

Hampshire Rare and Notable Bryophytes Register



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Cover: Four species of conservation concern with important populations in Hampshire: *Pallavicinia lyellii*, *Splachnum ampullaceum*, *Dicranum spurium* and *Codonoblepharon forsteri* (*Zygodon forsteri*).

January 2022 update:

Minor corrections and edits.

2.1 Habitats Directive rewritten to include mention of *Leucobryum albidum* and *Sphagnum* spp.

2.6 amended and Table 7 revised. All decline codes have been reviewed and tabulated separately for county, regional and national decline. Appendices updated to reflect changes.

1.0 GENERAL INTRODUCTION

1.1 Purpose and Content of the Register

This document updates an unpublished draft *Rare Bryophyte Register and Checklist for Hampshire* (Rumsey 2014). The main aim is to provide a list of species recorded in the county which are considered to be of conservation priority and importance. The selection of species therefore takes account of the published European and British Red Lists, lists of Nationally Rare and Scarce bryophytes and a compiled list of county 'rare' and 'scarce' species based on the existing records. The register also includes selected species of environmental, ecological and scientific importance. Species included in the register have been assigned to one of three County Notable categories.

Selection criteria for inclusion in the register and the rationale used for assigning taxa to Notable categories are set out below, followed by a review of the qualifying taxa for each of the selection criteria in **Section 2.0**. The register is presented as a table of qualifying species in **Appendix 1**, preceded by some summary statistics. A full checklist of all Hampshire species with their statuses and additional information is available as a separate Excel file.

This version of the Register does not present full details of records of rare or other notable species in the county; instead, summaries of the habitat and status of 30 of the more important species in Hampshire have been written. It is hoped that these can be expanded with more details and lists of records in a future issue. Hectad maps of Hampshire species have also been compiled and are available on the Hampshire and Isle of Wight Bryophytes website (www.jnecology.uk/bryophytes).

The Hampshire Rare and Notable Bryophytes Register also replaces the list of 13 Priority Species of bryophytes included in the Hampshire Biodiversity Action Plan (Hampshire Biodiversity Partnership 2000). A note on these is included in **Section 2.0** under 'County Responsibility Species'.

We hope that the publication of this register will help increase awareness and understanding of important bryophyte species and habitats for developers, planners, ecologists and bryologists working in the county and stimulate further recording. Sources of information used in compiling this register are listed below (section 1.5). For further information on rare and Notable species see the vice-county pages and distribution maps on the Hampshire and Isle of Wight Bryophytes website: www.jnecology.uk/bryophytes.

We would be happy to receive comments and corrections to this register, as well as records of bryophytes for the county. A spreadsheet recording form is available on the website. Contact details are as follows:

VC11 and general enquiries: John Norton (john@jnecology.uk)

VC12: Fred Rumsey (f.rumsey@nhm.ac.uk)

1.2 Nomenclature

Bryophytes are made up of Liverworts (Marchantiophyta), Hornworts (Anthocerotophyta) and Mosses (Bryophyta). The scientific names used in this document follow the 2020 checklist of British and Irish bryophytes (Blockeel et al. 2021a), with names in previous use given in brackets if different (these follow the Hill et al. [1988] vice-county census catalogue or its unpublished revisions). A new census catalogue, incorporating the updated names, was published in December 2021 (Blockeel et al. 2021b).

The taxa selected for the register are predominantly ‘full species’, but several infraspecific taxa have also been included where normally recorded as such, usually because they are clearly defined in their morphology and often also in their habitat and substrate preferences (see explanatory notes to **Appendix 1**). Note that the terms ‘species’ and ‘taxa’ are used somewhat interchangeably in this document, with ‘species’ preferred for the criteria names (e.g. ‘County Rare species’).

1.3 Criteria for Inclusion on the Register

Any taxon recorded in Hampshire (taken as VC11 and VC12 combined) has been included in the register if it meets at least one of the rarity and threat criteria or other attributes listed in **Box 1** below. This applies to all native, alien and recently increasing ‘anthropomorphic’ taxa.

Box 1: Summary of criteria and attributes for inclusion in the Hampshire Rare and Notable Bryophytes Register

Further information is given in **Section 2.0**.

- **National and international legislative status** – species included on Annex II of the Habitats Directive, on Schedule 8 of the Wildlife and Countryside Act or listed as Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- **National and international threat status** – species with threatened or Near Threatened status on the European Red List and British Red List.
- **County Responsibility Species** – species for which Hampshire is currently likely to support 10% or more of the British population.
- **National rarity status** – Nationally Rare (NR) and Nationally Scarce (NS) species occurring in 1–15 and 16–100 hectads of the Ordnance Survey national grid in Great Britain.
- **County rarity status** – County Rare (CR) and County Scarce (CS) species, assessed using existing data.¹
- **National, regional and county decline status** – species declining either nationally, regionally or within the county.²
- **Habitat indicator species** – species strongly associated with rare or declining semi-natural habitats or specialised bryophyte microhabitats.³
- **Species of environmental, ecological or scientific importance** – including species that serve important ecosystem functions, such as *Sphagnum*.⁴

1. The poor quality of historical bryophyte data for Hampshire meant that it was very difficult to carry out a purely numerical evaluation of county rarity status as has been done for vascular plants in Hampshire (see Rand 2017; Rand & Barker 2017). Furthermore, it was not possible (and perhaps not particularly useful) to carry out the assessment separately for the two vice-counties. County Rare status has therefore primarily been assigned to species recorded from 5 or fewer hectads and named localities, whilst County Scarce species are those recorded from <16 hectads or localities. See section **2.5** for further information.
2. Decline was assessed with reference to the latest national atlas (Blockeel et al. 2014), existing records and the authors’ experience of the species in the county.
3. A list of habitat indicator species in Hampshire has been drawn up based on their known ecology and habitat preferences, but the selection is provisional at the current time.
4. A full list of these has not yet been compiled, but they include wetland species of ecological and environmental importance, especially *Sphagnum*, which serve important ecosystem functions. Other species of purely scientific value could also be included.

1.4 Assignment of Notable Categories

Taxa qualifying for inclusion in the register under the criteria listed above have been assigned to a three-tier classification of conservation importance, each denoted by a code. These are therefore referred to as 'County Notable' categories, as follows:

CN1	High conservation priority species
CN2	Medium conservation priority species
CN3	Other species of environmental, ecological or scientific importance

These are intended to provide a simpler means of referring to the relative importance of species (particularly those with multiple designations and statuses) and could also be used in conjunction with a scoring system for carrying out site and habitat assessments (to be covered in a separate document). Notable categories have usually been assigned according to the highest qualifying criterion from **Box 1**:

Criteria (in approximate descending order of importance)	Notable category
National or international legislative status	CN1
National or international threat status (NT or above)	
County Responsibility Species	
Nationally Rare species	
County Rare species	
Nationally Scarce species	CN2
County Scarce species	
Habitat indicator species	CN3
Species of environmental, ecological or scientific importance	

Although it would be convenient to refer to the CN1 species as 'Hampshire Red List' species, this is not adopted here because they have not been assessed using the IUCN Red List methodology. Further review of the CN1 species is required because several have only been recorded on a single occasion, and could either be genuinely very rare in the county or simply overlooked due to lack of specialist recording. Some are recorded only from the New Forest but are not under conservation threat in Britain. See section **2.5** for further comments.

Judgement based on recent field recording experience has sometimes been used to assign a species or taxon to a different Notable category than its conservation status and historical records would indicate. For example, a few species classified as County Rare but undoubtedly under-recorded have been categorised as CN2 rather than CN1. These also include a number of critical taxa such as some *Bryum* spp. for which ripe sporophytes required for confident identification are rarely present. It should be noted that species decline status has not been used to directly determine Notable categories, but has been taken into account when making such judgements.

The CN3 category includes habitat indicator species and environmentally and/or ecologically important species which do not already qualify under CN1 or CN2 in terms of their threat or rarity

status. It was clearly important to incorporate such species into the register, since those that provide important ecosystem functions such as *Sphagnum* mosses and other wetland species would otherwise have been omitted (the exceptionally bryophyte-rich habitats of the New Forest mires adversely bias any county-wide rarity assessment of wetland species).

The remaining species not included in the above categories are those which are very common and widespread and not of any serious conservation concern in the county. They comprise the majority of woodland species (particularly epiphytes, many of which are increasing), common grassland and heathland species and many of those that grow on calcareous walls, concrete and tarmac. These are listed in the accompanying Excel file.

The analysis of records, and hence the assessment of Notable categories, is based on the data held by or submitted to the British Bryological Society (BBS) up to December 2017 (see 1.5), with some more recent records of local and rare species added manually. This issue of the register should therefore be regarded as a provisional, working document. Further review of the Notable categories will be carried out when all the recent records have been incorporated. There are also records from various sources, including bryophyte herbaria and Francis Rose's notebooks, which have so far have not been verified or input into the BBS dataset. However, the addition of these further records is unlikely to significantly change the present picture of distribution of the majority of species and should not affect the current assessment of County Notable categories, except in the case of species that are currently declining or increasing more rapidly.

Total counts of County Notable species

At the date of issue of this document the total number of taxa recorded from Hampshire is 499. They comprise three hornworts, 121 liverworts and 375 mosses. Totals and percentages of taxa in the Notable categories are as follows:

Notable category	No. of taxa
CN1	142 (28.5%)
CN2	115 (23.0%)
CN3	87 (17.4%)
Total Notable taxa in the register	344 (68.9%)
Taxa with no conservation status and not Notable	155 (31.1%)
Total taxa in Hampshire	499

Thus, the CN1 and CN2 taxa account for just over half of the Hampshire bryophyte flora and the notable categories combined to just over two-thirds of all taxa. See **Appendix 1** summary table for further statistics.

1.5 Sources of Information and Acknowledgements

The VC11 and VC12 records were provided by the Biological Records Centre (BRC). The authors would like to thank the BBS and Oli Pescott at BRC for his assistance in supplying and managing the datasets.

Rarity and conservation statuses of bryophytes are taken from the European Red List (Hodgetts et al. 2019), the current national lists of rare and scarce bryophytes (Pescott 2016), the revised British Red List (Hodgetts 2011), the list of NERC S41 Species of Principal Importance in England

(available online). Taxonomy and nomenclature follow the 2020 British checklist of bryophytes (Blockeel et al. 2021a). Information on national distribution and habitat preferences is based on the most recently published *Atlas of British & Irish Bryophytes* (Blockeel et al. 2014) and the BBS field guide (Atherton et al. 2010).

Published works on bryophytes for the county comprise the detailed account by Jean Paton (1961) for VC11, the account of the flora by Alan Crundwell and Francis Rose in the *Flora of Hampshire* (Brewis et al. 1996) and Rod Stern's *Atlas of South Hampshire Bryophytes* (Stern 2010a). Rod Stern also wrote a short account of bryophytes in the New Forest (Stern 2010b). A survey and assessment of rare and scarce bryophytes in the New Forest was carried out by Callaghan (2010).

We have also drawn on unpublished information included in the record cards of Rod Stern and Alan Crundwell (the previous VC11 and VC12 recorders) and on the notebook records of Francis Rose, kindly provided by the Sussex Wildlife Trust (these are available on the NBN Atlas, but are not currently included in the BBS/BRC dataset).

Much useful information has also been gathered through field meetings of the BBS Southern Group (or jointly with neighbouring groups), our own field excursions and from other bryologists recording in the county. We would like to thank all those who have contributed to our knowledge of the bryophyte flora of the county by attending meetings and sending in records, both past and present.

2.0 REVIEW OF QUALIFYING TAXA

2.1 National and International Legislative Status

See Table 1.

Bern Convention

Hamatocaulis vernicosus is the only species in Hampshire listed on the Bern Convention (*The Convention on the Conservation of European Wildlife and Natural Habitats*) and on Annex II of the Habitats Directive (*Animal and plant species of Community interest whose conservation requires the designation of Special Areas of Conservation*). It has only been recorded once in the county in the New Forest.

***Hamatocaulis vernicosus* Bern, Annex II, S41, Eur: VU, CN1**

A pleurocarp of wet mires, springs and flushes where there is some mineral enrichment and conditions are not strongly base-rich. In the UK it is best recorded in Wales, but also widespread and scattered over much of western Britain and Ireland. There are historical records for Norfolk and also Hampshire, where recorded at Holmsley Bog in the New Forest (VC11) in 1958 along a drainage ditch. Recent searches of the Holmsley area have failed to refind it, but it could still occur here or elsewhere in the New Forest in suitable habitat. It is not thought to be declining or under threat in Britain.

Table 1: Species recorded from Hampshire with European or national legislative status

For a detailed key to codes used in tables see **Appendix 1**. 'NNR last record' indicates the year of the last record for taxa not recently recorded, i.e. in the period 1990 onwards. Codes for Least Concern (LC) are omitted from the Red List columns in tables.

Taxon	Hectads	NNR last record	Bern	Habitats Directive	GB legislative status	Hants Notable
<i>Cephaloziella baumgartneri</i>	1				BAP, S41	CN1
<i>Codonoblepharon forsteri</i> (<i>Zygodon forsteri</i>)	3				Sch8, BAP, S41	CN1
<i>Dicranum spurium</i>	14				BAP, S41	CN1
<i>Fossombronia foveolata</i>	7				S41	CN1
<i>Hamatocaulis vernicosus</i>	1	1958	A1	Annex II		CN1
<i>Heterogemma capitata</i> (<i>Lophozia capitata</i>)	5	1985			BAP, S41	CN1
<i>Leptodontium gemmascens</i>	1	1917			BAP, S41	CN1
<i>Leucobryum glaucum</i>	29			Annex V		CN2
<i>Pallavicinia lyellii</i>	5				S41	CN1
<i>Sphaerocarpos europaeus</i> (<i>S. texanus</i>)	2				S41	CN2
<i>Sphagnum</i> (all species)				Annex V		
<i>Tortula cuneifolia</i>	1	1956			BAP, S41	CN1
<i>Tortula wilsonii</i>	2				BAP, S41	CN1
<i>Weissia condensa</i>	4				BAP, S41	CN1
<i>Weissia sterilis</i>	5				BAP, S41	CN1

Habitats Directive

Leucobryum glaucum and all species of *Sphagnum* are listed on Annex V of the Habitats Directive (Animal and plant species of Community interest whose taking in the wild and exploitation may be the subject of management measures). *L. glaucum* is very similar to *L. juniperoideum*, a recent taxonomic split and so not included on the annex. Both are widespread and locally abundant in Hampshire on acid soils in woodland and on wet heath, particularly in the New Forest. However, following molecular studies it is now believed that most records of *L. juniperoideum* in Britain actually refer to a different species, *L. albidum* (a paper is in preparation). *Leucobryum* is sold as 'Pincushion Moss', often online, and seems to be becoming popular with interior designers, so there is a concern that collecting from the wild may become more frequent. They are slow-growing species which would be easily harmed by collecting. For these reasons both have been included in the register under category **CN2**. The Sphagna which do not otherwise qualify as CN1 or CN2 are included under CN3 as indicators of high quality habitats.

Wildlife and Countryside Act

Codonoblepharon forsteri (*Zygodon forsteri*) is the only species occurring in Hampshire which is currently included on Schedule 8 of the Wildlife and Countryside Act 1981. It is listed in the register under **CN1** and also meets several other criteria for this category.

***Codonoblepharon forsteri* (*Zygodon forsteri*) Sch8, S41, Eur: EN, GB: EN, NR, CN1**

A specialist moss of rain tracks and wet pockets on roots and knotholes of Beech trees in the New Forest (VC11) and Epping Forest in Essex. In the New Forest it is restricted to four hectads, with the main stronghold being in the Rufus Stone area (SU21).

UK BAP and S41 species

There are 12 species in Hampshire listed on the former UK Biodiversity Action Plan as Priority Species or included in the list of Species of Principal Importance in England under Section 41 of the NERC Act 2006 (S41 species) (**Table 1**). These have all been given **CN1** notable status, except for the liverwort *Sphaerocarpos europaeus* (*S. texanus*), which is likely to be spreading in the county (it was recorded in the past from three localities in VC12 and more recently from two sites in the New Forest and two in Gosport, but not all records have yet been added to the dataset).

***Cephaloziella baumgartneri* BAP, S41, GB: EN, NR, CN1**

A tiny leafy liverwort of lightly shaded calcareous rock and similar substrates. It is restricted to a handful of sites predominantly in coastal areas of southern England. The only Hampshire population is at Netley Abbey (VC11), discovered at in 2013, but still present and thriving there in 2018, even though restricted to scattered small patches on a relatively short section of the perimeter wall.

***Dicranum spurium* BAP, S41, GB: VU, NS, CN1**

A moss of dry to wet heathland, typically associated with older heather stands. The main centres of population are the New Forest, the Thames Basin heaths and an area of eastern Scotland. The latest atlas (Blockeel et al. 2014) notes that it has declined in England due to loss and deterioration of its habitat. This is likely to be true in VC12 where it was recorded historically from six hectads, but only two recently. In the New Forest it is widespread but usually only present in small colonies. It has been historically recorded from all ten hectads and recently from at least five.

***Heterogemma capitata* (*Lophozia capitata*) BAP, S41, Eur: VU, GB: VU, NR, CN1**

A leafy liverwort associated with acidic sand and clay substrates on tracks, woodland rides and old sand pits. In Britain it is a lowland species, with a scattered distribution in south and east England. In Hampshire it has been recorded from two hectads in the New Forest (VC11) (one of which is now a golf course) and three from VC12, at Yateley Heath Wood (last recorded 1985), Shortheath Common and Silchester Common.

***Leptodontium gemmascens* BAP, S41, Eur: VU, GB: NT, NS, CN1**

This acrocarp is well known as a species of old thatched roofs. It prefers thatch in the later stages of decay, where not usually protected by galvanised wire netting. It has also been found on old grass and rush tussocks in a marshy meadow. It is restricted mainly to southern Britain, where generally rare and scattered. In Hampshire there is a single 1917 record from Romsey (VC11) 'on a wooden roof'.

***Pallavicinia lyellii* S41, Eur: VU, NS, CN1**

A thallose liverwort, in Hampshire typically found at the base of Alder *Alnus glutinosa* trees in wet woodland, or sometimes on tussocks of *Carex paniculata*. It appears to favour microhabitats that are damp but not waterlogged in winter. During a recent survey of the Hampshire populations by Callaghan (2019) it was confirmed from only three of about six of its former sites (all VC11), but at two of these only in very small quantity. The other more extensive population at Cadnam Common is still thriving. In September 2020 a large new population was discovered at Withycombe Shade on the Beaulieu River, in the east of the New Forest (VC11).

***Tortula cuneifolia* BAP, S41, GB: EN, NR, CN1**

An ephemeral acrocarp of bare, friable soil historically recorded mostly from scattered coastal sites in south-west England and Wales. It was recorded from Lee-on-the-Solent (VC11) in 1956, but not refound during recent searches of the area. It is strongly declining in Britain and probably no longer occurs in Hampshire.

***Tortula wilsonii* BAP, S41, GB: VU, NS, CN1**

An acrocarp with Mediterranean affinities which forms perennial patches on well-drained soil on hedgebanks and mud-capped walls. It is locally frequent on the Lizard in Cornwall, becoming scattered around other coastal areas in the south-west and Wales, but has disappeared from other historical sites on Anglesey, around the North Wales coast and from other scattered localities in England. In Hampshire, in VC11, there was a single record from Lymington on a coastal sandy bank in 1974, but more recently a sizeable colony was discovered on a south-facing bank with elm scrub by Anglesey Lagoon in Gosport, in January 2020.

***Weissia condensa* BAP, S41, GB: NT, NS, CN1**

An acrocarp of dry, exposed chalk grassland with a scattered distribution on chalk and limestone downland across southern England; one record from Ireland. In Hampshire recorded from at least three localities within the Butser Hill area, and also from Broughton Down and Old Winchester Hill (VC11). Blockeel et al. (2014) noted that some past records have proved to be errors for *Weissia controversa* var. *crispata*, which is nearly identical. Plants resembling *W. condensa* at Portsdown Hill have also proved to be this, and so its true status in Hampshire is uncertain. Hampshire records need to be reviewed.

***Weissia sterilis* BAP, S41, Eur: NT, GB: NT, NS, CN1**

An acrocarp of dry calcareous soil but much less common than other *Weissia* species and mainly restricted to the southern English chalk. It appears to be rare or overlooked in Hampshire (finding fruiting plants for identification is difficult), with recent records only from Butser Hill, Old Winchester Hill and Portsdown Hill (VC11). It has also been recorded from Broughton Down (VC11) in 1985/86 and Stockbridge Down (VC12) in 1986.

British endemic species in Hampshire

Weissia sterilis is the only species in Hampshire which is categorised as an endemic or near-endemic in Britain (Bosanquet et al. 2018). It also occurs in north-east France (Blockeel et al. 2014).

2.2 National and International Threat Status**European Red List**

There are 28 native species in Hampshire listed in categories other than Least Concern on the Red List of European bryophytes (alien species are not evaluated on the list) (**Table 2**). There is one Critically Endangered (CR) species (*Protolophozia herzogiana*), nine Vulnerable (VU), 15 Near Threatened (NT) and one Data Deficient (DD) (*Campylopus subulatus*). All the species in the threat categories qualify as **CN1** in the register, whilst *Campylopus subulatus* also does so on account of its County Rare status. The Near Threatened species fall under either **CN1** or **CN2**, depending on their county rarity status. Of the Vulnerable species only *Pallavicinia lyellii* and *Pottiopsis caespitosa* have been recorded in the county since 1990, but all of the Near Threatened species have been seen recently apart from *Entosthodon mouretii* and *Porella arboris-vitae*.

Table 2: European and British Red List species recorded from Hampshire

Taxon	Hectads	NRR last record	GB legislative status	Eur Red List	GB Red List	Hants Notable
<i>Acaulon mediterraneum</i>	1			NT	VU	CN1
<i>Acaulon muticum</i>	11			NT		CN2
<i>Aneura mirabilis</i>	4			NT		CN2
<i>Anthoceros agrestis</i>	6			NT		CN1
<i>Bryum creberrimum</i>	2	1959			NT	CN1
<i>Bryum gemmilucens</i>	1				NT	CN1
<i>Bryum intermedium</i>	5	1988			DD	CN1
<i>Campylopus subulatus</i>	1	1958		DD		CN1
<i>Campylostelium saxicola</i>	2	1967		VU		CN1
<i>Cephaloziella baumgartneri</i>	1		BAP, S41		EN	CN1
<i>Cephaloziella elachista</i>	3	1981		VU	NT	CN1
<i>Cephaloziella spinigera</i>	2	1975			NT	CN1
<i>Cephaloziella turneri</i>	1	1928			NT	CN1
<i>Codonoblepharon forsteri</i> (<i>Zygodon forsteri</i>)	4		WCA, BAP, S41	EN	EN	CN1
<i>Dialytrichia saxicola</i>	3				VU	CN2
<i>Dicranum spurium</i>	16		BAP, S41		VU	CN1
<i>Drepanocladus lycopodioides</i> (<i>Pseudocalliergon lycopodioides</i>)	1	1958		VU	NT	CN1
<i>Drepanocladus sendtneri</i>	1	1963		VU		CN1
<i>Ephemerum recurvifolium</i>	9			NT		CN2
<i>Fossombronia maritima</i>	1	1977			NT	CN1
<i>Hamatocaulis vernicosus</i>	1	1958		VU		CN1

Taxon	Hectads	NRR last record	GB legislative status	Eur Red List	GB Red List	Hants Notable
<i>Heterogemma capitata</i> (<i>Lophozia capitata</i>)	5	1985	BAP, S41	VU	VU	CN1
<i>Hypnum imponens</i>	8			NT		CN1
<i>Kandaea elodes</i> (<i>Campyliadelphus elodes</i>)	5			NT		CN1
<i>Leptodontium flexifolium</i>	4			NT		CN1
<i>Leptodontium gemmascens</i>	1	1917	BAP, S41	VU	NT	CN1
<i>Odontoschisma francisci</i> (<i>Cladopodiella francisci</i>)	12			NT		CN1
<i>Pallavicinia lyellii</i>	5		S41	VU		CN1
<i>Philonotis calcarea</i>	7			NT		CN1
<i>Porella arboris-vitae</i>	4	1988		NT		CN1
<i>Pottiopsis caespitosa</i>	4			VU		CN1
<i>Protolophozia herzogiana</i> (<i>Lophozia herzogiana</i>)	1			CR	VU	CN1
<i>Rhynchostegiella litorea</i>	8				NT	CN1
<i>Scapania curta</i>	1	1951			NT	CN1
<i>Scorpidium scorpioides</i>	8			NT		CN2
<i>Sematophyllum substrumulosum</i>	4				NT	CN2
<i>Splachnum ampullaceum</i>	9			NT		CN2
<i>Tortula cuneifolia</i>	1	1956	BAP, S41		EN	CN1
<i>Tortula schimperi</i>	1	1958			DD	CN1
<i>Tortula wilsonii</i>	2		BAP, S41		VU	CN1
<i>Trichocolea tomentella</i>	9			NT		CN2
<i>Tricholepidozia tetradactyla</i> (<i>Telaranea murphyae</i>)	1				VU	CN1
<i>Weissia condensa</i>	5		BAP, S41		NT	CN1
<i>Weissia sterilis</i>	6		BAP, S41	NT	NT	CN1

***Acaulon mediterraneum* Eur: NT, GB: VU, NR, CN1**

A tiny ephemeral moss of bare, disturbed ground; formerly regarded as a subspecies of *Acaulon muticum*. Recently confirmed from a cemetery in Fareham (VC11) in 2019, the only definite Hampshire record to date. Records mapped in the latest bryophyte atlas (Blockeel et al. 2014) are mainly in south-west England, but there have been more recent records from the coast of West Wales.

***Campylopus subulatus* Eur: DD, CN1**

Recorded on a single occasion on a gravel path in the New Forest (VC11) in 1958. A critical taxon which is undoubtedly overlooked by bryologists who are unfamiliar with it. It is frequent on forestry tracks in Wales and other parts of western Britain, so could be widespread in the New Forest and perhaps also on forested heathland sites in north-east Hampshire.

***Campylostelium saxicola* Eur: VU, NS, CN1**

A tiny acrocarp of damp, shaded sandstone rocks. Local and very scattered over Britain. Recorded historically from SU72 and SU73 (VC12), with the only localised record from Wheatham Hill (now part of Ashford Hangers NNR), at Steep, Petersfield in September 1967.

***Cephaloziella elachista* Eur: VU, GB: NT, NR, CN1**

A tiny leafy liverwort which grows amongst *Sphagnum* in bogs or amongst other vegetation on wet heaths. Only recorded from 19 widely scattered hectads in Britain and Ireland; four in the recent recording period (1990–2013). In Hampshire it was recorded from Shatterford Bog (SU30, VC11) in the New Forest in 1981 and from three sites in VC12: Blackmoor (SU73) in 1972, Shortheath Common (SU73) in 1951 and Tadley Common (SU66) in 1964. Few bryologists have made thorough searches for bog hepatics, so it could well be commoner in the county than the records suggest.

***Drepanocladus lycopodioides* (*Pseudocalliergon lycopodioides*) Eur: VU; GB: NT, NS, CN1**

A pleurocarp of strongly calcareous dune slacks and flushes; very scattered in Britain. There is a single 1958 record from Dibden Bottom in the New Forest (VC11). It could still occur here or at other sites since it is easily visually mistaken for *Scorpidium scorpiodes*, a frequent species of base-rich mires in the New Forest.

***Drepanocladus sendtneri* Eur: VU, NS, CN1**

A pleurocarp of highly calcareous wet ground in dune slacks and old marl pits, etc. with a scattered distribution mainly around the coast in Britain, but also inland in Ireland. Historically confused with *D. aduncus*. In Hampshire only recorded from Marlborough Deep's marl pits near Holmsley in the New Forest (VC11); the last record being 1963. Callaghan (2010) failed to refind it during a detailed survey but noted that suitable habitat still exists here and elsewhere in the New Forest.

***Hypnum imponens* Eur: NT, NS, CN1**

A pleurocarp of wet heath, raised bogs and damp acidic woodland with centres of population in northern England, southern Scotland and the Hampshire/Surrey area. Despite good availability of habitat in the county it seems to be at best scattered, but is easily overlooked and under-recorded due to its similarity with *H. jutlandicum*. It has been recorded from six hectads in the New Forest (VC11) and two in eastern Hampshire (VC12) (not since 1975 at Shortheath Common).

***Odontoschisma francisci* (*Cladopodiella francisci*) Eur: NT, NS, CN1**

A small and easily overlooked leafy liverwort of peaty banks and ditch sides, associated with heathland and moorland throughout Britain and parts of Ireland. It has been widely recorded in Hampshire in the past, particularly in the New Forest (VC11) and on the north-east heaths (VC12), but there are only recent records from three hectads in the New Forest.

***Pottiopsis caespitosa* Eur: VU, NS, CN1**

A scattered and possibly declining moss predominantly of chalk and limestone grassland sites in southern England, but also recorded from North Wales. It is an annual acrocarp of bare, disturbed chalky soil but is often sporadic in its appearance from year to year. In Hampshire, historically recorded from Farley Mount and Twyford Down (VC11), and more recently from Porton Down (VC12) (1989 and 2013) and Portsdown Hill (VC11) (2017 and 2018).

***Protolophozia herzogiana* (*Lophozia herzogiana*) Eur: CR, GB: VU, NR, CN1**

Recorded historically from heathland in Woolmer Forest (VC12) and from one other British site in Scotland. At Woolmer the last record was in 1997, but it has been searched for more recently and is probably now extinct. It is known only from five localities worldwide including one other in Europe, and in Australia and New Zealand (Blockeel et al. 2014). It has been suggested that it could be a genuinely rare bipolar species or possibly a 'mutant' form of another species.

British Red List

Twenty-five species in Hampshire are included in the British Red List (Hodgetts 2011) under categories other than Least Concern (**Table 2**). Three are classified as Endangered, seven as Vulnerable, 13 as Near Threatened and two as Data Deficient. Thirteen already qualify as **CN1** on the basis of the higher level criteria covered above, including the three Endangered species, *Cephaloziella baumgartneri*, *Codonoblepharon forsteri* and *Tortula cuneifolia*. Of the remaining 12 species all should qualify as **CN1**, but *Dialytrichia saxicola* and *Sematophyllum substrumulosum* are considered to be increasing in the southern Britain and are classified as **CN2** in anticipation that the British status is likely to be revised in the near future. Seven of the remaining 10 species have not been recorded recently in the county, including the two Data Deficient taxa, *Bryum intermedium* and *Tortula schimperi*.

***Dialytrichia saxicola* GB: VU, NR, CN2**

A patch-forming or cushion-forming acrocarp of calcareous substrates. It was only realised to be present in Britain in 2007, but the oldest herbarium record was from 1927. There have been several new vice-county records published for southern Britain in the last few years, and in VC11 it has been seen at four locations since 2018 in three different situations (on asphalt in light shade, on mortar on top of brick walls and on a church headstone under trees) (these are not all yet entered in the dataset).

***Rhynchostegiella litorea* GB: NT, NS, CN1**

A fine-leaved pleurocarp forming short swards on of calcareous tree bases, hedgerows and old walls with a distribution coinciding mainly with calcareous districts of southern England. In Hampshire it has been recorded from seven hectads in VC11 and one in VC12, but there are very few localised records.

***Sematophyllum substrumulosum* GB: NT, NS, CN2**

A pleurocarp of Mediterranean origin which typically occurs as an epiphyte on logs and stumps of trees or occasionally on living tree bases. It has been long established on Yew at Kingley Vale in Sussex and on the Isles of Scilly, but has spread across southern Britain and southern Ireland only in the last decade or so (and has reached North Wales and Northern Ireland). In Hampshire it was first recorded in 2016 at Creech Woods, Denmead (VC11) and Peak Copse, Basingstoke in 2020 (VC12). There have been four other recent records. It is likely to be widespread in the county and is probably no longer nationally scarce, but is assigned County Scarce and CN2 status for the time being.

***Tricholepidozia tetradactyla* (*Telaranea murphyae*) GB: VU, NR, CN1**

An alien species of leafy liverwort first recorded in 1961 from Tresco on the Isles of Scilly, and later also from St Mary's. It was found in two locations on the Bournemouth coast in 1996, just inside Dorset (VC9) and in 2002 at Alum Bay in South Hampshire (VC11). It grows with other acidophile liverworts on old logs under woodland and on sandy banks.

2.3 County Responsibility Species

The concept of County Responsibility Species (CRS) has been adopted here, defined as those taxa for which Hampshire is currently likely to support 10% or more of the British population. CRS status was evaluated by calculating the proportion of all-time hectad records for Hampshire out of the total for Britain using the figures presented in the national atlas (Blockeel et al. 2014) for the 1990–2013 recording period. This relatively crude method results in a provisional list of 16 species (**Table 3**), although not all potential species have yet been checked to see if they qualify and it is possible that a few others might do so if the calculation were to take into account population sizes. In addition to those species already qualifying as **CN1** under the higher level criteria in Tables 1 and 2, a further five are assigned to CN1 on the basis of this criterion: *Abietinella abietina*, *Cephalozia macrostachya*, *Herzogiella seligeri*, *Leptobarbula berica* and *Seligeria calycina* (see boxes below for four of these).

Table 3: County Responsibility Species of bryophytes in Hampshire

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants rarity	Hants Notable
<i>Abietinella abietina</i>	24					CS	CN1
<i>Cephalozia macrostachya</i>	13					CS	CN1
<i>Cephaloziella baumgartneri</i>	1		BAP, S41		EN	CR	CN1
<i>Cephaloziella elachista</i>	3	1981		VU	NT	CR	CN1
<i>Codonoblepharon forsteri</i> (<i>Zygodon forsteri</i>)	4		Sch8, BAP, S41	EN	EN	CR	CN1
<i>Dicranum spurium</i>	16		BAP, S41		VU	CS	CN1
<i>Herzogiella seligeri</i>	18						CN1
<i>Hypnum imponens</i>	8			NT		CS	CN1
<i>Leptobarbula berica</i>	16					CS	CN1
<i>Odontoschisma francisci</i> (<i>Cladopodiella francisci</i>)	12			NT		CS	CN1
<i>Pallavicinia lyellii</i>	5		S41	VU		CR	CN1
<i>Protolophozia herzogiana</i> (<i>Lophozia herzogiana</i>)	1			CR	VU	CR	CN1
<i>Rhynchostegiella litorea</i>	8				NT	CS	CN1
<i>Seligeria calycina</i>	26						CN1
<i>Weissia condensa</i>	5		BAP, S41		NT	CR	CN1
<i>Weissia sterilis</i>	6		BAP, S41	NT	NT	CR	CN1

***Abietinella abietina* NS, CN1**

A pleurocarp of dry, thin, exposed calcareous soil, especially in quarries and chalkpits, where it is characteristic of the CG7 NVC community (*Festuca ovina*-*Hieracium pilosella*-*Thymus* grassland). It is especially frequent in south and south-east England, including the Brecks, but also occurs in scattered sites around Britain and around part of the northern Irish coast. In Hampshire it is widespread but uncommon, sometimes occurring only as small patches within large sites. Better populations include those at Yew Hill Quarry, Kings Somborne (VC11), Portsdown Hill (VC11) and Micheldever Spoilheaps (VC12). The two forms var. *abietina* and var. *hystricosa* have been recognised, but are not clearly defined morphologically and have been confused in Hampshire, with both being recorded at some sites. However, our plants are likely all to belong to var. *hystricosa*.

***Cephalozia macrostachya* NS, CN1**

A leafy liverwort which generally grows amongst *Sphagnum* in bogs and mires. It is present in all the main bogs in the New Forest (VC11), with several recent records, and has been recorded in the past from Shortheath Common (SU73, VC12), most recently in 1975, and on older dates from two other hectads in VC12.

***Herzogiella seligeri* NS, CN1**

An epiphytic pleurocarp of logs and sometimes living tree roots in acid woodland. Its British distribution is strongly biased to south-east England. In Hampshire it is apparently widespread in both vice-counties, but there have been very few records in the recent recording period, possibly because it is easily passed over for other similar species. Because it appears to be stable or increasing in England (Blockeel et al. 2014), its status in the county has probably not changed, so it qualifies as a County Responsibility Species and **CN1** on the register.

***Seligeria calycina* CN1**

A tiny acrocarp which forms small patches on chalk stones and rocks, often in damp and sheltered situations. It is virtually restricted to the chalk of south-east England, extending north through Lincolnshire into south-east Yorkshire. In Hampshire it is commonest in the eastern hangars around Petersfield, but absent from the south-west of the county and the coast.

Hampshire Priority Species

Table 4 shows the list of 13 Priority Species of bryophytes in Hampshire published in Volume 2 of the Hampshire Biodiversity Action Plan (Hampshire Biodiversity Partnership 2000). *Ephemerum stellatum* is now considered to be conspecific with *E. serratum*, which has recently changed name to *E. stoloniferum* (confusingly, the much commoner *E. minutissimum* now takes the name of *E. serratum*). *Weissia sterilis* was listed under its older name of *Weissia tortilis*. It is not known who compiled the list or what criteria were used for selection. Seven species are already included on the register in category **CN1** on the basis of national legislation and threat criteria covered above. The remaining five species (*Ctenidium molluscum*, *Ephemerum stoloniferum*, *Lejeunea lamacerina*, *Orthotrichum sprucei* and *Targionia hypophylla*) have been assessed for county Notable status on the basis of the other criteria covered below and fall under categories **CN1** to **CN3**. Six of the 13 species qualify as County Responsibility Species.

Ctenidium molluscum was presumably included on the list because of the occurrence of the 'woodland taxon', especially in the New Forest. This name was coined by Francis Rose but was not formally described and is not currently recognised as being distinct from any of the other

recognised varieties. Since it is widespread in the county, *Ctenidium molluscum* is currently included in the register as a habitat indicator in the **CN3** category. *Seligeria calycina* may have been included because it has a restricted distribution in Europe (Blockeel et al. 2014), although it is currently classified as Least Concern on the European Red Data list.

Table 4: Hampshire Priority Species

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants CRS	Hants Notable
<i>Campylostelium saxicola</i>	2	1967		VU			CN1
<i>Codonoblepharon forsteri</i> (<i>Zygodon forsteri</i>)	4		Sch8, BAP, S41	EN	EN	Y	CN1
<i>Ctenidium molluscum</i>	41						CN3
<i>Ephemerum stoloniferum</i> (<i>E. serratum</i>)	9						CN2
<i>Hamatocaulis vernicosus</i>	1	1958		VU			CN1
<i>Lejeunea lamacerina</i>	11						CN2
<i>Orthotrichum sprucei</i>	4						CN1
<i>Pallavicinia lyellii</i>	5		S41	VU		Y	CN1
<i>Protolophozia herzogiana</i> (<i>Lophozia herzogiana</i>)	1			CR	VU	Y	CN1
<i>Seligeria calycina</i>	26					Y	CN1
<i>Targionia hypophylla</i>	3						CN1
<i>Weissia condensa</i>	5		BAP, S41		NT	Y	CN1
<i>Weissia sterilis</i>	6		BAP, S41	NT	NT	Y	CN1

2.4 National Rarity Status

As with vascular plants and other groups national rarity is categorised on the basis of the number of 10km squares (hectads) of the Ordnance Survey British grid in which species have been recorded during a defined time period. Nationally Rare species are those recorded from 1–15 hectads and Nationally Scarce species from 16–100 hectads. For bryophytes the most recent assessment is for the period 1970–2013 (Pescott 2016).

Nationally Rare species

Fifteen Nationally Rare species occur in Hampshire (**Table 5**), of which only one, *Riccia crystallina*, does not already qualify for county Notable status on the basis of the higher level criteria covered above. It is a presumed alien, and so was not assessed for Red List status by Hodgetts (2011). It is currently known from three sites in the New Forest, so is County Rare and assigned to **CN1**. All of the other species in the table are also County Rare and **CN1** except for *Dialytrichia saxicola*, an increasing species which has been placed in **CN2** since it is probably under-recorded (see under 2.2). Seven of the species listed have not been recorded recently and most of the remaining species are only known from a single locality.

It should be noted that three further species occurring in the county were not assessed by Pescott (2016), being ‘excluded on special grounds’; these are *Entosthodon mouretii*, which is ‘not clearly distinct from *E. fascicularis* in Britain’, *Flexitrichum flexicaule* (*Ditrichum flexicaule*) ‘not consistently separated from *D. gracile*’ and *Grimmia dissimulata*, noted as ‘under-recorded’. All are likely to be genuinely rare in Hampshire and have therefore been assigned to **CN1**. *Entosthodon mouretii* is also classified as Near Threatened in Europe.

Table 5: Nationally Rare bryophytes recorded from Hampshire

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants Notable
<i>Acaulon mediterraneum</i>	1			NT	VU	CN1
<i>Bryum creberrimum</i>	2	1959			NT	CN1
<i>Bryum gemmilucens</i>	1				NT	CN1
<i>Cephaloziella baumgartneri</i>	1		BAP, S41		EN	CN1
<i>Cephaloziella elachista</i>	3	1981		VU	NT	CN1
<i>Cephaloziella turneri</i>	1	1928			NT	CN1
<i>Codonoblepharon forsteri</i> (<i>Zygodon forsteri</i>)	4		Sch8, BAP, S41	EN	EN	CN1
<i>Dialytrichia saxicola</i>	3				VU	CN2
<i>Fossombronia maritima</i>	1	1977			NT	CN1
<i>Heterogemma capitata</i> (<i>Lophozia capitata</i>)	5	1985	BAP, S41	VU	VU	CN1
<i>Protolophozia herzogiana</i> (<i>Lophozia herzogiana</i>)	1			CR	VU	CN1
<i>Riccia crystallina</i>	1					CN1
<i>Scapania curta</i>	1	1951			NT	CN1
<i>Tortula cuneifolia</i>	1	1956	BAP, S41		EN	CN1
<i>Tricholepidozia tetradactyla</i> (<i>Telaranea murphyae</i>)	1				VU	CN1

Nationally Scarce species

Sixty-three Nationally Scarce species have been recorded in Hampshire (**Table 6**) of which 40 have not already been assigned a Notable category under the higher level criteria covered above. These qualify as **CN1** if they are also County Rare (28 species) or **CN2** if they are County Scarce (12 species) – see next section. They include *Lophocolea bispinosa*, an alien and *Hennediella macrophylla* a probable alien, both of which have relatively few records but are given County Scarce rather than County Rare status because they are known to be spreading anthropogenically and are presently under-recorded. *Lophocolea bispinosa* is locally abundant on short, damp acid grassland in the New Forest; *Hennediella macrophylla* on trampled soil under trees, usually near water, with records so far from Warblington (VC11), Burley (VC11) and Winchester (VC12).

Table 6: Nationally Scarce bryophytes recorded from Hampshire

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants Notable
<i>Abietinella abietina</i>	24					CN1
<i>Aloina ambigua</i>	3	1984				CN1
<i>Aloina brevirostris</i>	1	1957				CN1
<i>Aloina rigida</i>	2	1957				CN1
<i>Aneura mirabilis</i>	4			NT		CN2
<i>Anthoceros agrestis</i>	6			NT		CN1
<i>Atrichum tenellum</i>	1	1986				CN1
<i>Brachydontium trichodes</i>	1	1988				CN1
<i>Brachythecium salebrosum</i>	2	1984				CN2
<i>Bryum intermedium</i>	5	1988			DD	CN1
<i>Bryum tenuisetum</i>	13	1986				CN2
<i>Bryum torquescens</i>	5					CN1

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants Notable
<i>Campylophyllopsis calcarea</i> (<i>Campylophyllum calcareum</i>)	7					CN1
<i>Campylopus subulatus</i>	1	1958		DD		CN1
<i>Campylostelium saxicola</i>	2	1967		VU		CN1
<i>Cephalozia macrostachya</i>	13					CN1
<i>Cephalozia pleniceps</i>	1	1956				CN1
<i>Cephaloziella rubella</i>	7	1975				CN1
<i>Cephaloziella spinigera</i>	2	1975			NT	CN1
<i>Dicranum flagellare</i>	3	1975				CN1
<i>Dicranum polysetum</i>	3					CN1
<i>Dicranum spurium</i>	16		BAP, S41		VU	CN1
<i>Didymodon acutus</i> s.str.	1					CN1
<i>Drepanocladus lycopodioides</i> (<i>Pseudocalliergon lycopodioides</i>)	1	1958		VU	NT	CN1
<i>Drepanocladus sendtneri</i>	1	1963		VU		CN1
<i>Ephemerum crassinervium</i> subsp. <i>sessile</i> (<i>Ephemerum sessile</i>)	1	1985				CN1
<i>Fissidens crispus</i>	5					CN2
<i>Fossombronia foveolata</i>	8		S41			CN1
<i>Grimmia orbicularis</i>	2					CN1
<i>Gymnostomum viridulum</i>	2					CN1
<i>Hamatocaulis vernicosus</i>	1	1958		VU		CN1
<i>Hennediella macrophylla</i>	3					CN2
<i>Herzogiella seligeri</i>	18					CN1
<i>Hygroamblystegium humile</i>	6					CN2
<i>Hypnum imponens</i>	8			NT		CN1
<i>Kandaea elodes</i> (<i>Campyliadelphus elodes</i>)	5			NT		CN1
<i>Leptodontium gemmascens</i>	1	1917	BAP, S41	VU	NT	CN1
<i>Lophocolea bispinosa</i>	7					CN2
<i>Microbryum starckeanum</i>	2					CN1
<i>Nardia geoscyphus</i>	4	1975				CN1
<i>Odontoschisma francisci</i> (<i>Cladopodiella francisci</i>)	12			NT		CN1
<i>Oleolophozia perssonii</i> (<i>Lophozia perssonii</i>)	2					CN1
<i>Pallavicinia lyellii</i>	5		S41	VU		CN1
<i>Philonotis caespitosa</i>	2	1960				CN1
<i>Plasteurhynchium striatulum</i>	6					CN2
<i>Pottiopsis caespitosa</i>	4			VU		CN1
<i>Rhynchostegiella curviseta</i>	12					CN2
<i>Rhynchostegiella litorea</i>	8				NT	CN1
<i>Ricciocarpos natans</i>	3					CN1
<i>Sematophyllum substrumulosum</i>	4				NT	CN2
<i>Sphaerocarpos europaeus</i> (<i>Sphaerocarpos texanus</i>)	3		S41			CN2
<i>Sphaerocarpos michelii</i>	5					CN2
<i>Sphagnum pulchrum</i>	1					CN1
<i>Sphagnum subsecundum</i>	7					CN2
<i>Targionia hypophylla</i>	3					CN1
<i>Tortella inflexa</i>	9					CN2
<i>Tortella squarrosa</i> (<i>Pleurochaete squarrosa</i>)	3					CN1
<i>Tortula schimperi</i>	1	1958			DD	CN1
<i>Tortula wilsonii</i>	2		BAP, S41		VU	CN1

Taxon	Hectads	NRR last record	GB legislative status	ERL	GB Red List	Hants Notable
<i>Ulota coarctata</i>	2					CN1
<i>Weissia condensa</i>	5		BAP, S41		NT	CN1
<i>Weissia rutilans</i>	2	1989				CN1
<i>Weissia sterilis</i>	6		BAP, S41	NT	NT	CN1

Didymodon acutus is currently Nationally Scarce but may now warrant Nationally Rare status following molecular work showing that most plants previously recorded as this are referable to *D. icmadophilus* (reported by Blockeel 2019, p. 29). Conversely *D. icmadophilus*, which was Nationally Rare, may no longer be so. *D. acutus* s.str. has so far been confirmed from only one site in VC11, so is County Rare and **CN1** (see box).

***Didymodon acutus* NR? CR CN1**

An acrocarp forming small cushions on bare, chalky substrates; probably confined to chalk and limestone in southern Britain. Current national rarity and threat status uncertain (it may be under-recorded or genuinely very rare). A record for Portsdown Hill (VC11) collected in December 2014 is one of only three so far that have been confirmed in Britain; the others being from North Somerset (VC6) in 1991 and the Isle of Wight in December 2020 (VC10). A plant photographed during a meeting at Porton Down (VC12) in March 2013 is almost certainly this taxon, but was not collected at the time.

2.5 County Rarity Status

Limitations in assessing distribution and abundance of bryophytes in Hampshire

Making accurate assessments of distribution and abundance of bryophytes in the county was not possible for several reasons but mainly due to the imprecise methods of field recording and inputting of data used in the past. Historical records from the time that Jean Paton was based in the county (c.1957–1960) and many recent records have only been added to the dataset at hectad resolution, usually without a site name or date given. More recent recording by the previous VC11 and VC12 recorders was carried out by use of master recording cards for each 5km square, but only rare and interesting species were recorded as individual records with a site name, date and grid reference. The other records were usually assigned to a nominal date or date period.

In assessing rarity status consideration has also been given to the fact that relatively few experienced bryologists have ever worked in the county, and being a large county coverage has generally been thin on the ground or variable over time, even for bryophyte rich areas such as the New Forest. This has made it difficult to assess the true status of uncommon and apparently rare species and also to make any meaningful analysis for different time periods (e.g. to measure possible decline).

Taxa have changed taxonomically over time, so it was not always possible to assign records of some historically recorded taxa to one or other currently recognised taxa (e.g. those now split into two or more species). This was therefore taken into account when analysing county rarity status for certain species (see explanatory notes to **Appendix 1**).

Assessment of county rarity status has therefore been based on the number of hectads recorded in the county, either for all records or for the period from 1990 onwards, and by making manual counts of the number of named localities, if these have been given. Judgements based on our current knowledge and field recording experience, have been made so that county rarity categories

could be assigned, particularly for under-recorded species. The most recent national atlas (Blockeel et al. 2014) has sometimes been useful in helping to assess the likely true distribution of species in the county, i.e. by comparison with other better-recorded areas and from the commentary given in the text.

A precautionary approach has therefore sometimes been taken in assigning to County Rare and County Scarce categories and the corresponding **CN1** and **CN2** Notable categories. It is likely that several under-recorded species have been placed in categories higher than is necessary, but it was felt better to include such species so that they are flagged up in data searches (see Error! Reference source not found.) rather than to ignore them. The county rarity and Notable categories will therefore need to be periodically reviewed as more recording and data input is carried out, but hopefully the number of future changes will be relatively small.

County Rare species

County Rare (CR) status has been assigned to taxa with five or fewer recorded hectads and usually not more than five named localities. Taxa historically recorded from a greater number of hectads have also been assigned County Rare status if there have been no recent records and they are known to be declining nationally or regionally.

Species recorded from a single location are automatically coded as County Rare if they are considered to be genuinely rare; this applies to newly discovered species such as *Bryum gemmilucens* and *Pohlia bulbifera* found in 2019. Quite a number of historical records are 'one-off' finds, particularly from the New Forest, which is relatively under-recorded apart from the richer bogs and some other hotspots, so the true status of these in the county can only be guessed at. It is quite possible that a few of these are misidentifications of critical and taxonomically problematic species, such as *Racomitrium ericoides* and *Philonotis caespitosa*.

All County Rare species qualify for **CN1** Notable status. The recently split *Ulota crispa* group (*U. crispa* s.str., *U. crispula* and *U. intermedia*) are assumed to be widespread in the county (or at least not rare) and have not been assigned CR status even though there are relatively few confirmed records at present (only a single record of *U. intermedia*). In total, 136 taxa are classified as County Rare in Hampshire, equal to 27% of the register total of 499 taxa; 59 of these have not been recorded recently (in the period 1990 onwards) and 73 do not otherwise qualify for Notable status under any of the higher level criteria. Fifteen taxa recorded from 6 to 15 hectads but not recently qualify on the basis of known national or regional decline. One further species (*Thuidium assimile*) was included even though not thought to be declining nationally (it is recorded historically from 8 hectads, but its habitat of short calcareous grassland is known to have seriously declined in the county).

County Scarce species

County Scarce (CS) species are those which are not County Rare but generally recorded from 15 or fewer hectads and/or named localities over the whole recording period. Species known to be regionally declining have been classified as County Scarce even if historically recorded from more than 15 hectads (i.e. if not qualifying as County Rare). Several additional species have also been counted as County Scarce on the basis of suspected decline in the county (i.e. those with a large discrepancy in numbers of hectads over the past and recent periods, and also recorded in less than 10 hectads or <5 named localities in the recent period). These have been marked as possible County Decline – see next section. Many species thought to have been under-recorded since 1990 but not likely to be in decline have not been categorised as CS, but some will have been coded as habitat indicators and may therefore be included in the register as **CN3** species.

In total, 115 taxa are classified as County Scarce in Hampshire, equal to about 23% of the register total of 499 taxa. Of these, 26 species already qualify for the register under the higher level criteria described above and the remaining species are all assigned to **CN2**. Of those which already qualify, 8 are CN1 and the remainder CN2. Only a single CS taxon, *Dicranella cerviculata*, has not been recorded recently. Eight of the species which do qualify under higher level criteria do so as **CN1**.

2.6 Decline

Actual declines in bryophytes may be related to factors such as changes in atmospheric pollution (including competition with increasing nitrogen-tolerant species), climate change, loss or deterioration of habitats and changes in management practices. However, apparent declines may also be explained by changes in observer coverage and expertise or of recording intensity over time. For further information see the introductory chapters (especially Chapters 3-5) in Volume 1 of Blockeel et al. (2014).

A provisional list of 43 declining species in Hampshire compiled in earlier issues of this document has now been revised to give a list totalling 100 taxa (**Table 7**). The information on national decline (ND) and regional decline (RD) is based mainly on the analysis of bryophyte trends given in Chapter 5 and Appendix 5.2 of Blockeel et al. (2014) (authored by Preston & Hill) and on the individual species accounts in those two volumes. Most of the species listed as 'decreasing generally' in Appendix 5.2 have been assigned to ND and those listed as 'decreasing in lowlands' to RD.

County decline (CD) for Hampshire was assessed by comparing hectad counts of species for all dates with the counts for the recent recording period (1990 onwards), but it was not possible to base the assessment purely on a calculation because many species have been grossly under-recorded recently (several species with no recent records were not thought likely to have declined). Therefore, species were only coded if the decline was thought to be real. Very rare species in the county, especially those with only a small number of historical records, have not been coded as CD, even if declining regionally or nationally, because there is no evidence that they have ever been properly established here. Such species will in any case receive **CN1** status due to their county rarity.

Codes for county decline, regional decline and national decline are shown in separate columns in the table (previously there were combined into a single column). Because a precise assessment of decline was difficult the decline codes have not been used as stand-alone criteria for assigning Notable categories in the register, but have been used to support the assignment of a Notable category under other criteria, particularly county rarity status.

Table 7: Declining species in Hampshire

Taxon	Hectads	Hectads 1990-	NRR last record	GB rarity	Hants rarity	CD	RD	ND	Hants Notable
<i>Abietinella abietina</i>	24	10		NS	CS	CD	RD		CN1
<i>Aloina brevirostris</i>	1		1957	NS	CR		RD	ND	CN1
<i>Anthoceros agrestis</i>	6	1		NS	CR		RD	ND	CN1
<i>Aulacomnium palustre</i>	26	15					RD		CN3
<i>Bartramia pomiformis</i>	21	6			CS	CD	RD		CN2
<i>Bazzania trilobata</i>	2	1			CR		RD		CN1
<i>Blasia pusilla</i>	6	2			CR		RD	ND	CN1
<i>Brachytheciastrum velutinum</i>	51	15				CD	RD	ND	CN2

Taxon	Hectads	Hectads 1990-	NRR last record	GB rarity	Hants rarity	CD	RD	ND	Hants Notable
<i>Brachythecium glareosum</i>	23	5			CS	CD			CN2
<i>Breutelia chrysocoma</i>	2		1989		CR		RD		CN1
<i>Bryoerythrophyllum recurvirostrum</i>	47	16				CD	RD		–
<i>Bryum alpinum</i>	8	6					RD		–
<i>Bryum caespiticium</i>	9	5					RD	ND	–
<i>Bryum gemmilucens</i>	1	1		NR	CR		RD	ND	CN1
<i>Bryum intermedium</i>	5		1988	NS	CR		RD	ND	CN1
<i>Bryum moravicum</i>	25	7					RD		–
<i>Bryum pallens</i>	24	7					RD	ND	–
<i>Calliergon giganteum</i>	13	6			CS		RD		CN2
<i>Calliergonella lindbergii</i>	29	9					RD		–
<i>Campylium chrysophyllum</i> (<i>Campyliadelphus chrysophyllus</i>)	30	16				CD			CN3
<i>Campylium protensum</i>	27	9			CS	CD	RD	ND	CN2
<i>Campylium stellatum</i>	18	11					RD		CN3
<i>Campylophyllopsis calcarea</i> (<i>Campylophyllum calcareum</i>)	7	1		NS	CR	CD	RD	ND	CN1
<i>Campylopus fragilis</i>	14	1			CR	CD	RD	ND	CN1
<i>Cephalozia bicuspidata</i>	34	15					RD		–
<i>Cephaloziella rubella</i>	7		1975	NS	CR	CD	RD	ND	CN1
<i>Cephaloziella spinigera</i>	2		1975	NS	CR		RD	ND	CN1
<i>Cirriphyllum piliferum</i>	47	23				CD			CN3
<i>Climacium dendroides</i>	21	9			CS	CD			CN2
<i>Dicranella cerviculata</i>	11		1980		CS	CD	RD	ND	CN2
<i>Dicranum bonjeanii</i>	20	7				CD	RD	ND	CN3
<i>Dicranum fuscescens</i>	2	1			CR		RD		CN1
<i>Dicranum spurium</i>	16	11		NS	CS		RD	ND	CN1
<i>Ditrichum heteromallum</i>	6	2			CS		RD		CN2
<i>Drepanocladus lycopodioides</i> (<i>Pseudocalliergon lycopodioides</i>)	1		1958	NS	CR		RD	ND	CN1
<i>Encalypta streptocarpa</i>	20	8			CS	CD			CN2
<i>Encalypta vulgaris</i>	3	3			CR		RD	ND	CN1
<i>Entodon concinnus</i>	20	7			CS	CD			CN2
<i>Fissidens osmundoides</i>	2	1			CR		RD		CN1
<i>Fossombronia pusilla</i>	3	2			CR		RD	ND	CN1
<i>Gymnocolea inflata</i>	20	5					RD		CN3
<i>Hylocomium splendens</i>	37	9			CS	CD	RD		CN2
<i>Isopaches bicrenatus</i> (<i>Lophozia bicrenata</i>)	8		1986		CR	CD	RD	ND	CN1
<i>Kurzia pauciflora</i>	16	9					RD		CN3
<i>Leptodontium flexifolium</i>	4	1			CR		RD	ND	CN1
<i>Leucodon sciurioides</i>	38	8			CS	CD	RD		CN2
<i>Loeskeobryum brevirostre</i>	8		1973		CR	CD	RD		CN1
<i>Lophozia ventricosa</i>	15	6					RD		CN3
<i>Marchantia quadrata</i> (<i>Preissia quadrata</i>)	5	2			CR		RD		CN1
<i>Mylia anomala</i>	14	4			CS		RD		CN2
<i>Nardia scalaris</i>	17	3			CS	CD	RD		CN2

Taxon	Hectads	Hectads 1990-	NRR last record	GB rarity	Hants rarity	CD	RD	ND	Hants Notable
<i>Neckera pumila</i>	34	3			CS	CD	RD		CN2
<i>Neckera smithii</i> (<i>Leptodon smithii</i>)	24	5			CS	CD	RD		CN2
<i>Odontoschisma francisci</i> (<i>Cladopodiella francisci</i>)	12	3		NS	CS	CD	RD	ND	CN1
<i>Odontoschisma sphagni</i>	17	9					RD		CN3
<i>Palustriella commutata</i>	5	2			CR		RD		CN1
<i>Philonotis calcarea</i>	7	3			CR		RD		CN1
<i>Philonotis fontana</i>	23	9					RD		CN3
<i>Physcomitrium pyriforme</i>	26	9					RD	ND	–
<i>Plagiochila porelloides</i>	28	4				CD	RD		CN3
<i>Plagiothecium denticulatum</i>	44	8				CD	RD		CN3
<i>Plagiothecium latebricola</i>	22	7				CD	RD	ND	CN3
<i>Pogonatum aloides</i>	29	8					RD		CN3
<i>Pogonatum nanum</i>	8	2			CR	CD	RD	ND	CN1
<i>Pohlia nutans</i>	49	7				CD	RD	ND	CN3
<i>Polytrichum commune</i>	29	19					RD		CN3
<i>Polytrichum piliferum</i>	31	10					RD		CN3
<i>Pottiopsis caespitosa</i>	4	2		NS	CR		RD		CN1
<i>Pseudocrossidium revolutum</i>	40	6				CD			CN3
<i>Ptilidium pulcherrimum</i>	11	1			CS	CD	RD	ND	CN2
<i>Racomitrium lanuginosum</i>	10	3			CS		RD		CN2
<i>Rhizomnium pseudopunctatum</i>	5	4			CR		RD		CN1
<i>Rhodobryum roseum</i>	7	1			CR	CD	RD	ND	CN1
<i>Riccardia chamedryfolia</i>	28	8					RD		–
<i>Riccia fluitans</i>	11	3			CS	CD	RD	ND	CN2
<i>Saccogyna viticulosa</i>	2	2			CR		RD		CN1
<i>Scapania irrigua</i>	20	8					RD		CN3
<i>Scapania nemorea</i>	22	5				CD	RD		CN3
<i>Scapania undulata</i>	13	4			CS		RD		CN2
<i>Sciuro-hypnum populeum</i>	14	5			CS	CD			CN2
<i>Scleropodium touretii</i>	18	6					RD		CN3
<i>Scorpidium revolvens</i>	7	7			CS		RD		CN2
<i>Scorpidium scorpioides</i>	8	6			CS		RD		CN2
<i>Solenostoma hyalinum</i>	9	1			CS		RD		CN2
<i>Sphagnum compactum</i>	21	12					RD	ND	CN3
<i>Sphagnum papillosum</i>	21	14					RD		CN3
<i>Sphagnum rubellum</i> (<i>Sphagnum capillifolium</i> subsp. <i>rubellum</i>)	12	12					RD		CN3
<i>Sphagnum tenellum</i>	21	11					RD		CN3
<i>Straminergon stramineum</i>	13	7			CS		RD		CN2
<i>Thuidium assimile</i>	8		1984		CR	CD			CN1
<i>Tortula cuneifolia</i>	1		1956	NR	CR		RD	ND	CN1
<i>Tortula lindbergii</i>	15	3			CR	CD	RD	ND	CN1
<i>Tortula subulata</i>	20	3			CS	CD	RD	ND	CN2
<i>Tortula wilsonii</i>	2	1		NS	CR		RD	ND	CN1
<i>Warnstorfia fluitans</i>	15	5					RD	ND	CN3

Taxon	Hectads	Hectads 1990-	NRR last record	GB rarity	Hants rarity	CD	RD	ND	Hants Notable
<i>Weissia angustifolia</i> (<i>Weissia longifolia</i> var. <i>angustifolia</i>)	24	7				CD			CN3
<i>Weissia controversa</i> var. <i>controversa</i>	4	4			CS		RD		CN2
<i>Weissia controversa</i> var. <i>crispata</i>	4	4			CS		RD		CN2
<i>Weissia rutilans</i>	2		1989	NS	CR		RD	ND	CN1
<i>Weissia sterilis</i>	6	3		NS	CR	CD	RD	ND	CN1

National Decline

Thirty-seven nationally declining taxa occur in Hampshire, all of which are also considered to be regionally declining. Only 18 of these have been coded as county declining; the others generally being too rare or under-recorded in the county to assess whether there has been a definite trend over time. Exceptions are *Dicranum spurium*, *Sphagnum compactum* and *Warnstorfia fluitans* which are probably stable in the New Forest, though *Dicranum spurium* could be declining on the north-east Hampshire heaths. It is interesting that *Physcomitrium pyriforme* is included in the list of taxa 'decreasing generally' in Appendix 5.2 of the atlas, so is here coded as ND. It is a species of wet pastures and nutrient-enriched mud, but is unlikely to be declining in Hampshire, even though there is a quite a large difference between the historical hectad count of 26 compared to 9 in the 1990- period. This and two other taxa (*Bryum caespitium* and *B. pallens*) are not listed under any notable category in the register, though *B. pallens* should perhaps qualify as County Scarce and **CN2**.

Regional Decline

Not surprisingly, 90 of the 100 taxa are coded as regionally declining, but only 30 are also considered to be declining in the county. Of these, only one has not been assigned Hampshire notable status: *Bryoerythrophyllum recurvirostrum*, which even though likely to have declined here, is still also fairly widespread.

Regionally and county declining taxa include several species of chalk grassland and exposed chalk and calcareous soil (such as *Abietinella abietina*, *Campylium protensum*, *Campylophyllopsis calcarea*, *Rhodobryum roseum*, *Tortula lindbergii* and *Weissia sterilis*); epiphytic species, such as *Leucodon sciuroides*, *Neckera pumila* and *N. smithii*; plus some for which the cause of the decline is unknown, e.g. *Bartramia pomiformis*, *Brachytheciastrum velutinum*, *Campylopus fragilis* and *Ptilidium pulcherrimum*; though in some cases could be related to historical changes in atmospheric sulphur and nitrogen. There are no recent records for *Cephaloziella rubella*, *Dicranella cerviculata*, *Isopaches bicrenatus* and *Loeskeobryum brevirostre*. The decline of species of chalk and limestone habitats is especially worrying. Open, disturbed chalk grassland has seriously declined in the county through reduction in grazing and the closure of many old chalk quarries. This habitat loss has probably also affected others on the list (see below) including *Brachythecium glareosum*, *Campylium chrysophyllum*, *Encalypta streptocarpa* and *Entodon concinnus*.

Bartramia pomiformis, *Hylocomium splendens*, *Leucodon sciuroides*, *Neckera smithii* and *Tortula subulata* were reasonably widespread in the past and relatively well recorded, each occurring historically in 20 hectads; therefore regional decline has been used to justify current classification as County Scarce and **CN2**. *Ptilidium pulcherrimum* was historically recorded from about 10 named localities (11 hectads), but only one recently. It is an easily overlooked species so has also been classified as County Scarce/**CN2**.

The 60 non-CD taxa include many more that are rare or under-recorded and several further species considered to be stable, especially bog and wetland species which are holding their own in the New Forest and probably also in the north-east heaths, such as *Aulacomnium palustre*, *Campylium stellatum*, *Odontoschisma sphagni*, *Polytrichum commune* and several Sphagna. However, further recording and analysis is needed so that these species can be reviewed again in the future.

County Decline

A further 10 species have been coded as county decline (CD), which are not also RD or ND. In most cases this has been justified by a large change in recorded hectads between the two time periods. They comprise *Brachythecium glareosum*, *Campylium chrysophyllum*, *Cirriphyllum piliferum*, *Climacium dendroides*, *Encalypta streptocarpa*, *Entodon concinnus*, *Pseudocrossidium revolutum*, *Sciuro-hypnum populeum*, *Thuidium assimile* and *Weissia angustifolia*. It can be seen that several of these are associated with chalk and limestone habitats, as remarked on above. Only one taxon, *Thuidium assimile*, is coded as **CN1** on the basis of its county rarity status. It was last recorded in 1984 and may be extinct, though is a taxonomically problematic species. Five of the 10 species are categorised CS/**CN2** and four as **CN3** as habitat indicators.

2.7 Ecologically and Environmentally Important Species

Habitat indicator species

Species in this category have been manually selected according to their known habitat preferences and distribution in the county. They include: (a) species known to have strong associations with important and often declining semi-natural habitats (such as bog, fen, wet woodland and chalk downland) and (b) species characteristically associated with specialised bryophyte microhabitats and substrates, such as drying pond margins, bare/disturbed acid and calcareous soils, shaded dry banks in acid woodland and hard chalk and limestone rock. A few of the scarcer species of arable farmland have also been selected, especially where they also occur in other disturbed habitats.

Very common and widespread species have generally not been coded as habitat indicators, since they are not under conservation threat in the county. They comprise species occurring in our better-represented Priority Habitats, such as lowland dry heath, dry acid grassland and semi-natural broadleaved woodland, and those associated with urban habitats, especially calcareous walls, concrete, mortar and tarmac. Most woodland epiphytes have not been selected because many are increasing in response to increases in nitrogen pollution.

A total of 207 taxa in Hampshire have been coded as habitat indicators in the register, of which 87 do not otherwise qualify for Notable status under other criteria, so are assigned to the **CN3** category. The list requires further review.

Species of environmental, ecological or scientific importance

A definitive list of species in these categories has not yet been drawn up, but all such species are likely also to be habitat indicators, and will be assigned to Notable category **CN3** or higher in the register. In particular, they include *Sphagnum* mosses which contribute to a large proportion of the total plant biomass in bogs and wet heaths where they perform important ecosystem functions by sequestering carbon as peat and attenuating runoff of rainwater. Mosses may also contribute to filtering of pollutants in wetland ecosystems. Other species of purely ecological or scientific value could also be included in this category.

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APPENDIX 1: HAMPSHIRE RARE AND NOTABLE BRYOPHYTES REGISTER

Introduction

The table below gives the summary version of the Hampshire Rare and Notable Bryophytes Register, correct at October 2021. Names used follow the 2020 checklist (Blockeel et al. 2021). A more detailed version is available as an Excel spreadsheet file which also serves as a checklist for all taxa recorded in the county. Notes on the columns and a key to the codes used are given below. The table and spreadsheet were generated from a Microsoft Access database administered by John Norton.

The record and hectad counts are based on the BBS/BRC records (either existing or recently submitted) up to October 2021 but some records dating from 2018-2021 have not yet been input. Some of the record and hectad counts and last dates in the table have been manually updated to reflect these additional records. The distribution maps shown on the Hampshire and Isle of Wight Bryophytes website (www.jnecology.uk/bryophytes/hantsmaps.html) use the same data.

Grouping and assignation of taxa

Many taxa are represented by more than one BRC code, relating to changes in how they were recorded over time, particularly with respect to variations in taxonomic rank and aggregate grouping. For this reason it was necessary to assign records to a standardised list of taxa names and BRC codes so they could be grouped together for analysis and mapping.

Most taxa have been grouped at species level, but some subspecies and varieties have also been grouped separately, particularly if this is how they are listed in the vice-county census catalogue. Such taxa are usually clearly defined in their morphology and often also in their habitat and substrate preferences. Examples include the three subspecies of *Hypnum cupressiforme* and two of the three varieties of *Weissia controversa* which occur in Hampshire. *Microbryum davallianum* has been listed as var. *davallianum* because a second variety, var. *commutatum* is usually recorded separately, but has so far not been recorded in Hampshire, even though likely to be present. In a few cases a taxonomic rank qualifier, either 's.str.' (in the strict sense) or 's.l.' (in the broad sense) has been added to the name to make it clear as to what it refers. The BRC codes are not shown in the table below, but are given on the spreadsheet version. The taxon names are unique within the register.

The process of grouping and assigning taxon names and codes to each record on the Hampshire database was achieved by creating a cross-reference ('lookup') table so that the assigned names and codes could be updated through database queries. This table is available on request.

Some decisions had to be made as to how to treat records of certain taxa recorded differently in the past, including those that have since been split into two species. For some, this was relatively straightforward, e.g. past records of *Schistidium apocarpum* were assumed to refer to *S. crassipilum*, since *S. apocarpum* s.str. is now known to be predominantly a western and northern species and is not yet confirmed for Hampshire. However, it was considered that several other split taxa were best excluded from the analysis. Similarly, taxa recorded at an aggregate level (which frequently happens with bryophytes, when capsules are not present for critical identification) were also usually excluded from the analysis, even though in some cases it was likely that the majority of records were likely to apply to one much commoner taxon (e.g. in the case of *Aloina aloides*).

Excluded taxa have been marked with an 'X' in a field in the lookup table and each corresponding record in the dataset has also been similarly marked.

Part of the reason for applying fairly strict grouping and filtering of past records in this manner was so as not to mask patterns of distribution shown on the recently updated hectad maps and therefore to give more impetus to future recording efforts (i.e. to encourage the filling of gaps in distribution and recording taxa more critically). Allowance has sometimes been made in assigning County Notable categories to such taxa, where the number of records and hectads may have been adversely affected by this process.

A large number of duplicate 'hectad marker' records have also been marked for exclusion in the database. These were apparently entered by previous VC Recorders for mapping purposes, consisting of records of each taxon for each recorded hectad for a nominal start and end date.

Key to codes and statuses

* = spreadsheet only

Group	Bryophyte group: H = hornwort, L = liverwort, M = moss.
Native status	Native status in Hampshire: A = alien or probable alien, N = native.
TaxonID*	Taxon unique identifier (=BRC number). This is the taxon ID assigned to the records for grouping under single species or subspecies.
Taxon	Taxon scientific name (as assigned to records for grouping purposes; unique in this table). Follows the 2020 checklist.
Hectads	No of hectads recorded in Hampshire (all years).
Records*	No of records (all years) [includes many duplicate entries, especially for rarities entered twice or more into the database through different sources].
Hect 1990	No of hectads, 1990 onwards
Recs 1990*	No of records, 1990 onwards
Last VC11*	Year of most recent record in VC11
Last VC12*	Year of most recent record in VC12
NRR last record	Year of most recent record for taxa not recorded in either vice-county 1990 onwards.
ERL	European Red List (Hodgetts et al. 2019): CR = Critically Endangered EN = Endangered VU = Vulnerable NT = Near Threatened DD = Data Deficient
Nat legis	WCA = listed on Schedule 8 of the Wildlife & Countryside Act, 1981 (as amended) BAP = listed as Priority Species on former UKBAP S41 = Species of Principal Importance in England on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006
GB Red List	Species included on revised national Red List (Hodgetts 2011) under threat categories: EN = Endangered VU = Vulnerable NT = Near Threatened [DD = Data Deficient - not used as criterion]
GB rarity	Nationally rare and scarce status, as revised by Pescott (2016): NR = nationally rare (present in 1-15 hectads of the OS national grid) NS = nationally scarce (present in 16-100 hectads) (NR) = Previously nationally rare but no post-1970 records () = excluded on special grounds
HBAP	P = Hampshire Priority Species listed in Volume 2 of the Hampshire Biodiversity Action Plan (Hampshire Biodiversity Partnership 2000)
Hants CRS	Y = County Responsibility Species (species for which Hampshire is currently likely to support 10% or more of the British population)

Group	Bryophyte group: H = hornwort, L = liverwort, M = moss.
Hants rarity	Hampshire rarity status: CR = County Rare. Taxa recorded from <6 hectads and <6 named localities. Also includes some nationally and regionally declining taxa recorded from 6-15 hectads historically but with no recent records. CS = County Scarce. Taxa recorded from <16 named localities and hectads. Also includes some regional and county declining taxa recorded historically from >15 hectads, but <10 recently and typically with <5 named localities recently
Decline	ND = national decline (predominantly lowland England) RD = regional decline CD = county decline
Indicators	Ind = Habitat indicator species
Hants Notable	Hampshire Notable bryophytes classification: CN1 = High conservation priority species CS2 = Medium conservation priority species CN3 = Other species of environmental, ecological or scientific importance

Statistical summary

Attribute	Count	% of total taxa
Total taxa	499	100.0%
Hornworts	3	0.6%
Liverworts	121	24.2%
Mosses	375	75.2%
Alien	9	1.8%
Native	490	98.2%
Taxa recorded in 1 hectad	55	11.0%
Taxa recorded in 2-3 hectads	45	9.0%
Taxa recorded in 4-5 hectads	40	8.0%
Taxa recorded in 6-15 hectads	117	23.4%
Taxa recorded in 16-30 hectads	94	18.8%
Taxa recorded in >30 hectads	148	29.7%
Total	499	100.0%
No. of taxa not recorded 1990 onwards	61	12.2%
National legislation (WCA, BAP or S41)	12	16.0%
European Red List CR	1	0.0%
European Red List EN	1	0.2%
European Red List VU	9	1.8%
European Red List NT	16	3.2%
European Red List DD	1	0.4%
Total	28	5.6%
GB Red List EN	3	0.0%
GB Red List VU	7	0.0%
GB Red List NT	13	0.0%
GB Red List DD	2	0.0%
Total	25	0.0%
Nationally Rare	15	0.0%

Attribute	Count	% of total taxa
Nationally Scarce	63	0.0%
Total	78	0.0%
HBAP Priority Species	13	0.0%
County Responsibility Species	16	3.2%
County Scarce	115	23.0%
County Rare	136	27.3%
Total	251	50.3%
National decline	37	7.4%
Regional decline	90	18.0%
County decline	40	8.0%
All decline categories combined	100	20.0%
Habitat indicators	207	41.5%
County Notable CN1	142	28.5%
County Notable CN2	115	23.0%
County Notable CN3	87	17.4%
County Notable total	344	68.9%
Not Notable	155	31.1%

Hampshire Rare and Notable Bryophytes Register – Summary Table

The full checklist is on the accompanying Excel spreadsheet. Last updated 27/2/2022.

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Abietinella abietina	24	10					NS		Y	CS	CD	RD		Ind	CN1
M	N	Acaulon mediterraneum	1	1		NT		VU	NR			CR					CN1
M	N	Acaulon muticum	11	8		NT						CS				Ind	CN2
M	N	Aloina aloides	13	4												Ind	CN3
M	N	Aloina ambigua	3		1984				NS			CR					CN1
M	N	Aloina brevirostris	1		1957				NS			CR		RD	ND		CN1
M	N	Aloina rigida	2	1					NS			CR					CN1
L	N	Aneura mirabilis	4	1		NT			NS			CS				Ind	CN2
L	N	Aneura pinguis	30	10												Ind	CN3
M	N	Anomodon viticulosus	33	15												Ind	CN3
H	N	Anthoceros agrestis	6	1		NT			NS			CR		RD	ND	Ind	CN1
H	N	Anthoceros punctatus	6	4								CS				Ind	CN2
M	N	Atrichum tenellum	1		1986				NS			CR					CN1
M	N	Aulacomnium palustre	26	15										RD		Ind	CN3
M	N	Bartramia pomiformis	21	6								CS	CD	RD		Ind	CN2
L	N	Bazzania trilobata	2	1								CR		RD		Ind	CN1
L	N	Blasia pusilla	6	2								CR		RD	ND	Ind	CN1
M	N	Blindiadelpus recurvatus	3		1984							CR					CN1
M	N	Brachydontium trichodes	1		1988				NS			CR					CN1
M	N	Brachytheciastrum velutinum	51	15									CD	RD	ND		CN2
M	N	Brachythecium glareosum	23	5								CS	CD			Ind	CN2
M	N	Brachythecium salebrosum	2		1984				NS			CR					CN2
M	N	Breutelia chrysocoma	2		1989							CR		RD			CN1
M	N	Bryum algovicum	8	1								CS					CN2
M	N	Bryum archangelicum	2	2								CR				Ind	CN1
M	N	Bryum bornholmense	9	5								CS					CN2
M	N	Bryum creberrimum	2		1959			NT	NR			CR					CN1
M	N	Bryum donianum	5	3								CR					CN1
M	N	Bryum gemmiferum	4	3								CR					CN1
M	N	Bryum gemmilucens	1	1				NT	NR			CR		RD	ND		CN1
M	N	Bryum intermedium	5		1988			DD	NS			CR		RD	ND		CN1

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Bryum pallescens	1	1								CR					CN2
M	N	Bryum pseudotriquetrum	24	13												Ind	CN3
M	N	Bryum sauteri	2		1982							CR					CN1
M	N	Bryum tenuisetum	13		1986				NS			CS					CN2
M	N	Bryum torquescens	5	2					NS			CR				Ind	CN1
M	N	Calliergon cordifolium	22	9												Ind	CN3
M	N	Calliergon giganteum	13	6								CS		RD		Ind	CN2
L	N	Calypogeia neesiana	1		1958							CR					CN1
L	N	Calypogeia sphagnicola	7	3								CS				Ind	CN2
M	N	Campylium chrysophyllum	30	16									CD			Ind	CN3
M	N	Campylium protensum	27	9								CS	CD	RD	ND	Ind	CN2
M	N	Campylium stellatum	18	11										RD		Ind	CN3
M	N	Campylophyllopsis calcarea	7	1					NS			CR	CD	RD	ND	Ind	CN1
M	N	Campylopus brevipilus	13	5								CS					CN2
M	N	Campylopus fragilis	14	1								CR	CD	RD	ND		CN1
M	N	Campylopus subulatus	1		1958	DD			NS			CR					CN1
M	N	Campylostelium saxicola	2		1967	VU			NS	P		CR					CN1
L	N	Cephalozia catenulata	1		1970							CR					CN1
L	N	Cephalozia connivens	24	10												Ind	CN3
L	N	Cephalozia curvifolia	7	5								CS					CN2
L	N	Cephalozia lunulifolia	15	2								CS					CN2
L	N	Cephalozia macrostachya	13	7					NS		Y	CS				Ind	CN1
L	N	Cephalozia pleniceps	1		1956				NS			CR					CN1
L	N	Cephaloziella baumgartneri	1	1			BAP, S41	EN	NR		Y	CR				Ind	CN1
L	N	Cephaloziella divaricata	29	8												Ind	CN3
L	N	Cephaloziella elachista	3		1981	VU		NT	NR		Y	CR					CN1
L	N	Cephaloziella hampeana	14	1								CS				Ind	CN2
L	N	Cephaloziella rubella	7		1975				NS			CR	CD	RD	ND		CN1
L	N	Cephaloziella spinigera	2		1975			NT	NS			CR		RD	ND		CN1
L	N	Cephaloziella turneri	1		1928			NT	NR			CR					CN1
L	N	Chiloscyphus pallescens	16	3								CS					CN2
M	N	Cinclidotus fontinaloides	8	3								CS				Ind	CN2
M	N	Cirriphyllum crassinervium	38	11												Ind	CN3
M	N	Cirriphyllum piliferum	47	23									CD			Ind	CN3
M	N	Climacium dendroides	21	9								CS	CD			Ind	CN2

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Codonoblepharon forsteri	4	4		EN	Sch8, BAP, S41	EN	NR	P	Y	CR				Ind	CN1
M	N	Ctenidium molluscum	41	26						P						Ind	CN3
M	N	Dialytrichia saxicola	3	3				VU	NR			CR					CN2
M	N	Dichodontium pellucidum	5	2								CR					CN1
M	N	Dicranella cerviculata	11		1980							CS	CD	RD	ND		CN2
M	N	Dicranella rufescens	15	2								CS					CN2
M	N	Dicranodontium denudatum	1		1973							CR					CN1
M	N	Dicranum bonjeanii	20	7									CD	RD	ND	Ind	CN3
M	N	Dicranum flagellare	3	1					NS			CR					CN1
M	N	Dicranum fuscescens	2	1								CR		RD			CN1
M	N	Dicranum majus	22	6												Ind	CN3
M	N	Dicranum montanum	16	8												Ind	CN3
M	N	Dicranum polysetum	3	2					NS			CR					CN1
M	N	Dicranum spurium	16	11			BAP, S41	VU	NS		Y	CS		RD	ND	Ind	CN1
M	N	Dicranum tauricum	21	11													CN2
M	N	Didymodon acutus s.str.	1	1								CR				Ind	CN1
M	N	Didymodon ferrugineus	1		1941							CR					CN1
M	N	Didymodon umbrosus	6	3								CS					CN2
L	N	Diplophyllum obtusifolium	1		1981							CR					CN1
M	N	Ditrichum heteromallum	6	2								CS		RD		Ind	CN2
M	N	Drepanocladus lycopodioides	1		1958	VU		NT	NS			CR		RD	ND		CN1
M	N	Drepanocladus polygamus	1		1957							CR					CN1
M	N	Drepanocladus sendtneri	1		1963	VU			NS			CR					CN1
M	N	Encalypta streptocarpa	20	8								CS	CD			Ind	CN2
M	N	Encalypta vulgaris	3	3								CR		RD	ND	Ind	CN1
M	N	Entodon concinnus	20	7								CS	CD			Ind	CN2
M	N	Entosthodon fascicularis	15	4												Ind	CN3
M	N	Entosthodon mouretii	1		1969	NT			()			CR					CN1
M	N	Entosthodon obtusus	9	3								CS					CN2
M	N	Ephemerum crassinervium subsp. sessile	1		1985				NS			CR					CN1
M	N	Ephemerum recurvifolium	9	5		NT						CS					CN2
M	N	Ephemerum stoloniferum	9	2						P		CS					CN2
M	N	Eucladium verticillatum	11	2								CS					CN2

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Fissidens adianthoides	33	16												Ind	CN3
M	N	Fissidens crispus	5	4					NS			CS					CN2
M	N	Fissidens dubius	27	13												Ind	CN3
M	N	Fissidens gracilifolius	20	5												Ind	CN3
M	N	Fissidens incurvus	26	9												Ind	CN3
M	N	Fissidens osmundoides	2	1								CR		RD			CN1
M	N	Fissidens pusillus	9	5								CS					CN2
M	N	Flexitrichum flexicaule	4	3					()			CR				Ind	CN1
M	N	Flexitrichum gracile	11	11												Ind	CN3
L	N	Fossombronina foveolata	8	6			S41		NS			CS				Ind	CN1
L	N	Fossombronina incurva	3	3								CR					CN1
L	N	Fossombronina maritima	1		1977			NT	NR			CR					CN1
L	N	Fossombronina pusilla	3	2								CR		RD	ND		CN1
L	N	Frullania fragilifolia	5	5								CS				Ind	CN2
L	N	Frullania tamarisci	31	11												Ind	CN3
M	N	Grimmia dissimulata	1		1988				()			CR					CN1
M	N	Grimmia orbicularis	2	2					NS			CR				Ind	CN1
M	N	Grimmia trichophylla	9	3								CS				Ind	CN2
L	N	Gymnocolea inflata	20	5										RD		Ind	CN3
M	N	Gymnostomum viridulum	2	2					NS			CR				Ind	CN1
M	N	Gyroweisia tenuis	32	1												Ind	CN3
M	N	Hamatocaulis vernicosus	1		1958	VU			NS	P		CR					CN1
L	N	Haplomitrium hookeri	1		1816							CR					CN1
L	N	Harpalejeunea mollerii	1	1								CR					CN1
M	N	Hedwigia stellata	1	1								CR				Ind	CN1
M	N	Hennediella heimii	12	7								CS				Ind	CN2
M	A	Hennediella macrophylla	3	3					NS			CS					CN2
M	N	Herzogiella seligeri	18	6					NS		Y						CN1
M	N	Heterocladium flaccidum	1	1								CR					CN1
L	N	Heterogemma capitata	5		1985	VU	BAP, S41	VU	NR			CR					CN1
M	N	Homalia trichomanoides	40	12												Ind	CN3
M	N	Homalothecium lutescens	36	23												Ind	CN3
M	N	Hookeria lucens	19	9												Ind	CN3
M	N	Hygroamblystegium humile	6	2					NS			CS				Ind	CN2
M	N	Hygroamblystegium tenax	21	8												Ind	CN3

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Hygroamblystegium varium	17	2												Ind	CN3
M	N	Hygrohypnum luridum	9	4								CS				Ind	CN2
M	N	Hylocomiadelphus triquetrus	41	22												Ind	CN3
M	N	Hylocomium splendens	37	9								CS	CD	RD		Ind	CN2
M	N	Hyocomium armoricum	2	2								CR				Ind	CN1
M	N	Hypnum imponens	8	4		NT			NS		Y	CS				Ind	CN1
L	N	Isopaches bicrenatus	8		1986							CR	CD	RD	ND		CN1
L	N	Jungermannia atrovirens	1	1								CR					CN1
L	N	Jungermannia pumila	1		1988							CR					CN1
M	N	Kandaea elodes	5	3		NT			NS			CR				Ind	CN1
L	N	Kurzia pauciflora	16	9										RD		Ind	CN3
L	N	Kurzia sylvatica	1		1977							CR					CN1
L	N	Lejeunea cavifolia	15	2								CS				Ind	CN2
L	N	Lejeunea lamacerina	11	3						P		CS				Ind	CN2
M	N	Leptobarbula berica	16	8							Y	CS				Ind	CN1
M	N	Leptodontium flexifolium	4	1		NT						CR		RD	ND		CN1
M	N	Leptodontium gemmascens	1		1917	VU	BAP, S41	NT	NS			CR					CN1
M	N	Leskea polycarpa	24	7												Ind	CN3
M	N	Leucobryum glaucum	32	13												Ind	CN2
M	N	Leucobryum juniperoideum	16	13												Ind	CN2
M	N	Leucodon sciuroides	38	8								CS	CD	RD		Ind	CN2
M	N	Loeskeobryum brevirostre	8		1973							CR	CD	RD			CN1
L	A	Lophocolea bispinosa	7	7					NS			CS					CN2
L	N	Lophozia excisa	9	5								CS				Ind	CN2
L	N	Lophozia ventricosa	15	6										RD		Ind	CN3
L	N	Marchantia polymorpha subsp. polymorpha	4		1960							CR					CN1
L	N	Marchantia quadrata	5	2								CR		RD		Ind	CN1
L	N	Mesoptychia badensis	6	5								CS				Ind	CN2
L	N	Mesoptychia turbinata	26	11												Ind	CN3
M	N	Microbryum curvicolium	9	4								CS				Ind	CN2
M	N	Microbryum davallianum var. davallianum	29	10												Ind	CN3
M	N	Microbryum floerkeanum	18	7												Ind	CN3
M	N	Microbryum rectum	26	10												Ind	CN3
M	N	Microbryum starckeanum	2	1					NS			CR				Ind	CN1

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Mnium stellare	4	1								CR				Ind	CN1
L	N	Mylia anomala	14	4								CS		RD		Ind	CN2
L	N	Nardia geoscyphus	4		1975				NS			CR					CN1
L	N	Nardia scalaris	17	3								CS	CD	RD		Ind	CN2
M	N	Neckera complanata	50	20												Ind	CN3
M	N	Neckera crispa	17	5												Ind	CN3
M	N	Neckera pumila	34	3								CS	CD	RD		Ind	CN2
M	N	Neckera smithii	24	5								CS	CD	RD		Ind	CN2
M	N	Nogopterium gracile	11	5								CS				Ind	CN2
L	N	Odontoschisma denudatum	14	7												Ind	CN3
L	N	Odontoschisma fluitans	10	7												Ind	CN3
L	N	Odontoschisma francisci	12	3		NT			NS		Y	CS	CD	RD	ND	Ind	CN1
L	N	Odontoschisma sphagni	17	9										RD		Ind	CN3
L	N	Oleolophozia perssonii	2	2					NS			CR				Ind	CN1
L	N	Orthocaulis attenuatus	2	1								CR					CN1
M	N	Orthotrichum cupulatum	14	8								CS					CN2
M	N	Orthotrichum sprucei	4	1						P		CR					CN1
M	N	Oxyrrhynchium schleicheri	22	8												Ind	CN3
M	N	Oxyrrhynchium speciosum	23	11												Ind	CN3
L	N	Pallavicinia lyellii	5	4		VU	S41		NS	P	Y	CR				Ind	CN1
M	N	Palustriella commutata	5	2								CR		RD		Ind	CN1
M	N	Palustriella falcata	7	4								CS				Ind	CN2
L	N	Pellia neesiana	11	8												Ind	CN3
H	N	Phaeoceros laevis s.l.	7	4								CS				Ind	CN2
M	N	Philonotis caespitosa	2		1960				NS			CR					CN1
M	N	Philonotis calcarea	7	3		NT						CR		RD		Ind	CN1
M	N	Philonotis fontana	23	9										RD		Ind	CN3
M	N	Physcomitrium patens	8	2								CS				Ind	CN2
L	N	Plagiochila asplenioides	31	6												Ind	CN3
L	N	Plagiochila bifaria	1	1								CR					CN1
L	N	Plagiochila porelloides	28	4									CD	RD		Ind	CN3
L	N	Plagiochila spinulosa	1		1925							CR					CN1
M	N	Plagiomnium cuspidatum	2		1900							CR					CN1
M	N	Plagiomnium elatum	10	4								CS				Ind	CN2
M	N	Plagiothecium denticulatum	44	8									CD	RD		Ind	CN3

Group	Native status	Taxon	Hectads	Hectads 1990-	NRR last record	ERL	Nat legis	GB Red List	GB rarity	HBAP	Hants CRS	Hants rarity	CD	RD	ND	Ind	Hants Notable
M	N	Plagiothecium laetum	2	1								CR					CN1
M	N	Plagiothecium latebricola	22	7									CD	RD	ND	Ind	CN3
M	N	Plagiothecium undulatum	29	12												Ind	CN3
M	N	Plasteurhynchium striatulum	6	2					NS			CS				Ind	CN2
M	N	Platygyrium repens	3	3								CR					CN2
M	N	Pleuroidium subulatum	10	3								CS				Ind	CN2
M	N	Pleurozium schreberi	33	12												Ind	CN3
M	N	Pogonatum aloides	29	8										RD		Ind	CN3
M	N	Pogonatum nanum	8	2								CR	CD	RD	ND		CN1
M	N	Pogonatum urnigerum	7	2								CS					CN2
M	N	Pohlia bulbifera	1	1								CR					CN1
M	N	Pohlia camptotrachela	1		1955							CR					CN1
M	N	Pohlia drummondii	6	1								CS					CN2
M	N	Pohlia elongata	1		1905							CR					CN1
M	N	Pohlia lescuriana	12	5								CS					CN2
M	N	Pohlia nutans	49	7									CD	RD	ND	Ind	CN3
M	N	Pohlia wahlenbergii	32	6												Ind	CN3
M	N	Polytrichum commune	29	19										RD		Ind	CN3
M	N	Polytrichum juniperinum	53	29												Ind	CN3
M	N	Polytrichum longisetum	12	6								CS					CN2
M	N	Polytrichum perigoniale	1		1950							CR					CN1
M	N	Polytrichum piliferum	31	10										RD		Ind	CN3
M	N	Polytrichum strictum	3		1973							CR					CN1
L	N	Porella arboris-vitae	4		1988	NT						CR				Ind	CN1
L	N	Porella cordaeana	1	1								CR					CN1
L	N	Porella platyphylla	40	16												Ind	CN3
M	N	Pottiopsis caespitosa	4	2		VU			NS			CR		RD			CN1
L	N	Protolophozia herzogiana	1	1		CR		VU	NR	P	Y	CR					CN1
M	N	Pseudocrossidium revolutum	40	6									CD			Ind	CN3
L	N	Ptilidium ciliare	7	2								CS					CN2
L	N	Ptilidium pulcherrimum	11	1								CS	CD	RD	ND		CN2
M	N	Racomitrium elongatum	7	6								CS				Ind	CN2
M	N	Racomitrium ericoides	1	1								CR					CN1
M	N	Racomitrium fasciculare	3	2								CR					CN1
M	N	Racomitrium heterostichum	5		1983							CR					CN1

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M	N	Racomitrium lanuginosum	10	3								CS		RD		Ind	CN2
L	N	Reboulia hemisphaerica	12	6								CS				Ind	CN2
M	N	Rhizomnium pseudopunctatum	5	4								CR		RD		Ind	CN1
M	N	Rhodobryum roseum	7	1								CR	CD	RD	ND	Ind	CN1
M	N	Rhynchostegiella curviseta	12	7					NS			CS				Ind	CN2
M	N	Rhynchostegiella litorea	8	6				NT	NS		Y	CS				Ind	CN1
M	N	Rhynchostegiella teneriffae	7	5								CS				Ind	CN2
M	N	Rhynchostegium megapolitanum	14	8								CS					CN2
M	N	Rhytidiadelphus loreus	29	12												Ind	CN3
L	N	Riccardia incurvata	5	2								CR				Ind	CN1
L	N	Riccardia latifrons	11	5								CS				Ind	CN2
L	N	Riccardia multifida	11	6												Ind	CN3
L	N	Riccardia palmata	3	3								CR					CN1
L	N	Riccia cavernosa	4	3								CR				Ind	CN1
L	A	Riccia crystallina	1	1					NR			CR					CN1
L	N	Riccia fluitans	11	3								CS	CD	RD	ND	Ind	CN2
L	N	Riccia subbifurca	8	2								CS					CN2
L	N	Ricciocarpos natans	3	1					NS			CR				Ind	CN1
L	N	Saccogyna viticulosa	2	2								CR		RD		Ind	CN1
M	N	Sanionia uncinata	6	1								CS				Ind	CN2
M	N	Sarmentypnum exannulatum	17	6												Ind	CN3
L	N	Scapania aspera	4	1								CR				Ind	CN1
L	N	Scapania compacta	4		1987							CR					CN1
L	N	Scapania curta	1		1951			NT	NR			CR					CN1
L	N	Scapania gracilis	3	1								CR					CN1
L	N	Scapania irrigua	20	8										RD		Ind	CN3
L	N	Scapania nemorea	22	5									CD	RD		Ind	CN3
L	N	Scapania undulata	13	4								CS		RD		Ind	CN2
L	N	Schistochilopsis incisa	1		1950							CR					CN1
M	N	Schistostega pennata	1		1982							CR					CN1
M	N	Sciuro-hypnum plumosum	6	3								CS				Ind	CN2
M	N	Sciuro-hypnum populeum	14	5								CS	CD			Ind	CN2
M	N	Scleropodium touretii	18	6										RD		Ind	CN3
M	N	Scorpidium cossonii	8	7								CS				Ind	CN2

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M	N	Scorpidium revolvens	7	7								CS		RD		Ind	CN2
M	N	Scorpidium scorpioides	8	6		NT						CS		RD		Ind	CN2
M	N	Scorpiurium circinatum	9	6								CS					CN2
M	N	Seligeria calcarea	7	5								CS				Ind	CN2
M	N	Seligeria calycina	26	10						P	Y					Ind	CN1
M	N	Sematophyllum substrumulosum	4	4				NT	NS			CS					CN2
L	N	Solenostoma gracillimum	33	7												Ind	CN3
L	N	Solenostoma hyalinum	9	1								CS		RD			CN2
L	N	Solenostoma paroicum	1		1973							CR					CN1
L	A	Sphaerocarpos europaeus	3	2			S41		NS			CS					CN2
L	A	Sphaerocarpos michelii	5	5					NS			CS					CN2
M	N	Sphagnum angustifolium	4	4								CR				Ind	CN1
M	N	Sphagnum auriculatum	33	20												Ind	CN3
M	N	Sphagnum capillifolium s.str.	4	4								CS				Ind	CN2
M	N	Sphagnum compactum	21	12										RD	ND	Ind	CN3
M	N	Sphagnum contortum	5	5								CS				Ind	CN2
M	N	Sphagnum cuspidatum	17	11												Ind	CN3
M	N	Sphagnum fallax	21	12												Ind	CN3
M	N	Sphagnum fimbriatum	24	10												Ind	CN3
M	N	Sphagnum flexuosum	14	9												Ind	CN3
M	N	Sphagnum inundatum	13	10												Ind	CN3
M	N	Sphagnum medium	12	8								CS				Ind	CN2
M	N	Sphagnum molle	10	9								CS				Ind	CN2
M	N	Sphagnum palustre	31	20												Ind	CN3
M	N	Sphagnum papillosum	21	14										RD		Ind	CN3
M	N	Sphagnum pulchrum	1	1					NS			CR				Ind	CN1
M	N	Sphagnum rubellum	12	12										RD		Ind	CN3
M	N	Sphagnum squarrosum	20	7												Ind	CN3
M	N	Sphagnum subnitens	25	15												Ind	CN3
M	N	Sphagnum subsecundum	7	5					NS			CS				Ind	CN2
M	N	Sphagnum tenellum	21	11										RD		Ind	CN3
M	N	Sphagnum teres	5	5								CS				Ind	CN2
L	N	Sphenolobus minutus	2	1								CR					CN1
M	N	Splachnum ampullaceum	9	8		NT						CS				Ind	CN2

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M	N	Straminergon stramineum	13	7								CS		RD		Ind	CN2
M	N	Syntrichia virescens	2	2								CS					CN2
L	N	Targionia hypophylla	3	1					NS	P		CR					CN1
M	N	Taxiphyllum wissgrillii	12	1								CS				Ind	CN2
M	N	Tetraplodon mnioides	1		1986							CR					CN1
M	N	Thuidium assimile	8		1984							CR	CD			Ind	CN1
M	N	Thuidium delicatulum	9	6								CS				Ind	CN2
M	N	Tortella flavovirens	9	9								CS				Ind	CN2
M	N	Tortella inflexa	9	5					NS			CS				Ind	CN2
M	N	Tortella squarrosa	3	3					NS			CR				Ind	CN1
M	N	Tortella tortuosa	6	3								CS				Ind	CN2
M	N	Tortula acaulon var. papillosa	1	1								CR					CN1
M	N	Tortula acaulon var. pilifera	5	5								CS					CN2
M	N	Tortula cuneifolia	1		1956		BAP, S41	EN	NR			CR		RD	ND		CN1
M	N	Tortula lindbergii	15	3								CR	CD	RD	ND		CN1
M	N	Tortula protobryoides	10	5								CS					CN2
M	N	Tortula schimperi	1		1958			DD	NS			CR					CN1
M	N	Tortula subulata	20	3								CS	CD	RD	ND	Ind	CN2
M	N	Tortula viridifolia	4	1								CR				Ind	CN1
M	N	Tortula wilsonii	2	1			BAP, S41	VU	NS			CR		RD	ND		CN1
L	N	Trichocolea tomentella	10	4		NT						CS				Ind	CN2
M	N	Trichodon cylindricus	36	8												Ind	CN3
L	A	Tricholepidozia tetradactyla	1	1				VU	NR			CR					CN1
M	N	Trichostomum brachydontium	10	6								CS				Ind	CN2
M	N	Trichostomum crispulum	21	10												Ind	CN3
L	N	Tritomaria exsectiformis	7	2								CS					CN2
M	N	Ulota coarctata	2	1					NS			CR					CN1
M	N	Warnstorfia fluitans	15	5										RD	ND	Ind	CN3
M	N	Weissia angustifolia	24	7									CD			Ind	CN3
M	N	Weissia brachycarpa var. brachycarpa	4		1959							CR					CN1
M	N	Weissia brachycarpa var. obliqua	9	9												Ind	CN3
M	N	Weissia condensa	5	3			BAP, S41	NT	NS	P	Y	CR				Ind	CN1

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M	N	Weissia controversa var. controversa	4	4								CS		RD		Ind	CN2
M	N	Weissia controversa var. crispata	4	4								CS		RD		Ind	CN2
M	N	Weissia rutilans	2		1989				NS			CR		RD	ND		CN1
M	N	Weissia sterilis	6	3		NT	BAP, S41	NT	NS	P	Y	CR	CD	RD	ND	Ind	CN1
M	N	Zygodon rupestris	23	10												Ind	CN3
M	N	Zygodon stirtonii	10	2								CS					CN2