G3.9c Macaronesian Juniperus woodland

Summary

This Macaronesian woodland habitat consists of micro-woodlands and shrublands dominated by various endemic *Juniperus* species, specific to each archipelago. Some are extensive, others very rare, and they all show specific features in their flora in relation to the climatic, terrain and soils conditions of their localities. Historical use, mostly for charcoal, timber and freeing of land for grazing led to severe depletion and, now, wood harvesting, goat grazing, house-building and exotic plant invasions are the most widespread threats with wildifire especially endangering for the rarest sub-types. Strict protection regimes and programmes of regeneration for the rarest *Juniperus* spp. are essential for conservation.

Synthesis

A favourable overall status in the whole of Macaronesia is found over a 50 year time span, due to a 31% increase of the habitat area (with unknown quality trend), mainly as a result of agricultural abandonment. However there is evidence of a large area reduction in the original, historical area, with an estimated negative trend of more than 50%. Therefore, this habitat qualifies for the Vulnerable (VU) status for criterion A3. The amount of distribution grid cells is relatively low, but as there are no continuing declines or future threats, these figures do not lead to any category above Least Concern (LC).

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A3	Vulnerable	A3

Sub-habitat types that may require further examination

Each of the five variaties mentioned in the description could be assessed separately, mostly at regional (archipelago) level. The *Juniperus cedrus* subsp. *maderensis* variety in Madeira is likely to have the Critically Endangered (CR) status (with a future risk of collapse, if specific conservation measures are not taken). The *Juniperus cedrus* ssp. *cedrus* variety of the Canary Islands may reach the Endangered (EN) status. The *Juniperus brevifolia* and *J. turbinata* subsp. *canariensis* forests are likely not to have a more threatened status than Vulnerable.

Habitat Type

Code and name

G3.9c Macaronesian Juniperus woodland

Juniperus turbinata subsp. *canariensis* habitat at La Gomera, Canary Islands (Photo: Jorge Capelo).

Juniperus brevifolia habitat at Faial, Azores (Photo: Sandra Mesquita).

Habitat description

Micro-woodlands of small trees or tall shrubs up to 10 m tall, dominated or co-dominated by *taxa* of the genus *Juniperus* L., all endemic to Macaronesia's archipelagos: Azores, Madeira and the Canaries. Four distinct *taxa* dominate several distinct subtypes of the habitat G3.9c, each with specific sinecological traits, biogeography and floristic character (no common shared characteristic infrageneric *taxa* among them); *Juniperus turbinata* subsp. *canariensis* (the Canaries and a single location in Madeira), *Juniperus cedrus* subsp. *cedrus* (the Canaries), *Juniperus cedrus* subsp. *maderensis* (Madeira) and *Juniperus brevifolia* (Azores). The five subtypes are:

1. *Juniperus turbinata* subsp. *canariensis* habitats of the Canary Islands (*Mayteno canariensis-Juniperion canariensis*). Tall shrublands dominated by hard leathery leaves or scaly-leaved plants in low altitude infra-thermomediterranean semi-arid to dry localites, on thin mediterranean volcanic rock-derived soils (leptosols or thin cambisols). Dominated or co-dominated by *J. turbinata* subsp. *canariensis*, *Olea europaea* subsp. *cerasiformis*, *Rhamnus crenulata* and *Maytenus canariensis*; secondarily also by *Euphorbia bertholothii*, *Euphorbia wildpretii*, *E. atropurpurea, Pistacia atlantica*, *P. lentiscus*, *Hypericum canariense* and other characteristic shrubs can be locally dominant (see Characteristic species). Most of the habitat occupies rocky hillslopes in valleys not higher than 300 m a.s.l, but reaching sporadic very rocky locations and volcano craters and hillsides, up to 1900 m a.s.l. It is found in the islands of Tenerife, La Gomera, La Palma, El Hierro and sporadically in Gran Canaria. Low-altitude versions are in contact, in general, with *Phoenix canariensis* palm-groves (G2.5b). Regional floristic combinations of dominants (and co-dominants) in the Canaries are: a) Tenerife: *J. turbinata* subsp. *canariensis, Olea europaea* subsp. *cerasiformis, Pistacia atlantica, Hypericum canariense*. Contacts with *Euphorbia atropurea* scrubland can include characteristic plants of the later community: *E. atropurpurea, E. lamarkii, Aeonium hahworthii, Retama rhodorhyzoides*; b) La Gomera: *J. turbinata* subsp. *canariensis*, *Brachypodium arbuscula*, *Jasminum odoratissimum*, *Euphorbia bertholothii*; c) La Palma: *J. turbinata* subsp. *canariensis, Olea europaea* subsp. *cerasiformis, Rubia fruticosa*; d) El Hierro: *J. turbinata* subsp. *canariensis*, *J. odoratissimum*, *Euphorbia wildepretii*, *Rubia fruticosa*; e) Gran Canaria: *Olea europaea* subsp. *cerasiformis* but with sporadic *J. turbinata* subsp. *canariensis, Pistacia lentiscus*, *Bupleurum aciphyllum*, *Asparagus plocamoides*.

2. *Juniperus turbinata* subsp. c.f. *canariensis* habitats of Madeira (*Mayteno umbellatae-Oleion maderensis*). Very rare habitat of Madeira, in an inacessible single location with a few tens of individuals of juniper in a NE slope of Madeira Island. The taxononomical status of this juniper is incertain at the subspecies level, but so far it seems to be included in subsp. *canariensis*. The floristic combination of the community is: *Maytenus umbellata, Globularia salicina, Erica arborea* subsp. *arborea* and *Helichrysum melaleucum*.

3. *Juniperus cedrus* subsp. *cedrus* in the Canaries (*Juniperion cedri*). Although *J. cedrus* subsp. *cedrus*

is found inside *Pinus canariensis* forests, and is thought to have been abundant there and historically eliminated by cutting, the greatest abundance is nowadays in the shrub communities (also with shrubby individuals of *Pinus canariensis*) just above the *Pinus canariensis* timberline, already outside (above) the cloud belt. Thus, we interpret the later ecological situation alone as the habitat G3.9c, being the presence in canarian pinewood secondary. These communities are found in Tenerife mostly from ca. 1900 to 2200 m a.s.l., reaching the Cañadas del Teide, and contacting with *Spartocytisus nubigenius* (*Spartocytision nubigeni*) communities. It occurs also in the external fringe of Taburiente's crater, in La Palma. Very isolated occurrences are those in Gran Canaria y La Gomera. These are xerophytic communities in rocky outcrops (lithosols) under upper mesomediterranean to supramediterranean dry to humid bioclimate. Floristic dominants are, in Tenerife: J*. cedrus* subsp*. cedrus, Adenocarpus viscosus, Echium wildpretii* and *Pterocephalus lasiospermus*; in La Palma: *J. cedrus* subsp. *cedrus*, *Adenocarpus spartioides*, *Echium trichosyphon* and *Pterocephalus porphyranthus*.

4. *Juniperus cedrus* subsp. *maderensis* habitats of Madeira (*Polysticho falcinelli-Ericion canariensis*). Rare habitats in the summits of Madeira´s mountains (Pico Ruivo, 1862 m a.s.l.). There is evidence that this small tree used to be much abundant and probably a co-dominant species in the actual tree-heath forest, *Polysticho falcinelli-Ericetum canariensis*, the community of *Erica arborea* subsp. *canariensis* of Madeira above 1.500 m a.s.l., but historically heavily cut for timber and charcoal. Probabily, less than ten individuals remain in the hillsides of Pico Ruivo in inaccessible locations. Dominant in the community are: *Juniperus cedrus* subsp. *maderensis*, *Erica arborea* subsp. *canariensis*, *Erica platycodon* subsp. *maderincola*, *Sorbus maderensis* (doubtful presence after wildfire in 2011), *Polystichum falcinellum, Teucrium francoi*.

5. *Juniperus brevifolia* habitats of Azores (*Culcito macrocarpae-Juniperion brevifoliae*). Although *Juniperus brevifolia* spans the whole of the laurel forest in Azores, *Lauro azoricae-Juniperetea brevifoliae* vegetation class and associated vegetation (seral stages), its optimum is in the form of a needle-leaved micro- to nano-forest, in the meso- to supratemperate hyperhumid to ultra-hyperhumid bioclimate, on leptosols or deeper andosols with an iron pan layer (placic horizon) usually with a thick acid horizon of organic matter or a thick blanket *Sphagnum* sp. pl. bog in the ground layer. In this sense, the habitat G3.9c is restricted to the *Culcito macrocarpae-Juniperion brevifoliae* alliance. It is present in the whole of the Azores Islands. The common characteristics of habitat are (with dominance or co-dominance): *Juniperus brevifolia, Myrsine retusa, Viburnum treleasi, Vaccinium cylindraceum, Rubus hoschttetorum, Hypericum foliosum, Myrtus communis, Erica azorica* (the later is dominant in *Erica azorica*-dominated F4.3 habitat type, which is the main contact with G3.9c); other taxa: *Grammitis marginella* subsp. *azorica*, *Corema azorica*.

Indicators of good quality:

In a general sense, the more coenotically satured, namely by characteristic *taxa* and the less plants of seral stages co-dominate, the greater integrity of habitat is. Some part of such habitats have been historically cut (many times selectively), grazed or under agriculture. Thus, secondary, or altered versions of it are always found. These are versions of the habitat with less dense woody plant stratum (sometimes a parkland instead of the typical dense community), and where the lower strata have been substituted by zoo-antropogenic vegetation (*Cisto monspeliensis- Micromerion hyssopifoliae* in the Canaries and Madeira) and neophyte-dominated vegetation (*Holcus* sp. pl. and *Agrostis* sp. pl., *A. azorica* excluded, in the Azores). These degraded versions of habitat have much less conservation value, but potential to ecological restauration.

Characteristic species:

Vascular plants

Subtype 1*: J. turbinata* subsp. canariensis (dom.), *Olea europaea* subsp*. cerasiformis* (dom.) , *Rhamnus*

crenulata (dom.) , *Maytenus canariensis* (dom.) , *Asparagus scoparius, Bupleurum salicifolium, Globularia salicina, Teucrium heterophyllum, Euphorbia bertholothii*, *Euphorbia wildpretii*, *Euphorbia atropurpurea, Pistacia atlantica*, *P. lentiscus*, *Hypericum canariensis, Euphorbia lamarkii, Aeonium hahworthii, Retama rhodorhyzoides, Brachypodium arbuscula*, *Jasminum odoratissimum, Rubia fruticosa, Echium wildpretii, Bupleurum aciphyllum*, *Asparagus plocamoides, Erysimum bicolor, Anagyris latifolia, Androcybium hierrense, Argyranthemum calychryson, Argyranthemum escarrei, Asparagus umbellatus, Asteriscus sericeus, Bupleurum handiense, Bystropogon plumosus, Convolvulus lopezsocazi, Dorycnium eryophtalmum, Echium purpuriense, E, strictum, E. giganteum, Marcetella moquiniana, Ruta pinnata, Sideritis brevicaulis, Sideritis pumila, Spartocytisus filipes, Teline osyrioides* subsp. *sericea, Vicia cirrhosa.*

Subtype 2 : *Maytenus umbellata* (dom.), *Globularia salicina* (dom.), *Erica arborea* subsp. *arborea* (dom.), *Erica platycodon* subsp*. maderincola*, *Helichrysum melaleucum.*

Subtype 3: J*uniperus cedrus* subsp*. cedrus, Adenocarpus viscosus, Echium wildpretii*, *Pterocephalus lasiospermus, Adenocarpus spartioides*, *Echium trichosyphon*, *Pterocephalus porphyranthus, Pinus canariensis* (shrub), *Andryala teydensis, Bufonia paniculata, Carlina xeranthemoides, Erysimum scoparium, Nepeta teydea, Scrophularia glabrata, Sideritis oroteneriffae, Chamaecytisus calderae, Chamaecytisus proliferus* subsp*. hierrensis, Echium auberianum, Echium trichosyphon, Echium wildpretii.*

Subtype 4: *Juniperus cedrus* subsp. *maderensis*, *Erica arborea* subsp. *canariensis*, *Erica platycodon* subsp. *maderincola*, *Sorbus maderensis, Polystichum falcinellum, VacciniumTeucrium francoi, Polystichum x maderensis, Ranunculus cortusifolius* var. *minor.*

Subtype 5: *Juniperus brevifolia* (dom.) *, Myrsine retusa, Viburnum treleasi, Vaccinium cylindraceum, Rubus hoschttetorum, Hypericum foliosum, Erica azorica, Arceuthobium azoricum, Bellis azorica, Carex hochstetteriana, Cerastium vagans, Culcita macrocarp, Dryopteris azorica, Dryopteris crispifolia, Elaphoglossum semicylindricum, Hedera azorica, Platanthera grex 'micrantha', Smilax divaricata, Euphrasia grandiflora, Euphorbia stygiana, Vaccinium cylindraceum, Rubia agostinhoi* (non *R. agostinhoi sensu auct. mad et iber. = R. occidens; Rubia agostinhoi* is a strict azorean endemism).

Classification

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

EUNIS:

G3.9c Macaronesian *Juniperus* woodland

EuroVegChecklist:

Mayteno canariensis-Juniperion canariensis

Mayteno umbellatae-Oleion maderensis

Juniperion cedri

Polysticho falcinelli-Ericion canariensis

Culcito macrocarpae-Juniperion brevifoliae

Annex 1:

9560 *Endemic forests with *Juniperus* spp.

Emerald:

G3.9 Coniferous woodland dominated by Cupressaceae or Taxaceae

MAES:

Woodland & forest

IUCN:

1.4 Temperate Forest

EFT:

10.7 Juniper forest

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

Regions
Macaronesian

Justification
Juniperus cedrus subsp. *cedrus*, *J. cedrus* subsp. *maderensis*, *J. turbinata* subsp. *canariensis*, *J. brevifolia* are arborescent shrubs endemic to Macaronesia, make up specific vegetation belts in the archipelagos and are dominant or co-dominant in Macaronesian ecosystems. The rarity of each taxon varies among the archipelagos: for instance *J. cedrus* subsp. *maderensis* is extremely rare in Madeira and conversely *J. brevifolia* is abundant in Azores. The habitats make up an important part of the altitude natural vegetation in all archipelagos. Altough analogous habitats might be found in continental Europe, the high floristic endemicity and ecological originality makes the juniper habitats of Macaronesia outstand as very important to conservation.

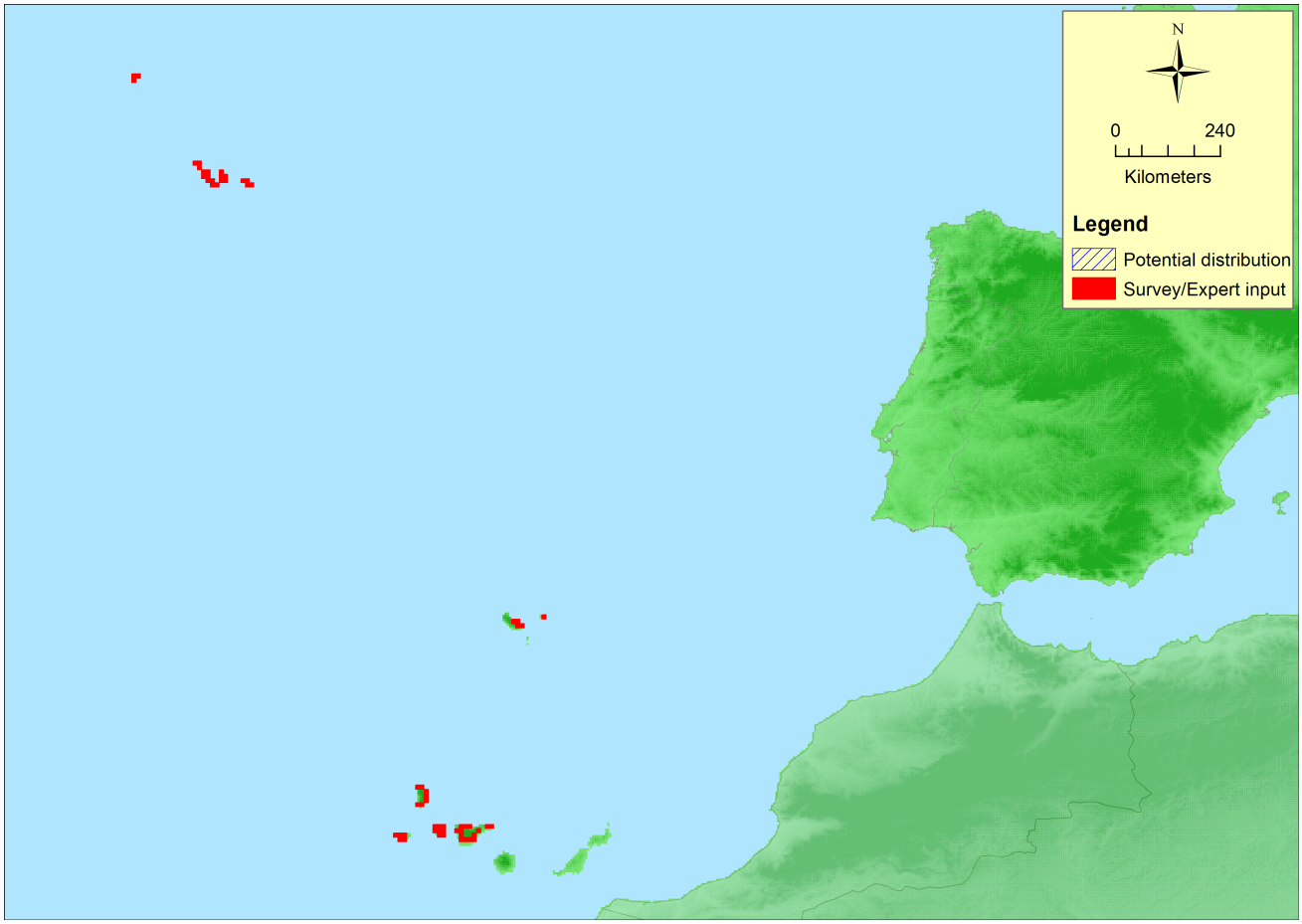
Geographic occurrence and trends

EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Portugal	Madeira: Present Portugal Azores: Present	514 Km^2	Increasing	Unknown
Spain	Canary Islands: Present	15.78 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	582350 Km^2	62	530 Km^2	
EU 28+	582350 Km^2	62	530 Km^2	

Distribution map



The map is complete. Data source: Art17.

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

100% of the habitat lies within the EU 28.

Trends in quantity

The portuguese area is, by far, greater than the spanish due to *Juniperus brevifolia* being an ubiquous plant in the Azores. On the contrary, *J. cedrus* subsp. *maderensis* has only a few wild individuals and is very rare. At the global count the portuguese area is increasing due to agriculture set aside, cutting for timber and coal, and conservation policies. Thus, great attention must be put in policies, because each case should be taken specifically. The Portuguese data suggest that the habitat increased in area of 32% in the 50 year-time span. Data is from 1974 National Forest Inventory. In turn, as concerns the Canary Islands, in spite of several references reporting about logging, husbandry with goats, housing, exotic plants invasion, the territorial data suggests a stable condition, so the trend in quantity can be considered as stable. The average variation is therefore around +31%.

For the assessment, historical data has been taken in account as evidence for a large reduction in quantity in the 250 years time-span. For instance, the Madeira's juniper is commonly found in large quantity in historical buildings (churches, public and private buildings) and is nowadays very rare in natural conditions. Historical reports of coal being extensively made from juniper exist from all the archipelagos.

As said, care should be taken in the average increase found from the whole of Macaronesia, because of the disproportion that azorean variant (subtype) induces in the average (of 31% increase), in spite of the canarian and madeirean ones might have been reduced and have a small distribution area. It adds that a wildfire in 2011 in Madeira might have affected the viability of survival of some of the few remaining individuals.

- Average current trend in quantity (extent)
  EU 28: Increasing
  EU 28+: Increasing
- Does the habitat type have a small natural range following regression?
  No
  Justification
  Due to abandonment of agriculture, cutting and protection policies, in global terms the habitat increased in the 50-years time span. The madeirean variant has, on the contrary, been much reduced due to natural causes (small population and wildfire). Historical reduction is estimated to have been very large (>50%) eversince the arrival of european settlers in the XV century. The EEO is > 50.000 km2, so the range is not small.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The global EEO is > 50.000 km2, so the range is not small.

Trends in quality

The trend estimated by the territorial experts is stable (Spain) or unknown (Portugal). Nevertheless, some uses (e.g. under-canopy goat/sheep husbandry, selective cutting for coal, wood for fences, etc.) were mantained over time, so there was certainly a depletion of quality to some extent, at least in historical times but also during the last 50 years. However, a quantitative estimation of its proportion is not possible. Due to protection policies, which reduced both cutting and grazing, the current trend in quality should be increasing.

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

Pressures and threats

Based on the territorial reports, the major threats for this habitat type are logging, husbandry with goats, housing, exotic plants invasion. Current and future threats for the rarest *J. cedrus* subsp. *maderensis* and even for *J. cedrus* subsp. *cedrus*, are due to natural hazards, e.g. wildfire or much reduced/isolated populations that might compromise the viability of the species.

List of pressures and threats

Agriculture

Non intensive sheep grazing
Non intensive goat grazing

Sylviculture, forestry

Forest replanting (non native trees)
Removal of forest undergrowth

Urbanisation, residential and commercial development

Dispersed habitation
Agricultural structures, buildings in the landscape

Invasive, other problematic species and genes

Invasive non-native species

Geological events, natural catastrophes

Fire (natural)

Conservation and management

Keeping most habitat sites under strict protection regimes, together with a proper management of the use of the dominant species (only where they are abundant and belonging to the rural/natural managed landscape), are the most effective measures of conservation.

For the very rare variants, the continuous monitoring of juniper population status is paramount. Replanting from cultivated plants (botanical gardens, etc.) might be a necessary option in the very small depleted locations (1.2.measures needed and 3.1. Restoring).

List of conservation and management needs

No measures

No measures needed for the conservation of the habitat/species
Measures needed, but not implemented

Measures related to forests and wooded habitats

Restoring/Improving forest habitats

Conservation status

Annex 1:

9560: MAC U1

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

Depending on the damage extent, it might bring to collapse if it affects a spatialy restricted variant/location. In this case, replanting from cultivated plants could be be advisable to obtain fully grown individuals in more than 50 years. For natural regeneration, if possible, the time span would be greater (+200). In case of more abundant variants, sucession would be sufficient in a 200+ years time span.

Effort required

50+ years	200+ years
Through intervention	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	+31 %	increasing %	increasing %	> 50% %
EU 28+	+31 %	increasing %	increasing %	> 50% %

Average reported values for Spain and Portugal yields 31% for quantity increase. The remaining quantitative subcriteria (A2a and A2b) were not applied, but expert evaluation and evidence support an increase. Historical reduction (subcriterion A3) is estimated to be between 50 and 80% at least, but a more exact figure cannot be provided.

Criterion B: Restricted geographic distribution

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

The EOO is > 50.000 Km^2 while the number of 10 x 10 grid locations (AOO) is only slightly greater than 50. However, there is no continuing decline or threat. As also the number of locations is larger than the thresholds all criteria under B lead to the conclusion Least Concern (LC).

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	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	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%

No complete data for quality are available for a reliable quantitative evaluation of criterion C/D1.

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	VU	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	VU	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria	
EU 28	EU 28+

Overall Category & Criteria			
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A3	Vulnerable	A3

Confidence in the assessment
Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

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