatively easy. Species groups such as mycorrhizal fungi and hygrophytic bryophytes and ferns recolonize much less easy.

### Effort required

| 50+ years |
|---|
| Through intervention |

## Red List Assessment

### Criterion A: Reduction in quantity

| Criterion A | A1 | A2a | A2b | A3 |
|---|---|---|---|---|
| *EU 28* | +1.2 % | unknown % | unknown % | unknown % |

| Criterion A | A1 | A2a | A2b | A3 |
|---|---|---|---|---|
| *EU 28+* | +1.1 % | unknown % | unknown % | unknown % |

EU 28 based on summed current data and summed reference data (about 50 years ago) available for CZ, HU, NL, FR, PL, RO, PT; EU28+ based additionally on CH and BA.

## Criterion B: Restricted geographic distribution

| Criterion B | B1 | | | | B2 | | | | B3 |
|---|---|---|---|---|---|---|---|---|---|
| | EOO | a | b | c | AOO | a | b | c | |
| *EU 28* | >50000 Km$^2$ | No | No | No | >50 | No | Yes | No | No |
| *EU 28+* | >50000 Km$^2$ | No | No | No | >50 | No | Yes | No | No |

See Synopsis for current pressures expected to result in a decline in area in next 20 years. Both EOO and AOO are large and do not meet the criteria B1 or 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* | 69 % | 66 % | unknown % | unknown % | unknown % | unknown % |
| *EU 28+* | 67 % | 65 % | 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% |

Based on countries with more or less complete data. Estimates of percentage affected differ widely between (neighbouring) countries probably as a result of different interpretations or perceptions.

## 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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