

Revised lists of nationally rare and scarce bryophytes for Britain

Oli Pescott

The production of lists of nationally rare and scarce taxa has become a standard part of plant conservation in Britain (Preston, 2006). Nationally rare taxa are defined as those occurring in 1–15 10 km squares in Britain (v.c.c. 1–112), whilst nationally scarce taxa occur in 16–100 10 km squares. The initial function of lists of nationally rare plants was essentially that of a ‘red list’ (Preston, 2006), however, nowadays the production of red lists includes assessments of threat, following internationally agreed criteria laid out by the IUCN (IUCN Standards and Petitions Subcommittee, 2014). Lists of nationally rare and scarce species now fulfil a subsidiary role, but still support such processes as the selection of Sites of Special Scientific Interest (SSSIs; Bainbridge *et al.*, 2013) and the identification of other important sites (Preston, 2010). Preston (2006, 2010) noted that complete revisions of the lists of nationally rare and scarce bryophytes would follow the completion of the new Atlas (Blockeel *et al.*, 2014); this paper fulfils that role, although the immediate stimulus for completing

this work was provided in 2015 by a review of SSSIs by country conservation agencies.

Preston (2010) noted that any forthcoming revision of the rare and scarce bryophyte lists would likely advance the starting cut-off date from which 10 km square counts were made. In consultation with the country agencies, it was agreed that the period 1970–2013 would be used, the 31st December 2013 being the cut-off date for receipt of records included in the new Atlas. This is a shorter period than those previously considered by Preston (2006, 2010), however, the general increase in recording (and digitisation) effort leading up to the publication of the Atlas should more than offset this difference (Preston, 2014). I follow the previous lists in only considering taxa currently accepted as either species or subspecies. Nomenclature follows Blockeel *et al.* (2014), which is largely based on Hill *et al.* (2008) with the additions and amendments listed by Blockeel *et al.* (2014, vol. 1, pp. 50–52). In addition I have included *Pterygoneurum papillosum*, added to the British flora by Blockeel & Ottley (2015), on the basis of specimens collected, and records submitted to the BBS database, before our cut-off date. A similar situation pertains to *Ditrichum pallidum*, reported new for Britain by Matcham (2013); this species, however, has not been included here pending acceptance by the Recorder for Mosses. I follow Preston (2010) in including alien, or probably alien, taxa. The approach in compiling these revised lists has generally been one of letting the data speak for themselves; the effect that special efforts to record certain species, spatial variation in recording, or recent changes in taxonomy may have on square totals is fully acknowledged (Preston, 2010; Preston & Rorke, 2014), but, given that assessments of nationally rare and scarce species are now common across groups, the view has been taken that the

number of species included or excluded on special grounds should be minimised wherever possible. Moreover, a list that summarises the recent state of the BBS database may be more likely to stimulate, or perhaps provoke, the recording of species for which data may currently be considered 'deficient'. Preston (2010) noted the linked issue of the frequency with which such lists are updated, suggesting that a decision was required on the compromise between the 'desire to be up-to-date and the need to avoid constantly tinkering with the list'; it is suggested here that a 10 year period may be appropriate for this aim. Such a period would allow for the impacts of taxonomic revisions to filter through to both recording practice and the BBS database, for a reasonable amount of recording to have taken place between revisions, and for a period of environmental change, or indeed stability, to potentially have had some effect on bryophytes and their habitats. In the intervening periods, bryologists working in the area of plant conservation can still use their specialist knowledge to interpret status reviews such as this one in the light of changes that may have been published since they were prepared.

To simplify the presentation of the new lists, species added to a list since the last update, as well as species which have moved between lists in either direction, have been labelled as such within a single revised list for each status category (Tables 1 and 2). Species which have not been recorded within the time period considered here, or which are now known from too many 10 km squares to be eligible for the status of nationally scarce, are given in separate tables (Tables 3 and 4 respectively). Species which were excluded for special reasons are given in Table 5, along with the justification. A spreadsheet to accompany this paper containing the 10 km square counts (for the period analysed) for all the species listed

here as nationally rare or scarce will be hosted on the BBS website (<http://rbg-web2.rbge.org.uk/bbs/bbs.htm>).

Changes to the list of nationally rare bryophytes

The additions to this list of species can be divided into three categories. The first of these comprises 19 taxa that had previously been classified as nationally rare, were moved to nationally scarce by Preston (2006, 2010), but are now again treated as rare. These taxa are the liverworts *Cephaloziella turneri*, *Fossombronia fimbriata*, *Fossombronia maritima*, *Lophozia capitata*, and *Scapania curta*, and the mosses *Andreaea nivalis*, *Atrichum angustatum*, *Aulacomnium turgidum*, *Bryum creberrimum*, *Bryum gemmilucens*, *Bryum knowltonii*, *Cynodontium tenellum*, *Fissidens monguillonii*, *Grimmia elongata*, *Habrodon perpusillus*, *Hypnum bambergeri*, *Oncophorus wahlenbergii*, *Pohlia andalusica*, and *Sciurohypnum glaciale*. A further 9 species have previously been classified as scarce, but not previously as rare: the liverworts *Pedinophyllum interruptum* and *Riccia crozalsii*, and the mosses *Bryum mildeanum*, *Buxbaumia aphylla*, *Dicranella crista*, *Hylacomiastrum pyrenaicum*, *Philonotis rigida*, *Syntrichia princeps*, and *Tortula canescens*. The final category of species includes 16 which have not previously been classified as either rare or scarce, the liverworts *Anastrophyllum joergensenii*, *Herbertus norenius*, *Moerckia hibernica*, and *Radula holtii*, and the mosses *Crossidium squamiferum*, *Dicranum spadiceum*, *Encalypta pilifera*, *Grimmia anomala*, *Leptodontium proliferum*, *Orthotrichum cambrense*, *Orthotrichum scanicum*, *Pohlia prolifera*, *Pterygoneurum papillosum*, *Schistidium confertum*, *Schistidium frigidum*, and *Tortula inermis*.

As might be expected, amongst the species

here elevated to the status of nationally rare can be found both those that are thought to have undergone genuine declines (e.g. *C. turneri*, *B. aphylla*, *H. perpusillus*, *T. canescens*), those which seem likely to be under-recorded, either due to their being easy to overlook (e.g. *F. fimbriata*, *B. mildeanum*), or due to spatial variation in recording over time (e.g. *F. maritima*, *H. pyrenaicum*), and those which may genuinely have typical 10 km square frequencies in Britain around the 10–20 mark, leading to their moving between the categories of rare and scarce despite little real change in their distribution (e.g. *L. capitata*). In other cases (e.g. *S. curta*, *R. crozalsii*), the underlying situation seems less clear, with more than one of the preceding scenarios appearing plausible.

The species not previously considered by Preston (2006, 2010) can be divided into those newly discovered, or rediscovered, in Britain (*R. holtii*, *C. squamiferum*, *D. spadiceum*, *E. pilifera*, *G. anomala*, *L. proliferum*, *O. cambrense*, *O. scanicum*, *P. papillosum*, *T. inermis*), and those hitherto subject to some degree of taxonomic confusion (*A. joergensenii*, *H. norenius*, *M. hibernica*, *P. prolifera*, *S. confertum*, *S. frigidum*). The relevant references for these newly discovered and newly (or re-) recognised species can be found in Preston (2014), with the exception of *P. papillosum* (Blockeel & Ottley, 2015).

Changes to the list of nationally scarce bryophytes

The additions to this list include 11 species moved from the rare list: the liverwort *Cephaloziella massalongi* and the mosses *Amblystegium radicale*, *Buxbaumia viridis*, *Entosthodon pulchellus*, *Grimmia tergestina*, *Orthotrichum obtusifolium*, *Rhytidiadelphus subpinnatus*, *Scopelophila cataractae*, *Sematophyllum substrumulosum*, *Sphagnum skyense*, and *Tortula schimperi*; three

species that were previously classified as scarce, but which were deleted by Preston (2006): the hornwort *Anthoceros agrestis*, the liverwort *Marsupella sprucei*, and the moss *Campylopus gracilis*; and 20 taxa new to the lists: the liverworts *Cephaloziella rubella*, *Lophocolea bispinosa*, *Marchantia polymorpha* subsp. *montivagans* and *Moerckia flotoviana*, and the mosses *Anomobryum concinatum*, *Dicranum flexicaule*, *Grimmia muehlenbeckii*, *Hennediella macrophylla*, *Hennediella stanfordensis*, *Heterocladium wulfsbergii*, *Racomitrium canescens*, *Rhynchostegiella litorea*, *Schistidium agassizii*, *Schistidium papillosum*, *Schistidium pruinosum*, *Schistidium robustum*, *Seligeria donniana*, *Sphagnum strictum*, *Sphagnum subsecundum*, and *Weissia rutilans*.

Some of the species here moved from rare to scarce have been the focus of recent focused survey work (*C. massalongi*, *B. viridis*, *S. cataractae*; Preston, 2014), or have benefitted from local recorder expertise or interest (*A. radicale*, *R. subpinnatus*, *S. skyense*). Others are thought to be genuinely increasing (*G. tergestina*, *O. obtusifolium*, *S. substrumulosum*; Blockeel *et al.*, 2014). Of the three species that have been re-added to the list of scarce bryophytes, only *A. agrestis* appears to have undergone a true decline, whereas *M. sprucei* and *C. gracilis* look more likely to be the casualties of variable recording effort (Blockeel *et al.*, 2014).

Of the newly scarce species, one might have been historically over-recorded (*C. rubella*); many, however, are the result of taxonomic revisions, or the promotion of previously infraspecific taxa (*M. flotoviana*, *A. concinatum*, *D. flexicaule*, *G. muehlenbeckii*, *S. agassizii*, *S. papillosum*, *S. pruinosum*, *S. robustum*, and *S. subsecundum*). The addition of *Marchantia polymorpha* subsp. *montivagans* and *Seligeria donniana* appears to be due to under-recording. *Weissia rutilans*

appears to be naturally rare, and of unpredictable occurrence, a combination of traits that make it highly likely to be under-recorded (Blockeel *et al.*, 2014). *Sphagnum strictum* appears to be the one newly scarce species for which a genuine decline has been posited (Hill & Preston, 2014). Finally, the inclusion here of *L. bispinosa*, *H. macrophylla*, and *H. stanfordensis* as nationally scarce is due to the fact that Preston (2006) did not consider alien bryophytes.

It is also noted that none of the species deleted by Preston (2006) as ‘clearly under-recorded’ have returned to nationally scarce status; additionally, most of the liverworts (*Adelanthus decipiens*, *Cephalozia catenulata*, *Haplomitrium hookeri*, *Riccardia incurvata*, *Scapania aequiloba*) and one of the mosses (*Poblia lescuriana*) classified as ‘borderline’ by Preston (2006), but retained as nationally scarce at that time, have now been deleted from the list.

Table 1. Revised list of nationally rare bryophytes

Aliens, or probable aliens, are indicated by an asterisk (*), species new to the list are indicated by the letter ‘N’, and species that were previously listed as nationally scarce but are here changed to rare are indicated by the Greek letter delta ‘Δ’.

| Liverworts (63) | | Mosses (166) |
|--|--------------------------------------|---------------------------------------|
| <i>Adelanthus lindenbergianus</i> | <i>Lophozia capitata</i> (Δ) | <i>Acaulon mediterraneum</i> |
| <i>Anastrophyllum alpinum</i> | <i>Lophozia herzogiana</i> | <i>Acaulon triquetrum</i> |
| <i>Anastrophyllum joergensenii</i> (N) | <i>Lophozia longiflora</i> | * <i>Achrophyllum dentatum</i> |
| <i>Anastrophyllum saxicola</i> | <i>Lophozia wenzelii</i> | <i>Andreaea alpestris</i> |
| <i>Athalamia hyalina</i> | <i>Marsupella arctica</i> | <i>Andreaea blyttii</i> |
| <i>Barbilophozia quadriloba</i> | <i>Marsupella boeckii</i> | <i>Andreaea frigida</i> |
| <i>Cephalozia ambigua</i> | <i>Marsupella condensata</i> | <i>Andreaea nivalis</i> (Δ) |
| <i>Cephaloziella baumgartneri</i> | <i>Marsupella profunda</i> | <i>Andreaea sinuosa</i> |
| <i>Cephaloziella calyculata</i> | <i>Marsupella sparsifolia</i> | <i>Anomodon attenuatus</i> |
| <i>Cephaloziella dentata</i> | <i>Moerckia hibernica</i> (N) | <i>Anomodon longifolius</i> |
| <i>Cephaloziella elachista</i> | <i>Nardia insecta</i> | <i>Aongstroemia longipes</i> |
| <i>Cephaloziella integerrima</i> | <i>Odontoschisma macounii</i> | <i>Aplodon wormskioldii</i> |
| <i>Cephaloziella turneri</i> (Δ) | <i>Pedinophyllum interruptum</i> (Δ) | <i>Arctoa anderssonii</i> |
| <i>Dumortiera hirsuta</i> | <i>Plagiochila norvegica</i> | <i>Atrichum angustatum</i> (Δ) |
| <i>Fossombronia fimbriata</i> (Δ) | <i>Radula carringtonii</i> | <i>Aulacomnium turgidum</i> (Δ) |
| <i>Fossombronia maritima</i> (Δ) | <i>Radula holtii</i> (N) | <i>Bartramia stricta</i> |
| <i>Fossombronia mittenii</i> | <i>Riccia bifurca</i> | <i>Blindia caespiticia</i> |
| <i>Geocalyx graveolens</i> | <i>Riccia canaliculata</i> | <i>Brachythecium trachypodium</i> |
| <i>Gongylanthus ericetorum</i> | <i>Riccia crozalsii</i> (Δ) | <i>Brachythecium cirrosum</i> |
| <i>Gymnocolea acutiloba</i> | * <i>Riccia crystallina</i> | <i>Bruchia vogesiaca</i> |
| <i>Gymnomitrium apiculatum</i> | <i>Riccia nigrella</i> | <i>Bryoerythrophyllum caledonicum</i> |
| <i>Gymnomitrium corallioides</i> | * <i>Riccia rhenana</i> | <i>Bryum apiculatum</i> |
| <i>Herbertus borealis</i> | <i>Scapania curta</i> (Δ) | <i>Bryum arcticum</i> |
| <i>Herbertus norenius</i> (N) | <i>Scapania gymnostomophila</i> | <i>Bryum calophyllum</i> |
| <i>Jamesoniella undulifolia</i> | <i>Scapania parvifolia</i> | <i>Bryum creberrimum</i> (Δ) |
| <i>Jungermannia polaris</i> | <i>Scapania praetervis</i> | <i>Bryum cyclophyllum</i> |
| <i>Leiocolea rutheana</i> | <i>Solenostoma caespiticium</i> | <i>Bryum dyffrynense</i> |
| <i>Lejeunea eckloniana</i> | <i>Southbya nigrella</i> | <i>Bryum gemmilucens</i> (Δ) |
| <i>Lejeunea mandonii</i> | <i>Southbya tophacea</i> | <i>Bryum gemmiparum</i> |
| <i>Lioclaena lanceolata</i> | <i>Telaranea europaea</i> | <i>Bryum knowltonii</i> (Δ) |
| * <i>Lophocolea brookwoodiana</i> | <i>Telaranea murphyae</i> | <i>Bryum maratii</i> |
| | * <i>Telaranea tetradactyla</i> | |

Nationally rare and scarce bryophytes

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|-----------------------------------|--|-----------------------------------|
| <i>Bryum mildeanum</i> (Δ) | <i>Hygrohypnum molle</i> | <i>Schistidium confertum</i> (N) |
| <i>Bryum muehlenbeckii</i> | <i>Hygrohypnum polare</i> | <i>Schistidium dupretii</i> |
| <i>Bryum salinum</i> | <i>Hygrohypnum smithii</i> | <i>Schistidium flaccidum</i> |
| <i>Bryum schleicheri</i> | <i>Hygrohypnum styriacum</i> | <i>Schistidium flexipile</i> |
| * <i>Bryum valparaisense</i> | <i>Hylocomiastrum pyrenaicum</i> (Δ) | <i>Schistidium frigidum</i> (N) |
| <i>Buxbaumia aphylla</i> (Δ) | <i>Hypnum bambergeri</i> (Δ) | <i>Schistidium helveticum</i> |
| * <i>Calyptrochaeta apiculata</i> | <i>Hypnum revolutum</i> | <i>Sciuro-hypnum glaciale</i> (Δ) |
| <i>Campylophyllum halleri</i> | <i>Hypnum vaucheri</i> | <i>Sciuro-hypnum starkei</i> |
| <i>Campylopus subporodictyon</i> | * <i>Leptodontium proliferum</i> (N) | <i>Seligeria brevifolia</i> |
| <i>Ceratodon conicus</i> | * <i>Leptophascum leptophyllum</i> | <i>Seligeria campylopoda</i> |
| <i>Cheilothela chloropus</i> | * <i>Leptotheca gaudichaudii</i> | <i>Seligeria carniolica</i> |
| <i>Cinclidotus riparius</i> | <i>Micromitrium tenerum</i> | <i>Seligeria diversifolia</i> |
| <i>Crossidium squamiferum</i> (N) | <i>Mielichhoferia elongata</i> | <i>Seligeria oelandica</i> |
| <i>Ctenidium procerrimum</i> | <i>Mielichhoferia mielichhoferiana</i> | <i>Seligeria trifaria</i> |
| <i>Cyclodictyon laetevirens</i> | <i>Mnium lycopodioides</i> | <i>Sematophyllum demissum</i> |
| <i>Cynodontium polycarpon</i> | <i>Mnium spinosum</i> | <i>Sphagnum balticum</i> |
| <i>Cynodontium tenellum</i> (Δ) | <i>Myurella tenerrima</i> | <i>Stegonia latifolia</i> |
| <i>Daltonia splachnoides</i> | <i>Oncophorus wahlenbergii</i> (Δ) | <i>Syntrichia norvegica</i> |
| <i>Dendrocryphaea lamyana</i> | <i>Orthodontium gracile</i> | <i>Syntrichia princeps</i> (Δ) |
| <i>Dialytrichia saxicola</i> | <i>Orthotrichum acuminatum</i> | <i>Tayloria lingulata</i> |
| <i>Dicranella crispa</i> (Δ) | <i>Orthotrichum cambrense</i> (N) | <i>Tayloria tenuis</i> |
| <i>Dicranella grevilleana</i> | <i>Orthotrichum consimile</i> | <i>Thamnobryum angustifolium</i> |
| <i>Dicranum elongatum</i> | <i>Orthotrichum gymnostomum</i> | <i>Thamnobryum cataractarum</i> |
| <i>Dicranum leioneuron</i> | <i>Orthotrichum pallens</i> | <i>Timmia austriaca</i> |
| <i>Dicranum spadiceum</i> (N) | <i>Orthotrichum pumilum</i> | <i>Timmia megapolitana</i> |
| <i>Didymodon cordatus</i> | <i>Orthotrichum scanicum</i> (N) | <i>Timmia norvegica</i> |
| <i>Didymodon glaucus</i> | <i>Palustriella decipiens</i> | <i>Tortella fragilis</i> |
| <i>Didymodon icmadophilus</i> | <i>Paraleucobryum longifolium</i> | * <i>Tortula amplexa</i> |
| <i>Ditrichum cornubicum</i> | <i>Philonotis marchica</i> | <i>Tortula canescens</i> (Δ) |
| <i>Ditrichum subulatum</i> | <i>Philonotis rigida</i> (Δ) | <i>Tortula cernua</i> |
| <i>Encalypta pilifera</i> (N) | <i>Physcomitrium eurystomum</i> | <i>Tortula cuneifolia</i> |
| <i>Ephemerum cohaerens</i> | <i>Plagiobryum demissum</i> | <i>Tortula inermis</i> (N) |
| <i>Ephemerum hibernicum</i> | <i>Plagiomnium medium</i> | <i>Tortula leucostoma</i> |
| <i>Eurhynchiastrum pulchellum</i> | <i>Plasteurhynchium meridionale</i> | <i>Tortula solmsii</i> |
| <i>Fissidens curvatus</i> | <i>Pohlia andalusica</i> (Δ) | <i>Tortula vahlbiana</i> |
| <i>Fissidens monguillonii</i> (Δ) | <i>Pohlia obtusifolia</i> | <i>Weissia levieri</i> |
| <i>Fissidens serrulatus</i> | <i>Pohlia proligera</i> (N) | <i>Weissia multicausularis</i> |
| <i>Grimmia alpestris</i> | <i>Pohlia scotica</i> | <i>Zygodon forsteri</i> |
| <i>Grimmia anodon</i> | <i>Pseudocalliergon turgescens</i> | <i>Zygodon gracilis</i> |
| <i>Grimmia anomala</i> (N) | <i>Pseudoleskea incurvata</i> | |
| <i>Grimmia arenaria</i> | <i>Pseudoleskeella nervosa</i> | |
| <i>Grimmia crinita</i> | <i>Pterygoneurum lamellatum</i> | |
| <i>Grimmia elatior</i> | <i>Pterygoneurum papillosum</i> (N) | |
| <i>Grimmia elongata</i> (Δ) | <i>Ptychodium plicatum</i> | |
| <i>Grimmia unicolor</i> | <i>Racomitrium himalayanicum</i> | |
| <i>Habrodon perpusillus</i> (Δ) | <i>Rhynchostegium rotundifolium</i> | |
| <i>Heterocladium dimorphum</i> | <i>Saelania glaucescens</i> | |
| <i>Homomallium incurvatum</i> | <i>Schistidium atrofusum</i> | |

Table 2. Revised list of nationally scarce bryophytes

Aliens, or probable aliens, are indicated by an asterisk (*), species new to the list are indicated by the letter 'N', and species that were previously listed as nationally rare but are here changed to scarce are indicated by the Greek letter delta 'Δ'.

| | | |
|--|-----------------------------------|-----------------------------------|
| Hornworts (2) and liverworts (77) | <i>Marsupella brevissima</i> | <i>Amblystegium confervoides</i> |
| <i>Anthoceros agrestis</i> (N) | <i>Marsupella sphacelata</i> | <i>Amblystegium radicale</i> (Δ) |
| <i>Phaeoceros carolinianus</i> | <i>Marsupella sprucei</i> (N) | <i>Amphidium lapponicum</i> |
| <i>Acrobolbus wilsonii</i> | <i>Marsupella stableri</i> | <i>Andreaea megistospora</i> |
| <i>Anastrophyllum donnianum</i> | <i>Mastigophora woodsii</i> | <i>Andreaea mutabilis</i> |
| <i>Anastrophyllum hellerianum</i> | <i>Moerckia blyttii</i> | <i>Anomobryum concinnatum</i> (N) |
| <i>Aneura mirabilis</i> | <i>Moerckia flotoviana</i> (N) | <i>Arctoa fulvella</i> |
| <i>Anthelia juratzkana</i> | <i>Nardia breidlerii</i> | <i>Atrichum tenellum</i> |
| <i>Barbilophozia kunzeana</i> | <i>Nardia geoscyphus</i> | <i>Bartramia halleriana</i> |
| <i>Barbilophozia lycopodioides</i> | <i>Odontoschisma elongatum</i> | <i>Brachydontium trichodes</i> |
| <i>Bazzania pearsonii</i> | <i>Pallavicinia lyellii</i> | <i>Brachythecium salebrosum</i> |
| <i>Calyptogeia azurea</i> | <i>Petalophyllum ralfsii</i> | <i>Bryum canariense</i> |
| <i>Calyptogeia integrispula</i> | <i>Plagiochila carringtonii</i> | <i>Bryum dixonii</i> |
| <i>Calyptogeia suecica</i> | <i>Plagiochila heterophylla</i> | <i>Bryum elegans</i> |
| <i>Cephalozia loitlesbergeri</i> | <i>Pleurocladula albescens</i> | <i>Bryum intermedium</i> |
| <i>Cephalozia macrostachya</i> | <i>Porella pinnata</i> | <i>Bryum kunzei</i> |
| <i>Cephalozia pleniceps</i> | <i>Radula voluta</i> | <i>Bryum riparium</i> |
| <i>Cephaloziella massalongi</i> (Δ) | <i>Riccia beyrichiana</i> | <i>Bryum tenuisetum</i> |
| <i>Cephaloziella nicholsonii</i> | <i>Riccia huebeneriana</i> | <i>Bryum torquescens</i> |
| <i>Cephaloziella rubella</i> (N) | <i>Ricciolepis natans</i> | <i>Bryum warneum</i> |
| <i>Cephaloziella spinigera</i> | <i>Scapania calcicola</i> | <i>Bryum weigelii</i> |
| <i>Cephaloziella stellulifera</i> | <i>Scapania cuspiduligera</i> | <i>Buxbaumia viridis</i> (Δ) |
| <i>Cladopodiella francisci</i> | <i>Scapania degenii</i> | <i>Campyliadelphus elodes</i> |
| <i>Cololejeunea rosettiana</i> | <i>Scapania lingulata</i> | <i>Campylophyllum calcareum</i> |
| <i>Diplophyllum taxifolium</i> | <i>Scapania nimbose</i> | <i>Campylopus gracilis</i> (N) |
| <i>Eremonotus myriocarpus</i> | <i>Scapania ornithopodioides</i> | <i>Campylopus pilifer</i> |
| <i>Fossombronia angulosa</i> | <i>Scapania paludicola</i> | <i>Campylopus schimperii</i> |
| <i>Fossombronia caespitiformis</i> | <i>Scapania paludosa</i> | <i>Campylopus setifolius</i> |
| <i>Fossombronia foveolata</i> | <i>Solenostoma confertissimum</i> | <i>Campylopus shawii</i> |
| <i>Harpanthus flotovianus</i> | <i>Solenostoma subellipticum</i> | <i>Campylopus subulatus</i> |
| <i>Jamesoniella autumnalis</i> | <i>Sphaerocarpos michelii</i> | <i>Campylostelium saxicola</i> |
| <i>Jungermannia borealis</i> | <i>Sphaerocarpos texanus</i> | <i>Catoscopium nigratum</i> |
| <i>Leiocolea fitzgeraldiae</i> | <i>Sphenolobopsis pearsonii</i> | <i>Cinclidium stygium</i> |
| <i>Leiocolea gillmanii</i> | <i>Targionia hypophylla</i> | <i>Conardia compacta</i> |
| <i>Leiocolea heterocolpos</i> | <i>Tetralophozia setiformis</i> | <i>Conostomum tetragonum</i> |
| * <i>Lophocolea bispinosa</i> (N) | <i>Tritomaria exsecta</i> | <i>Coscinodon cribrus</i> |
| <i>Lophozia longidens</i> | <i>Tritomaria polita</i> | <i>Cynodontium jenneri</i> |
| <i>Lophozia obtusa</i> | | <i>Cynodontium strumiferum</i> |
| <i>Lophozia opacifolia</i> | Mosses (186) | <i>Dicranodontium asperulum</i> |
| <i>Lophozia perssonii</i> | <i>Abietinella abietina</i> | <i>Dicranodontium uncinatum</i> |
| <i>Marchantia polymorpha</i> subsp. | <i>Aloina ambigua</i> | <i>Dicranoweisia crispula</i> |
| <i>montivagans</i> (N) | <i>Aloina brevirostris</i> | <i>Dicranum flagellare</i> |
| <i>Marsupella adusta</i> | <i>Aloina rigida</i> | <i>Dicranum flexicaule</i> (N) |
| <i>Marsupella alpina</i> | <i>Amblyodon dealbatus</i> | <i>Dicranum polysetum</i> |

Nationally rare and scarce bryophytes

| | | |
|---------------------------------------|---------------------------------------|---|
| <i>Dicranum spurium</i> | <i>Isopterygiopsis muelleriana</i> | <i>Rhynchostegiella litorea</i> (N) |
| <i>Dicranum undulatum</i> | <i>Kiaeria falcata</i> | <i>Rhytidiadelphus subpinnatus</i> (Δ) |
| <i>Didymodon acutus</i> | <i>Kiaeria glacialis</i> | <i>Rhytidium rugosum</i> |
| <i>Didymodon tomaculosus</i> | <i>Kiaeria starkei</i> | <i>Sanionia orthothecioides</i> |
| <i>Disclidium nudum</i> | <i>Leptodontium gemmascens</i> | <i>Schistidium agassizii</i> (N) |
| <i>Distichium inclinatum</i> | <i>Meesia uliginosa</i> | <i>Schistidium papillosum</i> (N) |
| <i>Ditrichum lineare</i> | <i>Microbryum starckeanum</i> | <i>Schistidium pruinosum</i> (N) |
| <i>Ditrichum plumbicola</i> | <i>Mnium thomsonii</i> | <i>Schistidium robustum</i> (N) |
| <i>Ditrichum pusillum</i> | <i>Myrinia pulvinata</i> | <i>Schistidium trichodon</i> |
| <i>Ditrichum zonatum</i> | <i>Myurella julacea</i> | <i>Sciuro-hypnum reflexum</i> |
| <i>Drepanocladus sendtneri</i> | <i>Myurium hochstetteri</i> | <i>Scopelophila cataractae</i> (Δ) |
| <i>Encalypta alpina</i> | <i>Oedipodium griffithianum</i> | <i>Seligeria acutifolia</i> |
| <i>Encalypta ciliata</i> | <i>Oncophorus virens</i> | <i>Seligeria donniana</i> (N) |
| <i>Encalypta rhaptocarpa</i> | <i>Orthothecium rufescens</i> | <i>Seligeria patula</i> |
| <i>Entosthodon mühlenbergii</i> | <i>Orthotrichum obtusifolium</i> (Δ) | <i>Seligeria pusilla</i> |
| <i>Entosthodon pulchellus</i> (Δ) | <i>Orthotrichum speciosum</i> | <i>Sematophyllum substrumulosum</i> (Δ) |
| <i>Ephemerum sessile</i> | <i>Oxystegus hibernicus</i> | <i>Sphagnum affine</i> |
| <i>Fissidens crispus</i> | <i>Paraleptodontium recurvifolium</i> | <i>Sphagnum lindbergii</i> |
| <i>Fissidens fontanus</i> | <i>Philonotis caespitosa</i> | <i>Sphagnum majus</i> |
| <i>Fissidens polyphyllum</i> | <i>Philonotis seriata</i> | <i>Sphagnum platyphyllum</i> |
| <i>Fissidens rivularis</i> | <i>Philonotis tomentella</i> | <i>Sphagnum pulchrum</i> |
| <i>Fissidens rufulus</i> | <i>Physcomitrium sphaericum</i> | <i>Sphagnum riparium</i> |
| <i>Grimmia atrata</i> | <i>Plagiopus oederianus</i> | <i>Sphagnum skyense</i> (Δ) |
| <i>Grimmia decipiens</i> | <i>Plagiothecium cavifolium</i> | <i>Sphagnum strictum</i> (N) |
| <i>Grimmia incurva</i> | <i>Plagiothecium platyphyllum</i> | <i>Sphagnum subsecundum</i> (N) |
| <i>Grimmia laevigata</i> | <i>Plasteurhynchium striatulum</i> | <i>Splachnum vasculosum</i> |
| <i>Grimmia longirostris</i> | <i>Platydictya jungermannioides</i> | <i>Tetraplodon angustatus</i> |
| <i>Grimmia montana</i> | <i>Platyhypnidium lusitanicum</i> | <i>Thuidium recognitum</i> |
| <i>Grimmia muehlenbeckii</i> (N) | <i>Pleurochaete squarrosa</i> | <i>Tomentypnum nitens</i> |
| <i>Grimmia orbicularis</i> | <i>Pohlia filum</i> | <i>Tortella densa</i> |
| <i>Grimmia ovalis</i> | <i>Pohlia flexuosa</i> | <i>Tortella inclinata</i> |
| <i>Grimmia tergestina</i> (Δ) | <i>Pohlia ludwigii</i> | <i>Tortella inflexa</i> |
| <i>Gymnostomum calcareum</i> | <i>Polytrichastrum sexangulare</i> | <i>Tortula atrovirens</i> |
| <i>Gymnostomum viridulum</i> | <i>Pottiopsis caespitosa</i> | <i>Tortula freibergii</i> |
| <i>Hageniella micans</i> | <i>Pseudobryum cinclidioides</i> | <i>Tortula schimperi</i> (Δ) |
| <i>Hamatocaulis vernicosus</i> | <i>Pseudocalliergon lycopodioides</i> | <i>Tortula wilsonii</i> |
| <i>Hedwigia ciliata</i> s.str. | <i>Pseudocalliergon trifarium</i> | <i>Ulota calvescens</i> |
| <i>Hedwigia integrifolia</i> | <i>Pseudoleskea patens</i> | <i>Ulota coarctata</i> |
| * <i>Henediella macrophylla</i> (N) | <i>Pseudoleskeella catenulata</i> | <i>Weissia condensa</i> |
| * <i>Henediella stanfordensis</i> (N) | <i>Pseudoleskeella rupestris</i> | <i>Weissia rostellata</i> |
| <i>Herzogiella seligeri</i> | <i>Pterigynandrum filiforme</i> | <i>Weissia rutilans</i> (N) |
| <i>Herzogiella striatella</i> | <i>Pterygoneurum ovatum</i> | <i>Weissia squarrosa</i> |
| <i>Heterocladium wulfsbergii</i> (N) | <i>Pylaisia polyantha</i> | <i>Weissia sterilis</i> |
| <i>Hygroamblystegium humile</i> | <i>Racomitrium canescens</i> (N) | |
| <i>Hygrohypnum duriusculum</i> | <i>Racomitrium macounii</i> | |
| <i>Hypnum hamulosum</i> | <i>Rhizomnium magnifolium</i> | |
| <i>Hypnum imponens</i> | <i>Rhynchostegiella curviseta</i> | |

Table 3. Species with no post-1970 records, with their previous classification. (M, moss).

| | | |
|---|-------------------------------------|-----------------|
| M | <i>Brachythecium erythrorrhizon</i> | Nationally Rare |
| M | <i>Bryum uliginosum</i> | Nationally Rare |
| M | <i>Grimmia sessitana</i> | Nationally Rare |
| M | <i>Philonotis cernua</i> | Nationally Rare |
| M | <i>Poblia crudoides</i> | Nationally Rare |
| M | <i>Tetradontium repandum</i> | Nationally Rare |

Table 4. Species deleted from the nationally scarce list as a result of accumulating > 100 10 km squares between 1970–2013, with the number of such squares for this period. (L, liverwort; M, moss).

| | | | | | |
|---|---------------------------------|-----|---|--------------------------------|-----|
| L | <i>Adelanthus decipiens</i> | 106 | M | <i>Ephemerum recurvifolium</i> | 126 |
| L | <i>Cephalozia catenulata</i> | 128 | M | <i>Glyphomitrium daviesii</i> | 101 |
| L | <i>Fossombronina incurva</i> | 105 | M | <i>Grimmia lisae</i> | 120 |
| L | <i>Haplomitrium hookeri</i> | 103 | M | <i>Leptobarbula berica</i> | 116 |
| L | <i>Leptoscyphus cuneifolius</i> | 104 | M | <i>Philonotis arnellii</i> | 107 |
| L | <i>Riccardia incurvata</i> | 110 | M | <i>Plagiothecium laetum</i> | 122 |
| L | <i>Riccia cavernosa</i> | 111 | M | <i>Platygyrium repens</i> | 140 |
| L | <i>Scapania aequiloba</i> | 131 | M | <i>Poblia lescuriana</i> | 104 |
| L | <i>Scapania uliginosa</i> | 107 | M | <i>Sphagnum austinii</i> | 112 |
| M | <i>Didymodon umbrosus</i> | 112 | M | <i>Weissia perssonii</i> | 124 |

Table 5. Species excluded on special grounds. (M, moss).

| | | |
|---|--|---|
| M | <i>Andreaea rothii</i> subsp. <i>rothii</i> | Species common; subspecies under-recorded and intermediates not uncommon |
| M | <i>Ditrichum flexicaule</i> | Not consistently separated from <i>D. gracile</i> |
| M | <i>Entosthodon mouretii</i> | Not clearly distinct from <i>E. fascicularis</i> in Britain |
| M | <i>Ephemerella readeri</i> | Recently recognised; excluded until we have a clearer picture of its distribution |
| M | <i>Grimmia dissimulata</i> | Under-recorded |
| M | <i>Oxystegus daldinianus</i> | Recently recognised; excluded until we have a clearer picture of its distribution |
| M | <i>Oxystegus minor</i> | Recently recognised; excluded until we have a clearer picture of its distribution |
| M | <i>Schistidium elegantulum</i> | Under-recorded |
| M | <i>Schistidium maritimum</i> subsp. <i>piliferum</i> | Recently recognised; under-recorded |
| M | <i>Thamnobryum maderense</i> | Status of British material unclear |
| M | <i>Tortella bambergeri</i> | Under-recorded |
| M | <i>Tortula pallida</i> | Taxon 'poorly defined' (Blockeel <i>et al.</i> , 2014) |

Nationally rare and scarce bryophytes

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- O.L. Pescott**
CEH Wallingford, Benson Lane, Crowmarsh
Gifford, Wallingford, Oxfordshire OX10 8BB
e olipes@ceh.ac.uk

▽Left to right: The Nationally Scarce *Oedipodium griffithianum* and *Philonotis seriata*. R. Hodd

