

# Contribution to the bryophyte flora of the NW Bulgaria

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**Abstract.** The bryophyte flora of the NW Bulgaria – the western part of the Balkan Range and part of the West Forebalkan – was studied. A total of 252 species were recorded. Of them, 48 are liverworts and 204 are mosses. Three species are new to Bulgaria and 46 are new to the floristic regions of the Western Balkan Range and West Forebalkan. Twenty-five of the species are red-listed.

**Key words:** bryophyte biodiversity, bryophyte flora, Bulgaria, Western Balkan Range, West Forebalkan

## Introduction

The mountain regions of NW Bulgaria have always attracted the attention of botanists, because of the diversity of landforms and plant species (incl. endemics and relicts), as well as the composition, ecology and biological potential of the vegetation types. However, comparatively less attention has been paid to bryophyte diversity. The distribution of bryophytes in the Western Balkan Range and West Forebalkan has been reported in several publications during the years 1911–1965. More data could be found in the publication of Petrov (1963). The regions with more chorological information are Mt Berkovska (Arnaudoff 1911), Petrohan locality (Petrov 1963), the rocky area around the town of Belogradchik (Petrov 1963, 1966), the peak Midzhur region (Petrov 1963; Papp & Erzberger 2007), and the valley of river Iskur (Podpéra 1911; Papp & al. 2006). The total number of bryophytes reported from the Western Balkan Range, west of the valley of river Iskur and West Forebalkan is 290, including a number of conservation-important species.

Occasional data on bryophyte composition may be found in publications on the vascular flora and vegetation. For example, Bondev (1966) in a study on high

mountain vegetation of Mt Berkovska and Mt Chiprovka reported 24 plant associations containing bryophytes. Velchev & al. (1973) found the association of *Ramonda serbica* with bryophytes (12 species) to be the most widely distributed association of the species. Analysing the ecological and phytocoenological characteristics of the beech forests in Petrohan University Experimental Forestry Station, Pavlov (1978) described five associations with bryophytes as vegetation components.

In 2003, during a transboundary project between Bulgaria and Serbia all existing information on biodiversity was summarized and a proposal was prepared for West Balkan Nature Park. Over 100 units, most of them of European conservation importance, and one-third of the priority sites for protection measures represent the identified habitats. Many conservation-important species and habitats at global and European level are located in the karst areas and the high-mountain zones of the Western Balkan Range and West Forebalkan (Gussev & Dimitrov 2007; Spiridonov 2007). In the Serbian part of the Balkan Range the bryophyte flora was investigated by Papp & Erzberger (2007) and some records were derived from the Bulgarian side of peak Midzhur. Seven species were found, which are included in the *Red Data Book of European Bryophytes* (ECCB 1995). One Euro-

pean red-listed species, *Encalypta microstoma*, has been found on the Bulgarian side of peak Midzhur, too. Several rare at the national level species were also recorded. However, there are no recent studies of bryophytes covering a larger area of the Western Balkan range in Bulgaria. Therefore, the present research was necessary in order to assess the current bryophyte distribution, condition of habitats, threats and conservation measures to be undertaken.

## Study area

Bryophyte samples were collected from two floristic regions: Western Balkan Range (west of river Iskur valley) and West Forebalkan (the region of Belogradchik and Dolni Lom village). Old-growth beech and spruce forests, mixed fir-beech forests and oak forests of *Quercus daleshampii*, *Q. frainetto* and *Q. cerris* attract the attention of bryologists in relation to various microhabitats offering favourable substrates for bryophytes.

## Methods

In order to cover the variety of substrates and microhabitats of bryophytes, plant samples were collected from different habitat types. A list of the visited localities is presented below. Specimens are kept in the herbarium of the Institute of Botany (SOM) and the herbarium of the Hungarian Natural History Museum in Budapest (BP). The nomenclature follows Grolle & Long (2000) for liverworts and Hill & al. (2006) for mosses.

### List of the visited localities:

1. Western Balkan Range: Beledie Han village, river Kriva, Lyulyaka tourist house, 670 m, 42°53'27.6"N, 23°10'26.7"E, 27.06.2006.
2. Western Balkan Range: Petrohan Pass, Gintsi village, 1408 m, 43°07'19.9"N, 23°07'30.8"E, 27.06.2006.
3. Western Balkan Range: Berkovitsa town, Haydushki Vodopadi waterfalls, acidic rocks, 763 m, 43°12'20.5"N, 23°03'25.2"E, 28.06.2006.
4. Western Balkan Range: Berkovitsa town, downstream of Haydushki Vodopadi waterfalls, acidic rocks in a beech forest, 661 m, 43°12'50.6"N, 23°03'52.0"E, 28.06.2006.
5. Western Balkan Range: Berkovitsa town, downstream of Haydushki Vodopadi waterfalls, 570 m, 43°13'33.6"N, 23°04'43.6"E, 28.06.2006.
6. Western Balkan Range: Berkovitsa town, under peak Kom, off the Kom tourist house towards peak Malak Samar, across the Gorna Kuriya Nature Reserve, *Piceetum*, N facing slope, acidic rocks, 1610 m, 43°11'12.4"N, 23°04'46.7"E and 43°10'52.2"N, 23°04'21.9"E, 28.06.2006.
7. Western Balkan Range: Varshets, Zanozhene village, valley of river Stara, at Byalata Voda turist house, under peak Todorini Kukli, acidic rocks, 880 m, 43°08'31.1"N, 23°13'30.3"E, 29.06.2006.
8. Western Balkan Range: Gorni Lom village, under peak Midzhur, along a stream, acidic rocks, 715 m, 43°26'10.3"N, 22°43'09.3"E, 30.06.2006.
9. West Forebalkan: Dolni Lom village, acidic rocky grassland, 390 m, 43°29'53.7"N, 22°46'55.2"E, 30.06.2006.
10. West Forebalkan, Replyana village, open grassland and *Carpinetum orientalis*, 525 m, 43°30'53.0"N, 22°44'35.6"E, 30.06.2006.
11. West Forebalkan: Belogradchik town, permian red sandstone rocks around the Kaleto Castle, 603 m, 43°37'25.2"N, 22°40'35.9"E, 01.07.2006.
12. Western Balkan Range: along the eco-route from Kopren chalet to the waterfall area, 600 m, 42°19'09.3"N, 22°51'00.4"E, 23.07.2007.
13. Western Balkan Range: rocky slopes above Kopren chalet, 1067 m, 43°19'15.0"N, 22°51'13.7"E, 23.07.2007.
14. Western Balkan Range: along the eco-route from Kopren chalet to the waterfall area, at the Landzhyin Skok waterfall, on beech bark, 1123 m, 43°19'02.1"N, 22°51'02.5"E, 23.07.2007.
15. Western Balkan Range: at river Stakevska near the building of the Midzhur State Game Farm and about 5-10 m off the breeding-ponds, on beech bark (old beech tree), 804 m, 43°29'25.0"N, 22°33'10.5"E, 25.07.2007.
16. Western Balkan Range: buffer zone of Chuprene Biosphere Reserve near Gorski Rai chalet, in beech-spruce forest, 1354 m, 43°27'13.4"N, 22°38'08.4"E, 24.07.2007.
17. Western Balkan Range: Petrohan locality, transitional spring mire, 1470 m, 43°06'55"N, 23°07'58"E, 19.07.2005.

18. Western Balkan Range: ca. 4 km NW of Koplivtsi village, a swampy meadow, 43°20'01.9"N, 22°51'56.1"E, 19.07.2005.
19. Western Balkan Range: S of Zanozhene village, in the valley of river Stara Reka river, on soil in beech forest, 750 m, 43°09'03.2"N, 23°13'56.4"E, 20.05.2003
20. Western Balkan Range: Varshets town, Zanozhene village, valley of river Stara, above Byalata Voda shelter house, under peak Todorini Kukli, acidic rocks, 1190 m, 43°08'01.5"N, 23°12'45.0"E, 29.06.2006.
21. West Forebalkan: above Replyana village, at the water-catchment area, decaying wood at river bank, ca. 500 m, 43°30'53.5"N, 22°44'36.0"E, 24.07.2007.

## Results and discussion

The total number of species collected during the current study is 252 (Table 1). Of them 48 are liverworts (*Marchantiophyta*) and 204 are mosses (*Bryophyta*). Thus the bryophytes of the Western Balkan range account for ca. 33% of the total bryophyte flora of Bulgaria. *Leucobryum juniperoideum* (Brid.) Müll.Hal., *Platygyrium repens* (Brid.) Schimp., and *Pohlia lutescens* (Limpr.) H. Lindb. are new to Bulgaria. Forty-six species are new to the floristic regions of the Western Balkan Range and West Forebalkan. Twenty five species are threatened and included in the bryophyte Red List of Bulgaria: 18 *Vulnerable*, 6 *Endangered*, and one *Critically Endangered* (Natcheva & al. 2006). Furthermore, three species are *Near Threatened* and two are *Data Deficient*.

Habitat richness and the variety of microhabitats in the study area favour the bryophyte species diversity. In a number of habitats, such as coniferous forests, mires, wet sites along rivers and streams, rock outcrops, humid mountain river valleys, bryophytes are an important component of the ground floor plant communities. Situated close to the national frontier, the westernmost parts of the Western Balkan Range and West Forebalkan have not been subjected to human activities in the past, so these territories are comparatively well preserved. However, during the last two decades threats like infrastructure development, tourism, changes in land management regimes, forestry, etc. have caused environmental changes not only in the vicinity of the settlements. Habitats like coniferous and beech forests, mires and grasslands with high natural significance could be damaged by human activities, which will result in decreasing of biodiversity, including the bryophyte flora. The conclu-

sion is that the bryophyte flora is very diverse and several rare bryophytes still exist in the territory. The presence of variety of bryophyte species, including the threatened ones, makes the study area important from the viewpoint of nature conservation.

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**Table 1.** List of species collected during this study.

**Abbreviations:** \* species new to the study area; \*\* species new to Bulgarian bryophyte flora; Threat categories according to the national bryophyte *Red list* (Natcheva & al. 2006): CR – *Critically Endangered*; EN – *Endangered*; VU – *Vulnerable*; NT – *Near Threatened*; BC – *Bern Convention*; RDB – included in the *Red Data Book of European Bryophytes* (ECCB 1995). For locality numbers see text.

No	Species	Locality	Conservation status
<i>Marchantiophyta</i>			
1.	<i>Anastrophyllum minutum</i> (Schreb.) R.M. Schust.	20	
2.	<i>Barbilophozia barbata</i> (Schmidel ex Schreb.) Loeske	3, 11, 20	
3.	<i>B. hatcheri</i> (A. Evans) Loeske	6	
4.	<i>B. lycopodioides</i> (Wallr.) Loeske	6	
5.	<i>Bazzania trilobata</i> (L.) Gray	20	
6.	<i>Blepharostoma trichophyllum</i> (L.) Dumort.	3, 20	
7.	<i>Calyptogeia azurea</i> Stotler & Crotz	6	
8.	<i>Cephalozia bicuspidata</i> (L.) Dumort.	6	
9.	<i>Cephaloziella divaricata</i> var. <i>asperifolia</i> (Taylor) Macvicar*	11	
10.	<i>Chiloscyphus polyanthus</i> (L.) Corda	7, 20	
11.	<i>Conocephalum conicum</i> (L.) Dumort.	7	
12.	<i>Diplophyllum taxifolium</i> (Wahlenb.) Dumort.	6	
13.	<i>D. albicans</i> (L.) Dumort.	3	
14.	<i>D. obtusifolium</i> (Hook.) Dumort.	6	
15.	<i>Frullania dilatata</i> (L.) Dumort.	1, 3, 4, 5, 6, 10, 11, 14	
16.	<i>Jamesoniella autumnalis</i> (DC.) Steph.	7, 20	
17.	<i>Jungermannia gracillima</i> Sm.	7	
18.	<i>J. pumila</i> With.*	7	
19.	<i>Lejeunea cavifolia</i> (Ehrh.) Lindb.	3, 7, 20	
20.	<i>Lepidozia reptans</i> (L.) Dumort.	20	
21.	<i>Lophocolea bidentata</i> (L.) Dumort.	21	
	<i>L. bidentata</i> var. <i>rivularis</i> (Raddi) Warnst.*	3, 4	

Table 1. Continuation.

No	Species	Locality	Conservation status
22.	<i>L. heterophylla</i> (Schrad.) Dumort.	3, 6, 7, 20	
23.	<i>L. minor</i> Nees	1	
24.	<i>Lophozia ascendens</i> (Warnst.) R.M. Schust.	6	VU, RDB
25.	<i>L. longidens</i> (Lindb.) Macoun*	6, 20	
26.	<i>L. sudetica</i> (Nees ex Huebener) Grolle*	6	
27.	<i>L. ventricosa</i> (Dicks.) Dumort.	6, 20	
28.	<i>Marchantia polymorpha</i> L. subsp. <i>polymorpha</i>	1	
29.	<i>Marsupella funckii</i> (F. Weber & D. Mohr) Dumort.*	20	VU
30.	<i>M. emarginata</i> (Ehrh.) Dumort.	3, 20	
31.	<i>Metzgeria conjugata</i> Lindb.	3, 7, 12, 20	
32.	<i>M. furcata</i> (L.) Dumort.	1, 3, 4, 11, 20	
33.	<i>Nardia scalaris</i> Gray	6	
34.	<i>Pellia endiviifolia</i> (Dicks.) Dumort.	1, 7, 20	
35.	<i>Plagiochila asplenioides</i> (L. emend. Taylor) Dumort.	20	
36.	<i>P. porelloides</i> (Torrey ex Nees) Lindenb.	1, 3, 7, 14, 20	
37.	<i>Porella arboris-vitae</i> (With.) Grolle	3	
38.	<i>P. codeana</i> (Huebener) Moore	1, 3, 4, 4, 5, 7, 10	
39.	<i>P. platyphylla</i> (L.) Pfeiff.	1, 4, 11, 20	
40.	<i>Radula complanata</i> (L.) Dumort.	1, 3, 4, 10, 14, 20	
41.	<i>Reboulia hemisphaerica</i> (L.) Raddi	1	
42.	<i>Riccardia multifida</i> (L.) Gray	7	
43.	<i>Scapania irrigua</i> (Nees) Nees	6	
44.	<i>S. nemorea</i> (L.) Grolle	3, 20, 21	
45.	<i>S. curta</i> (Mart.) Dumort.*	6	
46.	<i>S. undulata</i> (L.) Dumort.	20	
47.	<i>Trichocolea tomentella</i> (Ehrh.) Dumort.	7	
48.	<i>Tritomaria quinquedentata</i> (Huds.) H. Buch	3, 20	
<b>Bryophyta</b>			
1.	<i>Abietinella abietina</i> (Hedw.) M. Fleisch.	1, 8, 10	
2.	<i>Amblystegium serpens</i> (Hedw.) Schimp.	1, 11	
3.	<i>A. subtile</i> (Hedw.) Schimp.	4	
4.	<i>Amphidium mougeotii</i> (Schimp.) Schimp.	3, 13	
5.	<i>Andreaea rupestris</i> Hedw.*	6, 20	
6.	<i>Anomodon attenuatus</i> (Hedw.) Huebener	1, 3, 4, 13, 14	
7.	<i>A. viticulosus</i> (Hedw.) Hook. & Taylor	3	
8.	<i>Atrichum undulatum</i> (Hedw.) P. Beauv.	3	
9.	<i>Aulacomnium palustre</i> (Hedw.) Schwägr.	17	
10.	<i>Barbula unguiculata</i> Hedw.	1, 7, 8, 9, 10	
11.	<i>Bartramia halleriana</i> Hedw.	3	
12.	<i>B. ithyphylla</i> Brid.	6, 20	
13.	<i>B. pomiformis</i> Hedw.	20	
14.	<i>Brachytheciastrum velutinum</i> (Hedw.) Ignatov & Huttunen	3, 6, 12, 20	
15.	<i>Brachythecium albicans</i> (Hedw.) Schimp.*	8, 9, 11, 20	
16.	<i>B. geheebii</i> Milde*	20	EN, RDB
17.	<i>B. rivulare</i> Schimp.	1, 3, 4, 7, 10, 12	
18.	<i>B. rutabulum</i> (Hedw.) Schimp.	1, 3, 11, 12, 20	
19.	<i>Bryoerythrophyllum recurvirostrum</i> (Hedw.) P.C. Chen	1	
20.	<i>Bryum alpinum</i> Huds. ex With.	8	
21.	<i>B. argenteum</i> Hedw.	1, 11	
	<i>B. argenteum</i> var. <i>lanatum</i> (P. Beauv.) Hampe*	10	
22.	<i>B. capillare</i> Hedw.	1, 3, 4, 6, 9, 11	
23.	<i>B. dichotomum</i> Hedw.	1, 10	
24.	<i>B. moravicum</i> Podp.	1, 4, 6	
25.	<i>B. torquescens</i> Bruch & Schimp.	8	
26.	<i>Buxbaumia viridis</i> (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl.*	16	NT, BC, RDB
27.	<i>B. aphylla</i> Hedw.	19	EN
28.	<i>Calliergon cordifolium</i> (Hedw.) Kindb.	17	
29.	<i>Calliergonella cuspidata</i> (Hedw.) Loeske	7, 17, 18	
30.	<i>Campylophyllum calcareum</i> (Crundw. & Nyholm) Hedenäs	1, 10	
31.	<i>Ceratodon pupureus</i> (Hedw.) Brid.	3, 6, 8, 11	
32.	<i>Cinclidotus fontinaloides</i> (Hedw.) P. Beauv.	10	
33.	<i>Cirriphyllum crassinervium</i> (Taylor) Loeske & M.Fleisch.	1, 3, 4, 11	
34.	<i>Climacium dendroides</i> (Hedw.) F. Weber & D. Mohr*	8, 20	
35.	<i>Cratoneuron filicinum</i> (Hedw.) Spruce	20	
36.	<i>Ctenidium molluscum</i> (Hedw.) Mitt.	3, 7, 20	
37.	<i>Cynodonium bruntonii</i> (Sm.) Bruch & Schimp.	11	
38.	<i>Cynodontium polycarpon</i> (Hedw.) Schimp.*	3	
39.	<i>Dichodontium palustre</i> (Dicks.) Stech	6	
40.	<i>Dichodontium pellucidum</i> (Hedw.) Schimp.*	3, 7	
41.	<i>Dicranella heteromalla</i> (Hedw.) Schimp.	3, 6, 7, 11	
42.	<i>D. rufescens</i> (Dicks.) Schimp.*	7	VU
43.	<i>D. schreberiana</i> (Hedw.) Dixon	7	

Table 1. Continuation.

No	Species	Locality	Conservation status
44.	<i>Dicranodontium denudatum</i> (Brid.) E. Britton *	3	VU
45.	<i>Dicranoweisia crispula</i> (Hedw.) Milde	6, 20	
46.	<i>Dicranum bonjeanii</i> De Not.	17	
47.	<i>D. flexicaule</i> Brid.*	20	
48.	<i>D. scoparium</i> Hedw.	3, 6, 7, 20	
49.	<i>D. tauricum</i> Sapiegin	6	
50.	<i>D. viride</i> (Sull. & Lesq.) Lindb.	15	EN, BC, RDB
51.	<i>Didymodon acutus</i> (Brid.) K. Saito*	10	
52.	<i>D. rigidulus</i> Hedw.	1	
53.	<i>Diphyscium foliosum</i> (Hedw.) D. Mohr*	3, 6, 7, 20	
54.	<i>Encalypta streptocarpa</i> Hedw.	1	
55.	<i>Eurhynchium angustirete</i> (Broth.) T.J. Kop.	3, 4, 7, 20	
56.	<i>E. striatum</i> (Hedw.) Schimp.	20	
57.	<i>Fissidens adianthoides</i> Hedw.	20	
58.	<i>F. bryoides</i> Hedw.	7	
59.	<i>F. crassipes</i> Wilson ex Bruch & Schimp.	1	VU
60.	<i>F. dubius</i> P. Beauv.	3, 20	
61.	<i>F. pusillus</i> (Wilson) Milde	1	
62.	<i>F. taxifolius</i> Hedw.	7, 10	
63.	<i>Fontinalis antipyretica</i> Hedw.	7, 8, 20	
64.	<i>Funaria hygrometrica</i> Hedw.	11	
65.	<i>Grimmia decipiens</i> (Schultz) Lindb.*	11	
66.	<i>G. hartmannii</i> Schimp.	3, 4, 20	
67.	<i>G. incurva</i> Schwägr.*	6	
68.	<i>G. laevigata</i> (Brid.) Brid.	8, 10	
69.	<i>G. montana</i> Bruch & Schimp.*	11	VU
70.	<i>G. muehlenbeckii</i> Schimp.*	20	VU
71.	<i>G. ovalis</i> (Hedw.) Lindb.	8, 10, 11	
72.	<i>G. pulvinata</i> (Hedw.) Sm.	1, 8, 10, 11	
73.	<i>G. tergestina</i> Tomm. ex Bruch & Schimp.*	10	
74.	<i>G. trichophylla</i> Grev.*	6, 8, 11, 20	
75.	<i>Hamatocaulis vernicosus</i> (Mitt.) Hedenäs	18	VU, BC, RDB
76.	<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	3, 4, 11, 20	
77.	<i>H. stellata</i> Hedenäs*	11	
78.	<i>Herzogiella seligeri</i> (Brid.) Z. Iwats.	20	
79.	<i>Heterocladium dimorphum</i> (Brid.) Schimp.	6	
80.	<i>H. heteropterum</i> (Brid.) Schimp.*	3, 4, 20	
81.	<i>Homalia trichomanoides</i> (Hedw.) Brid.	3	
82.	<i>Homalothecium lutescens</i> (Hedw.) H. Rob.	8, 9, 10	
83.	<i>H. philippeanum</i> (Spruce) Schimp.	1, 4	
84.	<i>H. sericeum</i> (Hedw.) Schimp.	1, 8, 10, 11	

No	Species	Locality	Conservation status
85.	<i>Homomallium incurvatum</i> (Schrad. ex Brid.) Loeske	1	
86.	<i>Hygroamblystegium fluviatile</i> (Hedw.) Loeske	4	
87.	<i>H. humile</i> (P.Beauv.) Vanderp., Goffinet & Hedenäs	11	CR
88.	<i>H. tenax</i> (Hedw.) Jenn.	10, 11	
89.	<i>H. varium</i> (Hedw.) Mönk.	1	
90.	<i>Hygrohypnum duriusculum</i> (De Not.) D.W. Jamieson	20	
91.	<i>Hylocomium splendens</i> (Hedw.) Schimp.	3, 6, 20	
92.	<i>Hypnum cupressiforme</i> Hedw.	1, 3, 4, 6, 7, 8, 10, 11, 14, 20	
	<i>H. cupressiforme</i> var. <i>resupinatum</i> (Taylor) Schimp.	20	
93.	<i>Isopterygiopsis muelleriana</i> (Schimp.) Z. Iwats.*	4	VU
94.	<i>Isothecium alopecurioides</i> (Lam. ex Dubois) Isov.	3, 4, 6, 7, 11, 14, 20	
95.	<i>Kindbergia praelonga</i> (Hedw.) Ochyra	20	
96.	<i>Leptodon smithii</i> (Hedw.) F. Weber & D. Mohr*	11	
97.	<i>Lescuraea saxicola</i> (Schimp.) Molendo	20	VU
98.	<i>Leskea polycarpa</i> Hedw.	5	
99.	<i>Leucobryum juniperoideum</i> (Brid.) Müll.Hal.**	1, 4	
100.	<i>Leucodon sciuroides</i> (Hedw.) Schwägr.	1, 4, 5, 10, 20	
101.	<i>Loeskeobryum brevirostre</i> (Brid.) M. Fleisch.	3, 20	VU
102.	<i>Mnium lycopodioides</i> Schwägr.*	3	
103.	<i>M. stellare</i> Hedw.	1, 3	
104.	<i>Neckera besseri</i> (Lobarz.) Jur.	1, 3, 20	
105.	<i>N. complanata</i> (Hedw.) Huebener	3	
106.	<i>N. crispa</i> Hedw.	3, 13	
107.	<i>Orthotrichum affine</i> Schrad. ex Brid.	3, 5, 10	
108.	<i>O. anomalum</i> Hedw.	1, 5, 8, 10, 11	
109.	<i>O. cupulatum</i> Hoffm. ex Brid.	1	
110.	<i>O. lyellii</i> Hook. & Taylor*	10	
111.	<i>O. obtusifolium</i> Brid.	2, 5	
112.	<i>O. pallens</i> Bruch ex Brid.	2, 3, 10	
113.	<i>O. pumilum</i> Sw. ex Anon.*	3, 10	NT
114.	<i>O. stramineum</i> Hornsch. ex Brid.	7, 20	
115.	<i>O. striatum</i> Hedw.*	2, 3, 10, 20	
116.	<i>Oxyrrhynchium hians</i> (Schimp.) Warnst.	1, 11	
117.	<i>Oxystegus tenuirostris</i> (Hook. & Taylor) A.J.E. Sm.*	3, 20	
118.	<i>Paraleucobryum longifolium</i> (Hedw.) Loeske	3, 14, 20	
119.	<i>P. sauteri</i> (Bruch & Schimp.) Loeske*	20	VU, RDB

Table 1. Continuation.

No	Species	Locality	Conservation status
120.	<i>Phascum cuspidatum</i> Hedw.	10, 11	
121.	<i>Philonotis fontana</i> (Hedw.) Brid.	7	
122.	<i>Plagiomnium affine</i> (Blandow ex Funck) T.J. Kop.	3, 6	
123.	<i>P. rostratum</i> (Schrad.) T.J. Kop.	1, 3, 20	
124.	<i>P. undulatum</i> (Hedw.) T.J. Kop.	1, 3, 7, 11, 20	
125.	<i>Plagiothecium cavifolium</i> (Brid.) Z. Iwats.	3, 6, 12, 13	
126.	<i>P. nemorale</i> (Mitt.) A. Jaeger	20	
127.	<i>P. succulentum</i> (Wilson) Lindb.*	3, 7, 20	
128.	<i>Plagiomnium cuspidatum</i> (Hedw.) T.J. Kop.	1, 3, 20	
129.	<i>Plasteurhynchium striatulum</i> (Spruce) M. Fleisch.*	1	
130.	<i>Platygyrium repens</i> (Brid.) Schimp.**	4	
131.	<i>Platyhypnidium riparioides</i> (Hedw.) Dixon	10, 12, 20	
132.	<i>Pleurochaete squarrosa</i> (Brid.) Lindb.	10	
133.	<i>Pleurozium schreberi</i> (Willd. ex Brid.) Mitt.	6, 17, 20	
134.	<i>Pogonatum aloides</i> (Hedw.) P. Beauv.	20	
135.	<i>P. urnigerum</i> (Hedw.) P. Beauv.	6	
136.	<i>Pohlia cruda</i> (Hedw.) Lindb.	3, 6	
137.	<i>P. longicolla</i> (Hedw.) Lindb.	6	DD
138.	<i>P. lutescens</i> (Limpr.) H. Lindb.**	6	
139.	<i>P. melanodon</i> (Brid.) A.J. Shaw	1	
140.	<i>P. nutans</i> (Hedw.) Lindb.	20	
141.	<i>Polytrichastrum alpinum</i> (Hedw.) G.L. Sm.	6	
142.	<i>P. formosum</i> (Hedw.) G.L. Sm.	3, 6, 8, 20	
143.	<i>Polytrichum juniperinum</i> Hedw.	8, 11	
144.	<i>P. piliferum</i> Hedw.	3, 6, 8, 11, 20	
145.	<i>P. strictum</i> Menzies ex Brid.	17	
146.	<i>Pseudoleskeella catenulata</i> (Brid. ex Schrad.) Kindb.	1	
147.	<i>P. nervosa</i> (Brid.) Nyholm	1, 2, 3, 4, 5, 10	
148.	<i>Pseudotaxiphyllum elegans</i> (Brid.) Z.Iwats.	3, 20	VU
149.	<i>Pterigynandrum filiforme</i> Hedw.	2, 3, 4, 6, 11, 13, 20	
150.	<i>Pylaisia polyantha</i> (Hedw.) Schimp.	5	
151.	<i>Racomitrium aciculare</i> (Hedw.) Brid.	20	
152.	<i>R. affine</i> (F. Weber & D. Mohr) Lindb.*	6, 8, 20	VU
153.	<i>R. aquaticum</i> (Brid. ex Schrad.) Brid.	3, 6, 7, 20	
154.	<i>R. canescens</i> (Hedw.) Brid.	8, 11, 17, 20	
155.	<i>R. fasciculare</i> (Hedw.) Brid.*	20	DD
156.	<i>R. heterostichum</i> (Hedw.) Brid.	6, 7, 20	
157.	<i>R. lanuginosum</i> (Hedw.) Brid.	20	
158.	<i>R. sudeticum</i> (Funck) Bruch & Schimp.	6, 20	
159.	<i>Rhabdoweisia fugax</i> (Hedw.) Bruch & Schimp.	3, 6	
160.	<i>Rhizomnium punctatum</i> (Hedw.) T.J. Kop.	3, 7, 20, 21	
161.	<i>Rhynchostegiella tenella</i> (Dicks.) Limpr.	1	VU
162.	<i>Rhynchostegium megapolitanum</i> (Blandow ex F. Weber & D. Mohr) Schimp.*	10	
163.	<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	6, 8, 17	
164.	<i>R. triquetrus</i> (Hedw.) Warnst.	3, 6, 20	
165.	<i>Sanionia uncinata</i> (Hedw.) Loeske	6, 20	
166.	<i>Schistidium apocarpum</i> (Hedw.) Bruch & Schimp.	3	
167.	<i>S. crassipilum</i> H.H. Blom	1, 8, 10	
168.	<i>S. elegantulum</i> H.H. Blom*	10	
169.	<i>S. helveticum</i> (Schkuhr) Deguchi	10	
170.	<i>Sciuro-hypnum flotowianum</i> (Sendtn.) Ignatov & Huttunen	4	
171.	<i>S. populeum</i> (Hedw.) Ignatov & Huttunen	3, 4, 12, 20	
172.	<i>Seligeria pusilla</i> (Hedw.) Bruch & Schimp.*	1	VU
173.	<i>Sphagnum angustifolium</i> (C.E.O. Jensen ex Russow) C.E.O. Jensen	17	
174.	<i>S. auriculatum</i> Schimp.	17	
175.	<i>S. compactum</i> Lam. & DC.	17	
176.	<i>S. contortum</i> Schultz	17	
177.	<i>S. cuspidatum</i> Ehrh. ex Hoffm.	17	EN
178.	<i>S. fallax</i> (H. Klinggr.) H. Klinggr.	17	VU
179.	<i>S. flexuosum</i> Dozy & Molk.	17	
180.	<i>S. girgensohnii</i> Russow	17	
181.	<i>S. magellanicum</i> Brid.	17	
182.	<i>S. papillosum</i> Lindb.	17	
183.	<i>S. quinquefarium</i> (Braithw.) Warnst.	20	
184.	<i>S. russowii</i> Warnst.	17	
185.	<i>S. subsecundum</i> Nees	17	
186.	<i>Syntrichia calcicola</i> J.J. Amann	9	
187.	<i>S. montana</i> Nees	1, 10, 11	
188.	<i>S. papillosa</i> (Wilson) Jur.*	10	EN
189.	<i>S. ruralis</i> (Hedw.) F. Weber & D. Mohr	1, 4, 6, 8, 10, 11	
190.	<i>Taxiphyllum wissgrillii</i> (Garov.) Wijk & Margad.	1, 3	VU
191.	<i>Thamnobryum alopecurum</i> (Hedw.) Gangulee	3, 7, 12, 20	
192.	<i>Thuidium assimile</i> (Mitt.) A. Jaeger	5, 11, 20	
193.	<i>T. delicatulum</i> (Hedw.) Schimp.	7	NT
194.	<i>T. recognitum</i> (Hedw.) Lindb.	3, 20	
195.	<i>Timmia bavarica</i> Hessel.*	1	

Table 1. Continuation.

No	Species	Locality	Conservation status
196.	<i>Tortella tortuosa</i> (Hedw.) Limpr.	8, 10	
197.	<i>Tortula inermis</i> (Brid.) Mont.*	1	
198.	<i>T. modica</i> R.H. Zander*	9	
199.	<i>T. muralis</i> Hedw.	1, 9, 10, 11	
200.	<i>Trichodon cylindricus</i> (Hedw.) Schimp.*	1, 3, 6	
201.	<i>Ulota crispa</i> (Hedw.) Brid.	15, 20	EN
202.	<i>Weissia condensa</i> (Voit) Lindb.	10	
203.	<i>W. levieri</i> (Limpr.) Kindb.*	10	
204.	<i>W. longifolia</i> Mitt.	10	

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