

**European Community Directive
on the Conservation of Natural Habitats
and of Wild Fauna and Flora
(92/43/EEC)**

**Second Report by the United Kingdom under
Article 17
on the implementation of the Directive
from January 2001 to December 2006**

**Conservation status assessment for :
S1413: *Lycopodium sp.* - Clubmosses**

Please note that this is a section of the report. For the complete report visit <http://www.jncc.gov.uk/article17>

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S1413 *Lycopodium* sp. Clubmosses

Audit trail compiled and edited by JNCC and the Plant Conservation Working Group

This document is an audit of the data and judgements on conservation status in the UK's report on the implementation of the Habitats Directive (January 2001 to December 2006) for this species. Superscript numbers accompanying the headings below, cross-reference to headings in the corresponding Annex B reporting form. This supporting information should be read in conjunction with the UK approach for species (see 'Assessing Conservation Status: UK Approach').

Lycopodium is a genus of clubmosses. For this reporting round, the UK has decided to interpret *Lycopodium* spp. strictly, only including the species that are within the genus *Lycopodium* and not the other genera in Lycopodiaceae. There are two well-known species in the UK: *L. clavatum* and *L. annotinum*. These are both considered in the assessment below. A third species, *L. lagopus* has recently been described from the UK (Rumsey, 2007). This is not further discussed in the assessment, but it is believed that the conclusions reached would not be affected. It is a rare upland species, which grows with *L. annotinum*, and faces similar threats.

1. Range Information^{2.3}

Most sites for *L. annotinum* are found in Scotland. *L. clavatum* was once widespread, but is now almost restricted to upland areas.

Since the range of *L. clavatum* completely includes the range for *L. annotinum*, these are considered together in the calculation of surface area.

1.1 Surface area of range^{2.3.1}

100,592km²

The above estimate was calculated within Alpha Hull software, using extent of occurrence as a proxy measure for range (see Map 1.1). The value of alpha was set at 20 km to reflect the dispersal capacity of these species. The alpha hull (range area) was clipped to include terrestrial habitat only.

1.2 Date of range determination^{2.3.2}

1987 – 1999

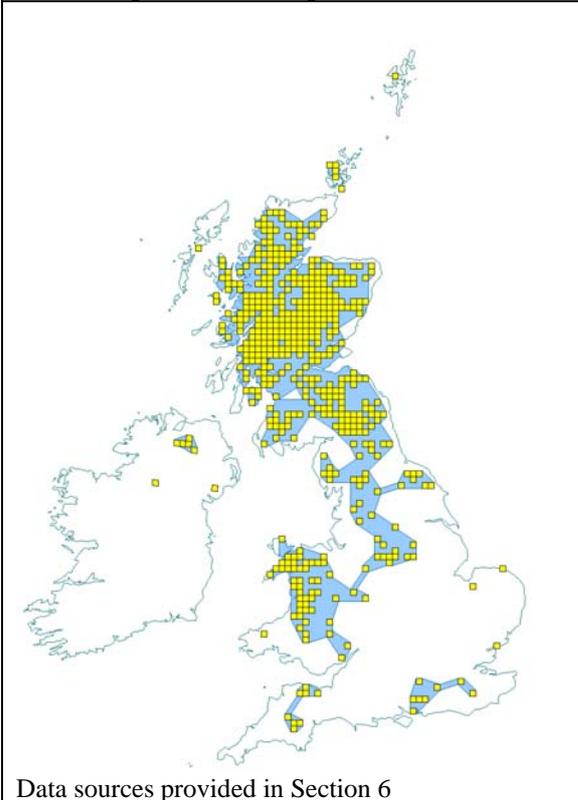
The range estimate was calculated using records from the most recent recording date class in Preston *et al.* (2002). Records from this time period provide the best representation of current range as it is understood by species specialists.

1.3 Quality of range data^{2.3.3}

Good

Preston *et al.* (2002) provides an accurate representation of these widespread species.

Map 1.1 Current extent of occurrence
and occupied 10-km squares (1987-1999)



1.4 Range trend^{2.3.4} & Range trend magnitude^{2.3.5}

Unknown

Based on the information available, it is not possible to quantify trends since the Habitats Directive came into force in 1994. However, observations by species experts indicate that small, fragmented populations in the lowlands are being lost (as has been occurring throughout the twentieth century), and as a result, there has most likely been a gradual decline in range since the Habitats Directive came into force. However, in the absence of more substantive data at the 10-km resolution, trend has been reported as unknown.

1.5 Range trend period^{2.3.6}

1994 – 2006

1.6 Reasons for reported trend in range^{2.3.7}

Not applicable

1.7 Favourable reference range^{2.7.1}

100,592km² (Equal to current)

The decision tree in Note 1 has been used as a guide in determining the favourable reference range estimate (see ‘Assessing Conservation Status: UK Approach’).

The post-1994 range trend (at a 10-km resolution) is unknown. Therefore, on the basis that current range is not restricted, the favourable reference range has been set as at least equivalent to current.

1.8 Range conclusion^{2.8}

Favourable

Current trend is unknown and favourable reference range is equivalent to the current estimate.

2. Population of the species^{2.4}

2.1 Population estimate^{2.4.1}

Unknown

Information on population sizes for *Lycopodium* species is limited. The only proxy measure available for population size is the number of occupied 10-km squares: 521 10-km squares (see Map 1). However, although this species is widespread, it is also infrequent, and expert opinion is that providing an estimate at the 10 km scale would disguise important population changes at a local level.

2.2 Date of population estimate^{2.4.2}

1987 – 1999

The estimation above is based upon records held from 1987-1999 (the most recent date class in Preston *et al.* (2002)).

2.3 Method of population estimate^{2.4.3}

3 = from comprehensive inventory

Preston *et al.* (2002) represents a complete inventory survey of 10-km squares.

2.4 Quality of population data^{2.4.4}

Moderate

Although Preston *et al.* (2002) offers a good data source, coverage in Scotland may be slightly less extensive owing to the remote nature of much of the terrain. Further, although the surrogate measure of 10-km squares is useful where more detailed population data is lacking, it is essentially a coarse measure of distribution; it does not offer a true insight into populations at a local level. Data quality is therefore reported as moderate, rather than good.

2.5 Population trend^{2.4.5} & Population trend magnitude^{2.4.6}

Decreasing

Observations by species experts indicate that small, fragmented populations in the lowlands, and also populations within its core upland areas, continue to be lost at a gradual but steady rate.

2.6 Population trend period^{2.4.7}

1994 – 2006

2.7 Reasons for reported trend in population^{2.4.8}

3. Direct human influence (restoration, deterioration, destruction)

In the lowlands, declines have been attributed primarily to the agricultural improvement of marginal land, and the increased use of fertilisers.

In the Scottish uplands, there may have been a problem from overgrazing, or possibly undergrazing, where the plants get swamped by deep heather. The impact of this is not really known.

2.8 Justification of % thresholds for trends^{2.4.9}

Not applicable

2.9 Main pressures^{2.4.10}

100 Cultivation – intensification of pastoral agriculture

120 Fertilisation

810 Drainage – agricultural

140 Grazing

2.10 Threats^{2.4.11}

100 Cultivation – intensification of pastoral agriculture

120 Fertilisation

810 Drainage – agricultural

140 Grazing

2.11 Favourable reference population^{2.7.2}

Unknown

In the absence of a reliable population estimate, it is not appropriate to report a favourable reference population estimate. However, based on the decision tree in Note 1 (see ‘Assessing Conservation Status: UK Approach’), decreasing trends would indicate that any such value would be greater than current.

2.12 Population conclusion^{2.8}

Unfavourable – Inadequate

Although the favourable reference population is unknown, the European Commission recommends that a declining trend be used to indicate that population structure is deviating from norm. Hence, a judgement of Unfavourable is triggered; on the basis that trend is likely to have been less than 1% per annum, Unfavourable – Inadequate is favoured over Unfavourable – Bad.

3. Habitat for the species in the Biogeographic region or sea^{2.5}

Preston *et al.* (2002) states for *L. clavatum*: “A prostrate, evergreen perennial herb of heaths, moors and mountains. It is often frequent on base-rich micaceous soils, but also occurs on more acidic *Calluna* heath and *Nardus* grassland. Propagation is mostly vegetative, but spores can colonise new sites, particularly the disturbed soil of roadside embankments and quarries.”

Preston *et al.* (2002) states for *L. annotinum*: “A sprawling, evergreen herb typically found on mountains and moorlands amongst deep *Calluna* on hill slopes, and sometimes in *Pinus sylvestris* woods. It usually grows on acidic peaty soils, often overlying boulders, or in hollows where snow accumulates.”

3.1 Surface area of habitat^{2.5.2}

Unknown

3.2 Date of estimation^{2.5.3}

Not applicable

3.3 Quality of data on habitat area^{2.5.4}

Poor

3.4 Habitat trend^{2.5.5}

Unknown

Historically, much of England was nutrient poor. However, due to agricultural improvements, this is no longer the case. There is insufficient information to comment on more recent trends. The continuing declines in populations might suggest that the habitat continues to decline, but this may actually be due to old plants on small habitat fragments dying without regeneration being possible, despite the fact that the overall habitat area is currently stable. The grazing impacts in the upland areas are also poorly understood.

3.5 Habitat trend period^{2.5.6}

1994 – 2006

3.6 Reasons for reported trend in habitat^{2.5.7}

3 = Direct human influence (restoration, deterioration, destruction)

Agricultural improvement of English lowlands, overgrazing and undergrazing of parts of the Scottish highlands.

3.7 Suitable habitat for the species (in km²)^{2.7.3}

Unknown

Essentially these species could colonise any areas with low nutrient status where the grazing levels are not too high and there is no regular burning.

3.8 Habitat conclusion^{2.8}

Unknown

Historically, lowland *Lycopodium* habitat has declined in both area and quality, with many areas only containing small habitat fragments currently. However, insufficient information is known about current habitat conditions for these species to make a confident judgment on its status at this time.

4. Future Prospects^{2.6}

Poor prospects

The two *Lycopodium* species considered in this assessment are not offered legal protection in the UK, and are not included under any conservation lists. No conservation action is therefore planned at present.

In the lowlands, sites continue to be lost, possibly due to these existing only on small habitat fragments that are not viable for long-term populations. Without major habitat restoration work to enlarge these fragments, the prospects for *Lycopodium* remain poor. Even within the core upland range, *Lycopodium* may be in decline due to pressures from both over-grazing and under-grazing.

4.1 Future prospects conclusion^{2.8}

Unfavourable – Inadequate

The pressures are clearly significant, and are continuing to cause declines. However, it was not considered that the pressures should be classified as ‘severe’ at this time.

5. Overall Conclusion^{2.8}

Unfavourable-Inadequate

Range was Favourable, population and future prospects were assessed as Unfavourable – Inadequate; habitat was Unknown. Therefore, in accordance with Annex C, where one or more judgments are inadequate (but none are bad) the overall assessment is Unfavourable – Inadequate.

Table 5.1 Summary of conclusions

Parameter	Judgement	Grounds for Judgement (in accordance with Annex C)	Reliability*
Range	Favourable	Current range is equal to the favourable reference range, the trend is unknown	3
Population	Unfavourable – Inadequate	Any other combination Current population is less than the favourable reference population, but not greatly so	2
Habitat	Unknown	No or insufficient reliable information available	N/A
Future Prospects	Unfavourable – Inadequate	Any other combination Habitat restoration for these species is required to ensure that long-term viability is not at risk throughout the range	3
Overall Assessment	Unfavourable – Inadequate	One or more Unfavourable – Inadequate but no Unfavourable – Bad	2

*1=High, 2=Moderate, 3=Low

High – Expert opinion is that the concluding judgement accurately reflects the current situation based on a professional understanding of the species. For range, population, and habitat, quality of data used to establish the current estimate has been identified as “good”; data used to inform trends is comprehensive and up to date.

Moderate – A greater understanding of the feature, or the factors affecting it, is required before a confident concluding judgement can be made by experts. For range, population, and habitat, the current estimate and/or trend are based on recent, but incomplete or limited survey data; or alternately, a comprehensive, but outdated (pre-1994) review.

Low – Judgements, and comprising estimates, are based predominately on expert opinion.

N/A – Assessment conclusion is “unknown”, on the basis of insufficient reliable information.

6. References

PRESTON, C.D., PEARMAN, D.A. & DINES, T.D. 2002. *New Atlas of the British & Irish Flora*. Oxford University Press.

RUMSEY, F.J., 2007. An overlooked boreal clubmoss *Lycopodium lagopus* (Laest. ex Hartm.) Zinserl. ex Kusen. (Lycopodiaceae) in Britain. *Watsonia* **26**, 477-480.

Map Data Source

Vascular Plant Database, Botanical Society of the British Isles, via the Biological Records Centre.