ANNOTATED CHECKLIST OF BRYOPHYTES
OF THE BEARTOOTH MOUNTAINS OF WYOMING,
SHOSHONE NATIONAL FOREST

Prepared for:
Shoshone National Forest and Wyoming Natural Diversity Database

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INTRODUCTION

The Shoshone National Forest (SNF) is a unique nationally protected area which is located in the northwestern part of Wyoming, bordering the world renowned Yellowstone National Park. The unveiling of SNF plant diversity is still in progress. Until now, there was not a list of this least-studied group of higher plants, which are bryophytes. During the summers of 2008-2009, within the frames of bryophyte inventory projects on the SNF, the author explored its northern territories which lie in the mountains of the Wyoming’s Beartooth Plateau; distribution and documentation of the bryophytes has been the subject of the research.

Historically, the bryoflora of the Wyoming’s Beartooth Plateau has been poorly documented, except for several noteworthy collections of E. Lawton (1953), F. J. Hermann (1965) & W. A. Weber (1973) and some other researchers. The present study intended to fill that gap. The research encompassed the Plateau for a total of 150 mi² ranging in elevation from 2000 to 3350 m. Totally, during two field seasons, approximately three thousand bryophyte specimens were collected, along with a herbarium of dominating vascular plants within plots where bryophytes were studied.

As a result of the analysis of the author’s herbarium, along with materials of preceding researchers, 201 species from 101 genera and 47 families were registered in the bryoflora of the Beartooth Mountains of Wyoming, representing two phyla of bryophytes: Marchantiophyta, or liverworts (27 species, 18 genera, and 13 families), and Bryophyta, or mosses (174 species, 83
genera, and 34 families). 11 species and one variety are novelties to the state moss flora, all based on the author’s collections; two undescribed species / subspecies were revealed. The list of rare taxa includes at least 19 species, which are globally and/or regionally rare, and represented in Wyoming by few populations.

Further efforts of the author will be focused on specification of the listed bryophyte taxa distribution and ecology within the study area, extension of species list, visiting the least explored areas of the Plateau, more completely embracing the ecological diversity of sites, further revealing rare species and evaluation of their conservation status for their protection, work on taxonomically problematic groups; special attention will be paid to liverworts as the least-known group of the Wyoming bryophytes.

The checklist may be cited as:

1. STUDY AREA: A BRIEF PHYSIOGEOGRAPHIC OVERVIEW

The Beartooth Plateau is a part of the Beartooth-Absaroka mountain complex in the Central Rockies, located in south central Montana with a small portion in northwest Wyoming. Geologically, the Plateau represents an uplifted fault block of Precambrian granite and crystalline metamorphic rocks, which was uplifted, eroded, partially blanketed with lava from Yellowstone’s volcanoes (Poldervaart & Bentley, 1958; Lageson & Spearing, 1991). Glaciers carved out U-shaped valleys and created the distinct alternating plateau-canyon landscape. An extensive, gentle surface, partially dissected by canyons and glacial cirques, occupies most of the Plateau, a substantial part of which is above 3000 m; numerous alpine and subalpine lakes, high peaks, persistent snowfields, moist north-facing slopes, waterfalls and cascades, riparian corridors are the major features of the area. The Plateau contains a broad area of alpine habitats that include boulder fields, talus slopes, moist and dry meadows, snowbeds, patterned ground, and bedrock outcrops (Eversman, 1995). Ancient granite is overlain in places by Cambrian-Devonian carbonates and shales forming limestone cliffs (Clay/Beartooth Butte) (Carson et al., 1998).

The Beartooths are largely above the timberline, and alpine meadows and tundra are the characteristic vegetation. The growing season at high elevations is as brief as about 45 days, and the plants and the soil are sensitive to trampling; the ecosystems are especially vulnerable in the harsh conditions of wind-swept summits. Of the primary alpine vegetation types, Johnson & Billings (1962) describe Geum rossii (R. Br.) Ser. turfs on summits, ridges and upper slopes, Deschampsia caespitosa (L.) Beauv. meadows on lower mesic slopes and basins, Carex scopulorum Holm fens on wet, mineral bog and peat soils and Salix planifolia Pursh (+ S. spp.) thickets along drainages. Lower elevations have grass and sagebrush-dominated communities, while forested areas are dominated by combinations of species: Pinus contorta Dougl. ex Loud., Pseudotsuga menziesii (Mirb.) Franco and Populus tremuloides Michx., found at elevations up to 2700 m (8900 ft.); at higher elevations Abies lasiocarpa (Hook.) Nutt., Picea engelmannii Parry ex Engelm., P. glauca (Moenck) Voss and Pinus albicaulis Engelm. are common, each occurring up to the timberline. As recent study revealed, the Beartooth Plateau of Wyoming encompasses high fen diversity all across its elevation range (Heidel et al., 2008).

The present research was carried out in the montane, subalpine and alpine vegetation zones of the Beartooth Plateau, within 44°50’-45°01’N & 109°24’-109°51’W.
2. ANNOTATED CHECKLIST OF BRYOPHYTES OF THE BEARTOOTH MTS. OF WYOMING, SHOSHONE NATIONAL FOREST

2.1. List of the author’s bryophyte collection sites in the Beartooth Mts. in 2008-2009

**Island Lake CG: spruce forest***. Island Lake Campground, loop A, N 3, slope facing to the south-west; subalpine Picea engelmannii – Vaccinium scoparium forest; rotting wood, shaded granite rocks under canopy of spruce. Sect. 10, R105W T57N, el. 9520-9550 ft., 12.08.08 (map: site 011).

**Summits: alpine tundra-1.** MT-WY state line vicinity (on WY side), wind-swept slope facing to the north-north-east, alpine tundra with dominated Geum rossii turf vegetation; scattered granite outcrops. Sect. 22 and further north to the state line, R104W T58N, el. approx. 10250 - 10300 ft, 12.08.08 (map: site 014).

**Summits: alpine fen-1.** Vast depression on gentle slope facing to the west-north-west; alpine Salix planifolia - Carex spp. - Bryidae fen with Sarmentypnum exannulatum (+ S. sarmentosum) pools. Sect. 22, R104W T58N; el. approx. 10450 ft., 12.08.08 (Figs. 1-3, map: site 015). [INSERT PHOTOS 1-3]

**Summits: alpine fen-2.** Slope facing to the north, immediately south of HWY 212. Alpine Caltha leptosepala + Polygonum bistortoides + Sedum integrifolium (+ Geum rossii) – Bryidae fen along snow-melt rill (below drainage pipe). Sect. 28, R104W T58N, el. 10800 ft., 12.08.08 (map: site 016).

**Summits: alpine tundra-2.** Scenic point beside ski-lift and bench mark, 20-100 meters west of HWY 212, gentle slope facing to the west; wet alpine tundra dominated by Geum rossii, dwarf willow (Salix arctica ?), Polygonum bistortoides; scattered granite outcrops and debris. Sect. 28, R104W T58N, el. appr. 10880-10900 ft, 12.08.08 (map: site 017).

**Boggy shore of Island Lake.** Island Lake Campground vicinity, eastern-south-eastern shore of Island Lake: willow wetlands and moss fens along the shore and moss-lined banks of stream. Salix planifolia, Kalmia microphylla, Phyllodoce empetriformis, Caltha leptosepala, Pedicularis sp., Luzula parviflora, etc. Sect. 3, R105W T57N, el. approx. 9530 ft, 12.08.08 (map: sites 018-019).

**Summits: alpine tundra-3.** 0.5 km east of HWY 212, gentle wind-swept rocky slope facing to the north-east, fragment of alpine tundra with poor vegetation and scattered granite outcrops. Dwarf willow (Salix arctica?), Phyllodoce empetriformis, Geum rossii, Selaginella densa, Polygonum bistortoides, Antennaria sp., Solidago sp., Carex spp., lichens, etc. Sect. 22, R104W T58N, el. approx. 10350 ft., 13.08.08 (map: site 020).

* “Working names” of sites are in bold.
**Summits: dry creek in alpine tundra.** Approx. 1 km east of HWY 212, slope facing to the north-east, dry course of stream (former stream channel), long interrupting stripe of wet alpine tundra alternating with fragments of alpine fen: Salix reticulata, cf. + S. planifolia – Sedum lanceolatum + Geum rossii + Polygonum bistortoides. Sect. 22, R104W T 58N; el. approx. 10350 ft., 13.08.08 (map: site 021).

**Summits: alpine tundra-4.** WY-MT state line vicinity (on WY side), slope facing to the north-west, fragment of wet alpine tundra with patches of dense thickets of Salix planifolia. Sect. ? (unmarked on the map), R104W T58N, el. approx. 10250 ft., 13.08.08 (map: site 022).

**Summits: alpine fen-3.** WY-MT state line vicinity (on WY side), wet steep slope facing to the west (to Twin Lakes), alpine Salix planifolia – Aulacomnium palustre fen along dry stream channel, moss-lined banks, ecotone zone between fen and wet alpine tundra. Sect. ? (unmarked on the map), R104W T58N, el. approx. 10100 ft., 13.08.08 (map: site 023).

**Summits: granite outcrops in alpine tundra-1.** Slope facing to the north, lookout to small alpine lake from HWY 212; fragment of disturbed alpine tundra immediately beside the road, in front of pull off; granite outcrops, boulders and debris, covered by mosses and lichens. Sect. 31, R104W T58N, el. approx. 10900 ft., 13.08.08 (map: site 024).

**Unnamed tributary of Frozen Lake.** Slope facing to the south-south-west: seepage area with patches of snowbeds, numerous streamlets of unnamed tributary of Frozen Lake and vast area of adjacent alpine Bryidae fens and pools; fragment of alpine meadow on talus slope. Sect. 31 & 36, R104-105W T58N; el. approx. 10380-10580 ft., 14.08.08 (Figs. 4-8, map: site 025-029). [INSERT PHOTOS 4-8]

**Two lakes along HWY 212.** Willow and moss wetlands between two unnamed alpine lakes, immediately south of highway; peaty banks of the lakes; ecotone zone of Salix planifolia - Bryidae fen and wet Picea engelmannii + Pinus albicaulis forest. Sect. 6, R104W T57N, el. approx. 10020 ft. 14.08.08 (map: site 030).

**Little Bear Creek-1.** Little Bear Creek, west of NF Rd 151 dead end, steep rocky terrace facing to the north, forested with Picea engelmannii & P. glauca, granite cliff ledges, moss wetlands along the shore, clay bank of the creek. Sect.11, R105W, T57N; el. approx. 9670 ft., 14.08.08 (Fig. 9, map: site 031). [INSERT PHOTO 9].

**Little Bear Lake Fen-NW-08 & 09.** A basin and basin toe slope aapamire fen located above Little Bear Lake, on both sides of HWY 212; mounds (Salix planifolia) - Carex scopulum – Aulacomnium palustre + Sphagnum spp. communities), broad intervening shallow swales (Carex utriculata – Sarmentypnum exannulatum + S. sarmentosum) and deep swales (Sarmentypnum exannulatum + Sphagnum platyphyllum) (Heidel et al., 2008; author’s data). North-western part of fen. Sect.11, R105W T57N; el. 9560-9600 ft. 15.08.08, 25.08.09 (Figs. 10, 11, map: sites: in 2008-034, in 2009: 357-365). [INSERT PHOTO 10, 11].
Little Bear Lake Fen-SE-08 & 09. (see above). South-eastern part of fen. Sect. 11, R105W T57N; el. 9560-9600 ft. 16.08.08, 25.08.09 (Figs. 12, 13, map: sites: in 2008 - 035, in 2009 - 366-368). [INSERT PHOTO 12, 13].

Island Lake CG: subalpine meadow. Gentle (5°-10°) slope facing to the south, between NF Rd 148 and Island Lake Campground, Loop A. Subalpine meadow (Antennaria sp., Aster sp., Erigeron sp., Carex spp., Trollius alibiflorus, Sibbaldia procumbens, Solidago sp., Phleum pratense, Juncus spp., Polygonum bistortoides, etc.), & ecotone zone of the meadow and Picea engelmannii forest; scattered granite debris and ourcrops. Sect. 11, R105W, T57N, el. 9560 ft. 16.08.08.08-035, in 2009 - 366-368). 

Clay Butte Fen. An upper montane fen on Quaternary alluvium, influenced by the CaCO2-rich material eroded from Beartooth Butte and the confluent Clay Butte (Heidel et al., 2008). Nuphar polysepala pool complexes, zone of Carex aquatilis-Bryidae semi-aquatic communities, floating mats with Carex limosa & Menyanthes trifoliata, the medium height shrub communities of Salix eastwoodiae-Carex utriculata and low shrub communities of (Betula glandulosa +) Salix planifolia-Carex aquatilis; Bryidae associations at the bases of willow shrubs. Ecotone zone of fen and Picea engelmannii + Pinus albicaulis – Vaccinium scoparium forest. Sect. 12, R106W T57N, el. approx. 8980 ft., 16.08.08 (map: site 034.1)

Lily Lake Swamp Forest. Wet (and in places swamp) coniferous forest on the western shore of Lily Lake (south-eastern edge of Lily Lake Fen). Picea glauca (+ P. engelmannii + Pinus contorta) – Alnus incana (+ Rosa sp. + Ribes sp. + Juniperus communis) – Vaccinium scoparium + Linnaea borealis (+ Equisetum sp.) – Bryidae community. Sect. 1, R107W T57N, el. approx. 7700 ft., 17.08.08. (map: site 036).

Lily Lake Fen. A rich montane fen in a relatively steep-sided toe slope setting, overlying Quaternary glacial deposits (Heidel et al., 2008). Eastern-south-eastern edge of Lily Lake Fen immediately north-west of Lily Lake; the zone of medium shrub fen immediately above the lake, Salix boothii - Carex utriculata communities, ditches crossing the fen. Alnus incana, Betula glandulosa, Equisetum sp., Parnassia palustris, Luzula parviflora, Carex spp., Calamagrostis sp., etc. Sect. 6, R107W T57N; el. approx. 7680 ft. 17.08.08 (Fig. 14, map: sites 037-038). [INSERT PHOTO 14].

Mud Lake Fen. A rich montane fen in a basin setting, overlying Quaternary glacial deposits. Extensive plant communities of Carex utriculata, Salix wolfii (+ Pentaphylloides floribunda + Betula glandulosa) - Carex aquatilis; communities of floating mats at the margin around the lake – (Typha latifolia + Calamagrostis sp. +) Carex lasiocarpa + Menyanthes trifoliata – Bryidae and Carex vesicaria zone (Heidel et al., 2008). Sect.1 & 6, R108W T57N; el. approx. 7700 ft. 17.08.08 (Fig. 15, map: sites 039-040). [INSERT PHOTO 15].

Clarks Fork of Yellowstone River-1. Pilot Creek Campground vicinity, valley of Clarks Fork, wet Picea glauca + Pinus contorta – Alnus incana (+ Juniperus communis + Shepherdia canadensis) - Equisetim spp. forest on the river terrace, massive granite outcrops under open canopy of spruce;
steep clay bank of the river and adjacent gullies. Sect. 33, R107W T58N el. 6950-7020 ft., 18.08.08 (map: sites 041-042).

**Crazy Creek CG Swamp.** Woody peatland site in the vicinity of Crazy Creek Campground, immediately south of HWY 212; a valley toe slope swamp on Quaternary alluvium, forested with Picea glauca (+ P. engelmannii) & Pinus spp. with many old fallen logs covered by vegetation; massive granite outcrops in the upland pine forest. Sect. 10, R107W T57N; el. approx. 6940 ft. 18.08.08 (Fig. 16, map: sites 043-044). [INSERT PHOTO 16].

**Little Bear Creek-2.** Unnamed tributary of Little Bear Creek, approx. 0.5 km south of Island Lake Campground, immediately south of HWY 212; Salix planifolia wetlands along the creek (Juncus mertensianus, Saxifraga odontoloma, Sedum rhodanthum, etc.), moss-lined bank, underwater rocks and sandy bottom of the creek, disturbed subalpine meadow between highway and creek. Sect. 10, R105W T57N, el. approx. 9480 ft., 18.08.08 (map: site 045).

**Summits: alpine fen-4.** HWY 212, slope facing to the north-west, 50-200 meters west of highway; alpine Salix planifolia – Carex spp. - Bryidae fen along stream; granite boulders in ecotone zone between fen and alpine tundra. Sect. 22, R104W T58N; el. approx. 10400 ft., 19.08.08 (map: sites 046-048).

**Summits: alpine tundra-5.** Wind-swept 5°-20° slope facing to the west, 30-100 m west of HWY 212. Rocky alpine tundra dominated by Geum rossii (with Polygonum bistortoides, Gentiana algida, lichens, etc.). Sect. 28, R104W T58N, el. 10630-10700 ft., 19.08.08 (map: sites 049-052).

**Summits: alpine tundra-6.** Wind-swept 5°-10° slope, facing to the west, 100-300 m east of HWY 212. Rocky alpine tundra dominated by Geum rossii; abundance of lichens. Sect. 27 & 28, R104W T58N, el. 10750-10840 ft., 19.08.08 (map: sites 053-056).

**Summits: wet alpine meadow & fen.** HWY 212, gentle slope facing to the east-north-east, small spot of ecotone zone of alpine meadow and Bryidae fen; Sect. 27, R104W T58N, el. 10750 ft., 19.08.08 (map: site 057-58).

**Summits: alpine fen-5.** HWY 212; gentle slope facing to the east-north-east, small depression beside the trailhead of NF Trail 623; alpine (Salix planifolia -) Caltha leptosepala + Sedum sp. + Carex spp. + Polygonum bistortoides – Bryidae fen with shallow pools; wet clay in seepage zone. Sect. 28, R104W T58N; el. 10700-10730 ft., 19.08.08 (Fig. 17, map: sites 059-060). [INSERT PHOTO 17].

**Wyoming Creek-1.** East summit, headwaters of Wyoming Creek; alpine fens in the valley of creek approx. 1 mile east of HWY 212: Salix planifolia wetlands (with Pedicularis groenlandica, cf., Sedum rhodanthum, Caltha leptosepala, Carex spp.), moss-lined peaty and sandy banks of stream, pasture place. Sect. 27, R104W T58N, el. 10300 ft., 20.08.08 (map: site 061).

**Summits: granite outcrops in alpine tundra-2.** Gentle slope facing to the south-east; granite debris in dry rocky Selaginella densa(+) tundra, 50-70 meters south-east of HWY 212. Sect. 33, R104W T58N, el. approx. 10750 ft., 20.08.08 (map: site 062).
Summits: roadside of HWY 212. HWY 212, gentle slope facing to the south-east, disturbed alpine tundra and neglected ground on highway roadside. Sect. 33, R104W T58N, el. approx. 10750 ft., 20.08.08 (map: site 063).

Small alpine lake. HWY 212, small lake in vast depression, approx. 100 m north of highway; boggy shore of the lake. Bryidae and sedge wetlands crossed by brooks. Caltha leptosepala, Carex spp., Juncus spp., Pedicularis parryi, cf., Veronica sp., Phyllocoche empetriformis, etc. Sect. 29, R104W T58N, el. approx. 10500 ft., 20.08.08 (Fig. 18, map: site 064).

Summits: Overlook Roadside Park. HWY 212, the loop of NF Rd 150, Overlook Roadside Park, alpine rocky tundra with Selaginella densa, granite outcrops covered by mosses and lichens. Sect. 31, R104W T58N, el. approx. 10930 ft., 20.08.08 (map: site 065).

Littlelock Creek Fen. The head of an unnamed tributary to Little lock Creek, 0.8 km east of Christmas Lake; a basin toe slope alpine fen “Littlelock Creek Fen” overlaying Precambrian bedrock (Heidel et al., 2008). Mounds with dominating Salix planifolia – Carex scopulorum – Aulacomnium palustre (+ Sphagnum Sect. Acutifolia) communities; Sarmentypnum exannulatum swales; streams crossing the fen; ecotone zone between fen and wet alpine tundra. Sect. 34, T58N R104W, el. approx. 10680 ft., 21.08.08 (map: sites 066-072).

Ghost Creek Fen. Headwaters of Ghost Creek, a basin montane fen lying on Precambrian bedrock. Extensive floating mat zone surrounding pools, dominated by Carex limosa, Drosera anglica, Menyanthes trifoliata and Sphagnum warnstorfii, with patches of Eriophorum chamissonis + Drosera anglica - Straminergon stramineum community; Sphagnum warnstorfii (+ Carex buxbaumii, C. interior) hummocks and carpets and broad bands of Calamagrostis cana densis stands along the perimeter of fen (Heidel et al., 2008; author’s data); ecotone zone between fen and swamp Picea engelmannii (+ P. glauca) forest. Sect. 15, T58N R107W, el. appr. 7900 ft., 22.08.08 (Figs. 19, 20, map: sites 073-081). [INSERT PHOTO 19, 20].

Meadow Lake Fens. Basin toe slope fens “Meadow Lake Fen” & “Meadow Lake North Fen” (also known as “Fantan North Fen”) located 0.8-1 miles north-west of Fantan Lake; aapamire fens with large pools, Sarmentypnum exannulatum-dominating deep swales, shallow narrowly-spaced swales with Carex aquatilis and Sphagnum platyphyllum, and (Salix planifolia) - Carex scopulorum – Aulacomniummn palustre mounds (Heidel et al., 2008; author’s data). Sect. 15-16, R105W T57N; el. appr. 9850 ft., 22.08.08 (Figs. 21-25, map: sites 082-089). [INSERT PHOTO 21-25].

Clay Butte: slope facing to E. Clay Butte. Vicinity of Clay Butte Lookout Visitor Center; steep (30°-60°) slope facing to the east (to the Beartooth Butte), limesone debris scattered on the slope across subalpine meadow communities and patches of Picea engelmannii forest. Sect. 1, R106W T57N, el. 9560-9700 ft., 22.08.08 (map: site 090-094).

Creek SW of Beartooth Butte. Boggy valley of Beartooth Creek immediately south-west of Beartooth Butte, wet subalpine meadows and willow wetlands along the shore (Salix sp., S. planifolia, Trollius albiflorus, Equisetum spp., Mertensia ciliata, Pedicularis sp., etc.), moss-lined
banks of creek, inundated rocks and sandy bottom. Sect. 1, R106W T57N, el. approx. 9500 ft., 22.08.08 (Fig. 26, map: site 094.1). [INSERT PHOTO 26].

**Pine forest along HWY 212.** Steep 30°-50° slope facing to the south, immediately along HWY 212; (Picea engelmannii + Abies lasiocarpa +) Pinus contorta + P. albicaulis forest (with Juniperus communis, Vaccinium scoparium, Thalictrum sp., etc.); brook under canopy of trees. Sect. 12, R106W T57N, el. approx. 8950 ft., 23.08.08 (map: site 097).

**Aspen grove along HWY 212.** Second-growth forest of Populus tremuloides on gentle slope facing to the south along HWY 212, approx. 3-3.5 km east of HWYs 212 & 296 intersection, between BM 7659 & Overlook. Sect. 16, R107W T57N, el. approx. 7700 ft., 23.08.08 (Fig. 27, map: site 098) [INSERT PHOTO 27].

**E shore of Beartooth Lake.** Eastern shore of Beartooth Lake, approx. 500 meters north-northwest of Beartooth Lake campground; Salix planifolia – Carex spp. - Bryidae fen along boggy lake shore with Drepanocladus longifolius pools; willow wetlands along Little Bear Creek. Sect. 6, R105W T57N, el. approx. 8900 ft., 18.08.09 (Figs. 28, 29, map: sites 203-205) [INSERT PHOTO 28, 29].

**Beartooth Lake CG: wet subalpine meadow & fen.** Beartooth Lake Campground vicinity, approx. 1 km east of Beartooth Lake, immediately across the FS road near campground; complex of wet subalpine meadow dominated by herbaceous perennials and (Salix planifolia -) Carex spp. – Bryidae fen community (Caltha leptosepala, Trollius albiflorus, Luzula sp., scattered hummocks of Sphagnum warnstorfii, etc.). Sect. 5 & 6, R105W T57N, el. 8930-8970 ft., 19.08.09 (Fig. 30, map: sites 206-216) [INSERT PHOTO 30].

**Clay Butte: slope facing to W.** Clay Butte; vicinity of Clay Butte Lookout Visitor Center. Limestone and granite debris and outcrops on slope facing to the west (along Rd 142); fragments of grasslands and Abies lasiocarpa (? no cones) & Picea glauca + P. engelmannii woodlands on summit, downslope (within 20-150 meters north of lookout) and west slope. Sect. 1 & 2 R106W T57N, el. 9550-9800 ft., 19.08.09 (Figs. 31, 32, map: sites 218-231). [INSERT PHOTO 31, 32].

**Summits: granite outcrops in alpine tundra-3.** Wind-swept gentle rocky slope facing to the west, approx. 50 meters south-east of HWY 212; granite outcrops. Sect. 31, R104W T58N, el. 10970 ft., 20.08.09 (map: site 232).

**Wyoming Creek-2.** Alpine fens of east summit at head of Wyoming Creek: Bryidae fens on seepage E slope, Salix planifolia wetlands along the creek, Sarmentypnum exannulatum pools, granite debris along rocky snow-melt rills, moss-lined sandy-clay and peaty banks of streamlets. Sect 27, R104W T58N, el. 10450-10600 ft., 20.08.09 (Fig. 33, map: sites 233-262). [INSERT PHOTO 33].
**Swamp Lake Fen & vicinity.** Base of Cathedral Cliffs, 2 miles east of Crandall Ranger Station. A calcareous fen in basin and valley toe slope setting, with central open water and palustrine emergent zone (Heidel et al., 2008): emergent vegetation of Schoenoplectus acutus & Typha latifolia, hygrophilous communities of Carex simulate and/or C. utriculata (- Drepanoclados aduncus + Plagiomnium ellipticum); upland communities of north-north-west facing slope, adjacent to the fen: Picea glauca + P. engelmannii (+ Pseudotsuga menziesii + Populus tremuloides) forest, ecotone zone of shrubby vegetation: Pentaphylloides floribunda (+ Betula glandulosa) + Salix sp. – Carex spp.; granite and limestone outcrops. Sect. 11 & 13, R105W T56N, el. 6570-6610 ft., 21.08.09 (Fig. 34, map: sites 263-288, including 279-287 - upland communities) [INSERT PHOTO 34]

NB This site is a part of Beartooth-Absaroka mountain complex but it lies aside from the Beartooth Plateau; this fen was included into research schedule for its significance: it is the largest fen in the state (98.9 ha) and the only extremely rich fen in the area, harboring an extremely high concentration of species of concern (Heidel et al., 2008).

**NE & N shore of Beartooth Lake.** Vast area of north-eastern and northern boggy shores of Beartooth Lake within watershed of Little Bear Creek and Beartooth Creek; Salix ssp. wetlands, graminoid, Bryidae and Sphagnum fens along streams, dry and inundated granite boulders and outcrops scattered across the valley, moss-lined banks of creeks; immediately adjacent to the upland communities of wet Picea engelmannii + P. glauca + Pinus contorta + P. albicaulis forest. Sect. 5&6, R105W T57N, el. 8860-8970 ft., 22.08.09 (Figs. 35-36, map: sites 289-294, 310-312) [INSERT PHOTOS 35-36]

**Beartooth Butte.** East base of Beartooth Butte; steep (20-60°) slope facing to the east, with scattered patches of Picea engelmannii forest; open and shaded limestone debris and sedimentary rocks. Sect. 6, R105W T57N, el. 8950-9250 ft., 22.08.09 (Figs. 37-39, map: sites 295-309) [INSERT PHOTO 37-39]

**Little Bear Creek-3.** Unnamed tributary of Little Bear Creek, approx. 0.5 km south-west of Island Lake Campground, 0-50 meters north of HWY 212; Salix planifolia wetlands along the shore (Carex spp., Sedum rhodanthum, Senecio triangularis, Phleum alpinum, etc.), moss-lined bank of creek, granite boulders and sedimentary rocks lining the creek, underwater stones. Sect. 9, R105W T57N, el. approx. 9400 ft., 23.08.09 (Figs. 40-42, map: sites 313-321) [INSERT PHOTOS 40-42]

**Coniferous forest near Clay Butte Fen.** HWY 212, Clay Butte foothills, Clay Butte Fen vicinity. Wet subalpine Abies lasiocarpa + Picea glauca + P. engelmannii + Pinus contorta forest adjacent to the fen; unnamed creek crossing the forest. Sect. 12, R106W T57N, el. approx. 9000 ft., 23.08.09 (Fig. 43, map: sites 322-326). [INSERT PHOTO 43]

**Beartooth Creek.** Beartooth Creek, Beartooth Falls vicinity, approx. 100 meters south of HWY 212, along the trail; wet granite debris in the splash zone of creek, moss-lined bank of creek, upland community of Picea engelmannii + Pinus contorta forest; Saxifraga odotholoma + Mertensia
ciliata + Senecio triangularis – Bryidae fen in small depression of former stream course. Sect. 7, R105W T57N, el. approx. 8900 ft., 23.08.09 (Fig. 44-45, map: sites 327-334). [INSERT PHOTO 44-45]

**WY-MT state line: spruce forest.** HWY 212, pull off near WY-MT state line marker. Picea engelmannii forest along the road; shaded granite outcrops. Sect. 24, R108W T58N, el. approx. 7770 ft., 24.08.09 (map: site 335).

**Index Creek.** Vast valley of Index Creek on slope facing to the south; Pseudotsuga menziesii + Picea glauca + Pinus contorta – (Shepherdia canadensis + Amelanchier alnifolia – Linnaea borealis) - Bryopsis forest and debris material along the creek; roadside substrates near HWY 212 pull off in front of the bridge over the creek. Sect. 19 & 24, R107-108W T58N, el. 7450-7520 ft., 24.08.09 (Fig. 46, map: sites 336-342).

**Fox Creek.** Valley of Fox Creek on slope facing to the north-east, HWY 212 pull off in front of the creek, Picea glauca(+) forest, Rubus idaeus thickets on rocky bank of creek along the highway; roadside substrates. Sect. 30, R107W T58N, el. approx. 7200 ft., 24.08.09. (Fig. 47-48, map: sites 345-351) [INSERT PHOTO 47-48]

**Willow Park.** South-eastern edge of “Willow Park”, 50-150 meters north of HWY 212; vast complex of Salix planifolia – Carex spp. – Bryidae fen and wet mountain meadows (Phleum pratense, Achillea millefolium, Carex spp., Equisetum spp., etc.); ecotone zone of fen and adjacent Picea engelmannii forest. Sect. 32, R107W T58N, el. 6970-6980 ft., 24.08.09 (Figs. 47-48, map: sites 345-351) [INSERT PHOTO 47-48]

**Clarks Fork of Yellowstone River-2.** HWY 212 pull off, approx. 100 meters east of intersection of highway and Clarks Fork of Yellowstone River; steep moss-lined bank of Clarks Fork in front of pull off; scattered stands of Picea glauca (+ P. engelmannii ?) along the shore. Sect. 4, R107W T57N, el. 6930-6940 ft., 24.08.09 (Fig. 49, map: sites 352-353) [INSERT PHOTO 49]

**Crazy Creek.** Crazy Creek, approx. 50 meters north of HWY 212, NF Trail 612, shaded granite cliffs along the creek. Sect. 3, R107W T57N, el. 6950-6970 ft., 24.08.09 (Fig. 50, map: sites 354-356). [INSERT PHOTO 50]

**Rd 120: roadside tundra communities.** Approx. 300 meters south of intersection of HWY 212 & Rd 120 (Morrison Jeep Trail), pull off of Rd 120, fragment of disturbed Polytrichum tundra on wind-swept gentle slope facing to the south. Sect. 11, R105W T57N, el. 9700 ft., 25.08.09 (map: site 369).

**Canyon Creek.** Rd 120 (Morrison Jeep Trail), Canyon Creek; broad boggy valley of creek, alternating subalpine meadow and willow, sedge and moss wetlands (Salix planifolia, cf., Carex spp., Polygonum bistortoides, Sedum rhodanthum, Potentilla sp., Antennaria spp., Aulacomnium palustre, Sphagnum riparium, S. warnstorfi); moss-lined peaty banks of streams and ditches. Carex spp. – Sphagnum riparium + S. russowii + S. squarrosum fen along the widened portion of creek.
Sect. 13, R105W T57N, el. approx. 9400 ft., 25.08.09 (Figs. 51-52, map: sites 370-377). [INSERT PHOTOS 51-52]

**Sawtooth Palsa Fen.** Rd 120 (Morrison Jeep Trail), approx. 1 mile east-south-east of Sawtooth Lake; a fen in a basin of a broad subalpine valley overlying Quaternary glacial deposits, with raised peat overlying permafrost. Sawtooth Palsa Fen (marked as “Peat Beds” on the map) is the only known occurrence of a palsa in the lower 48 states. Principal dominants: Festuca brachyphylla, Deschampsia caespitosa, Polytrichum juniperinum & P. strictum (palsa vegetation), Carex scopulorum, C. canescens, Straminergon stramineum (“carpets”), Sarmentypnum exannulatum (shallow and deep swales), Salix planifolia, Carex scopulorum (on slightly raised areas, and along streams crossing the fen) (Heidel et al., 2008; author’s data). Sect. 29, R104W, T57N, el. 9650-9700 ft., 25.08.09 (Figs. 53-56, map: sites 378-392). [INSERT PHOTOS 53-56]

**Sawtooth Meadows.** Rd 120 (Morrison Jeep Trail), “Sawtooth Meadows”, boggy valley of unnamed creek connecting Sawtooth Lake and Top Lake-I: wet subalpine meadows, willow wetlands and moss fens (Salix planifolia, cf., Phyllodoce empetriformis, Deschampsia cespitosa, Carex illota, cf., etc.); hygro- and hydrophilous vegetation of lakes, swales and pools scattered across the valley (Sphagnum platyphyllum + Sarmentypnum exannulatum, etc.). Sect. 19, R104W T57N, el. approx. 9430 ft., 25.08.09 (map: sites 393-394).

**Top Lake Fen.** Rd 120 (Morrison Jeep Trail), boggy western shore of Top Lake-2; subalpine moss fen with Sphagnum and Polytrichum hummocks, abundant Kalmia microphylla & Phyllodoce empetriformis. Sect. 18, R104W T57N, el. approx. 9500 ft., 25.08.09 (map: sites 395-397).

**Creek between Dollar & Sawtooth Lakes.** Rd 120 (Morrison Jeep Trail), unnamed creek connecting Dollar Lake and Sawtooth Lake; subalpine Salix planifolia – Sphagnum spp. + Bryidae fen along the shore, moss-lined peaty banks and underwater granite boulders. Sect. 24, R105W, T57N, el. approx. 9400 ft., 25.08.09 (map: sites 398-402).

**Lake Creek Waterfalls.** Lake Creek rapids; overlook “Lake Creek Waterfalls” 50 meters north of HWY 212; high terrace over the creek, covered by Picea glauca & Pseudotsuga menziesii forest; granite rocks and moss-lined bank in splash zone of the waterfall. Sect. 8, R107W T57N, el. approx. 7500 ft., 26.08.09 (Figs. 57-58, map: sites 403-410). [INSERT PHOTOS 57-58]

**HWYs 212 & 296 intersection: slope facing to S.** Intersection of HWYs 212 & 296, dry south slope covered with xerophytic communities dominated by Selaginella densa, Artemisia tridentata, Lupinus sp. & Poaceae spp.; granite boulders on slope. Sect. 7, R107N T57N, el. approx. 7150 ft., 26.08.09 (map: sites 411-412).

**Lake Creek CG: wet coniferous forest.** Lake Creek Campground along Lake Creek, 50-100 meters north of intersection of HWY 296 and Rd 170; slope facing to the south-west; shaded rocky bank of creek and nearby wet Picea glauca + Pinus contorta - Alnus incana + Shepheridia canadensis + Spiraea betulifolia + Rubus parviflorus (– Linnaea borealis) - Bryopsida forest. Sect. 17, R107W T57N, el. approx. 6950 ft., 26.08.09 (map: sites 413-416).
**Clarks Fork of Yellowstone River.** HWY 296; the spot immediately south-east of junction of Muddy Creek and Clarks Fork of Yellowstone River, in front of pull off; gravel shore of Clarks Fork, massive granite boulders along the shore; steep bank forested with Alnus incana and Picea spp. Sect. 28, R107W T57N, el. 6620-6640 ft., 26.08.09 (Figs. 59-60, map: sites 417-421). [INSERT PHOTOS 59-60]

**Sawtooth Lake.** Western and northern shores of Sawtooth Lake: subalpine Salix planifolia – Sphagnum platyphyllum + S. warnstorfi fen on the western shore, shaded steep banks of the lake and wet granite boulders in spray-moist zone; numerous streams, rills and cataracts falling into the lake from north and west, their moss-lined rocky and peaty banks, inundated granite boulders; upland communities of Pinus contorta + Picea engelmannii forest along the touristic trail. Sect. 19 & 30, R105W T57N, el. approx. 9250 ft., 27.08.09. (Fig. 61, map: sites 422-428, 438-440 – western shore, sites 429-437 – northern shore) [INSERT PHOTO 61]

**Unnamed tributary of Sawtooth Lake.** Rd 149, slope facing to the east, 0.5 km west of Sawtooth Lake; unnamed creek falling into Sawtooth Lake. Willow wetlands along the creek and inundated granite boulders. Sect. 24, R105W T57N, el. approx. 9400 ft., 27.08.09 (map: sites 441-444).

**Lake WGN fen.** 0.7 miles north-west of Sawtooth Lake. Graminoid fen at head of small tributary falling into the Lake, on subalpine Quaternary alluvium with open water in the center (Heidel et al., 2008). Sphagnum community on north-eastern shore of water body, approx. 150 meters SW of Rd 149. Sect. 24, R105W T57N, el. approx. 9600 ft., 27.08.09 (map: sites 445-447).

**Lake WNG forest.** Rd149, subalpine Picea engelmannii + Pinus albicaulis - Vaccinium scoparium forest on the hillslope, approx. 150 meters east of “Lake WGN fen” site. Sect. 24, R105W T57N, el. 9600 ft., 27.08.09 (map: site 448).

**“Dichelyma creek”**. Rd 149, slope facing to the north, unnamed creek between Fantan South Fen and Canyon Creek wetlands; peaty bank of creek and wet granite boulders lining the creek, abundantly covered with mats of Dichelyma falcatum. Sect. 14, R 105 T57N, el. approx. 9500 ft., 27.08.09 (map: sites 449-451).

**Rd 149: roadside tundra communities.** Rd 149, slope facing to the north, disturbed Antennaria sp. + Carex spp. – Polycladum juniperinum tundra community immediately north of the road. Sect. 14, R105 T57N, el. approx. 9700 ft., 27.08.09 (map: site 452).

**Index Lookout: roadside.** HWY 212. Roadside of Index Lookout, packed ground between asphalt cover of the road and adjacent disturbed grasslands. Sect. 11, R107W T57N, el. approx. 8770 ft., 28.08.09 (map: site 453).

**Seepage slope along HWY 212.** Seepage slope along HWY 212, wet shaded ditch with hygrophilous Bryidae community. Sect. 11, R107W T57N, el. approx. 8700 ft., 28.08.09 (map: site 454-455).
Aspen stands along HWY 212. Populus tremuloides stands on slope facing to the south-west, along HWY 212; granite outcrops and boulders under aspen canopy. Sect. 14, R107W T57N, el. 8300-8350 ft., 28.08.09 (map: sites 456-457, 459-460).

Drainage pipe beside HWY 212. Roadside of HWY 212; shaded wet humus and loamy substrates on, inside and beside drainage pipe. Sect. 14, R107W T57N, el. approx. 8330 ft., 28.08.09 (map: site 458).

Muddy Creek. 50-100 meters north of HWY 212 & Rd 136 intersection, fishing camp site on the shore of Muddy Creek. Wet Picea engelmannii + P. glauca - Orthilia secunda + Linnaea borealis + Trollius albiflorus + Equisetum sp. forest along the creek; rotten wood submerged in slow waters of creek, shady moss-lined bank. Sect. 10, R107W T57N, el. approx. 8100 ft., 28.08.09 (map: sites 461-463).

Rd 801: swampy mixed forest. 0.5 miles south of HWY 296 & Rd 801 intersection, valley-like depression down the slope along Rd 801; swampy Picea glauca + Populus tremuloides – Salix spp. – Bryidae forest. Sect. 18, R107W T57N, el. 7030 ft., 28.08.09 (map: sites 464-466).

Clarks Fork of Yellowstone River-4. Valley of Clarks Fork of Yellowstone River, gentle south slope; massive flat granite outcrop 20-25 x 5-7 meters size, approx. 50 meters below pull off of HWY 296. Sect. 21, R107W T57N, el. approx. 6700 ft., 28.08.09 (map: sites 467-468).


Rd 167: swampy mixed forest. Swampy Picea glauca + Pinus contorta + Populus tremuloides + Alnus incana – Bryidae forest immediately east of HWY 296 along Rd 167, on gentle slope facing to the west. Sect. 34, R107W T57N, el. approx. 6600 ft., 28.08.09. (map: sites 472-474).

Little Bear Creek – 4. The portion of Little Bear Creek within Beartooth Lake Campground area; Salix planifolia wetlands along the creek, inundated granite boulders, moss-lined banks. Sect. 5, R105W T57N, el. approx. 8950 ft., 29.08.09 (map: sites 477-478).

Beartooth Lake CG: coniferous forest. Upland community of Pinus contorta + Picea engelmannii forest, adjacent to Beartooth Lake Campground, 0.7-1 km east of Beartooth Lake. Sect. 5 & 6, R105W T57N, el. 8900-8950 ft., 29.08.09 (map: sites 475-476, 479-480).
2.2. Checklist of bryophytes

The following list is composed on the basis of approximately two thousand and six hundred collections made by the author in the mountains of the Wyoming’s Beartooth Plateau within the period of Aug. 12-23, 2008 & Aug. 18-29, 2009. The collections of preceding researchers - F. J. Hermann, E. Lawton, W. Welch, W. A. Weber, R. L. Hartman, J. C. Elliott, and others – were also taken into account; materials kept at COLO and RM were primarily reviewed by the author; some specimens are cited on P. Eckel (2007). Also included was the recent data on bryophytes of Beartooth Mts. fens, taken from ecologo-botanical report of Heidel et al. (2008) and a zoological article of Booth & Zygmunt (2005); in the latter, Sphagnum lists from three Beartooth Mountain sites, based on S. Jackson’s group collections, were published. Collections of B. Heidel and S. Jackson’s group were identified by J. Harpel, R. Andrus, and the author.

As a result of the analysis of all available materials, 201 species from 101 genera and 47 families were documented in the bryoflora of the Beartooth Mountains of Wyoming, representing two phyla of bryophytes: Marchantiophyta, or liverworts (27 species, 18 genera, and 13 families), and Bryophyta, or mosses (174 species, 83 genera, and 34 families). The flora is predominantly boreal-montane with a high proportion of arctic-alpine species.

11 species and one variety are novelties to the state bryoflora, all based on the author’s collections. These are:

Aulacomnium palustre var. imbricatum, Brachythecium brandegei, B. campestre, B. udum, Campylopus schimperi, Dicranum elongatum, Philonotis yezoana, Pogonatum urnigerum, Sanionia georgico-uncinata, Sciuro-hypnum glaciale, Syntrichia calcicola cf., and Thuidium recognitum.

The list of rare taxa includes 19 globally and / or regionally rare species, represented in Wyoming by few populations. These are:


The group of infrequent in Wyoming taxa, most of which are interesting phytogeographically and/ or ecologically, includes 35 species and 1 variety. These are:

Aulacomnium androgynum, A. palustre var. imbricatum, Brachythecium turgidum, Cinclidium stygium, Conardia compacta, Dichodontium pellucidum, Dicranum elongatum, D. muehlenbeckii, Distichium inclinatum, Drepanoclados longifolius, Heterocladium dimorphum, Hylocomium splendens, Isopterygiopsis pulchella, Meesia uliginosa, Mnium spinulosum, Paludella squarrosa, Palustriella decipiens, Paraleucobryum enerve, Pleurozium schreberi, Pogonatum urnigerum, Pohlia bolanderi, P. drummondii, Polytrichastrum sexangulare, Polytrichum commune, Ptilium
crista-castrensis, Ptychostomum cyclophyllum, Rhytidium rugosum, Saelania glaucescens, Sciuromhypnum plumosum, Scorpidium revolvens, S. scorioides, Scouleria aquatica, Sphagnum fimbriatum, Tayloria lingulata, Thuidium recognitum, Tortula cernua.

The following species are the most widely distributed and common on the Beartooth Plateau, represented by a number of populations:

Amblystegium serpens, Aulacomnium palustre (typical form - var. palustre), Barbilophozia hatcheri, Blepharostoma trichophyllum, Brachytheciastrum collinum, Brachythecium erythrorrhizon, Breidleria pratensis (!), Campylium stellatum, Cephalozia pleniceps, Ceratodon purpureus, Climacium dendroides, Dicranoweissia crispula, Distichium capillaceum, Drepanocladus aduncus, Grimmia anodon, Hygrohypnum ochraceum, Hypnum revolutum, H. vaucheri, Leptobryum pyriforme, Marchantia alpestris, Mnium arizonicum, Philonotis fontana s.l., Plagiomnium ellipticum, Pohlia cruda, P. nutans, P. wahlenbergii, Polytrichastrum alpinum, Polytrichum juniperinum, P. piliferum, Ptychostomum pseudotriquetrum, Rhizomnium pseudopunctatum, Sanionia uncinata, Sarmentypnum exannulatum, S. sarmentosum (!), Sciuromhypnum latifolium (!), Sphagnum platyphyllum (!), S. warnstorfii (unusual form with rare pores in stem hyalodermis), Straminegron stramineum, Syntrichia norvegica, S. ruralis, Timmia austriaca, Tomentypnum nitens.

In the checklist, bryophyte species and genera are arranged alphabetically within the families of two principal bryophyte subdivisions - Marchantiophyta and Bryophyta. Specific Latin name is followed by the name of its site, the specimen number, plant community (where possible), ecotope / substrate type on which the species was found, species of admixture, if any, presence of sporogones (“S+”). For most of species and varieties, general comments on taxa distribution and /or ecology are given. For each species, elevation range within the study area is provided. Rare species (marked with “®”) and those new to Wyoming (marked with “!”) are provided with proper comments. The classification and nomenclature of bryophyte taxa follows Goffinet & Shaw (2009) and Flora of North America, vols. 1-3 (2007; http://www.mobot.org/plantscience/bfna); vascular plants are cited on Dorn (2001). The synonyms for some taxa are given.

Voucher specimens are deposited at the RM and Y. I. Kosovich-Anderson’s herbarium. Determinations were made by the author, otherwise as indicated.

NB Some forms were left unlisted owing to unclear issues on their taxonomy: revision of groups, such as Philonotis, Sphagnum (Sect. Acutifolia), Syntrichia, Bryaceae, and some others is necessary in this part of Rocky Mountains.
Phylum Marchantiophyta
Class Marchantiopsida
Subclass Blasiidae

Blasiaceae

1. Blasia pusilla (L.) Micheli 9250 ft. Boreal circumpolar species (Shlyakov, 1976); in Wyoming, it has scattered distribution, occurring from the montane to alpine, most frequently on moist soil along streams associated with other pioneer species of denuded loamy or clayey soils, on banks, in ditches.

Sawtooth Lake; # 5981, western shore of the lake, steep peaty banks, on raised grassy hummocks in shade, wet sandy-clay soil.

Subclass Marchantiidae

Marchantiaceae

2. Marchantia alpestris (Nees) Burgeff 6600-10550 ft. Arctic-alpine species with European-Siberian-American distribution (Shlyakov, 1982), common in Wyoming. In the Beartooth Plateau, it occurs in shaded niches along streamsides on wet clay, sandy and peaty soils, from the montane to alpine; associated with a large number of species.

Creek SW of Beartooth Butte; ## 3856, 3858; boggy shore of creek, willow wetlands, on wet clay shaded by Salix sp., assoc.: Bryum sp. s.l., Cratoneuron filicinum, Palustriella falcata, Plagiommium ellipticum.

Swamp Lake Fen & vicinity; ## 5156, 5158; willow wetlands on the western shore of Typha latifolia pond, on wet clay, in shade, locally very abundant, assoc.: Drepanoclados aduncus. Sparadically it occurs all arcoss ecotone zone of fen and Picea spp. – Pseudotsuga menziesii (+ Populus tremuloides) forest, on wet clay and peaty soil in shade.

Lily Lake Swamp Forest; ## 3032, 3041; wet forest floor of Picea glauca forest, on shaded litter and humus, abundant; assoc.: Aulacomnium palustre.

Little Bear Creek-2: # 3253, on wet denuded clayey soil of creek bank, in shade; assoc.: Pohlia sp., Polytrichum juniperinum.

Little Bear Creek-3: ## 5341, 5367; moss-lined bank of creek, in shade, on wet humus and sandy-clay soil, assoc.: Scapania subalpina, Hygrohypnum luridum.

Crazy Creek CG Swamp; ## 3171, 3184; swampy spruce forest, on forest floor, wet and soaked humus and peaty soil; in partial shade.

Unnamed tributary of Frozen Lake; ## 2610, 2632, 2634; on seepage slope, wet clay and peaty soil, often on snow patch margins; forms admixture to various hygrophilous Bryidae mosses.
Little Bear Lake Fen-NW-08: ## 2803, 2843; narrow ditch crossing the fen, on wet peaty soil and clay in deep shade, assoc.: Aulacomnium palustre, Dichelyma falcatum, Hygrohypnum ochraceum, Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia uncinata.

Ghost Creek Fen; ## 3742, 3744-3747, 3757; ecotone zone, swampy Picea engelmannii forest, on wet forest floor, brook bank, on peaty soil, in shade, abundant, assoc.: Cephalozia pleniceps, Chiloscyphus polyanthos, Aulacomnium palustre, Brachythecium sp. s.l., Bryum sp. s.l., Helodium blandowii, Pohlia cruda, Rhizomnium pseudopunctatum; on wet forest floor, assoc.: Aulacomnium palustre, Homalothecium nevadensis, Hypnum revolutum.

Wyoming Creek-1; ## 3474, 3478, 3486; vertical bank of stream, on soaked sandy-clay soil, in shade under Salix sp., assoc.: Bryum sp. s.l., Philonotis fontana s.l., Pohlia sp., Polytrichum juniperinum, Sanionia uncinata.

Rd 167: swampy mixed forest; ## 6200, 6202, 6203; on moist humus and peaty soil in shade beneath trees, locally abundant.

Muddy Creek; # 6140, wet spruce forest along the creek, on wet sandy-clay soil, in shade under trees.

Sawtooth Lake; # 6007, northern shore of lake, moss-lined bank of stream, on wet sandy-clay soil and humus, shaded by Salix sp., assoc.: Harpanthus flotovianus.

Sawtooth Palsa Fen; ## 5740, 5742, 5743; streamlet crossing the fen, willow thickets, on wet clay of bank, shaded by willows, locally abundant, assoc.: Philonotis fontana s.l., Polytrichum juniperinum, Sanionia uncinata.

Willow Park; ## 5559, 5565; montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, vertical wall of ditch, on wet peaty soil, in partial shade, assoc.: Brachythecium acutum, Drepanocladus aduncus.

Clark Forks of Yellowstone River-2; ## 5607, 5608; moss-lined bank of the river, denuded humus and clay, in shade beneath forbs.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4873, 4877, 4880; Carex spp. – Bryidae fen, on soaked peaty soil and clay along especially along streamlets and ditches, intermingled with many Bryidae mosses all across the fen.

Coniferous forest near Clay Butte Fen; ## 5411, 5416; wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and sandy soil along the streamlet, in shade under trees, associated with many Bryidae species.

Index Creek; # 5489, along the creek, on wet loam between granite debris, along with Bryidae mosses.

Beartooth Creek; 1) # 5451, moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay, assoc.: Drepanocladus aduncus. 2) # 5463, fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Brachythecium
rivulare, Climacium dendroides, Plagiomnium ellipticum, Rhizomnium pseudopunctatum, Sanionia uncinata, Sciuro-hypnum latifolium.

NE & N shore of Beartooth Lake; ## 5224, 5225; trail to Beauty Lake, wet Picea engelmannii + P. glauca forest, stream bank, on wet litter and humus, in shade under trees, locally abundant, assoc.: Rhizomnium pseudopunctatum.

Conocephalaceae

3. Conocephalum salebrosum Szweykowski et al. 6950-8900 ft. A recently described species related to the widespread C. conicum (L.) Dumortier, distinguished on a genetic and morphologic basis. According to Szweykowsky et al. (2005), C. salebrosum is a holarctic species occurring in Europe, East Asia and North America. In Colorado, it is “a common species along small streams in the foothills and montane zones. C. conicum… is exclusively European... the two species differ in the shiny surface of the former and the matte surface of the latter, as well as fundamental differences in the structure of the pores” (Weber, Wittmann, 2007, p. 161). On the author’s observation, it’s relatively common at montane and subalpine elevations of Wyoming.

Lake Creek CG: wet coniferous forest; # 5900, moss-lined bank of creek, wet humus, beneath Picea, Salix, and Alnus, not abundant.

Beartooth Creek; ## 5463, 5466; Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Marchantia alpestris, Brachythecium rivulare, Climacium dendroides, Plagiomnium ellipticum, Rhizomnium pseudopunctatum, Sanionia uncinata, Sciuro-hypnum latifolium.

NE & N shore of Beartooth Lake; # 5251, Beartooth Creek; Salix planifolia – Carex spp. – Bryidae community along the shore of creek, on soaked peaty soil, in shade, assoc.: Drepanocladus aduncus.

Class Jungermanniopsida

Subclass Pelliidae

Pelliaceae

4. Pellia neesiana (Gottsch) Limpricht 9250-9670 ft. Boreal or hypoarctic circumpolar species (Shlyakov, 1976); in Wyoming and Colorado, it’s occurring in a variety of wet sites, including streamsides, willow carrs, and edges of pools in the subalpine (Weber, Wittmann, 2007; author’s data).

Little Bear Creek-1; # 2708, moss-lined bank of creek, on wet denuded sandy-clay soil, in partial shade.
Sawtooth Lake; # 6039, waterfall; in narrow niche between granite rocks in the splash zone of the waterfall, deeply shaded, on wet humus, assoc.: Plagiothecium denticulatum.

**Subclass Jungermanniidae**

*Pseudolepicoleaceae*

5. **Blepharostoma trichophyllum (L.) Dumortier** 7700-10400 ft. Hypoarctic-boreal circumpolar species with bipolar distribution (Shlyakov, 1979). In the Beartooth Plateau, it occurs widely from the montane to the alpine zones on shaded rocks, on peaty banks, soil covered ledges and decaying wood, under constant moisture and relatively diffuse light; associated with a large number of species. In the rest of Wyoming, it’s not been collected enough to estimate whether or not it is common.

Summits: alpine fen-4; 1) # 3310, alpine streamlet bank, abundant, associated with Sanionia georgico-uncinata cf. 2) ## 3275, 3277, 3289, 3300, 3303, 3305; vertical banks of alpine pool, in shade, on wet and soaked bare peat, assoc.: Lophozia sp., Campylium stellatum, Dicranum spadiceum, Distichium capillaceum, Isopterygiopsis pulchella, Polytrichastrum alpinum, Sarmentypnum sarmentosum.

Pine forest along HWY 212; 1) ## 3902A, 3903, 3905, 3916; brook bank, on shaded wet sandy-clay soil, locally abundant, assoc.: Cephalozia pleniceps, Chiloscyphus pallescens, Aulacomnium palustre, Brachythecium sp. s.l., Bryaceae spp., Lophocolea heterophylla, Mnium blyttii, Rhizomnium punctatum. 2) ## 3807, 3908; on wet rotting wood of spruce, assoc.: Lophozia sp., Cephalozia sp., Brachythecium sp. s.l., Eurhynchiastrum pulchellum, Mnium blyttii. 23.08.08. 3) # 3912, on base of spruce tree, in shade; assoc.: Cephalozia sp., Chiloscyphus pallescens, Lophozia sp., Sanionia uncinata.

Two lakes along HWY 212; # 2666, boggy shore of the bigger lake, steep peaty bank, forms admixture to Scapania sp., Polytrichum juniperinum, Straminergon stramineum.

Ghost Creek Fen; ## 3752, 3753; swamp Picea engelmannii (+ P. glauca) forest in ecotone zone between Sphagnum fen and upland coniferous forest communities, on wet rotting wood, in shade, forms admixture to: Lepidozia reptans, Lophozia sp., Aulacomnium palustre, Dicranaceae spp.

Lily Lake Swamp Forest; # 3039, on rotting wood in boggy Picea glauca forest, assoc.: Eurhynchiastrum pulchellum.

Sawtooth Lake; # 5982; western boggy shore, shaded steep bank of the lake, on wet sandy-clay soil, assoc.: Scapania sp., Polytrichastrum alpinum, Sciuro-hypnum latifolium.

NE & N shore of Beartooth Lake; # 5211, trail to Beauty Lake, wet Picea engelmannii (+ P. glauca) forest, stream bank, on wet rotting wood, in shade under trees, locally abundant, assoc.: Pohlia nutans.
**Lepidoziaceae**

6. *Lepidozia reptans* (L.) Dumortier 7900 ft. Boreal circumpolar species (Shlyakov, 1979); occurs in moist, deep shaded woods, in moist sheltered locations. In Colorado, “this is an uncommon plant, but possibly it is overlooked because it is so small and tends to grow on rotting logs” (Weber, Wittmann, 2007, p. 172). Widespread in Montana (in particular, in fir-hemlock-pine-spruce woodlands) (Hong, 1975). In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Ghost Creek Fen; ## 3752, 3753; ecotone zone between Carex spp. + Drosera anglica-Sphagnum fen and Picea engelmannii forest, on wet rotting wood at base of spruce, in shade, assoc.: Blepharostoma trichophyllum, Lophozia ventricosa, Aulacomnium palustre, Dicranaceae spp.

**Lophocoleaceae**

7. *Chiloscyphus pallescens* (Ehrhart ex Hoffmann) Dumortier 6940-8950 ft. Widely distributed boreal circumpolar species (Shlyakov, 1982). In Wyoming, the species is common along streamside, on wet rock surfaces, soil, or logs and in peatland depressions throughout the montane and subalpine forested areas; associated with a large number of hygrophilous shade-loving species.

Pine forest along HWY 212; 1) ## 3899-3905, 3909, 3910, 3916; vertical sandy-clay banks of brook, abundant, assoc.: Blepharostoma trichophyllum, Cephalozia pleniceps, Aulacomnium palustre, Mnium blyttii, Rhizomnium punctatum, Sanionia uncinata. 2) # 3912, on base of spruce trunk, covered with a layer of humus, assoc.: Blepharostoma trichophyllum, Cephalozia pleniceps, Lophozia longiflora, Sanionia uncinata.

Crazy Creek CG Swamp; # 3189, swamp Picea engelmannii forest, in forest floor, forms admixture to Marchantia alpestris & Plagiomnium ellipticum.

Beartooth Creek; # 5452, moss-lined bank of creek, on wet clay between granite debris, assoc.: Drepanocladus aduncus, Rhizomnium pseudopunctatum.

Ghost Creek Fen; # 3745, swamp Picea engelmannii forest, on moist humus of brook bank, abundant, assoc.: Cephalozia pleniceps, Marchantia alpestris, Aulacomnium palustre.

Lily Lake Fen; ## 3062, 3064; high vertical walls of ditch/streamlets, peaty soil and humus, in shade under Salix sp., assoc.: Ptychostomum pseudoriquetrum.

8. *C. polyanthus* (L.) Corda 7700-7900 ft. Widely distributed boreal circumpolar species (Shlyakov, 1982); it’s encountered in the montane and subalpine forested areas of the Rocky Mountains; habitats are similar to those of *C. pallescens* (see above). In Wyoming, it’s not been collected enough to estimate whether or not it is common.
Ghost Creek Fen; # 3747, ecotone zone, boggy Picea engelmannii (+ P. glauca) forest at the edge of fen, brook banks, soaked peaty soil, in shade, abundant, forms admixture to: Marchantia alpestris, Brachythecium sp. s.l., Bryum sp. s.l., Pohlia cruda, Rhizomnium pseudopunctatum.

Lily Lake Fen; # 3081, Carex sp. stands immediately on the lake shore, on soaked peaty soil shaded by Picea glauca and Carex spp., assoc.: Breidleria pratensis, Mnium sp. s.l.

9. **Lophocolea heterophylla** (Shrader) Dumortier 8950 ft. Widely distributed boreal circumpolar species normally occurring in moist coniferous forests, on bare roots of trees covered by wet humus, on wet shaded soils of the forest floor (Shlyakov, 1982). In Wyoming, the distribution and ecology of this species is poorly known.

Pine forest along HWY 212; # 3902A, shaded by trees brook bank, on wet sandy-clay soil, forms admixture to Blepharostoma trichophyllum.

**Plagiochilaceae**

10. **Plagiochila porelloides** (Torrey ex Nees) Lindenberg 6940-7020 ft. Boreal circumpolar species (Shlyakov, 1982); it was found twice in the montane zone of the Beartooth Plateau; widespread in Montana (Hong, 1975). In Wyoming, the distribution of this species is poorly known.

Clarks Fork of Yellowstone River-1; # 3146, Picea glauca + Pinus contorta forest, on wet clay in steep gully, close to water line of the river, in shade beneath trees, locally abundant, assoc.: Brachythecium sp. s.l., Cratoneuron filicinum, Timmia austriaca, Sanionia uncinata.

Crazy Creek CG Swamp; # 3169, swampy Picea glauca + P. engelmannii forest, on wet and soaked humus and clay, in partial shade; assoc.: Marchantia alpestris, Aulacomnium palustre, Breidleria pratensis, Plagiomnium ellipticum, Rhizomnium pseudopunctatum.

**Cephaloziaaceae**

11. **Cephalozia bicuspidata** (L.) Dumortier 9400-9600 ft. Holarctic circumpolar species, widespread in the subarctic-subalpine zone (Schuster, 1977; Shlyakov, 1979). In Colorado, the species is known from very few collections - from spruce-fir woods and iron fen (Weber, Wittmann, 2007). In Wyoming, it’s not been collected enough to estimate whether or not it is rare.

Little Bear Lake Fen-NW-08; # 2838, in Carex scopulorum - Bryidae mound, abundant, forms admixture to Oncophorus wahlenbergii, Straminergon stramineum.

Creek connecting Dollar & Sawtooth Lakes; # 5790, willow wetlands along the creek, granite boulders along the creek, on wet peaty soil.

Little Bear Lake Fen-SW-08; # 2842, in low hummocks, on wet peaty soil, assoc.: Lophozia sp., Pohlia nutans, Polytrichastrum longisetum, Straminergon stramineum.

Boggy shore of Island Lake; # 2377, bottom of ditch, on wet peaty soil, assoc.: Scapania sp., Sphagnum Sect. Subsecunda.

Lily Lake swamp forest; # 3031, Alnus incana – Linnaea borealis + Equisetum sp. – Bryidae community in the ecotone zone between fen and coniferous forest, on rotting wood in shade, assoc.: Lophozia sp.

13. *C. pleniceps* (Austin) Lindberg 7680-10680 ft. Mainly boreal circumpolar species, distributed throughout the subarctic-subalpine region (Schuster, 1977; Shlyakov, 1979). In the Beartooth Plateau, associated with a large number of species on different types of wet, predominantly slightly acidic, soils and substrates.

Pine forest along HWY 212; 1) # 3903, shaded brook bank, on wet sandy-clay soil, abundant, assoc.: Blepharostoma trichophyllum, Chiloscyphus pallescens, Aulacomnium palustre, Brachythecium sp. s.l., Bryum sp., Mnium blyttii. 2) # 3905, on wet humus, forms admixture to Blepharostoma trichophyllum, Chiloscyphus pallescens, Rhizomnium punctatum.

Beartooth Lake CG: wet subalpine meadow & fen; # 4904, transition community between *Salix* sp. - Sphagnum warnstorfii fen and *Picea engelmannii* + Pinus spp. forest, at bases of Sphagnum hummocks, on soaked peaty soil, assoc.: Gymnocolea inflata.

Little Bear Lake Fen-NW-08; ## 2764, 2835; on low Bryidae hummock, forms admixture to Sarmentypnum exannulatum & Straminergon stramineum.

Lily Lake swamp forest; # 3038, *Picea glauca* – *Alnus incana* – *Linnaea borealis* + Equisetum sp. – Bryidae, on rotting wood in shade, assoc.: Lophozia sp.

NE & N shore of Beartooth Lake; # 5305, north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; *Salix* sp. – *Senecio tridentalis* + Calamagrostis sp. + *Caltha leptosepala* – Sphagnum spp. fen, forms admixture to Aulacomnium palustre, Sphagnum warnstorfii, Straminergon stramineum, Tomentypnum nitens.

Unnamed tributary of Frozen Lake; # 2576, seepage slope, on wet clay along streamlet, forms poor admixture to Polytrichastrum alpinum.

Ghost Creek Fen; # 3745, ecotone between Carex spp. + *Drosera anglica*- Sphagnum fen and *Picea engelmannii* + *P. glauca* forest, shaded creek bank, abundant, assoc.: Chiloscyphus pallescens, Marchantia alpestris, Aulacomnium palustre.
Littlerock Creek Fen; # 3588, Salix planifolia – Carex scopulorum – Sphagnum spp. + Aulacomnium palustre hummocks, on peaty soil; forms admixture to Bryophyta mosses: Aulacomnium palustre, Polytrichum strictum, etc.

Rock Creek Fen (Heidel et al., 2008).

*Cephaloziellaceae*


Canyon Creek; # 5655, broad boggy valley of creek, ecotone zone of subalpine meadow and Salix sp. – Carex spp. – Bryidae fen along the creek, on soggy ground, in pure mats, not abundant.

*Scapaniaceae*

15. **Anastrophyllum minutum (Schreber) R.M. Schuster** 9600 ft. Hypoarctic-montane circumpolar species (Shlyakov, 1980); it occurs throughout much of the subarctic-subalpine zone (Schuster, 1977). It’s listed for Montana but absent in Colorado (Hong, 2002; Weber, personal comm.). In Wyoming, the distribution and ecology of this species is poorly known.

Little Bear Lake Fen-NW-08; ## 2754, 2833, 2842, 2850; in low hummock, rather abundant as an admixture to other bryophytes (Polytrichastrum longisetum, Sphagnum warnstorfii, etc.). # 2850 det. by W. A. Weber.

16. **Barbilophozia floerkei (Weber & Mohr) Loeske** 9500 ft. Hypoarctic-montane species with bipolar, in Northern hemisphere basically European-American distribution (Shlyakov, 1980). In this portion of the Rocky Mountains, it occurs mostly at high subalpine and alpine elevations (Hong, 1975; Weber, Wittmann, 2007). The distribution and ecology of this species in Wyoming is poorly known.

Top Lake Fen; # 5781, moss fen on the western shore, forms low hummocks and carpets on soaked peaty soil, locally abundant.

17. **B. hatcheri (A. Evans) Loeske** 8900-10900 ft. This species is one of the characteristic forms of the upper edge of the coniferous forest and of the lower portions of the tundra region; has bipolar distribution (Schuster, 1977). Widespread in the Beartooth Plateau. On the author’s data, it is widespread in Albany, Carbon, Park Cos. In the rest of Wyoming, it’s not been collected enough to estimate whether or not it is common.

Summits: alpine tundra-2; # 2356, on humus soil at base of granite outcrop, in shade, assoc.: Dicranum spadiceum.
Summits: alpine fen-4; # # 3269, 3286, 3290, 3301; fen along streamlet, edges and shaded vertical walls of alpine pool, on soaked, wet and dry peaty soil, assoc.: Aulacomnium palustre, Brachythecium umum, Climacium dendroides, Distichium capilaceum, Pohlia bolanderi, P. nutans, Polytrichastrum alpinum, Sanonia georgico-uncinata.

Beartooth Lake CG: coniferous forest; # 6213, on loamy soil at base of Picea engelmannii, in shade, not abundant, assoc.: Polytrichum piliferum.

Boggy shore of Island Lake; # 2373, on the bases of Bryidae hummocks, on wet peaty soil, in shade.

NE & N shore of Beartooth Lake; # 5221, trail to Beauty Lake, bank of unnamed stream, wet Picea glauca + P. engelmannii forest, on wet humus, in shade beneath trees, locally abundant.

18. B. lycopodioides (Wallroth) Loeske 8950-8970 ft. Boreal-hypoarctic circumpolar species with bipolar distribution; in Northern Hemisphere, it’s widely distributed across tundra and northern boreal zones (Shlyakov, 1980). In this portion of the Rocky Mountain region, it is characteristic of forest floors in mature moist undisturbed subalpine spruce forests (Weber, Wittmann, 2007). This beautiful magnificent species is probably the largest leafy liverwort in the Beartooth Plateau; well-developed plants being 4-5 mm wide and 5-8 cm long.

NE & N shore of Beartooth Lake; # 5210, 5213; trail to Beauty Lake, dark Picea engelmannii forest, stream bank, on rotting wood of spruce, covered with humus, in shade beneath trees, locally very abundant, forms carpets.

Beartooth Lake CG: coniferous forest; # 6219, soil over granite outcrops in Pinus contorta + Picea engelmannii forest, in shade.

© 19. B. quadriloba (Lindberg) Loeske 10400 ft. Rare species, essentially arctic and alpine (Schuster, 1977). Distribution: Caucasus, Middle Asia, Actic region, Fennoscandia, mountains of Middle and Atlantic Europe, northern part of North America (Shlyakov, 1980). The species is unknown in Colorado; it was reported from Montana where it grows in fir-hemlock-spruce woodlands (Hong, 1975). In the Beartooth Plateau, the population is located close to the southern limit of species distribution in North America.

Summits: alpine fen-4; # 3308, at margin of alpine pool, on wet peaty soil, locally abundant, assoc.: Aulacomnium palustre, Brachythecium sp. s.l., Pohlia cruda, Polytrichastrum alpinum.

20. Gymnocolea inflata (Hudson) Dumortier 7680-9600 ft. Common boreal circumpolar species (Shlyakov, 1980). In Colorado and Wyoming, it is probably the most common, even dominant liverwort in subalpine fens, especially in shallows or around the edges of rock pools (Weber, Wittmann, 2007; author’s data).

Little Bear Lake Fen-NW-08; # 2744, Aulacomnium mounds, on wet peaty soil, not abundant, assoc.: Aulacomnium palustre, Tomentypnum nitens.
Beartooth Lake CG: wet subalpine meadow & fen; # 4904, transition community between Salix sp. - Sphagnum warnstorffii fen and Picea engelmannii + Pinus spp. forest, at bases of Sphagnum hummocks, on soaked peaty soil, assoc.: Cephalozia pleniceps.

Rock Creek Fen (Heidel et al., 2008).

21. Lophozia longiflora (Nees) Schiffner 8950 ft. Boreal-hyparctic circumpolar species (Shlyakov, 1980). In Wyoming, the species is poorly known.

Pine forest along HWY 212; # 3898, shaded brook bank, on base of Picea engelmannii trunk and rotting wood of tree, covered with a layer of humus, assoc.: Blepharostoma trichophyllum, Sanionia uncinata.

22. L. ventricosa (Dickson) Dumortier 7900-10500 ft. Boreal circumpolar species (Shlyakov, 1980); it’s a common, rather ubiquitous form extending into tundra as well as deciduous forest regions (Schuster, 1977). Widespread in Colorado and Montana (Weber, Wittmann, 2007; Hong, 1975). In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Ghost Creek Fen; # 3753, ecotone zone between Carex spp.+ Drosera anglica-Sphagnum fen and Picea engelmannii forest, on wet rotting wood, in shade, not abundant, assoc.: Lepidozia reptans, Aulacomnium palustre, Blepharostoma trichophyllum, Dicranaceae spp.

Sawtooth Palsa Fen; # 5741, streamlet crossing the fen, willow thickets, on wet clay of bank, shaded by willows, forms admixture, assoc.: Pohlia nutans, Polytrichastrum alpinum.

Wyoming Creek-2; ## 5051, 5061; moss-lined vertical bank of stream, on wet humus covering rotting and live roots of willow, locally abundant, assoc.: Scapania sp.

23. L. wenzelii (Nees) Stephani 10020-10450 ft. The species is high subalpine and arctic-alpine, and occurs in the center of its range under diverse ecological conditions: on wet rocks, over peat in bogs, etc. (Schuster, 1977). In Wyoming, the species is poorly known.

Two lakes along HWY 212; # 2678, boggy shore of the smaller lake, bank of the lake, on soaked peaty soil, assoc.: Scapania sp., Aulacomnium palustre, Polytrichum juniperinum.

Wyoming Creek-2; # 5026, moss-lines bank of stream, on wet humus and peaty soil, assoc.: Pohlia cruda, Polytrichastrum alpinum, Sanionia georgico-uncinata.


Beartooth Lake CG: wet subalpine meadow & fen; # 4911, along swales in moss fen, on soaked peaty soil, not abundant.

NE & N shore of Beartooth Lake; ## 5212, 5318; trail to Beauty Lake, wet Picea engelmannii forest, stream bank, on granite debris inundated by water of stream, in shade under trees, locally abundant, assoc.: Pohlia nutans; also swamp Picea engelmannii + Pinus contorta forest along Little Bear Creek, in moss hummock at base of pine tree, on peaty soil.
25. S. subalpina (Nees) Dumontier 9250-9600 ft. Hypoarctic circumpolar or almost circumpolar species (Shlyakov, 1981); it’s widely distributed throughout most of the subarctic-subalpine zone, northward into the tundra region (Schuster, 1977). It’s listed for Colorado & Montana (Hong, 2002; Weber, Wittmann, 2007). In Wyoming, the species is poorly known.

“Dichelyma creek”; ## 6093, 6095; moss-lined bank of creek, on wet clay in partial shade.

Little Bear Lake Fen-SW-08; # 2786, shaded bank of streamlet, on wet peaty and clay soil, assoc.: Hygrohypnum ochraceum.

Little Bear Creek-3; ## 5338, 5341, 5355; moss-lined bank of creek, in shade, on wet humus and sandy-clay soil, assoc.: Marchantia alpestris, Philonotis fontana s.l., Ptychostomum pseudotriquetrum.

Sawtooth Lake; 1) # 6037, rapids on the northern shore of lake, willow thickets, on wet sandy soil in shade, locally abundant; 2) ## 6019, 6921; northern shore of lake, moss-lined bank of stream, on wet sandy-humus soil, abundant, in pure mats.

Calypogeiacese

26. Calypogeia muellerana (Schiffner) Muller Fribourg 10020 ft. Boreal circumpolar species frequently occurring in wet and boggy forests and wet tundra communities (Shlyakov, 1979). In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Two lakes along HWY 212; ## 2662, 2669, 2672; boggy shore of the bigger lake, steep bank of the lake, on soaked peaty soil, abundant, assoc.: Scapania sp., Polytrichastrum alpinum.

Geocalycaceae

27. Harpanthus flotovianus (Nees) Nees 9250 ft. Hypoarctic-Eurasian-American species, primarily with pre-oceanic distribution (Shlyakov, 1979). Widespread in arctic and mountainous regions of the Northern hemisphere, most frequent on western sides of continents and rare elsewhere (Schofield, 2002). In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Sawtooth Lake; # 6007, northern shore of lake, moss-lined bank of stream, on damp sandy-clay and humus substrates, in shade, assoc.: Marchantia alpestris.
Phylum Bryophyta
Class Sphagnopsida
Sphagnaceae

28. Sphagnum angustifolium (C. Jensen ex Russow) C. Jensen 8280-9500 ft. This species is the only representative of bryophytes included in the lists of threatened, endangered, and sensitive plants of Wyoming. However, we are inclined to think that the distribution of this species in the region has been studied insufficiently to describe it as rare or threatened and it may premature to include it into such lists. Globally, it is considered as one of the most frequent species in arctic and boreal zones of Holarctic (Ignatov, Ignatova, 2003). On McQueen & Andrus (2007), it occurs as carpets, floating mats, low hummocks and hummock sides in wide range of habitats - from ombrotrophic to rich fens, open mires, sedge fens and muskeg, at low to high elevations. Some of these site types are not uncommon in Wyoming but poorly studied bryologically.

Top Lake Fen; # 5773, boggy south-western shore of lake, on wet peaty soil, abundant in low hummock, assoc.: Polytrichum commune.


Lily Lake East Fen (Booth & Zygmunt, 2005; Heidel et al., 2008).

29. S. fimbriatum Wilson ex Hooker, f. 9400-9500 ft. Widely distributed in arctic and boreal zones of Holarctic; in the Central Rocky Mountains, it occurs infrequently. In Montana, it is included to the list of species of conservation concern with status G5S1 (Montana Field Guide, …).

Creek connecting Dollar & Sawtooth Lakes; # 5792; willow wetlands along the creek, on wet peaty soil in hummock beneath Salix sp.


30. S. platyphyllum (Braithwaite) Warnstorf 7680-9850 ft. A species with sporadic distribution in arctic and boreal zones of Holarctic (Ignatov, Ignatova, 2003). Typically growing in minerotrophic habitats such as shores of lakes, ponds, streams, flarks of string mires, margins of open fens, especially flooded sites, at low to high elevations (McQueen, Andrus, 2007). In Montana, it is included to the list of species of conservation concern with status G5S1 (Montana Field Guide, …). In Wyoming, it’s a widely distributed species - numerous collections of S. platyphyllum were made by the author in 2007-2009 from glacial lakes of the Medicine Bow Mountains of Wyoming, in Albany & Carbon Cos. Also, as the present study shows, in the Beartooth Plateau of Wyoming, it’s a common species, too.
Little Bear Lake Fen-NW - 08 & 09: 1) #2747, 2820, 2824, 2826; floating in deep swales, (Carex utriculata –) Sphagnum platyphyllum + Sarmentypnum exannulatum communities, abundant. 2) #2783, 2805, 2814, 2817, 2818; in shallow swale, assoc.: Aulacomnium palustre, Dichelyma falcatum, Polytrichastrum longisetum, Sarmentypnum exannulatum. 3) #2784, submerged in ditch, pure mat. 3) #5623, forms pure carpets along the perimeter of pool, on soaked peaty soil, semi-submerged, abundant.

Little Bear Lake Fen-SE – 08 & 09: 1) #2875, 2885; pure mat, fully submerged in deep swales. 2) #2906, Carex utriculata – Sarmentypnum spp. swale of 0.5 meter depth, immersed on the edge of swale, forms admixture to Sarmentypnum spp. 3) #5638-5641; in interconnected shallow swales, locally abundant, assoc.: Sarmentypnum exannulatum, Scorpidium revolvens.

Meadow Lake Fens; ##3762, 3763, 3789, 3790, 3806; in narrow swales in Carex spp. - Sphagnum platyphyllum community, very abundant.

Canyon Creek; #5673; broad boggy valley of creek, Carex spp. – Sphagnum squarrosum + S. platyphyllum fen along the widened portion of creek, in carpets on soaked peaty soil, shaded by dense Carex stands, not abundant.

E shore of Beartooth Lake; ##4848-4852, 4854; Salix planifolia – Carex spp. – Bryidae fen, forms carpets on soaked peaty soil, and floating mats in pools.

Sawtooth Meadow; ##5762-5765; semi- and fully submerged in water of small lake / pool, locally abundant, assoc. Sarmentypnum exannulatum.

Sawtooth Lake; ##5958-5961, 5963, 5968, 5971; vast area of Salix sp. – Sphagnum platyphyllum (+ S. warnstorfii) fen along western shore of lake, on soaked peaty soil, very abundant. #5968 det. by J. Shaw.

Top Lake Fen; ##5773, 5779; boggy western shore of lake, high vertical peaty bank; forms narrow stripe in water along the bank, fully submerged.

Lake WGN fen; #6076, fully submerged in the water of lake, forms narrow stripe along the shore line.

“Dichelyma creek”; #6082, boggy shore of creek, in shade beneath sedges, on soaked peaty soil.


Lake WGN Fen, Lower Sheepherder Fen, Meadow Lake Fen, Rock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

31. S. riparium Ångström 9400 ft. Potential species of conservation concern in Wyoming; it was recently reported from Yellowstone National Park as a new species for the state (Lemly et al., 2007). On McQueen & Andrus (2007), its general distribution includes: Greenland; Alta., B.C.,
Man., N.B., Nfld., and Labr., N.W.T., N.S., Ont., P.E.I., Que., Sask., Yukon; Alaska, Conn., Ind., Maine, Mass., Mich., Minn., Mont., N.H., N.J., N.Y., Ohio, Pa., Vt., Wash., Wyo (on Lemly et al., 2007), and Eurasia; across its range, the species forms extensive carpets in weakly minerotrophic mires at low to moderate (!) elevations. As Ignatov & Ignatova (2003) emphasize, being common in arctic and boreal zones of Eurasia, S. riparium occurs relatively rarely in America. In neighboring bryologically well-explored Colorado, this species is unknown; in Montana, it’s been documented from several locations only and listed as a species of conservation concern (Elliott, 1993; Montana Field Guide, …). Interestingly, the Beartooth population of S. riparium was found at the highest elevation the species has ever been reported - 9400 ft. (the Yellowstone location lies at 8000 ft.).

Canyon Creek; 1) ## 5643, 5644, 5645, 5801, 5804; broad boggy valley of creek; on walls and bottom of streamlet courses and in ditches crossing moss fen, in shade under dense Carex stands, in pure mats or assoc.: Sphagnum warnstorfi, Sarmentypnum exannulatum, Sciurohypnum latifolium; locally abundant. 2) ## 5657-5660, 5671, 5683; vast valley of creek, Carex spp. – Sphagnum riparium + S. russowii + S. squarrosum fen along the widened portion of creek; forms low hummocks on soaked peaty soil, shaded by dense Carex stands, locally abundant, in pure mats or assoc.: Aulacomnium palustre, Calliergon cordifolium, Climacium dendroides, Polytrichum juniperinum, Ptychodostomum weigeltii.

32. S. russowii Warnstorf 7680-10680 ft. Widely distributed in arctic and boreal zones of Holarctic. In this portion of the Rocky Mountains, it’s very common in willow fens and on wet forest floors; often combined with S. warnstorfi (Elliott, 1993; Weber, Wittmann, 2007; author’s data).

Two lakes along HWY 212; ## 2674, 2676; ecotone zone of willow fen and Picea engelmannii (+ Pinus albicaulis) forest; forms low hummocks in wetlands between the lakes, in shade under Picea engelmannii.

Little Bear Lake Fen-NW-08; 1) ## 2819, 2832, 2840; Carex scopulorum – Aulacomnium palustre + Sphagnum Sect. Acutifolia, on wet peaty soil, abundant in hummock, assoc.: Aulacomnium palustre; # 2819 det. by R. Andrus. 2) # 2827, on top of mounds, abundant, in pure mats. 3) # 2830, base of mounds, assoc.: Lophozia sp., Scapania sp., Straminergon stramineum.

Littlerock Creek Fen: ## 3596, 3656; Salix planifolia – Carex scopulorum – Sphagnum Sect. Acutifolia + Aulacomnium palustre hummocks, on wet peaty soil; sporadic distribution across the fen, assoc.: Aulacomnium palustre. # 3656, det. by R. Andrus.

Top Lake Fen; # 5778, boggy western shore of lake, moss fen, on wet peaty soil, abundant in hummock.

Creek connecting Dollar & Sawtooth Lakes; ## 5786, 5789, 5791; willow wetlands along the creek, on wet peaty soil, assoc.: Climacium dendroides, Polytrichastrum alpinum, Rhizomnium pseudopunctatum.
Canyon Creek; # 5803, broad boggy valley of creek, moss fen, locally abundant, assoc.: Rhizomnium sp.; ## 5656, 5664; Carex spp. – Sphagnum riparium + S. russowii + S. squarrosum fen along the widened portion of creek, forms low hummocks on wet peaty soil, shaded by dense Carex stands, locally abundant, assoc.: Climacium dendroides.

Lake WGN fen; ## 6071-6075; vertical boggy bank of the lake and Sphagnum hummocks along the shore; on soaked peaty soil, abundant, assoc.: Lophozia sp., Aulacomnium palustre, Plagiothecium denticulatum, Pohlia nutans, Polytrichastrum alpinum, Polytrichum strictum.

Wyoming Creek-2; ## 5073, 5074; alpine moss fen along the creek, forms hummocks between streamlets of creek, very local (marked in bryology collections as “Sphagnum island”), assoc.: Aulacomnium palustre, Plagiomnium ellipticum, Pohlia nutans, Straminergon stramineum.

East Lily Lake (Booth & Zygmunt, 2005).

Meadow Lake Fens, Ghost Creek Fen, Lake WGN Fen, Littlerock Creek Fen, Lower Sheepherder Fen, Rock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

33. *S. squarrosum* Swartz ex Crome 7900-9850 ft. Widely distributed in arctic and boreal zones of Holarctic; in Wyoming, the species distribution is sporadic. It’s known in Wyoming from at least four counties: Teton Co (Spence, 1985), Park Co (on collections of Jackson’s group and the author); Albany & Carbon Cos (on the author’s collections).

Meadow Lake Fens; # 3788, along swale, Salix planifolia – Carex scopulorum – Aulacomnium palustre + Sphagnum spp., covers wet peaty soil along swales under Salix planifolia.

Ghost Creek Fen; 1) # 3725, forms carpets in the eastern part of fen, forms slight admixture to Sphagnum warnstorffii, Straminergon stramineum, & Tomentypnum nitens. 2) # 3702, in floating mats with Sarmentypnum exannulatum & Sphagnum warnstorffii, not abundant.

Canyon Creek; ## 5667, 5672; vast boggy valley of creek, Carex spp. – Sphagnum riparium + S. russowii + S. squarrosum fen along the widened portion of creek, forms low hummocks on wet peaty soil, shaded by dense Carex stands, locally abundant.

East Lily Lake (Booth & Zygmunt, 2005).


NE & N shore of Beartooth Lake; ## 5311-5313; north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio tridentalis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, on sides of moss hummocks, in partial shade on soaked peaty soil, in pure mats or assoc.: Straminergon stramineum, Tomentypnum nitens. Det. by J. Shaw.

Little Bear Lake Fen-SW-09; # 5618, west edge of fen (approx. 100 m of HWY212), streamlet crossing the fen, granite outcrops along the streamlet, on a layer of wet peaty soil, in shade beneath Salix sp., not abundant. Det. by J. Shaw.
Lily Lake East Fen (Heidel et al., 2008).

**35. S. sp., undescribed taxon, Sect. Subsecunda (Lindberg) Schimper** 9530-9600 ft.

Boggy shore of Island Lake; ## 2379, 2380, 2381, 2392; willow wetlands along the lake shore; not abundant in low hummocks, on vertical peaty banks of streamlet, also forms carpets in shallow swales; on soaked peaty soil.

Little Bear Lake Fen-SW-08; # 2822, Carex utriculata - Sphagnum sp. + Sarmentypnum exannulatum, on soaked peaty soil, not abundant.

Principal morphological feature of specimens: stable picture of unique pore arrangement in stem leaves, and some other characters.


Little Bear Creek Fen; ## 3632, 3646; in Salix planifolia – Sphagnum spp. hummocks, forms poor admixture to Aulacomnium palustre and Sphagnum warnstorfii.

Lake WGN Fen, Lily Lake East Fen, Rock Creek Fen (Heidel et al., 2008).

**37. S. warnstorfii Russow** 7900-10680 ft. Widely distributed in arctic and boreal zones of Holarctic. Very common in Wyoming, abundant in hummocks on eutrophic fens; associated with a large number of species of similar ecology. Rare irregular pores in stem hyalodermis (det. or ver. by R. Andrus) is characteristic for local forms of species.

Little Bear Creek-1; # 2698, wetlands on creek shore, on soaked peaty soil, not abundant. Det. by R. Andrus.

Little Bear Creek-4; # 6232, willow wetlands along creek, on wet peaty soil beneath Salix sp., assoc.: Aulacomnium palustre.

Boggy shore of Island Lake: ## 2382, 2383, 2391; vertical banks of streamlet, on peaty soil under willows; boggy shore of lake, forms hummocks, abundant. (# 2391 det. by R. Andrus).

Ghost Creek Fen; 1) ## 3720, 3722, 3758; ecotone zone between Drosera anglica – Sphagnum warnstorfii fen and Picea engelmannii forest, abundant in hummocks. 2) ## 3727, 3729, 3730, 3731, 3737, 3739; 20 meters N of Nuphar pool, dominating in hummocks, assoc.: Aulacomnium palustre, Plagiomnium ellipticum, Straminergon stramineum. 3) ## 3725, 3728, 3732; eastern part of fen, ecotone between fen and Picea engelmannii forest. 4) ## 3682, 3701, 3702; in floating mats, forms carpet, assoc.: Sarmentypnum exannulatum, Sphagnum squarrosum. ## 3722, 3758 det. by R. Andrus.

Sawtooth Palsa Fen; ## 5744, 5748, 5750; streamlet crossing the fen, willow thickets, peaty bank, locally abundant, assoc.: Aulacomnium palustre, Polytrichastrum longisetum, Polytrichum strictum.
Sawtooth Lake; 1) ## 5969, 5973, 5974, 5976; Salix sp. – Sphagnum fen along the western shore, on soaked peaty soil. 2) # 6002, northern shore of lake, moss-lined bank of stream, on wet peaty soil on granite boulders of stream, assoc.: Sanionia uncinata, Straminergon stramineum. 3) ## 6027, 6028; northern shore, steep peaty bank of the lake covered with Sphagnum hummocks, assoc.: Aulacomnium palustre, Climacium dendroides, Polytrichastrum alpinum. 4) # 6042, northern shore, creek near waterfall; on granite boulders (!) along the creek, with Aulacomnium palustre. 5) # 6060, creek on boggy western shore of lake, on granite boulders lining the creek.

NE & N shore of Beartooth Lake; 1) # 5233, small fragment of moss fen along unnamed creek in Picea engelmannii forest, in hummock, assoc.: Aulacomnium palustre, Climacium dendroides, Straminergon stramineum. 2) ## 5302, 5303, 5305, 5307, 5309, 5310; north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio triangularis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, abundant in hummock, assoc.: Cephalozia pleniceps, Aulacomnium palustre, Straminergon stramineum, Tomentypnum nitens.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4899-4901, 4903, 4912; ecotone zone of Salix spp. – Carex spp. – Sphagnum Sect. Acutifolia fen and Picea engelmannii forest, in hummocks along stream, on peaty soil, locally abundant.

Little Bear Lake Fen-NW-08: 1) # 2771.1, 2772.1, 2821; Carex scopulorum – Aulacomnium palustre + Sphagnum warnstorfii, on wet peaty soil, abundant in hummocks. 2) # 5636, 20 m of the road, on soaked peaty soil along swale, forms low hummocks, locally abundant, assoc.: Polytrichastrum longisetum, Straminergon stramineum.

Little Bear Lake Fen-SE-08; # 2879, 2888, 2908; abundant in hummocks, assoc.: Aulacomnium palustre, Straminergon stamineum.

Meadow Lake Fen; ## 3775.1, 3819; Carex scopulorum – Aulacomnium palustre + Sphagnum warnstorfii, forms hummocks under Salix planifolia, in shade. # 3775.1 det. by R.Andrus.

Littlerock Creek Fen; ## 3595, 3632, 3633, 3646-3648, 3650, 3652, 3653, 3662; in Salix planifolia – Sphagnum spp. + Aulacomnium palustre hummocks, abundant.

Canyon Creek; ## 5644, 5684, 5802; vast boggy valley of creek, moss fen; on walls and bottom of streamlet courses and in ditches, in Salix sp. – Carex spp. – Bryophyta community; in pure mats or assoc.: Sphagnum riparium.

Top Lake Fen; # 5771, boggy south-western shore of lake, on wet peaty soil, abundant in hummocks.

Wyoming Creek-2; # 5072, alpine moss fen along the creek, forms hummocks between streamlets of creek, very local (marked in bryology collections as “Sphagnum island”).

Lily Lake East Fen, Little Moose Lake Fen (Booth & Zygmunt, 2005; Heidel et al., 2008).

Class Polytrichopsida

*Polytrichaceae*


Beartooth Lake CG: coniferous forest; # 6230, *Picea engelmannii* + *Pinus contorta* forest, on loam and litter, in shade, not abundant.

Sawtooth Lake; # 6053, north-north-western shore, upland community of *Picea engelmannii* – *Pinus* spp. – *Vaccinium scoparium* forest; on loamy soil along the trail, not abundant.

39. *Pogonatum urnigerum* (Hedwig) P. Beauvois 9670 ft. Species new to Wyoming. *Pogonatum urnigerum* is a species and genus new for the Wyoming bryoflora. On Smith Merrill (2007), the range of the genus *Pogonatum* embraces North America, tropical America, Europe, Africa, Asia, Australasia; it’s widespread in the tropics of both hemispheres, with only a few North temperate representatives; of 5 species known in the flora of North America north of Mexico, *Pogonatum urnigerum* is the most widely distributed species of the genus with circumboreal range; it grows at moderate to high elevations. The finding of *P. urnigerum* has been quite predictable in this portion of the Rocky Mountains: it had been known before as not uncommon from neighbouring states, Montana, Idaho and Colorado (Elliott 1993; Smith Merrill, 2007; Weber, Wittman, 2007). “In Colorado this species ranges from alpine tundra, often occurring in dry shelves under boulders, to montane-subalpine where it may be found infrequently on the forest floor” (Weber, Wittman 2007, p. 116).

Little Bear Creek-1; # 2712, steep rocky terrace along the creek, forested with *Picea engelmannii*; on north-facing granite cliff ledge, inside the solid tightly compacted tufts of *Paraleucobryum enerve*, forms scare admixture.


It’s common in this portion of the Rocky Mountains (Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data).

Summits: alpine tundra-2; # 2345, on wet humus soil at base of granite outcrop, in partial shade, assoc.: Polytrichum piliferum.

Summits: alpine tundra-3; # 2419, on wet soil in hollow at base of granite outcrop, in partial shade, not abundant, assoc.: Brachythecium sp. s.l.

Summits: alpine fen-4; ## 3268, 3269, 3271, 3277, 3290, 3308; fen along streamlet, edge and steep banks of alpine pools, in partial shade, on wet and soaked peaty soil, assoc.: Barbilophozia hatcheri, B. quadriloba, Blepharostoma trichophyllum, Aulacomnium palustre, Brachythecium udum, Breidleria pratensis, Campylium stellatum, Climacium dendroides, Pohlia cruda, P. nutans, Sanionia georgico-uncinata cf., Sarmentypnum sarmentosum, Scorpidium revolvens.

Canyon Creek; # 5679, broad boggy valley, vertical walls of stream bank, on wet peaty soil, in shade under willows, not abundant, assoc.: Aulacomnium palustre.

Two lakes along HWY 212; # 2662, boggy shore of the bigger lake, steep bank of the lake, on soaked peaty soil, forms admixture to Calypogeia muellerana.

Little Bear Creek-1; ## 2693, 2695, 2702, 2705; creek bank, sandy-clay soil, assoc.: Scapania sp., Pohlia cruda, Rhizomnium spp., in shade.

Little Bear Creek-3; # 5361, willow wetlands long the creek, on wet sandy, humus and peaty soil, in shade, abundant, assoc.: Aulacomnium palustre, Rhizomnium pseudopunctatum.

Unnamed tributary of Frozen Lake; ## 2576, 2596; rocky slope, on wet loamy and humus soil, assoc.: Bartramia ithyphylla, Pohlia cruda, Syntrichia sp.

Little Bear Lake Fen-NW – 08 & 09; 1) ## 2799, 2815, 2843, 5624, 5627; ditch crossing the fen, on ditch walls, wet clay and peaty soil, in almost full shade, assoc.: Aulacomnium palustre, Ditrichum sp., Hygrohypnum ochraceum, Philonotis fontana s.l., Rhizomnium pseudopunctatum, Sanionia uncinata, Sciuro-hypnum latifolium. 2) # 2808, in shade at the base of Sphagnum hummocks, assoc.: Rhizomnium pseudopunctatum, Sphagnum sp. Sect. Acutifolia.

Littlerock Creek Fen; ## 3567, 3609, 3618, 3673; in Salix planifolia – Bryidae hummocks, assoc.: Aulacomnium palustre, Ditranum spadiceum, Fissidens osmundoides, Pohlia cruda.

Meadow Lake Fen; # 3771, beside granite boulder in the middle of fen, at base of boulder, on peaty soil, in shade.

Small alpine lake; ## 3503, 3508, 3512, 3515; boggy lake shore, on moist sandy-clay soil, assoc.: Aulacomnium palustre, Sanionia uncinata.

Wyoming Creek-1; ## 3465, 3472, 3473, 3482; creek bank, on moist clay, abundant, assoc.: Philonotis fontana s.l., Pohlia sp., Polytrichum juniperinum, Sanionia uncinata. 2) N 3479, 0.03 km south of creek; in crevices of granite outcrop, assoc.: Hypnum revolutum.
Wyoming Creek-2; 1) # 4975, alpine Bryidae fen on seepage slope; in carpets on soaked peaty soil, assoc.: Meesia uliginosa, Sanionia georgico-uncinata. 2) ## 5008, 5026, 5027, 5033, 5034, 5045, 5047; moss-lined vertical bank of stream, on wet humus, peaty and sandy-clay soil, in shade under dense stands of forbs and willows, assoc.: Lophozia wenzelii, Philonotis fontana s.l., Pohlia cruda, Sanionia georgico-uncinata, Sciurop-hynum latifolium, Straminergon stramineum, etc.

Lake WGN fen; # 6073, vertical boggy bank of the lake, on soaked peaty soil, in shade, assoc.: Lophozia sp., Plagiothecium denticulatum, Pohlia nutans, Sphagnum russowii.

Creek connecting Dollar & Sawtooth Lakes; ## 5786, 5794; willow wetlands along the creek, on wet peaty soil, assoc.: Rhizomnium pseudopunctatum, Sphagnum russowii.

Sawtooth Lake; 1) # 5982, western boggy shore, shaded steep bank of the lake, on wet sandy-clay soil, assoc.: Sciurop-hynum latifolium, Scapania sp. 2) # 6027, northern shore, boggy bank of the lake covered with Sphagnum hummocks, on wet peaty soil, locally abundant, assoc.: Aulacomnium palustre, Climacium dendroides, Sphagnum warnstorfii.

Sawtooth Palsa Fen; 1) ## 5695, 5696; granite outcrop semi-submerged into the swale, on wet peaty soil covering the outcrop surface, assoc.: Sanionia georgico-uncinata. 2) ## 5723, 5725; low Aulacomnium hummocks, wet peaty soil, forms admixture to Aulacomnium palustre & Sanionia georgico-uncinata cf. 3) ## 5740, 5741, 5751; streamlet crossing the fen, willow thickets, on wet clay and peaty soil of the bank, shaded by willows, locally abundant, assoc.: Lophozia ventricosa, Marchantia alpestris, Aulacomnium palustre, Pohlia nutans.

W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], 3200 m.s.m., W. A. Weber, B-44315 (COLO, RM).

Sawtooth Palsa Fen (Heidel et al., 2008).

41. P. longisetum (Swartz ex Bridel) G. L. Smith [Polytrichum longisetum Bridel, P. gracile Menzies]. 9400-10680 ft. Species with generally circumboreal distribution in the Northern Hemisphere. In this portion of the Rocky Mountains, it occurs in subalpine to alpine fens. In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Little Bear Lake Fen-NW – 08 & 09; 1) # 2806, forms carpet on wet peaty soil. 2) # 2783, in shallow swales, assoc.: Aulacomnium palustre, Sphagnum platyphyllum. 3) # 2793, covers ditch walls, on shaded wet peaty soil. 4) ## 2842, 2850; on peaty soil in low hummock, assoc.: Anastrophyllum minutum, Cephalozia leucantha, Lophozia sp., Pohlia nutans, Straminergon stramineum. 5) ## 2773, 2851, Carex scopulorum – Sphagnum spp., at base of hummocks. 6) ## 5632, 5636; swale 20 m of the road, on soaked peaty soil along swale, locally abundant, assoc.: Sphagnum warnstorfii, Straminergon stramineum.

Little Rock Creek Fen; ## 3600, 3619; in Salix planifolia – Aulacomnium palustre (+) hummocks, on peaty soil, not abundant, assoc.: Aulacomnium palustre.

Canyon Creek; # 5669, broad valley of creek, Carex spp. – Sphagnum spp. fen along the widened portion of creek, forms low hummocks on wet peaty soil, shaded by dense Carex stands.
Sawtooth Palsa Fen; # 5744, streamlet crossing the fen, willow thickets, peaty bank shaded by willows, locally abundant, assoc.: Sphagnum warnstorfii.


Littlerock Creek Fen (Heidel et al., 2008).

42. P. sexangulare (Bridel) G.L. Smith [Polytrichum sexangulare Bridel]. 10480-10520 ft. A species widely distributed all across the Arctic; it also occurs in the alpine zone of mountains of more southern latitudes where it usually grows on rocky banks of streamlets in late snow-melt areas. This northern species is infrequent in Wyoming. It was previously known in the state from a few locations in Albany and Big Horn Cos (Porter, 1935, Eckel, 2007). The occurrences in the Beartooth Plateau are the first known in Park Co.

Unnamed tributary of Frozen Lake, seepage slope; ## 2630, 2632; on soaked peaty soil and clay along streams and on snow patch margins; assoc.: Marchantia alpestris, Brachythecium brandegei, Polytrichum juniperinum, Sanionia georgico-uncinata; not abundant.

Wyoming Creek-2; 1) # 4990, rocky bank of creek, on wet clay between granite debris, in shade. S+(!). 2) # 5058, on wet sandy, humus and peaty soil of vertical moss-lined banks of streamlets, in shade under willows. S+(!).

43. Polytrichum commune Hedwig 9500 ft. Widely distributed species known from all continents, except for the Antarctic and some tropical regions; from arctic to moderate latitudes it occurs in plains; in lower altitudes it occurs in mountains. P. commune is very common in cold and relatively humid climates of boreal forests across northern North America and Eurasia (in Siberian taiga, it is one of dominating mosses on the forest floor). Wyoming populations are confined to high elevations, very sporadic and not abundant.

Top Lake Fen; 1) # 5773, boggy south-western shore of lake, on wet peaty soil, abundant in low hummock, assoc.: Sphagnum angustifolium. 2) # 5780, boggy western shore of lake, on wet peaty soil, abundant in hummock, assoc.: Aulacomnium palustre.

44. P. juniperinum Willdenow ex Hedwig 6950-10930 ft. The most common representative of the family Polytrichaceae, a well-known cosmopolite and almost weedy moss, occurs on all continents. In the Rocky Mountain region, abundant and widely distributed from the foothills through the alpine. One of the most common species in the Beartooth Plateau, inhabiting a great variety of substrates, including disturbed ones, but tends to avoid excessively dry or exposed sites; it’s associated with a large number of species.

Summits: alpine tundra-2; # 2347, wet alpine tundra, on soil at base of granite outcrop, in partial shade, assoc.: Barbilophozia hatcheri, Dicranum spadiceum, Hypnum revolutum, Mnium arizonicum.

Summits: alpine tundra-3; # 2416, on wet soil in hollow at base of granite outcrop, in partial shade, not abundant, assoc.: Hypnum revolutum.
Summits: alpine tundra-4; ## 2452, 2456, 2470, 2485; at bases of granite outcrops and beneath dwarf willow, on humus, in partial shade, locally abundant, forms pure mats or assoc.: Brachythecium brandegei, Distichium capillaceum, Encalypta rhahtocarpa, Hypnum revolutum, Tortella tortuosa var. fragilis.

Summits: alpine fen-4; # 3302, granite outcrop in ecotone zone of alpine tundra and fen; on a thick layer of humus in crevices, assoc.: Ceratodon purpureus.

Summits: alpine fen-5; ## 3432, 3445; around shallow pools on wet peaty and sandy soil, forms admixture to Philonotis fontana s.l. & Sanionia georgico-uncinata.

Summits: wet alpine meadow & fen; 1) # 3398, alpine meadow, wet humus, assoc.: Sanionia georgico-uncinata; 2) # 3399, alpine meadow, on dry disturbed soil, assoc.: Ceratodon purpureus.

Summits: Overlook Roadside Park; ## 3535, 3547; alpine tundra, on the base and in crevices of granite debris, in partial shade, assoc.: Tortella fragilis.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4883, 4892, 4894; etc.; Carex spp. – Bryidae fen, on wet peaty soil, intermingled with many other Bryidae mosses all across the fen.

Little Bear Creek-2; 1) # 3239, dry meadow, on disturbed ground near the trail; assoc.: Ceratodon purpureus, Bryum sp. s.l. 2) # 3253, creek bank, on wet clay, in shade; assoc.: Marchantia alpestris, Pohlia sp.

Little Bear Creek-3; 1) # 5326, moss-lined bank of creek, in shade, on wet clay in splash zone. 2) # 5333, granite boulder semi-submerged in the water of creek, on a thick layer of wet humus, assoc.: Ceratodon purpureus, Philonotis fontana s.l., Pohlia bolanderi.

Unnamed tributary of Frozen Lake; 1) dry rocky slope: ## 2577-2579, on shaded base of granite outcrop, assoc.: Ceratodon purpureus, Syntrichia norvegica. 2) seepage slope: a) ## 2626, 2629; late snow melt area, on wet clay and peaty soil, assoc.: Brachythecium brandegei, Sanionia georgico-uncinata; b) ## 2630, 2634; snow patch margins, on soaked loamy soil, assoc.: Marchantia alpestris, Scapania sp., Polytrichastrum sexangulare, Sanionia georgico-uncinata; c) ## 2546, 2563; on wet clay along streamlet, assoc.: Sciuro-hypnum latifolium.

Sawtooth Palsa Fen; 1) ## 5729, 5733; very abundant on mounds / raised peat, assoc.: Aulacomnium palustre, Straminergon stramineum. 2) ## 5755, 5757; ecotone zone between fen and wet subalpine tundra, in low hummock, on wet peaty soil, assoc.: Aulacomnium palustre.

Sawtooth Lake; # 5992, western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Campylium protensum, Plagionnium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, P. cruda, Sanionia uncinata, Sciuro-hypnum latifolium.

Unnamed tributary of Sawtooth Lake; # 6068, willow thickets along the shore, on dry peaty soil, in shade, assoc.: Ceratodon purpureus.
Two lakes along HWY 212; 1) # 2678, steep peaty bank of the smaller lake, abundant, assoc.: Lophozia wenzelii, Scapania sp., Aulacomnium palustre. 2) # 2679, P. engelmannii + Pinus albicaulis forest surrounding lakes, on wet forest floor, assoc.: Ceratodon purpureus, Pohlia sp., Polytrichum piliferum. 3) # 2661, shore of the small lake, boggy Picea engelmannii forest, on wet humus, assoc.: Scapania sp., Aulacomnium palustre. 4) # 2666, boggy shore of the bigger lake, steep bank, on soaked peaty soil, assoc.: Scapania sp., Blepharostoma trichophyllum, Straminergon stramineum.

Little Bear Lake Fen-NW-08 & 09; 1) ## 2769, 2780, 2788; ditch crossing the fen, wet peaty soil on granite boulder on the bottom of ditch. 2) ## 2791, 2794, in low hummock, assoc.: Bryum sp. s.l., Campylium stellatum, Ditrichum sp., Sanionia uncinata, Syntrichia sp. 3) # 2797, in carpets, on peaty soil, assoc.: Bryum sp. s.l., Ceratodon purpureus, Sarmentypnum exannulatum. 4) # 2837, ditch bottom, in almost full shade, assoc.: Aulacomnium palustre. 5) ## 2854, 2855, 2857, 5637; on disturbed ground and loamy soil of roadside slope, assoc.: Ceratodon purpureus, Bryum sp. s.l.; S+. 6) # 2753, in Aulacomnium palustre hummock, forms admixture.

Little Bear Lake Fen-SE-08; # 2882, in Aulacomnium palustre hummocks, assoc.: Aulacomnium palustre, Climacium dendroides.

Island Lake CG: subalpine meadow; # 2921, at base of granite outcrop, on loamy soil, in shade, assoc.: Ceratodon purpureus.

Clay Butte Fen; ## 2925, 2930; wet Picea engelmannii – Pinus sp. forest north-north-east of fen, wet peaty soil, assoc.: Aulacomnium palustre, Ptychostomum pallescens.

Clay Butte: slope facing to W; # 4923, grasslands on summit, 80-100 meters north of Clay Butte lookout, on dry loamy soil.

Lily Lake Fen; # 3067, lake shore, on rotten Picea log, laying among Carex spp. stands, assoc.: Sanionia uncinata.

Littlerock Creek Fen; ## 3560, 3607; Salix planifolia – Bryidae hummocks on wet peaty soil, in pure mats and assoc.: Oncophorus wahlenbergii.

Meadow Lake Fens; 1) ## 3764, 3768, granite boulder in the middle of fen, on peaty soil with loam at base of boulder, assoc.: Aulacomnium palustre, Ceratodon purpureus, Plagiothecium denticulatum, Pohlia sp., Tortula sp. 2) # 3793, in mesic sites of the fen margin, on peaty soil, assoc.: Aulacomnium palustre, Campylium stellatum, Tomentypnum nitens. 3) # 3775, in shady dense Salix planifolia thickets, assoc.: Climacium dendroides, Sphagnum warnstorffii.

Small alpine lake; 1) # 3506, boggy shore, on wet peaty soil. 2) ## 3501, 3502, 3505, 3509; in low hummocks, on wet clay along the streamlets crossing the shore, assoc.: Leptobryum pyriforme.

Wyoming Creek-1; 1) # 3476, wetlands along the creek, on wet clay, assoc.: Philonotis fontana s.l. 2) # 3490, abundant on relatively dry stream bank, on clay, S+. 3) ## 3472, 3474, 3478, 3481, 3483, 3485, 3486; vertical stream bank, wet clay soil, in shade under willows, assoc.: Marchantia
alpestris, Aulacomnium palustre, Dicranum spadiceum, Philonotis fontana s.l., Plagiomnium ellipticum, Polytrichastrum alpinum, Sanonia uncinata.

Wyoming Creek-2; ## 4983, 5101; alpine Bryidae fen on seepage slope, on granite debris along rocky rills and on peaty soil in willow hummocks.

Beartooth Lake CG: coniferous forest; # 6206, ecotone zone between willow wetlands (southeastern shore of lake) and upland community of Picea engelmannii + Pinus contorta forest; on wet peaty soil, abundant in hummocks, assoc.: Aulacomnium palustre, Philonotis fontana s.l.

Rd 149: roadside tundra communities; # 6097, on dry gravelly soil, abundant.

Lake WGN forest; # 6079, on rotting wood, in shade under spruce, assoc.: Ceratodon purpureus, Pohlia nutans.

Lake Creek Waterfalls; # 5875, fragment of moss wetlands in small depression on creek bank, on wet clay and peaty soil, assoc.: Climacium dendroides.

Lake Creek CG: wet coniferous forest; # 5903, wet Picea glauca + Pinus contorta – Rubus parviflorus – Linnaea borealis forest, in low hummock, on humus soil, in shade beneath trees, assoc.: Climacium dendroides, Sanonia uncinata.

Canyon Creek; ## 5671, 5682; broad boggy valley of creek, Salix sp. – Carex spp. – Bryidae fen along the creek, assoc.: Aulacomnium palustre, Calliergon cordifolium, Ptychostomum weigellii, Sanonia uncinata, Sciuro-hypnum latifolium, Sphagnum riparium, etc.

45. P. piliferum Hedwig 8900-10930 ft. Like the former species, it is widely distributed all across the world occurring on all continents (in tropical areas - in mountain sites). It prefers sunny situations and normally grows on shallow well-drained sandy or gravelly soils over rocks and boulders; it’s also characteristic for road cuts, old fields, burned areas, rocky ridges; in dry alpine tundra and late snow areas northward, it’s often associated with lichens. Polytrichum piliferum is very common in Wyoming and adjacent states. On the Beartooth Plateau, this species is a principal dominant of soil cover on wind-swept summits.

Summits: alpine tundra-1; ## 2269, 2270; dominating moss of tundra growing on dry gravelly soil.

Summits: alpine tundra-2; ## 2345, 2348, 2351, 2353; on sandy-gravelly soil at base of granite outcrop, in partial shade, assoc.: Dicranum spadiceum, Polytrichastrum alpinum.

Summits: alpine tundra-3; # 2398, on gravelly tundra soil sporadically all across the site, especially beside outcrops, in pure tufts.

Summits: alpine tundra-4; ## 2467, 2469; at bases and in crevices of granite outcrops, on humus, in partial shade, in pure tufts or assoc.: Syntrichia ruralis.

Summits: Overlook Roadside Park; #3536, rocky alpine tundra, gravelly soil, Selaginella densa – Polytrichum piliferum community, in full sun, abundant.
Little Bear Lake Fen-NW-08; # 2762, on open granite outcrop covered with sandy soil and humus, assoc.: Ceratodon purpureus.

Rd 120: roadside tundra communities; # 5642A, gentle slope, fragment of Polytrichum tundra near pull off; abundant on wet gravelly soil.

Beartooth Lake CG: wet subalpine meadow and fen; # 4914, granite outcrop in the fen, crevices filled with humus and sandy soil, assoc.: Ceratodon purpureus, Grimmia sp.

Pine forest along HWY 212; # 3897, Pinus contorta (+ P. flexilis) forest, on a layer of humus soil on granite outcrop, in diffuse light; forms dense mat.

Two lakes along HWY 212; # 2679, shore of the bigger lake, on wet loamy soil of Picea engelmannii + Pinus sp. forest, assoc.: Ceratodon purpureus, Pohlia sp., Polytrichum juniperinum.

Island Lake CG: subalpine meadow; ## 2918, 2922; on granite outcrop amidst subalpine meadow, shaded surfaces, on a thick layer of loamy and sandy soils, in crevices, abundant, in pure mats or assoc.: Tortula hoppeana.

Island Lake CG: spruce forest; # 2220, Picea engelmannii – Vaccinium scoparium forest, granite rock facing to the south, in crevice on a layer of humus, in partial shade beneath spruce; assoc.: Ceratodon purpureus.

Littlerock Creek Fen; # 3598, in Salix planifolia – Aulacomnium palustre hummocks, on dry peaty soil in open sun, not abundant, assoc.: Oncophorus wahlenbergii.

Meadow Lake Fen; # 3770, on granite boulder in the middle of fen, in shaded crevice of the boulder, not abundant, forms dense mat.

Beartooth Lake CG: coniferous forest; ## 6213, 6214, 6216; on loamy soil at base of Picea engelmannii, in shade, locally abundant, assoc.: Barbilophozia hatheri, Pohlia nutans.

Sawtooth Lake; 1) # 5991, western boggy shore of the lake, shaded steep bank, on dry peaty soil, assoc.: Ceratodon purpureus. 2) # 6025, northern shore of lake, sandy beach, the base of granite outcrop, on a thin layer of sand, partial shade, assoc.: Lescuraeas radicosa. 3) # 6042, northern shore, creek near waterfall; on open dry surfaces of granite boulders, with Bryum argenteum.

Sawtooth Palsa Fen; # 5760, roadside, in wet gravelly soil, assoc.: Ceratodon purpureus.

Little Bear Creek-3; ## 5342-5345; huge granite rock along the creek, in crevices filled with humus, assoc.: Ceratodon purpureus, Syntrichia ruralis.

Beartooth Creek; # 5453, Picea engelmannii – Pinus contorta forest on the shore; granite outcrop, on a thick layer of humus, in shade under trees, assoc.: Pohlia nutans.

Sawtooth Palsa Fen (Heidel et al., 2008).

**46. P. strictum Menzies ex Bridel** [Polytrichum affine Funck, P. juniperinum var. affine (Funck) Bridel]. 9600-10680 ft. A species widespread in the boreal regions of Holarctic occurring
on bogs, in moist alpine tundras, on rotten stumps in wet coniferous forests, etc. The species is not uncommon in Wyoming where it usually grows on Sphagnum fens and associated with Aulacomnium palustre and Sphagnum spp.

Littlerock Creek Fen; ## 3566, 3587, 3588, 3590, 3638; Salix planifolia – Carex scopulorum – Sphagnum spp. + Aulacomnium palustre, abundant in hummocks, forms compact tufts on peaty soil; assoc.: Cephalozia pleniceps, Aulacomnium palustre, Sphagnum russowii, S. warnstorfii.

Lake WGN fen; # 6071, in Sphagnum hummocks along the shore, on wet peaty soil, assoc.: Sphagnum russowii.

Sawtooth Palsa Fen; 1) ## 5728, 5730; very abundant on mounds / raised peat, assoc.: Aulacomnium palustre. 2) # 5750, streamlet crossing the fen, willow thickets on peaty bank, abundant, assoc.: Aulacomnium palustre, Sphagnum warnstorfii.


W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], 3250 m.s.m., W. A. Weber B-44259 (COLO, RM).

Littlerock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

Class Bryopsida
Subclass Timmiidae
Timmiaceae

47. Timmia austriaca Hedwig 6970-9250 ft. Widespread arctic-alpine species occurring in various habitats including exposed ridges, wet river edges, forested valleys, etc. In the Beartooth Plateau, it’s common on shaded river or creek banks and humus-covered surface of rocks in wet and swamp montane and subalpine coniferous forests.

Pine forest along HWY 212; ## 3913, 3916; brook bank, wet sandy-clay soil, in shade, locally abundant, assoc.: Sanionia uncinata.

Index Creek; ## 5493, 5494, 5518, 5533; Pseudotsuga menziesii + Picea glauca forest along the creek, on a thick layer of humus covering granite boulders, on humus soil and litter, abundant.

Lily Lake Swamp Forest; # 3020, on wet forest floor in swamp Picea glauca forest, litter and humus, assoc.: Aulacomnium palustre, Climacium dendroides.

Clay Butte Fen; 1) ## 2928, 2929, 2931; ecotone zone, edge of Picea engelmannii (+ Pinus albicaulis) forest bordering with north-north-east portion of fen, on rotting wood and wet humus, assoc.: Mnium arizonicum. 2) # 2962, Salix planifolia-Carex aquatilis, in shade under willow, on wet humus, not abundant.
Coniferous forest near Clay Butte Fen; ## 5410, 5417; wet Pinus contorta + Picea glauca + P. engelmannii – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus of streamlet bank, in shade under shrubs and trees.

Muddy Creek; ## 6123, 6125-6127, 6132-6136; wet Picea engelmannii + P. glauca forest along the creek, on wet litter, humus wet loamy soil and clay beneath spruces, especially abundant in hollows; in pure mats or assoc.: Climacium dendroides, Sanionia uncinata. S+.

Clarks Fork of Yellowstone River-1; 1) ## 3146, 3148; Picea glauca + Pinus contorta – Alnus incana forest, on wet clay in deep gully near the river shore, locally abundant, assoc.: Plagiochila porelloides, Brachythecium sp. s.l., Cratoneuron filicinum, Sanionia uncinata; 2) # 3151-3153; same forest, on humus and loamy soil in shade beneath trees, assoc.: Pleurozium schreberi, Sanionia uncinata. 3) ## 3158, 3160, 3164; same forest, huge granite outcrop, shaded side facing to the north, on a layer of wet humus, assoc.: Mnium thomsonii, Pohlia sp., Syntrichia ruralis.

Lake Creek Waterfalls; ## 5812-5815; high steep bank of creek, splash zone of the waterfall, on wet humus in deep shade under Picea glauca.

Sawtooth Lake; ## 6044, 6048; northern shore, creek near waterfall / rapids; on a layer of wet humus on granite boulders lining the creek, with Bartramia ithyphylla, Pohlia bolanderi, P. cruda.

Willow Park; ## 5576, 5581; ecotone zone between Picea engelmannii forest and montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, wet humus soil and litter, in partial shade.

48. T. megapolitana Hedwig 6600 ft.

Swamp Lake Fen & vicinity; # 5129; edge of fen (near HWY 296), on the base of granite rock, facing to the east, shaded by dense Alopecurus pratensis stands, on wet humus. S+.

49. T. sp., undescribed taxon 9250 ft.

Beartooth Butte; # 5275; eastern / south-eastern slope of Beartooth Butte, limestone debris; in crevice of vertical wall of limestone rock, shaded by tall forbs (Mertensia ciliata, Senecio triangularis, Aster sp., Thalictrum sp.); very local (found only in one place), not abundant but with numerous sporophytes; assoc.: Distichium capillaceum.

Principal morphological feature of specimen: capsules and setas are much smaller than in all known forms.

Subclass Funariidae

Encalyptaceae

50. Encalypta rhaptocarpa Schwägrichen 6500-10930 ft. A species with bipolar range, distributed all across Holarctic, but unevenly enough: in many continental regions of Asia and in the Arctic this is the most common species; in plains, E. rhaptocarpa is absent or extremely rare
(Ignatov, Ignatova, 2003). It usually occurs in small tufts in rock crevices or over mineral soil on rock ledges or cliffs, or on bare ground in tundra. In Wyoming, it’s rather common.

Summits: alpine tundra-4; ## 2470, 2471; on humus beneath dwarf willows, in shade, not abundant. S+.

Summits: alpine tundra-6; ## 3345, 3347, 3365; on bare ground beside granite outcrops and in open places, locally abundant, in pure mats. S+.

Summits: Overlook Roadside Park; # 3538, abundant on dry soil in alpine tundra, assoc.: Selaginella densa (Lycopodiophyta) & Polytrichum piliferum.

F. J. Hermann’s collection: soil in crevice of granite outcrop along Crandall Creek, Shoshone Nat. Forest, 36 miles NW of Cody, 6500 ft., F. J. Hermann 20039 (RM).

51. E. vulgaris Hedwig 6600 ft. A species with a wide distribution across Europe and unclear distribution in Asia and America owing to numerous transitional forms to E. rhahtocarpa (Ignatova, Ignatov, 2003). In our region, it is common in rock crevices in the foothill canyons and up to bare ground in the tundra (Weber, Wittmann, 2007).

Swamp Lake Fen & vicinity; # 5130, edge of fen (near HWY 296), base of granite rock, shaded by dense Alopecurus pratensis stands, on humus layer, assoc.: Orthotrichum sp. S+.

Subclass Dicraniidae

Scouleriaceae

52. Scouleria aquatica Hooker 6500-8900 ft. A species with the disjunct distribution in northwest North America and north Asia, infrequent across most of its range; global conservation rank G4. On Churchill (2007), the species occurs in aquatic habitats, banks or beds of streams and rivers, on rock, at low to high elevations, 0-1900 m. In Wyoming, it is known from several occurrences in Albany, Park, Sheridan, & Teton Cos (Porter, 1935; Churchill, 1985; Spence, 1985; Eckel, 2007). The population on the Beartooth Creek was discovered at the highest elevation (8900 ft, or 2700 m) ever reported for this species.

Beartooth Creek; ## 5423, 5424, 5426, 5427, 5431; granite debris along the creek, attached to boulders seasonally covered with fast-flowing water, locally abundant.

Lake Creek Waterfalls; ## 5810, 5816; on wet humus in shade, between granite outcrops lining the creek, in splash zone of waterfall.

F. J. Hermann’s collection: Crandall Creek, 6500 ft., F. J. Hermann 20041 (RM).
**Grimmaceae**

53. *Bucklandiella sudetica* (Funck) Bednarek-Ochyra & Ochyra [*Racomitrium sudeticum* (Funck) Bruch, Schimper & Gumbel]. 9500 ft. Widespread in northern hemisphere (especially in northern provinces) epilithic moss; in this portion of the Rocky Mountains it grows in upper subalpine and alpine, near streams or in seepage on granite rocks.


54. *Grimmia anodon* Bruch, Schimper & Gumbel 6620-10580 ft. Widely distributed all across Northern Hemisphere. In arid regions, it’s the most common species of the genus. Epilithic moss, forms tightly attached tufts mostly on granitic, sedimentary and calcareous rocks; frequent in Wyoming.

Unnamed tributary of Frozen Lake; # 2599, dry slope, in crevices and at bases of granite outcrops. S+.

Clay Butte: slope facing to W; ## 4917, 4940; limestone debris on western slope, seabed rock, on a layer of loamy soil, partially shaded.

Beartooth Lake CG: wet subalpine meadow and fen; # 4905, on granite outcrop in the fen, crevices filled with humus. S+.

Beartooth Lake CG: coniferous forest; # 6218, on granite boulder in shaded niches. S+.

Beartooth Butte; # 5267, scattered limestone debris on slope, on humus and loamy substrates in crevices and shaded surfaces of rock.

HWYs 212 & 296 intersection: slope facing to S; #5877, 5878; granite boulders on slope, in crevices of rock.

Lake Creek Waterfalls; # 5805, granite outcrops lining the creek, on wet surface.

Little Bear Creek-3; # 5347, high granite cliff, on shaded surface facing to the west, in splash zone of creek. S+.

Clarks Fork of Yellowstone River-3; # 5940, vertical surface of granite rock, in partial shade. S+.

Sawtooth Lake; ## 6023, 6026; northern shore, granite outcrop near the bank, on humus substrate. S+.

55. *G. elatior* Bruch ex Balsamo & De Notaris 9530-10930 ft. An epilithic moss, widespread in mountains of the Northern hemisphere. In our region, it’s one of the dominants of sloping, irrigated rock outcrops from the foothill canyons to the alpine.
Summits: Overlook Roadside Park; # 3527, on the base of granite debris, on wet loamy substrate, in shade.

Boggy shore of Island Lake; # 2435.1, ecotone zone between willow wetlands and Picea engelmannii forest, in crevices of granite outcrops, abundant.


56. G. longirostris Hooker 7500 ft. One of the most common Grimmias of the Northern hemisphere, growing on exposed, dry, acidic granite and quartzite; widespread all across the Rocky Mountains.

Lake Creek Waterfalls; # 5807, granite outcrops lining the creek, splash zone of waterfall.

57. G. montana Bruch, Schimper & Gumbel 9530-10930 ft. Widespread in the Rocky Mountains, an epilithic moss growing on exposed acidic granite and sandstone, it’s “probably the most ubiquitous mat-forming moss of boulders and outcrops from the foothills to the alpine. It’s a black moss, low and tightly attached to the substrate” (Weber, Wittmann, 2007, p. 87).

Summits: alpine tundra-1; ## 2273, 2281, 2286; on open surface and in crevices of granite outcrops, abundant.

Summits: alpine tundra-3; # 2403, granite outcrop, on a layer of humus, in full sun.

Summits: alpine tundra-5; # 3323, granite outcrop. S+.

Summits: alpine fen-3; # 2498, granite outcrop, abundant in crevices.

Summits: granite outcrops in alpine tundra-3; # 4950, on open surface of outcrop, locally abundant.

Summits: Overlook Roadside Park; # 3526, at base of granite debris, on loamy soil.

Boggy shore of Island Lake; # 2439.1, ecotone zone between willow wetlands and Picea engelmannii forest, on granite outcrops under spruce, in shade, forms dense mats, not abundant.

Wyoming Creek-2; # 5105, creek boggy valley, granite debris scattered in alpine moss fen, on a layer of humus in crevices, in sun.

58. G. pulvinata (Hedwig) J. E. Smith Epilithic moss, one of the most common species of the genus, widely distributed in both hemispheres. In Colorado, it’s a fairly common species on granite rocks, particularly in the foothills (Weber, Wittmann, 2007). In Wyoming, it’s not been collected enough to estimate whether or not it is common.

59. *Niphotrichum canescens* (Hedwig) Bednarek-Ochyra & Ochyra *Racomitrium canescens* (Hedwig) Bridel. 9500-10900 ft. Holarctic species, distributed from the Arctic to the boreal zone and southward through south China and Taiwan. This is the most frequently encountered species of *Racomitrium* s.l. In this portion of the Rocky Mountains, it often covers large areas of merely moist ground in the alpine tundra and in open subalpine sites (Elliott, 1993; Eckel, 2007; Weber, Wittmann, 2007).

Summits: alpine tundra-2; # 2357, at base of granite outcrop, on wet humus, shaded by sedges, assoc.: *Paraleucobryum enerve*.

W. A. Weber’s collection: Beartooth Plateau, 2900 m.s.m., W. A. Weber, B-44286 (RM, COLO).


Lake Creek CG: wet coniferous forest; # 5912, *Picea glauca – Rubus parviflorus – Linnaea borealis*, streamlet crossing the forest, on wet granite boulders covered with a layer of humus, in shade.

F. J. Hermann’s collections: 1) 6500 ft., small plants with yellowish red peristome teeth, moderately cribrose, F. J. Hermann 20032 (RM); 2) granite bluff along Route 212 [HWY 212. YeKA], Shoshone National Forest, 7500 ft., 46 miles NW of Cody, F. J. Hermann 20063 (RM), July 19, 1965.


Lake Creek Waterfalls; # 5856, on granite outcrops in splash zone of waterfall.


* By the present time, 50-60 % of Grimmiaceae specimens have been treated.

**Seligeriaceae**

62. *Blindia acuta* (Hedwig) Bruch, Schimper & Gumbel 7500-10500 ft. Widely distributed from the Arctic to mountains of equatorial provinces of Africa and America; also occurs in South Africa and Australia (Ignatov, Ignatova, 2003). It’s encountered sporadically across this portion of the Rocky Mountains, occurring on wet rocks and tundra at high elevations (Elliott, 1993; Eckel, 2007; Weber, Wittmann, 2007).
Boggy shore of Island Lake; # 2365, Salix sp. – Bryidae subalpine fen, at base of hummock, on wet peaty soil, in shade, assoc.: Sanionia uncinata.

Lake Creek Waterfalls; ## 5821, 5825, 5826, 5829, 5850; humus soil in shade under Picea engelmannii and on granite boulders covered with a layer of humus, in splash zone of waterfall, locally abundant, in pure mats or assoc.: Mnium marginatum, Philonotis yezoana.


Fissidentaceae

63. Fissidens bryoides Hedwig 7700-10760 ft. A species with very wide distribution all across Holarctic, in tropical Africa, South America and New Zealand (Ignatov, Ignatova, 2003). It’s encountered sporadically across this portion of the Rocky Mountains, occurring on shaded moist soil and seeping rocks, on moist banks from the foothills through the alpine (Elliott, 1993; Eckel, 2007; Weber, Wittmann, 2007; author’s data).

Summits: alpine tundra-6; # 3381, granite outcrops, in wet crevices, inside dense tufts of Orthotrichum, forms poor admixture, in deep shade.

Lily Lake Fen; ## 3053, 3055; on tall vertical walls of ditches/streamlets crossing the fen, on soaked peaty soil and humus, in deep shade beneath willows, assoc.: Campyliadelphus chrysophyllus.

64. F. osmundoides Hedwig 6950-10680 ft. Widely distributed in most of provinces of the Arctic and boreal zone. It’s encountered sporadically across this portion of the Rocky Mountains, occurring on moist soil, rock, and wood, peaty banks in the subalpine and alpine (Elliott, 1993; Eckel, 2007; Weber, Wittmann, 2007; author’s data).

Boggy shore of Island Lake; # 2385, willow wetlands along the streamlet, vertical bank, on peaty soil in deep shade under willows, not abundant, assoc.: Pohlia cruda.

Littlerock Creek Fen; # 3636, in low Bryidae hummocks, on peaty soil, in partial shade, not abundant, assoc.: Aulacomnium palustre, Meesia uliginosa, Polytrichastrum alpinum, Sarmentypnum sarmentosum.

Top Lake Fen; # 5782, boggy western shore of lake, peaty bank, in shade, not abundant.

Sawtooth Lake; 1) # 6030, northern shore, boggy bank of the lake covered with Bryidae mosses, on wet humus, assoc.: Distichium capillaceum. 2) # 6040, waterfall / rapids; on wet humus in crevice of granite rocks, in deep shade.

Lake Creek Waterfalls; # 5853, steep bank forested by Pseudotsuga menziesii, Picea glauca & Pinus contorta; on wet humus covering an outcrop surface, shaded by spruce.

**Ditrichaceae**

65. *Ceratodon purpureus* (Hedwig) Bridel 6950-10900 ft. This is “one of the half dozen abundant weedy mosses in the world…It occurs on packed earth, recently disturbed forest soils, burned areas, sidewalk cracks and neglected ground at all altitudes.” (Weber, Wittmann, 2007, p.73). Widely distributed in the Beartooth Plateau in a great variety of situations.

Summits: alpine fen-2; # 2335, on wet gravelly soil in ecotone zone of alpine tundra and fen, assoc.: *Syntrichia ruralis*.

Summits: alpine fen-3; # 2513, on bare peaty soil across the fen and transition zone to alpine tundra, abundant. S+.

Summits: alpine fen-4; #3302, granite outcrop in ecotone zone of alpine tundra and fen; on a thick layer of humus, forms admixture to *Polytrichum juniperinum*.

Summits: alpine tundra-4; # 2481, at bases of granite ourcrops, on humus, in partial shade.

Summits: granite outcrops in alpine tundra-1; # 2531, on shaded niches on humus and loamy soil under granite debris and outcrops.

Summits: wet alpine meadow & fen; #3399, alpine meadow, on dry disturbed soil, assoc.: *Polytrichum juniperinum*. S+.

Summits: roadside of HWY 212; # 3496, packed ground beside the road, assoc. *Bryum* sp. s.l.

Island Lake CG: spruce forest; # 2220, *Picea engelmannii* – *Vaccinium scoparium* forest, granite rock facing to the south, in crevice on a layer of humus, in shade beneath spruce; assoc.: *Polytrichum piliferum*.

Sawtooth Palsa Fen; # 5760, roadside disturbed grassland, on wet loamy soil, assoc.: *Polytrichum piliferum*.

Beartooth Lake CG: wet subalpine meadow and fen; # 4889, on granite outcrop in fen, crevices filled with humus, assoc.: *Grimmia* sp., *Tortula obtusifolia*.

Boggy shore of Island Lake; # 2372, on the bases of Bryidae hummocks, on wet peaty soil, assoc.: *Bryoerythrophyllum recurvirostrum*.

Pine forest along HWY 212; ## 3883, 3885-3888, 3891-3895; on loamy soil in shade at the bases of pine trees and on a thin layer of loam of granite outcrops, abundant, assoc.: *Brachythecium* sp. s.l., *Grimmia* spp., *Syntrichia norvegica*.

Little Bear Creek-2; # 3239, disturbed soil /packed earth of subalpine meadow between the creek and HWY 212, assoc.: *Bryum* sp., *Polytrichum juniperinum*, *Syntrichia* sp.
Little Bear Creek-3; 1) # 5333, granite boulder semi-submerged in the water of creek, on a thick layer of wet humus, assoc.: Philonotis fontana s.l., Pohlia bolanderi, Polytrichum juniperinum. 2) # 5345, huge granite rock along the creek, in crevices filled with humus, assoc.: Polytrichum piliferum, Syntrichia ruralis. 3) # 5376, roadside slope of highway in front of creek, 10 meters away from the bridge over the creek, on loamy and gravelly soil under Salix sp., assoc.: Syntrichia norvegica.

   Two lakes along HWY 212; # 2679, on wet disturbed loamy soil of Picea engelmannii + Pinus albicaulis forest, assoc.: Pohlia sp., Polytrichum juniperinum, P. piliferum; S+.

   Unnamed tributary of Frozen Lake; ## 2578, 2579, 2583, 2585, 2588, 2598; dry rocky slope, on loamy soil under granite rock, shaded by Carex sp., assoc.: Bartramia ittyphylla, Brachytheciastrum collimum, Pohlia cruda, Polytrichastrum alpinum, Polytrichum juniperinum, Ptychostomum pallescens, Syntrichia norvegica, Tortula hoppeana. S+.

   Little Bear Lake Fen-NW – 08 & 09; 1) ## 2773, 2779; in dry hummocks of Aulacomnium palustre, forms admixture. 2) # 2797, ditch walls, on peat soil, in shade, assoc.: Bryum sp. s.l., Ditrichum sp., Polytrichum juniperinum, Sarmentypnum exannulatum, not abundant. 3) # 2762; on granite outcrop covered with humus, assoc.: Polytrichum piliferum. 4) # 5637, roadside slope, on wet loamy soil, assoc.: Polytrichum juniperinum. S+.

   Little Bear Lake Fen-SE-08; # 2855, on packed earth along the trail in the ecotone zone of fen and Picea engelmannii forest, assoc.: Bryum sp. s.l., Polytrichum juniperinum, Pottiaceae spp. S+.

   Island Lake CG: subalpine meadow; # 2915, subalpine meadow, dry loamy soil, roadside; # 2921, at base of granite outcrop, loamy soil, in shade, assoc.: Polytrichum juniperinum.

   Clay Butte Fen, ## 2937, 2941; Picea engelmannii + Pinus albicaulis forest north-north-east of fen, ecotone zone, on humus and decaying wood, covered with a layer of loam, assoc.: Tortula hoppeana. S+.

   Clay Butte: slope facing to W; # 4926, summit, Abies lasiocarpa (? no cones) stands in front of Clay Butte lookout (behind the sign “No overnight camping”), on loamy soil and rotting wood, in shade beneath trees and Ribes sp. and along the trail, assoc.: Brachytheciastrum collimum.

   Littlerock Creek Fen; # 3572, on dry peaty soil in Salix planifolia hummocks, sporadically all across the fen. S+.

   Lily Lake Fen; ## 3084, 3087; boggy lake shore, on rotten Picea trunk, in shade. S+.

   Meadow Lake Fen; # 3768, granite boulder laying in the middle of the fen, on a thin layer of humus in crevice, assoc.: Pohlia sp., Polytrichum juniperinum.

   Small alpine lake; ## 3500, 3510, 3511; boggy shore, in low hummocks, abundant, assoc.: Pohlia sp., Polytrichum juniperinum, Pottiaceae spp.
Wyoming Creek-1; 1) # 3484, pasture area around the creek, on disturbed soil, assoc.: Leptobryum pyriforme, Lophoziaceae spp. 2) # 3489, 0.1 km south-west of Wyoming Creek, gentle slope facing to the north-east, on granite outcrops, humus layer, not abundant.

Wyoming Creek-2; ## 5011, 5034; on wet sandy-clay soil along streamlets; on peaty soil of vertical moss-lined banks, in shade under willows, assoc.: Pohlia obtusifolia, Ptychostomum pseudotriquetrum, etc.

Beartooth Lake CG: coniferous forest; # 6217, Pinus contorta + Picea engelmannii forest, on loamy soil, assoc.: Lophozia sp., Brachytheciastrum collinum.

Lake WGN forest; # 6078, rotting wood, on a layer of humus, in shade under spruces, assoc.: Pohlia nutans, Polytrichum juniperinum.

Unnamed tributary of Sawtooth Lake; # 6068, willow thickets along the shore, on dry peaty soil, in shade, assoc.: Polytrichum juniperinum.

Sawtooth Lake; 1) # 5991, western boggy shore of the lake, shaded steep bank, on dry peaty soil, assoc.: Polytrichum piliferum. 2) # 6050, northern shore, waterfall vicinity; on rotting wood near the water line of creek.

Lake Creek CG: wet coniferous forest; # 5906, Picea glauca + Pinus contorta – Rubus parviflorus – Linnaea borealis, at base of granite boulder, in shade. S+.

Fox Creek; # 5547; highway roadside, on loamy soil beneath Spiraea sp. S+.

Littlerock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

66. Distichium capillaceum (Hedwig) Bruch, Schimper & Gumbel 6570-10800 ft. A species widespread across polar through continental (in particular, boreal) regions, also found in mountains of different zones, including tropics; often prefers carbonates-containing substrates. In Wyoming and adjacent states, it’s widely distributed throughout the mountains in high altitude wetlands and seeping and shaded cliffs, debris and outcrops (not necessarily carbonates-containing!) (Flowers, 1973; Elliott, 1993, Eckel, 2007, Weber, Wittmann, 2007; author’s data).

Summits: alpine fen-2; # 2328, on peaty soil in seepage zone; cf. (no sporogones).

Summits: alpine fen-4; ## 3275, 3291, 3301; vertical banks of alpine pool, in shade, on wet bare peat, assoc.: Barbilophozia hatcheri, Blepharostoma trichophyllum, Lophozia sp., Dicranum spadiceum, Isopterygiopsis pulchella, Pohlia bolanderi. S+.

Summits: alpine tundra-4; ## 2459, 2460, 2470, 2487, 2488; on humus at bases of granite outcrops, in partial shade, locally abundant, mostly in pure mats. S+.

Clay Butte Fen; 1) ## 2934, 2935; Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, ecotone with fen, on loam and humus, in shade, assoc.: Bryoerythrophyllum recurvirostrum, Mnium thomsonii; S+ (2935). 2) # 2963, north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet humus. S+
Beartooth Butte; ## 5275 (cf.), 5283, 5287 (cf.), 5289; south-eastern slope of Beartooth Butte, limestone debris; in crevice of vertical surface of limestone rock; assoc.: Timmia sp. S+ (## 5283, 5289).

Swamp Lake Fen & vicinity; 1) ## 5124-5127, 5140, 5141; (Pentaphylloides floribunda +) Salix sp. – Carex spp. – Drepanoclados aduncus community, on wet peaty soil in willow hummocks, in shade, locally abundant, in pure mats or assoc.: Bryoerythropodium recurvirostrum, Leptobryum pyriforme, Plagiommium ellipticum; 2) # 5127, on the shaded base of granite rock at the edge of fen (near HWY 296). S+.

Coniferous forest near Clay Butte Fen; ## 5393, 5394, 5413; on wet clay along streamlet. S+.

Lily Lake Fen; # 3093, abundant in shallow ditches, on peaty soil, assoc.: Sanionia uncinata; cf. (no sporogones).

Sawtooth Lake; # 6030; northern shore, shaded bank of the lake covered with Bryidae mosses, on wet humus, assoc.: Fissidens osmundoides; cf. (no sporogones).

Clark Forks of Yellowstone River-2; # 5600, on humus soil of moss-lined bank, in shade. S+.

Willow Park; # 5566, montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, wet peaty soil, in partial shade, not abundant. S+.

Beartooth Creek; # 5460, Picea engelmannii – Pinus contorta forest on the creek shore; granite outcrop, in crevice filled with humus, in shade under trees, assoc.: Mnium thomsonii, Pohlia cruda; cf. (no sporogones).


67. D. inclinatum (Hedwig) Bruch, Schimper & Gumbel 9120-9220 ft. A species with distribution in most of Holarctic, in some regions infrequent or rare. In our region, it’s uncommon in calcareous snow-melt basins, on soil over rock. In Montana, it is included to the list of species of conservation concern with status G4G5S1 (Field Guide…). Reliable identification is possible only when sporogones are in presence.

Beartooth Butte; ## 5261, 5263, 5277; scattered limestone debris on slope, on a thick layer of humus, assoc.: Brachytheciastium collinum. S+.

68. Ditrichum flexicaule (Schwägrichen) Hampe 6950-10020 ft. A very variable species distributed all across Arctic and southward; forms compact mats or sods in seepage areas over rocks. Distribution in Wyoming is poorly known.

Two lakes along HWY 212; ## 2661, 2671, 2675; wet Picea engelmannii + Pinus albicaulis forest, on humus at bases of trees, partially shaded, forms tufts.

Lake Creek CG: wet coniferous forest; # 5934, Picea spp. – Alnus incana forest, on wet clay and humus, not abundant.
69. Saelania glaucescens (Hedwig) Brotherus  A species widespread predominantly in the subalpine zone. In Wyoming, it’s not been collected enough to estimate whether or not it is common: it’s known here only from the below mentioned collection.


Rhabdoweisiaceae

70. Dichodontium pellucidum (Hedwig) Schimper  9400-9480 ft. A species distributed in Northern Hemisphere, largely in temperate and subarctic areas. In this portion of the Rocky Mountains, it occurs on wet stones in snow-melt streams and cliffs from the foothills to alpine. Relatively rare in Wyoming where it was previously known from few occurrences in Albany Co (Eckel, 2007).

Little Bear Creek-2; # 3262, creek bank, on moist clay, in shade under willow, not abundant, assoc.: Philonotis fontana s.l., Sanionia uncinata.

Little Bear Creek-3; ## 5328, 5337, 5371, 5373; moss-lined bank of creek, in shade, on wet humus and sandy-clay soil, in pure mats or assoc.: Hygrohypnum ochraceum, Philonotis fontana s.l.

71. Dicranoweissia crispula (Hedwig) Linbderg ex Milde  6600-10100 ft. North-American and Asiatic species; it’s normally forming cushions on shaded granite rock, gravel, occasionally epixylic. Widespread in the Rocky Mountains. Some of Wyoming populations are located at the elevation much higher than it was indicated in “Bryophyte Flora of North America” – 10-2000 m (Schofield, 2007).

Summits: alpine fen-3; # 2511, at bases of granite outcrops on humus, in shade, in pure mats.

Clay Butte: slope facing to E; # 3853, in Picea engelmannii forest on steep slope, in crevice of granite boulder, covered with humus. S+.

Crazy Creek CG Swamp; 1) ## 3210, 3214; swampy Picea glauca forest, on the base of spruce, mesic site. S+. 2) # 3226, on shaded surfaces of huge granite outcrop in the forest. S+.

Beartooth Lake CG: coniferous forest; ## 6210, 6221; granite outcrops in spruce-pine woods, covered with humus, in shade, assoc.: Brachytheciastrum collinum. S+ (# 6221).

Aspen stands along HWY 212; ## 6108, 6112; in shaded crevices of granite boulders and on the bases of Populus tremuloides trunks.

Clay Butte: slope facing to W; # 4932, spruce woods on west slope below Rd 142; on rotting wood, in shade. S+.

Island Lake CG: spruce forest; # 2222, Picea engelmannii – Vaccinium scoparium forest, granite rock facing to the south, on a layer of humus, in shade beneath spruce. S+. 
Lake Creek CG: wet coniferous forest; # 5908, Picea sp. – Rubus parviflorus – Linnaea borealis, on granite boulders covered with humus, in shade. S+.

Index Creek; ## 5491, 5513; Pseudotsuga menziesii + Picea glauca forest along the creek, granite and volcanic boulders, on a layer of humus. S+.

Beartooth Creek; ## 5457, 5458; Picea engelmannii – Pinus contorta forest on the shore; granite outcrop, on a thick layer of humus, in shade under trees, assoc.: Pohlia nutans. S+.

Swamp Lake Fen & vicinity; # 5205, north foothills of Cathedral Cliff (seabed rock), Picea spp. forest along the trail, on the base of limestone debris, in shade. S+.

NE & N shore of Beartooth Lake; # 5227, trail to Beauty Lake, wet Picea engelmannii forest, on wet humus on the base of spruce, in shade, not abundant.

Beartooth Butte; # 5286, scattered limestone debris on slope, on a thick layer of humus on the bases of rocks, assoc.: Hypnum vaucheri. S+.


72. Oncophorus virens (Hedwig) Bridel 9250-10700 ft. A species widespread in Northern Hemisphere; frequently encountered near stream habitats, on moist rocks, rotten logs or boggy soil. Rather common in Wyoming.

Summits: alpine fen-1; ## 2292, 2305, 2308, 2317; in low hummocks on soaked peaty soil along pools, rather abundant.

Summits: alpine fen-5; # 3433, on soaked peaty soil, forms carpets, in pure mats.

Unnamed tributary of Sawtooth Lake; # 6067, willow wetlands along the shore, on wet sandy soil beneath Salix sp., in shade, assoc.: Campylium stellatum.

Sawtooth Lake; 1) ## 6003, 6016; northern shore of lake, moss-lined bank of stream, on wet sandy-clay soil and humus, shaded by Salix sp., assoc.: Sanionia uncinata. 2) ## 6062, 6063; creek on the western shore of lake, underwater on granite boulders, sandy-humus substrate, in pure mats and assoc.: Hygrohypnum ochraceum, Rhizomnium magnifolium.

W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], alpine bog of east summit, east slope, head of Wyoming Creek, 3250 m.s.m., W. A. Weber, B-44264 (COLO, RM).

73. O. wahlenbergii Bridel 7030-10680 ft. A species widespread in Northern Hemisphere; frequently encountered on rotten logs along streams or in flooded areas, less commonly on soil, humus, rock or bark at the base of coniferous trees. Rather common in Wyoming.
Little Bear Lake Fen-NW-08; ## 2834, 2838, 2849; dry mound at the margin of fen, ecotone zone between fen and Picea engelmannii forest; abundant, assoc.: Cephalozia bicuspidata, Aulacomnium palustre, Pohlia nutans, Straminergon stamineum, Tomentypnum nitens. S+ (# 2834).

Littlerock Creek Fen; ## 3560, 3582, 3598, 3608; Salix planifolia – Bryidae hummocks on peaty soil in partial shade or in sun; in pure mats or with Polytrichum juniperinum / P. piliferum. S+ (## 3560, 3582, 3608)

Rd 801: swampy mixed forest; # 6161, Picea glauca + Populus tremuloides forest, rotting wood, on a layer of humus.


**Dicranaceae**

74. *Dicranum elongatum* Schleicher ex Schwägrichen 10680 ft. Species new to Wyoming. Common in arctic or alpine tundra all across Northern hemisphere, growing on soil, rocks or soil over rocks, cliff ledges, cliff shelves, rarely decayed wood and stumps; sometimes in bogs and fens; 30-3700 m. Distribution: Greenland, North America (Alta., B.C., Man., Nfld. and Labr. (Nfld.), N.W.T., N.S., Nunavut, Ont., Que., Sask., Yukon; Alaska, Colo., Maine, Minn., Mont., N.H., N.Y.), Europe, Asia (Ireland, 2007). In Colorado, it’s restricted to alpine and subalpine fens or wet moss tundra (Weber, Wittmann, 2007). In Wyoming, the species is known from the only location – Littlerock Creek Fen.

Littlerock Creek Fen; ## 3565, 3577, 3593, 3594, 3611, 3624, 3625, 3634, 3640, 3641, 3664, 3669, 3671, 3676; Salix planifolia - Carex scopulorum – Bryidae, very abundant in hummocks, forms very characteristic dense compact tufts on peaty soil.

75. *D. muehlenbeckii* Bruch, Schimper & Gumbel 6600-10680 ft. An infrequent Holarctic species with North-American and Eurasian distribution, somewhat rare throughout North America (global conservation status is G3G5); it occurs on humus and sandy soil on cliffs, over boulders and among rocks in open woods or exposed sites at the elevation range 10-3100 m (Ireland, 2007). In Wyoming, it’s known only from several locations in Park Co (Eckel, 2007; author’s data).

Littlerock Creek Fen; # 3597, in Salix planifolia – Sphagnum spp. + Aulacomnium palustre hummocks, not abundant, forms admixture to Sanionia georgico-uncinata.

Wyoming Creek-2; # 5092, fragment of wet alpine tundra along the creek, on wet peaty soil.

W. A. Weber’s collections: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA]: 1) west side of Beartooth Pass, under late snow patch on steep slope north of switchback; rills and snowbeds, 3200 m.s.m., W. A. Weber B-44303 (COLO, RM), Aug. 18, 1973; 2) swales


76. **D. polysetum** Swartz 6950-7480 ft. Common circumboreal species. On Ireland (2007), occurs at the elevation range 10-2100 m on humus, soil over acidic or calcareous rock, and decaying wood in deciduous or more often coniferous forests, occasionally on bogs, fens, and swamps. It’s abundant and typical of upland boreal and montane forests in Montana (Elliott, 1993), but seems to be rarely collected in Wyoming. The population on Index Creek is located at highest elevation ever reported for this species - 7480 ft., or 2280 m.

Lake Creek CG: wet coniferous forest; # 5901, Picea glauca – Rubus parviflorus – Linnaea borealis, in low hummock, humus soil, in partial shade beneath trees, assoc.: Sanionia uncinata. S+.

Index Creek; # 5497, Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, rotting wood, locally abundant, assoc.: Dicranum sp., Sanionia uncinata.

77. **D. scoparium** Hedwig 8970-10680 ft. Widely distributed across Holarctic, within arctic, boreal, and nemoral zones; the ecology close to the former species. Rather common in this part of the Rocky Mountains (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). In Wyoming, it penetrates the alpine zone up to the elevation 10680 ft., or 3255 m (Littlerock Creek Fen) which is a much higher location than Ireland indicates for this species in “Flora of North America” – 50-2900 m (Ireland, 2007).

Little Bear Lake Fen-NW-08; # 2841, on dry mound with Carex scopulorum and Aulacomnium palustre, locally abundant, assoc.: Aulacomnium palustre, Sanionia uncinata.

NE & N shore of Beartooth Lake; ## 5215, 5216; trail to Beauty Lake, wet Picea spp. forest, stream bank, on wet rotting wood, in shade under trees, locally abundant.

Littlerock Creek Fen (Heidel et al., 2008).

78. **D. spadiceum** J. E. Zetterstedt 9500-10900 ft. An arctic-alpine species with North American and Eurasian distribution. In’s infrequent in this portion of the Rocky Mountains: it’s unknown in Colorado (Weber, Wittmann, 2007); in Montana, it is rare and listed as a species of conservation concern with status G5?S1 (Montana Field Guide, …). In Wyoming, it’s known only from few scattered occurrences in Park Co and Yellowstone National Park (Porter, 1935; Flowers, 1973; Eckel, 2007; author’s data). Locations on summits of the Beartooth Plateau are the highest ever reported for this species – 3000-3320 m vs. 2300 m indicated in “Flora of North America” (Ireland, 2007).

Summits: alpine tundra-2; ## 2344, 2347, 2348, 2356; wet alpine tundra, on humus soil at base of granite outcrop, in partial shade, assoc.: Barbilophozia hatcheri, Hypnum revolutum, H. vaucheri, Mnium arizonicum, Polytrichum juniperinum, P. piliferum.
Summits: alpine tundra-3; ## 2394, 2415; on gravelly soil beside outcrops in partial shade, in pure tufts or assoc.: Hypnum vaucheri, Polytrichum spp.

Summits: dry creek in alpine tundra; # 2424; on wet humus.

Summits: alpine fen-4; ## 3275, 3287, 3288; vertical banks of alpine pool, in shade, on wet bare peat, assoc.: Blepharostoma trichophyllum, Lophozia sp., Breidleria pratensis, Climacium dendroides, Distichium capillaceum, Isopterygiopsis pulchella.

Littlerock Creek Fen; # 3604, in Salix planifolia – Bryidae hummocks, on peaty soil in partial shade, not abundant.


79. **D. tauricum** Sapehin 7020 ft. A western North American species, occurring on trees and rotten wood (Ireland, 2007); it’s distributed sporadically in Wyoming (Eckel, 2007; author’s data).

Clarks Fork of Yellowstone River-1; # 3147, Picea glauca forest, in shade beneath spruce on rotting wood.

80. **Paraleucobryum enerve** (Thedin ex C. J. Hartman) Loeske 9670-10900 ft. An infrequent species of arctic and alpine regions; usual habitats are soil over boulders, noncalcareous outcrops and cliffs, sometimes in bogs and on stream banks. In Montana, it is a rare species included to the list of species of conservation concern with status G5?S1 (Elliott, 1993; Montana Field Guide, …). In Wyoming, it is known on very few materials: W. Weber’s and author’s collections from the Beartooth Plateau (see below), and one author’s collection from Snowy Range (border of Albany & Carbon Cos). In the rest of Wyoming, it’s not been collected enough to estimate whether or not it is rare.

Summits: alpine tundra-2; # 2357, at base of granite outcrop, on wet humus, shaded by sedges, assoc.: Niphotrichum canescens.

Little Bear Creek-1; # 2712, steep rocky terrace along the creek, north-facing granite cliff ledge, forms tightly compacted tufts on a thick layer of humus, abundant, assoc.: Dicranum sp., Pogonatum urnigerum.

W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], alpine bogs of east summit, east slope, head of Wyoming Creek, 3250 m.s.m., W. A. Weber B-44256 (COLO, RM).

**Leucobryaceae**

81. **Campylopus schimperi** Milde 9600 ft. New to Wyoming, potential species of conservation concern. Global conservation rank is G3G4. Campylopus schimperi is a rarely collected arctic-alpine species, occurring in mountain systems of the Northern hemisphere at elevations from 2700-3400 m (8850-11150 ft.). Its world distribution includes Greenland, Canada
(British Columbia, Newfoundland, Labrador and the Yukon), Europe, Asia (Bhutan, China, Japan, Nepal). Until recently, Campylopus schimperi was known from only two states of the U.S.A.: Alaska and Colorado (Frahm, 2007). In the Beartooth Plateau of Wyoming, the species was collected at subalpine elevations overlying Quaternary glacial deposits, in aapamire fen, featuring a series of elongated mounds and broad intervening shallow swales over much of the area and pH ranging from 6.5-7.4. The fen lies within highway corridor, its natural drainage is disturbed as a result of road construction (Heidel et al., 2008).

Little Bear Lake Fen-SE-08; # 2896, Carex scopulorum – Sphagnum warnstorffii + Aulacomnium palustre, forms pure mats on saturated soil at base of low moss hummock around swale.

Pottiaceae

82. Bryoerythrophyllum recurvirostrum (Hedwig) Chen 6600-9530 ft. A widely distributed species across all continents. On Zander (2007a), it grows on soil, rock (limestone, dolomite, gypsum, siliceous), mortar of wall, bark, in tussock tundra, alpine meadows, bluffs, forested and boggy areas, stream banks, lake shores; low to high elevations (20-3800 m). In the study area, it was found in the montane and subalpine zones.

Boggy shore of Island Lake; # 2372, on the bases of Bryidae hummocks, on peaty soil, assoc.: Ceratodon purpureus.

Clay Butte Fen; # 2934, Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, ecotone with fen, on loam and humus, in shade, assoc. Distichium capillaceum; S+.

Rd 801: swampy mixed forest; # 6162, Picea glauca + Populus tremuloides forest, on humus soil, not abundant, poor form.

Swamp Lake Fen & vicinity; # 5124, (Pentaphylloides floribunda +) Salix sp. – Carex spp. – Bryidae, on wet peaty soil in willow hummocks, in shade, not abundant, assoc.: Distichium capillaceum, Leptobryum pyriforme, Plagiomnium ellipticum.

E. Lawton’s collection: Lake Creek at Cody Road, west of Beartooth Butte, E. Lawton 2093 (WTU) Aug. 24, 1953.

© 83. Didymodon asperifolius (Mitten) Crum, Steere & Anderson [Barbula asperifolia Mitten, Didymodon rufus Lorentz]. 10500-10660 ft. Rather rare arctic-alpine species occurring on calcareous or acidic rock, moist calcareous soil, peatland, streamside, alpine, at moderate to high elevations (500-3700 m); it’s distributed in Greenland; Alta., B.C., Nfld. and Labr., N.W.T., Nunavut, Yukon; Alaska, Colo., Wyo; Europe, Asia (Savich-Lyubitskaya, Smirnova, 1970; Zander, 2007). In Colorado, it’s “a characteristic species of snow melt basins in the alpine tundra, occurring in loose mats, loosely attached to sandy gravels in periodically inundated meltwater rills” (Weber, Wittmann, 2007, p. 124). In Wyoming, it’s known only on two collections of W. A. Weber (see below). Global conservation rank of the species is G3G5.

84. **D. rigidulus Hedwig** [*Barbula rigidula (Hedwig) Milde*]. 9630 ft. A polymorphic species widely distributed in Holarctic; it’s also known from Mexico, South America, Antarctic, Central Africa; common on rocks and cliffs, predominantly carbonates (Ignatov, Ignatova, 2003). It’s not uncommon in Wyoming (Eckel, 2007).

Clay Butte: slope facing to W; # 4936, grasslands on west slope below Rd 142, debris of limestones, in crevices of seabed rock, on a layer of loamy soil, in partial shade, not abundant.

! 85. **Syntrichia calcicola Amann, cf.** 9030-9700 ft. Species new to Wyoming. A predominantly calciphilous species, known from Europe, Caucasus, and Middle Asia (Savich-Lyubitskaya, Smirnova, 1970; Gallego, 2006); in North America, it has unclear distribution. The species is not listed in “Bryophyte Flora of North America” (Mishler, 2007) although it was reported for Colorado by Weber & Wittmann, 2007.

Clay Butte: slope facing to W; 1) # 4915, on limestone cliff along the road, in poor tufts. 2) # 4930, grasslands on west slope down Rd 142; at base of granite outcrop, not abundant. 3) ## 4937, 4938, 4941, 4943, 4944, 4945; same grasslands, debris of limestones, in crevices of limestone rock, on a layer of loamy soil, in partial shade, not abundant, in pure tufts or assoc.: Bryum argenteum, Hypnum vaucheri.

Beartooth Butte; ## 5255, 5259, 5261, 5262, 5265, 5266, 5269, 5272, 5280; scattered limestone debris on slope, on humus and loamy substrates in crevices and shaded surfaces of rock, assoc.: Brachytheciastrum collinum, Bryum argenteum, Distichium capillaceum, Tortula obtusifolia.

NB Specimens from the Beartooth Plateau are morphologically identical to those from the Medicine Bow Mountains of Wyoming, collected by the author in 2007 (YeKA ## 870, 1281, 1292, 1294, 1658) and identified by M.T. Gallego (!) as S. calcicola. Additional study is necessary to confirm the determination of Wyoming’s “S. calcicola”. We are following Gallego (2006) in her treatment of the Syntrichia species.

86. **S. caninervis Mitten** [*Tortula caninervis (Mitten) Brotherus*]. 6600-6700 ft. A species widely distributed in arid zone of Eurasia, in North Africa and North America (Ignatov, Ignatova, 2003). In North America, it’s most common in the colder deserts and steppes; often forming extensive carpets at moderate to high elevations (Mishler, 2007). In Wyoming, it is a common species known on many collections representing a number of counties (Eckel, 2007).

Clarks Fork of Yellowstone River-4; # 6170, on horizontal surface of huge flat granite outcrop, locally abundant.

Swamp Lake Fen & vicinity; # 5204, north foothills of Cathedral Cliff, Picea spp. forest along the trail, on loamy soil, at base of limestone rock, in shade; cf.
87. **S. norvegica Weber & Mohr** [*Tortula norvegica (Weber) Lindberg*]. 7200-10580 ft. A widely distributed arctic-alpine species occurring in most of sectors of the Arctic and in high elevation areas of most mountain systems of Holarctic (Ignatov, Ignatova, 2003). In the Rocky Mountains, it’s common on wet soil and moist granite outcrops, as well as saturated ground under willows in subalpine fens; widespread in Wyoming (Eckel, 2007; author’s data).

Pine forest along HWY 212; ## 3886, 3887, 3896; abundant on loamy soil of pine forest (especially at the base of trees) and shaded surfaces of granite outcrops; assoc.: Ceratodon purpureus.

Aspen grove along HWY 212; # 3919, on granite outcrops, not abundant, assoc.: Bryum sp. s.l., Grimmia sp.

Little Bear Creek-3; ## 5375, 5376; roadside slope of highway in front of creek, 10 meters away from the bridge over the creek, on loamy and gravelly soil under Salix sp., locally abundant, assoc.: Ceratodon purpureus.

Unnamed tributary of Frozen Lake, dry slope; 1) ## 2574, 2577, 2579, 2580, 2583; on granite outcrops scattered across alpine meadow and fen, in shade, assoc.: Ceratodon purpureus, Polytrichum juniperinum. 2) # 2581, roadside, beside pipe along HWY 212, 1 meter of the road, assoc.: Philonotis fontana s.l.

Beartooth Lake CG: coniferous forest; # 6211, Pinus contorta + Picea engelmannii forest, surface of granite outcrop, covered with a layer of humus; in shade, assoc.: Tortula obtusifolia.

Index Creek; # 5520, Pseudotsuga menziesii + Picea glauca forest along the creek, on humus and litter, abundant, assoc.: Hypnum revolutum, Mnium arizonicum.

Fox Creek; # 5539, rocky bank of the creek, thickets of Rubus idaeus, on humus and litter between granite debris, abundant.

88. **S. ruralis (Hedwig) Weber & Mohr** [*Tortula ruralis (Hedwig) Crome, T. ruraliformis (Bescherelle) W. Ingham*]. 6500-10970 ft. An almost cosmopolitan moss, widely distributed in arctic and steppe plant communities, in dry open sites all across boreal zone (Ignatov, Ignatova, 2003). It’s encountered very frequently across this portion of the Rocky Mountains, occurring on dry to moist soil and rock in open and forested areas from low to high elevations (Flowers, 1973; Elliott, 1993; Eckel, 2007; Weber, Wittmann, 2007; author’s data). On summits of the Beartooth Plateau, S. ruralis is one of the most common species.

Summits: alpine fen-2; # 2335, on wet gravelly soil in ecotone zone of alpine tundra and fen, assoc.: Ceratodon purpureus.

Summits: alpine fen-3; ## 2494, 2495, 2511; at bases of granite outcrops on wet humus, in shade, abundant, assoc.: Aulacomnium palustre, Dicranoweissia crispula, Hypnum revolvens.
Summits: alpine tundra-3; ## 2393, 2400, 2404, 2410; on sides and in crevices of granite outcrops, in partial shade and in sun, abundant, in pure tufts or assoc.: Hypnum revolutum, H. vaucheri.

Summits: alpine tundra-4; ## 2451, 2449, 2486; at bases and on side surfaces of granite outcrops, on gravelly soil and humus, abundant.

Summits: alpine tundra-5; ## 3322, 3324, 3325, 3327, 3329; poor soil and granite debris in alpine tundra, very abundant, in pure mats and assoc.: Grimmia sp., Hypnum revolutum, Mnium arizonicum.

Summits: alpine tundra-6; 1) ## 3342, 3347A; on wet gravelly soil, locally abundant, in pure mats and associated with Hypnum revolutum and Grimmia sp.; 2) ## 3348-3353, 3363, 3367, 3371, 3375, 3379, 3380, 3387, 3389, 3390; between granite debris and in crevices of granite outcrops, in partial shade or in open places, on humus layer, normally in pure mats or assoc.: Grimmia sp., Hypnum revolutum, Mnium arizonicum, Orthotrichum spp.

Summits: dry creek in alpine tundra; # 2422, on wet tundra soil.

Summits: granite outcrops in alpine tundra-1; ## 2528, 2532, 2534, 2535, 2539; abundant in shaded niches on humus and loamy soil under granite debris and between them, assoc.: Hypnum revolutum, Mnium arizonicum, Sanionia uncinata.

Summits: granite outcrops in alpine tundra-2; # 3493, in shaded crevices of granite outcrops.

Summits: granite outcrops in alpine tundra-3; # 4949, at bases of granite outcrop and in their crevices, on loamy and gravelly substrates, in partial shade and in full sun, locally abundant.

Clay Butte: slope facing to W; # 4924, summit, Abies lasiocarpa (? no cones) stands in front of Clay Butte lookout (behind the sign “No overnight camping”), on loamy soil and litter in shade beneath trees and Ribes sp., also along the trail nearby, locally abundant.

HWYs 212 & 296 intersection: slope facing to S; ## 5884-5887; granite boulders on slope, in crevices and at bases of outcrops.

Lake Creek Waterfalls; # 5859, bridge over the waterfall, on granite outcrop, in shade.

Unnamed tributary of Frozen Lake; # 2582, seepage slope, on packed earth/loam of the roadside, not abundant.

Island Lake CG: spruce forest; # 2220, Picea engelmannii – Vaccinium scoparium forest, granite rock facing to the south, in crevice on a layer of humus, in shade beneath spruce.

Aspen grove along HWY 212; ## 3917, 3918; at the base of granite outcrops, in shade, abundant.

Clay Butte: slope facing to E; ## 3848, 3850, 3851; scattered Picea engelmannii stands, on limestone surface covered with loam.
Clay Butte Fen, # 2970, narrow stripe of Picea engelmannii forest along HWY 212, between highway and fen, on granite outcrops.

Coniferous forest near Clay Butte Fen; # 5409, wet Pinus contorta + Picea glauca + P. engelmannii – Salix sp. + Ribes sp. forest along unnamed creek, on wet sandy-humus substrate on granite outcrop, in shade under trees.

Clarks Fork of Yellowstone River-1; ## 3158, 3160, 3163, 3164; huge granite outcrop in Picea glauca – Alnus incana forest, side facing to the north, on wet humus, abundant, assoc.: Mnium thomsonii, Pohlia sp., Timmia austriaca.

Littlerock Creek Fen; ## 3591, 3620; Salix planifolia – Bryidae hummock, on dry peaty soil.

Rd 167: Pseudotsuga forest; ## 6171, 6172, 6175, 6176, 6177; on the base of granite cliff and on granite boulders of Pseudotsuga menziesii forest, in partial shade, abundant, mostly in pure tufts and assoc.: Hypnum revolutum, Orthotrichum spp.

Rd 801: swampy mixed forest; ## 6147, 6167, 6168; Picea glauca + Populus tremuloides forest, on shaded surfaces of granite outcrops, locally abundant, assoc.: Bryum argenteum, Ptychostomum pallescens.

Aspen stands along HWY 212; # 6107, on granite boulder beneath Populus tremuloides in shade, not abundant.

Index Lookout: roadside; # 6099, on dry neglected earth along asphalt cover of the road, not abundant.

Index Creek; 1) # 5492, volcanic boulder on the creek bank, in crevice on a layer of humus, in partial shade. 2) # 5502, Pseudotsuga menziesii + Picea glauca forest along the creek, granite boulders, on a thick layer of humus assoc.: Hypnum revolutum. 3) # 5536, roadside of highway across the bridge over Index Creek; on packed earth, locally abundant. 4) ## 5488, 5489; along the creek, on loam between granite debris.

Fox Creek; 1) # 5537, rocky bank of the creek, thickets of Rubus idaeus, on humus and litter between granite debris, abundant. 2) # 5548, highway roadside, on loamy soil beneath Spiraea sp.

Crazy Creek; # 5611, vertical wall of granite cliff, in shade beneath Pinus.

Beartooth Butte; # 5293, scattered sedimentary rock debris on slope, on a thick layer of humus on the bases of rocks, shaded by Picea engelmannii, locally abundant.

WY-MT state line: spruce forest; ## 5473-5478, on shaded side of huge boulder under Picea engelmannii, abundant, assoc.: Hypnum revolutum, H. vaucheri.

Little Bear Creek-3; # 5342, huge granite rock along the creek, in crevices filled with humus, assoc.: Ceratodon purpureus, Polytrichum piliferum.

Beartooth Creek; # 5462, Picea engelmannii – Pinus contorta forest on the creek shore; on granite outcrop, in shade under trees.
Swamp Lake Fen & vicinity; # 5136, grasslands along the fen, granite outcrop, side facing to the east (to the fen), on humus substrate, assoc.: Hypnum vaucheri.


89. Tortella fragilis (Hooker & Wilson) Limpricht 6950-10930 ft. A species widely distributed in most sectors of Holarctic and South Africa (Ignatov, Ignatova, 2003); it normally occurs on substrates desiccated some of the year, on calcareous and acidic rocks, on alpine fens and bogs, margins of solifluction lobes, snow patch margins, occasionally on decaying logs; in Wyoming, it’s known from quite a few locations (Eckel, 2007; author’s data).

Summits: dry creek in alpine tundra; ## 2420, 2423; wet soil in partial shade beneath Salix sp.

Summits: Overlook Roadside Park; # 3547, alpine tundra, on dry soil, assoc.: Polytrichum juniperinum.


90. T. tortuosa (Hedwig) Limpricht 7500-10930 ft. A very variable species with very wide distribution all across Holarctic, also in South America (Ignatov, Ignatova, 2003). In Wyoming, it’s encountered sporadically, occurring on soil covered stones and outcrops, and in wet alpine tundra on poor soil (Eckel, 2007; author’s data). In the Beartooth Plateau, it’s represented by a variety fragilifolia.

var. fragilifolia (Juratzka) Limpricht

Summits: alpine fen-1; ## 2298, 2303; in ecotone zone between alpine fen and tundra, on bare soil, abundant.

Summits: alpine tundra-3; # 2409, on wet soil sporadically all across the site.

Summits: alpine tundra-4; # 2470, at bases of granite outcrops, in partial shade, assoc.: Distichium capillaceum, Polytrichum juniperinum.

Summits: Overlook Roadside Park; # 3539, abundant in rocky alpine tundra, assoc.: Selaginella densa (Lycopodiophyta) & Polytrichum piliferum.

Lake Creek Waterfalls; # 5809, on humus in shade, between granite outcrops lining the creek.

91. **Tortula cernua (Hübener) Lindberg** [*Desmatodon cernuus* Hübener]. 6580-6600 ft. A rarely collected species with rather wide distribution in most of Holarctic, occurring predominantly in mountainous regions (Ignatov, Ignatova, 2003). Global status is G3G5. In Montana, it is rare and included to the list of species of conservation concern (Montana Field Guide, …). In Wyoming, it’s uncommon and known from several locations in Albany and Park Cos, and Yellowstone National Park (Eckel, 2007; author’s data).

Swamp Lake Fen & vicinity; # # 5109, 5162, 5164, 5184; *Hordeum jubatum* – *Desmatodon cernuus* community on wet marly substrate, in pure mats, sporadically along the edges of fen. S+.


Summits: dry creek in alpine tundra; # 2429, on humus beneath *Salix* sp. in shade. S+.

Island Lake CG: subalpine meadow; # # 2912, 2919, 2920; at the base of granite outcrop, on loamy soil.

Unnamed tributary of Frozen Lake; # # 2585, 2586; rocky slope, alpine meadow, on bare loamy soil, shaded by granite outcrop, and on roadside, assoc.: *Ceratodon purpureus*. S+.

Clay Butte Fen; # 2941, decaying fallen tree at north-north-east edge of fen, on wet rotting wood covered with a layer of loam, assoc.: *Ceratodon purpureus*.

Little Bear Lake Fen-SW- 08 & 09; 1) # 2779, in hummocks on dry peat, forms admixture to *Ceratodon purpureus*. 2) # 5615, on granite outcrops, on a thick layer of humus. S+.

Littlerock Creek Fen; # 3666, ecotone zone between alpine fen and alpine tundra, in low *Bryidae* hummocks, on dry peaty soil, in sun, not abundant.

Wyoming Creek-2; # # 4981, 5034; head of creek, alpine *Bryidae* fen on seepage slope, on granite rocks along streamlet; on dry peaty soil of moss-lined banks.

Sawtooth Palsa Fen; # 5761, roadside, subalpine tundra community, on wet loamy soil.


Sawtooth Palsa Fen (Heidel et al., 2008).

occurs on soil, silt, clay, especially calcareous substrates, occasionally runways and burrows of small animals, typically subarctic, Arctic and alpine habitats, at low to high elevations (0-3700 m); North American part of the range includes: Greenland; B.C., Nfld., and Labr., N.W.T., Nunavut, Yukon; Alaska, Ariz., Calif., Colo., Mont., Wash., Wyo (on Eckel, 2007, and the author’s data). It is known from Wyoming on very few collections: of E. Whitehouse (1951) from Big Horn National Forest, F. J. Hermann (1973) from Wind River Range, and the author from Littlerock Creek Fen.

Littlerock Creek Fen; # 3610, ecotone zone of alpine Salix planifolia – Bryophyta fen and wet alpine tundra, in low hummocks, on dry peaty soil, locally abundant. S+.

94. *T. obtusifolia* (Schwägrichen) Mathieu [*Desmatodon obtusifolius* (Schwägrichen) *Schimper*]. 8700-9150 ft. A species with scattered distribution in countries of Europe, North Africa, Middle East, Middle Asia, Siberia, Mongolia, Japan, North America (Ignatov, Ignatova, 2003). It grows on soil, rock, limestone, calcareous sandstone, stone walls, crevices, ledges at low to high elevations (0-3300 m) (Zander, Eckel, 2007). In Wyoming, it’s known from few locations (Eckel, 2007; author’s data).

Beartooth Lake CG: coniferous forest; # 6211, Pinus contorta + Picea engelmannii forest, humus substrate over granite outcrops, in shade, assoc.: *Syntrichia norvegica*.

Beartooth Lake CG: wet subalpine meadow and fen; # 4889, on granite outcrop in the fen, crevices filled with humus, assoc.: *Ceratodon purpureus*, *Grimmia sp*.

Seepage slope along HWY 212; ## 6104, 6105; on packed loamy earth along the road and in dry ditch, assoc.: *Philonotis fontana* s.l., *Ptychostomum pallescens*.

Beartooth Butte; # 5266, scattered limestone debris on slope, on loamy substrate in crevices of rock, in partial shade, assoc.: *Brachythecium collinum*, *Syntrichia calcicolae* cf.

Subclass Bryidae

*Splachnaceae*

95. *Tayloria lingulata* (Dickson) *Lindberg* 9500-9850 ft. An infrequent minerotrophic species with the distribution in Greenland; Alta, B.C., Man., Nfld. and Labr., N.W.T., Nunavut, Ont., Que., Yukon; Alaska, Wash.; n, c Europe, Asia (Siberia); and Atlantic Islands (Iceland); more often it occurs on damp soil or humus or on mud rich in organic matter such as bird droppings (Marino, 2009). In Wyoming, it’s known only from Beartooth Plateau where it grows on wet highly-mineralized peaty soil.

Little Bear Lake Fen-NW-08; # 2788, on ditch walls, wet peat soil, in shade, assoc.: *Polytrichum juniperinum*.

Little Bear Lake Fen-SE-08; # 2897, in low hummock, assoc.: *Brachythecium* sp. s.l., *Philonotis fontana* s.l., *Sciuro-hypnum latifolium*. Little Bear Lake Fen-SE-09; # 5616, on soaked peaty soil in carpets, in shade beneath Salix sp., locally abundant, assoc.: *Sarmentypnum exannulatum*. S+.
Meadow Lake Fens; ## 3797, 3799, 3800; soaked peaty soil, in low hummocks, locally abundant. S+ (# 3799).


Meadow Lake North Fen (Fantan North Fen) (Heidel et al., 2008).

**Meesiaceae**

© **96. Amblyodon dealbatus (Hedwig) Bruch, Schimper & Gumbel** A rare calcifile moss with disjunctive range, scattered distribution across the temperate part of northern hemisphere; it’s characteristically found in calcareous fens and meadows (Vitt, 2007); sporadically it can be encountered on rotting wood and organic soil in rich fens scattered across the boreal zone, also on wet gravelly substrates covered with humus along streamsides. It’s known in Wyoming only from several occurrences in Carbon Co on E.Nelson’s collection and in Park Co on E.Lawton’s collection (Porter, 1935, Eckel, 2007). In Montana, it is included to the list of species of conservation concern with status G3G5SH (Montana Field Guide, …).


Crazy Creek CG Swamp; # 3190, wet Picea glauca + P. engelmannii forest, in wet disturbed soil beside the trail. S+.

Clay Butte Fen; # 2992, Salix planifolia – Carex aquatilis, in small hummock, not abundant, S+.

Small alpine lake; # 3502, boggy moss-lined shore of the lake, assoc.: Polytrichum juniperinum, S+.

Mud Lake Fen; # 3130; in willow thickets, on wet peaty soil in deep shade. S+.

Wyoming Creek-1; # 3484, disturbed clayey soil of stream bank, assoc.: Ceratodon purpureus.

Wyoming Creek-2; # 5049, on wet sandy-humus and peaty soil of vertical moss-lined banks, in shade under willows.

Rd 801: swampy mixed forest; # 6165, Picea glauca + Populus tremuloides forest, rotting wood, on a layer of humus, in shade, assoc.: Amblystegium serpens.

Clark Forks of Yellowstone River-2; ## 5599, 5600; on humus soil and rotting wood under Picea sp., in deep shade. S+.  

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Index Creek; # 5490, along the creek, on wet loam between granite debris, along with the other Marchantia alpestris & Bryidae mosses. S+.

Coniferous forest near Clay Butte Fen; # 5415, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and sandy soil along the streamlet, in shade under trees. S+.

Swamp Lake Fen & vicinity; 1) # 5121-5124, 5163; (Pentaphylloides floribunda +) Salix sp. – Carex spp. – Bryidae and Schoenoplectus acutus – Drepanoclados aduncus + Conardia compacta communities, on wet and soaked peaty soil, in shade, sporadically all across the fen in proper sites, assoc.: Bryoerythrophyllum recurvirostrum, Conardia compacta, Distichium capillaceum, Drepanoclados aduncus, Plagiomnium ellipticum. S+. 2) # 5191, base of Cathedral Cliff, stream in Picea spp. forest, on wet marly substrate between granite boulders lining the stream, not abundant, assoc.: Drepanoclados aduncus, Cratoneuron filicinum. S+.

Swamp Lake Fen (Heidel et al., 2008).

© 98. Meesia longiseta Hedwig 7900 ft. Rather rare species occurring on calcareous soil banks and rich fens in boreal, alpine, and Arctic situations (Vitt, 2007). The distribution includes North and Central Europe, most sections of the Arctic, Caucasus, boreal zone of Asia and North America, north-east China; in most of regions, this is an infrequent or rare species declining its populations; it is included to Red Data book of Europe (Ignatov, Ignatova, 2003). In Montana, M. longiseta is listed as a species of conservation concern with status G4?S1 (Montana Field Guide, …). The species was omitted in Eckel’s list of mosses of Wyoming (Eckel, 2007) although it was known earlier from Bighorn Mountains (Lenz, 2006).

Ghost Creek Fen; # 3706, Drosera anglica – Sphagnum warnstorffii fen, Eriophorum chamissonis – Straminergon stramineum+, on soaked peaty soil, forms admixture to Straminergon stramineum.

99. M. uliginosa Hedwig 10580-10680 ft. Rather widely distributed in most sectors of the Arctic and boreal zone of Asia and North America (Ignatov, Ignatova, 2003); it is normally encountered on rich fens, moist calcareous soil banks, and soil covered rock crevices (Vitt, 2007). In Montana, M. uliginosa is listed as a species of conservation concern with status G4S1 (Montana Field Guide, …). In Wyoming, it’s not been collected enough to estimate whether or not it is rare.

Littlerock Creek Fen; # 3636, in low Bryidae hummocks, on wet peaty soil, in partial shade, not abundant, assoc.: Aulacomnium palustre, Fissidens osmundoides, Polytrichastrum alpinum, Sarmentypnum sarmentosum.

Wyoming Creek-2; # 4975, head of creek, alpine Bryidae fen on seepage slope; in carpets on soaked peaty soil, admixed to Polytrichastrum alpinum & Sanionia georgico-uncinata.

100. Paludella squarrosa (Hedwig) Bridel 7960-9700 ft. A representative of a monotypic genus growing half-immersed in shallow water of alpine and subalpine fens. The distribution includes: Greenland; Alta., B.C., Man., Nfld.and Labr. (Nfld), N.W.T., Nunavut, N.S., Ont., Que.,


Sawtooth Palsa Fen (Heidel et al., 2008).

*Bryaceae* *

**101. Bryum argenteum** Hedwig 7030-10300 ft. A species with cosmopolitan distribution, occurring from the Arctic to deserts and equatorial regions; it occurs on various substrate types in a number of different situations; common in man-made habitats: edges of roads, crevices in pavement, hard-packed soil, etc. On the Beartooth Plateau as well as across the state, it’s pretty common.

Summits: alpine tundra-4; # 2468, on dry loamy soil in open places. S+.

Pine forest along HWY 212; # 3899, in shaded crevice of granite outcrop, filled with loam, forms dense mat, not abundant.

Wyoming Creek-1; # 3469.1, pasture area along the creek, on dry clay, S+.

Rd 801: swampy mixed forest; # 6168, Picea glauca + Populus tremuloides forest, on shaded surfaces of granite outcrops, forms admixture to Ptychostomum pallescens and Syntrichia ruralis.

Clay Butte: slope facing to W; 1) # 4919, grasslands on summit, 80-100 meters north of Clay Butte lookout, on dry loamy soil. 2) # 4945, grasslands on west slope below Rd 142, limestone debris, in crevices of seabed rock, on a layer of loamy soil, assoc.: Syntrichia calcicola cf.

Beartooth Butte; # 5269, scattered limestone debris on slope, on humus and loamy substrates in crevices and shaded surfaces of rock, not abundant, assoc.: Syntrichia calcicola cf.

Index Creek; # 5489, along the creek, on wet loam between granite debris, along with the other Bryidae mosses and Marchantia alpestris.

Sawtooth Lake; # 6042, northern shore, creek near waterfall; on dry surfaces of granite boulders, with Polytrichum piliferum.

Lake Creek Waterfalls; # 5872, steep bank of creek, sandy-clay soil, in shade under Picea engelmannii.

**102. Ptychostomum bimum** (Schreber) J. R. Spence, cf. [*Bryum bimum* (Schreb.) Turn., *B. pseudotriquetrum var. bimum* (Schreb.) Lilj.]. 9000 ft. A species with wide distribution in
Holarctic. It is usually encountered on rich fens, calcareous soil banks, and soil covered rock crevices. In Wyoming, this species is poorly known.

Coniferous forest near Clay Butte Fen; # 5412, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and sandy soil along the streamlet, in shade under trees.

103. Ptychostomum cyclophyllum (Schwägrichen) J. R. Spence [Bryum cyclophyllum (Schwägrichen) Bruch, Schimper & Gumbel]. 6600-10800 ft. A species with wide distribution in boreal regions of Holarctic, but in most of them, on Ignatov & Ignatova (2003), it’s an infrequent species. In this portion of the Rocky Mountains, it’s found on subalpine and alpine peatlands; the species is known in Wyoming from very few occurrences (Eckel, 2007; author’s data).

Summits: alpine fen-2; ## 2325, 2329, 2336, 2338; on wet peaty soil in seepage zone, abundant.

Small alpine lake; # 3499, lake shore, on wet clay.

Beartooth Creek; # 5436, moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay, forms admixture to the other Bryidae mosses.

Unnamed tributary of Frozen Lake; # 2601, seepage slope, on soaked peaty soil between courses of streamlets, not abundant.


Swamp Lake Fen (Heidel et al., 2008; on J. C. Elliott’s collection).

104. P. pallescens (Schleicher ex Schwägrichen) J. R. Spence [Bryum pallescens Swartz]. 6600-10760 ft. A species widely distributed in Holarctic. One of the most common species of Bryaceae in Wyoming. Often encountered on wet disturbed soils of different origin, in crevices in rocks, on rotting logs in forests.

Summits: alpine tundra-6; # 3383, on humus substrates in shaded niches of granite debris, in shade, not abundant, assoc.: Brachytheciastrum velutinum.

Index Creek; # 5489, along the creek, on wet loam between granite debris, along with Marchantia alpestris & Bryidae mosses. S+.

Unnamed tributary of Frozen Lake; # 2583, seepage slope, on granite outcrops scattered across alpine meadow, assoc.: Ceratodon purpureus & Syntrichia norvegica.

Clay Butte Fen; # 2930, Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, on wet peaty soil, ecotone with fen, assoc.: Polytrichum juniperinum. S+.

Coniferous forest near Clay Butte Fen; # 5390, overturned stump of Picea sp., on loamy substrate, in partial shade, locally abundant. S+.

Rd 801: swampy mixed forest; # 6168, Picea glauca + Populus tremuloides forest, on shaded surfaces of granite outcrops, assoc.: Bryum argenteum & Syntrichia ruralis.
Seepage slope along HWY 212; # 6105, on packed loamy earth along the road and in dry ditch, assoc.: Philonotis fontana s.l., Tortula obtusifolia. S+.

Swamp Lake Fen & vicinity; # 5183, on wet clay sporadically along the edge of fen. S+.

Swamp Lake Fen (Heidel et al., 2008; on J. C. Elliott’s collections).

105. P. pseudotriquetrum (Hedwig) Spence & Ramsay [Bryum pseudotriquetrum (Hedwig) Schwägrichen]. 6560-10800 ft. A species with almost cosmopolite distribution: common from Arctic through subtropical zone; typical for eutrophic and mesotrophic fens and bogs, grows along streamlets, lakes and ponds, more often on carbonate soils; associated with a large number of species. Very common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). Widely distributed across the Beartoot Plateau.

Summits: alpine tundra-4; # 2477, on wet humus beneath arctic willows, in shade, pure mats.

Summits: alpine fen-2; ## 2323, 2340; on wet peaty soil in seepage zone.

Summits: alpine fen-3; # 2489, banks of dry stream course, wet peaty soil.

Summits: alpine fen-4; 1) # 3274, moss-lined banks of pools, in partial shade, abundant, assoc.: Sanionia georgico-uncinata cf., Plagiomnium ellipticum; 2) # 3279, fen along streamlet, walls, peaty soil, assoc.: Lophozia sp., Brachythecium sp. s.l., Climacium dendroides.

Unnamed tributary of Frozen Lake; # 2547, seepage slope, on soaked sandy and peaty soil in alpine moss fen.

Beartooth Butte; # 5297, steep slope, edge of Picea engelmannii forest, on wet loam and litter along the streamlet, partially shaded by trees, assoc.: Cratoneuron filicinum.

E shore of Beartooth Lake; ## 4834-4836; willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Hygrohypnum ochraceum, Plagiomnium ellipticum, Rhizomnium pseudopunctatum.

Beartooth Lake CG: wet subalpine meadow and fen; # 4865, Carex spp. – Bryidae fen, on soaked peaty soil, forms admixture to many other Bryidae mosses all across the fen.

Creek SW of Beartooth Butte; ## 3858, 3870, 3872, 3880; bank of creek, on soaked clay soil, admx.: Marchantia alpestris, Palustriella falcata, Plagiomnium ellipticum.

Little Bear Lake Fen-SE-08; # 2866A, ecotone zone with Picea engelmannii forest, at the margin of fen, in streamlet, assoc.: Philonotis fontana s.l. & Sciuro-hypnum latifolium.

Ghost Creek Fen; 1) ## 3748, 3750, ecotone zone, swampy Picea engelmannii + P. glauca forest, in wet forest floor, on wet humus, assoc.: Aulacomnium palustre, Cinclidium stygium, Helodium blandowii, Rhizomnium pseudopunctatum. 2) # 3718, west edge of fen, Calamagrostis canadensis - Carex spp., on lower parts of Carex and Calamagrostis stems, covered with a layer of peat, assoc.: Drepanocladus polygamus.
Little Bear Creek-3; ## 5338, 5365, 5366; moss-lined bank of creek, in shade, on wet sandy soil, humus and peat, on stones covered with proper substrates, assoc.: Scapania subalpina, Hygrohypnum ochraceum, Philonotis fontana s.l., Plagiommnium ellipticum.

Clay Butte Fen, 1) ## 2975, 2980; north-west portion of fen, thickets of tall Salix sp., hummocks under willows, soaked peaty soil, in deep shade, assoc.: Aulacomnium palustre, Climacium dendroides, Drepanocladus aduncus; 2) # 2988, Nuphar pool, on soaked peaty soil, partially submerged, abundant, assoc.: Plagiommnium ellipticum.

Coniferous forest near Clay Butte Fen; ## 5392, 5413; on wet humus soil and litter in shade of overturned stump of Picea engelmannii and along the bank of streamlet, assoc.: Mnium blyttii, Sciuro-hypnum latifolium.

Mud Lake Fen; # 3128, on wet peaty soil in floating mats, assoc.: Calliergon giganteum, Scorpidium cossonii.

Lily Lake Fen; 1) ## 3062, 3065; on high vertical walls of ditches/streamlets, wet peaty soil and humus, in deep shade, assoc.: Chiloscyphus pallescens. 2) ## 3068, 3070, 3071; boggy lake shore, in Carex spp. stands, moist peaty soil, very abundant.

Wyoming Creek-1; # 3479, creek bank, on moist sandy soil, not abundant.

Wyoming Creek-2; 1) # 4980, head of creek, alpine Bryidae fen on seepage slope; in carpets on soaked peaty soil, assoc.: Philonotis fontana s.l. 2) # 5011, on wet sandy-clay soil along streamlets, assoc.: Ceratodon purpureus, Pohlia obtusifolia. 3) # 5039, on peaty soil of vertical moss-lined banks, in shade under willows, assoc.: Polytrichastrum alpinum, Sanionia georgico-uncinata, etc.

Rd 801: swampy mixed forest; # 6166, Picea glauca + Populus tremuloides forest, on wet peaty soil, assoc.: Aulacomnium palustre.

Swamp Lake Fen & vicinity; ## 5106, 5117; Salix sp. (+ Pentaphylloides floribunda) – Carex spp., on wet peaty soil and clay, shaded by dense Carex stands.

Muddy Creek; # 6129, wet Picea glauca + P. engelmannii forest along the creek, on wet clay.

Drainage pipe beside HWY 212; # 6110, on wet loamy soil inside and around the pipe, in shade, abundant.

Seepage slope along HWY 212; # 6103, on wet loamy soil in shaded ditch.

Unnamed tributary of Sawtooth Lake; # 6070, granite boulders along the shore in the splash zone of creek, on wet clay, in shade, assoc.: Hygrohypnum ochraceum.

Creek connecting Dollar & Sawtooth Lakes; # 5797, willow wetlands along the creek, moss-lines bank of creek, on wet peaty soil.

NE & N shore of Beartooth Lake; # 5317, north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio tridentalis + Calamagrostis sp. +

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Caltha leptosepala – Sphagnum spp. fen, at bases of moss hummocks, on wet peaty soil, assoc.: Philonotis fontana s.l.

Lake Creek Waterfalls; # 5858, moss wetlands on creek bank, on wet clay, assoc.: Climacium dendroides.

Beartooth Creek; ## 5436, 5439, 5440; moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay.

Sawtooth Lake; 1) # 5980, western boggy shore of the lake, shaded steep bank of lake, on wet sandy-clay soil. 2) # 6061, creek on boggy western shore of lake, on wet granite boulders lining the creek, assoc.: Sanionia uncinata.

Sawtooth Palsa Fen; ## 5692, 5698; Carex spp. – Straminergon stramineum community along swale, forms carpets on soaked peaty soil, forms admixture to Sarmentypnum sarmentosum.


S. Jackson & palynologists group’s collection: Swamp Lake, SL1, Salix, Triglochin, sedges dominate; 6560 ft., pH: 8.0; assoc.: Calliergon giganteum, Campylium stellatum, Scorpidium cossonii; 2002.

Swamp Lake Fen (Heidel et al., 2008; on J. C. Elliott’s collection).


Meadow Lake Fens: # 3823, Carex sp. carpets, on soaked peaty soil, not abundant, assoc.: Drepano cladus polygamus.

Crazy Creek CG Swamp; # 3181, swampy Picea engelmannii forest, on wet peaty soil in partial shade.

Canyon Creek; # 5671, Salix spp. – Carex spp. – Bryidae fen along the widened portion of creek, in low hummocks on wet peaty soil, shaded by dense Carex stands, assoc.: Aulacomnium palustre, Calliergon cordifolium, Polytrichum juniperinum, Sphagnum riparium.

* By the present time, 50-60 % Bryaceae specimens have been treated.

**Mielichhoferiaceae Schimper**

Europe (Shaw, 2009); occurs on rather dry alpine soil or soil-filled rock crevices, at low to high elevations. Global conservation status – G3G4.

Summits: alpine fen-4; 1) # 3304, alpine Salix sp. – Carex spp. - Bryidae fen along streamlet; boggy bank of streamlet, on wet peaty soil, not abundant; det. by J. Shaw; 2) # 3301, vertical walls of alpine pool, assoc.: Barbilophozia hatcheri, Distichium capillaceum.


Little Bear Lake Fen-NW-08; ## 2776, 2807; in shaded ditch, on soaked peaty soil.

Little Bear Creek-2: # 3255, moss-lined banks of the creek, on wet clay.

Little Bear Creek-3; # 5333, granite boulder semi-submerged in the watercourse, on a thick layer of wet humus, assoc.: Ceratodon purpureus, Philonotis fontana s.l., Polytrichastrum juniperinum.

Sawtooth Lake; 1) # 5992, western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Campylium protensum, Plagiomnium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, P. cruda, Sanionia uncinita, Sciuro-hypnum latifolium. 2) # 6035, on wet sandy soil beside waterfall, beneath Picea engelmannii. 3) # 6044, northern shore, creek near waterfall; on a layer of wet humus on granite boulders lining the creek, with Timmia austriaca.


Summits: alpine fen-3; ## 2492, 2496; banks of dry stream course, wet peaty soil.

Summits: alpine fen-4; 1) # 3278, ecotone zone between alpine fen and tundra; at base of granite boulders, on wet humus, in shade, assoc.: Hypnum revolutum, Mnium arizonicum, M. thomsonii; 2) # 3308, at the margin of pool, assoc.: Barbilophozia quadriloba, Aulacomnium palustre, Brachythecium sp. s.l., Polytrichastrum alpinum.

Boggy shore of Island Lake; ## 2385, 2386; willow wetlands along the streamlet, vertical bank, on peaty soil in deep shade under willows, not abundant, assoc.: Fissidens osmundoides.

Little Bear Creek-1; # 2693, wet sandy-clay soil of creek bank, in shade, not abundant, assoc.: Polytrichastrum alpinum, Rhizomnium pseudopunctatum.

Unnamed tributary of Frozen Lake, dry rocky slope; ## 2596, 2598; on loamy soil under granite rock, shaded by Carex sp., assoc.: Bartramia ithyphylla, Brachytheciastrum collinum, Ceratodon purpureus, Polytrichastrum alpinum, Syntrichia sp.; not abundant.

Little Bear Lake Fen-NW-08: # 2780, attached to the surface of granite boulder laying on the ditch bottom, on a thin layer of humus, in shade, assoc.: Grimmia sp. & Polytrichum juniperinum; forms admixture.
Lily Lake swamp forest; # 3035, wet floor of Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae forest, in shade, under spruce roots, on a thick layer of humus.

Wyoming Creek-1; # 3482, willow wetlands, moss-lined bank, on shaded sandy-clay soil, not abundant, assoc.: Polytrichastrum alpinum & Sanionia uncinata. Det. by J. Shaw.

Wyoming Creek-2; ## 5026, 5035, 5038, 5043, 5065, 5104; vertical moss-lined bank of stream, on wet humus and peaty soil, beneath Carex and Salix, assoc.: Lophozia wenzelii, Bartramia ithyphylla, Polytrichastrum alpinum, Sanionia georgico-uncinata, etc.

Littlerock Creek Fen; ## 3609, 3618; Salix planifolia – Carex scopulorum – Aulacomnium palustre, on wet peaty soil, in partial shade, not abundant, assoc.: Polytrichastrum alpinum, Sanionia sp.

Ghost Creek Fen; # 3747, ecotone zone, swamp Picea engelmannii + P. glauca forest, brook bank, in shade, not abundant, assoc.: Chiloscyphus polyanthos, Marchantia alpestris, Rhizomnium pseudopunctatum.

Lake Creek Waterfalls; 1) # 5835, steep bank of creek, on wet humus and sandy-clay soil in shade under Picea engelmannii, in splash zone of waterfall, assoc.: Mnium marginatum. 2) # 5870, Alnus incana stands on creek shore, on wet sandy humus soil, assoc.: Mnium marginatum.

Sawtooth Lake; 1) # 5992, western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Campylium protensum, Plagiomnium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, Polytrichum juniperinum, Sanionia uncinata, Sciurohypnum latifolium. 2) # 6048, northern shore, creek near waterfall; on a layer of wet humus on granite boulders lining the creek, with Bartramia ithyphylla, Pohlia bolanderi, Timmia austriaca.

Beartooth Creek; # 5460, shore of the creek, Picea engelmannii – Pinus contorta forest; granite outcrop, in crevice filled with humus, in shade under trees, assoc.: Distichium capillaceum, Mnium thomsonii.


Summits: granite outcrops in alpine tundra-2; # 3492, in shaded crevices of granite outcrops, on wet loam. Det. by J. Shaw; cf.

Island Lake CG: spruce forest; # 2216, Picea engelmannii forest, on burned trunk, in shade. Det. by J. Shaw; cf.


110. **P. nutans (Hedwig) Lindberg** 7480-10680 ft. Widely distributed in Arctic, boreal and nemoral zones of both hemispheres, as well as in mountains of tropical zone of all continents (Ignatov, Ignatova, 2003); a species of soil banks, logs, tree bases and sometimes disturbed places; encountered from low to high elevations. In Wyoming and adjacent states, it is very common (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data).

Summits: alpine fen-4; ## 3280, 3290; alpine Salix sp. – Carex spp. – Bryidae fen along streamlet, walls of pool, on peaty soil, assoc.: Barbilophozia hatcheri, Aulacomnium palustre, Brachythecium sp. s.l., Polytrichastrum alpinum, Sanionia georgico-uncinata.

Summits: alpine fen-5; ## 3448, 3451; in low hummock, on dry peat, locally abundant. S+.

Boggy shore of Island Lake; # 2370, Salix sp. – Bryidae fen, on the bases of dry hummocks, assoc.: Aulacomnium palustre.

Little Bear Lake Fen-NW-08; 1) # 2842, in low moss hummocks, assoc.: Cephalozia leucantha, Lophozia sp., Straminergon stramineum, Polytrichastrum longisetum, 2) ## 2755, 2849, on mound, Carex scopulorum – Aulacomnium palustre, assoc.: Aulacomnium palustre, Oncophorus wahlenbergii, Tometypnum nitens; not abundant. # 2755 det. by J. Shaw.

NE & N shore of Beartooth Lake; ## 5211, 5218-5220; trail to Beauty Lake, wet Picea engelmannii + P. glauca + Pinus contorta forest, stream bank, on wet rotting wood, in shade under trees, locally abundant, assoc.: Blepharostoma trichophyllum, Aulacomnium palustre.

“Dichelyma creek”; # 6096, on wet clay of the bank, assoc.: Scapania sp.

Ghost Creek Fen; ## 3709, 3754; ecotone zone between Drosera anglica – Sphagnum warnstofrii fen and swampy Picea engelmannii forest, on dry peaty soil and rotting trunk of spruce, on a thin layer of humus. S+ (# 3754).

Wyoming Creek-1; # 3472, willow wetlands, moss-lined bank, on shaded sandy-clay soil, not abundant, assoc.: Polytrichastrum alpinum, Polytrichum juniperinum. Det. by J. Shaw.

Wyoming Creek-2; 1) # 5066, vertical moss-lined banks, on wet humus, in shade under willows, assoc.: Plagiommium rostratum. 2) # 5074, forms hummocks between streamlets of creek, very local (marked in bryology collections as “Sphagnum island”), assoc.: Aulacomnium palustre, Plagiommium ellipticum, Sphagnum russowii, Straminergon stramineum.

Littlerock Creek Fen; # 3574, on wet peaty soil between Salix planifolia hummocks.

Clay Butte Fen; ## 2932, 2933, 2936; Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, ecotone with fen, on rotting wood of spruce, in shade, assoc.: Brachytheciastrum collinum, Hypnum revolutum; S+.
Beartooth Lake CG: coniferous forest; # 6216, Pinus contorta + Picea engelmannii forest, on loamy soil at base of spruce, in shade, assoc.: Polytrichum piliferum.

Lake WGN forest; # 6077-6079; rotting wood, on a layer of humus, in shade under spruces, assoc.: Lophozia sp., Ceratodon purpureus, Polytrichum juniperinum. S+.

Lake WGN fen; # 6073, vertical bogg bank of the lake, on soaked peaty soil, in shade, assoc.: Lophozia sp., Plagiothecium denticulatum, Polytrichastrum alpinum, Sphagnum ruseriewii.

Sawtooth Lake; # 6047, northern shore, creek near waterfall; in wet crevices of granite boulders lining the creek; assoc.: Philonoptis fontana s.l., Plagiothecium denticulatum.

Sawtooth Palsa Fen; 1) # 5734, on mounds / raised peat, not abundant. 2) # 5741, streamlet crossing the fen, willow thickets, on wet clay of bank, shaded by willows, not abundant, assoc.: Lophozia ventricosa, Polytrichastrum alpinum.

Beartooth Creek; ## 5453, 5454; Picea engelmannii – Pinus contorta forest on the creek shore; granite outcrop, on a thick layer of humus, on rotting wood, in shade under trees, assoc.: Polytrichum piliferum.

Index Creek; # 5514, Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, rotting wood, on a layer of humus. S+.

111. P. obtusifolia (Bridel) L. Koch 10480-10700 ft. Rare arctic-alpine species (global conservation rank - G2G4). General distribution: Greenland; Alta., B.C., Nfld. and Labr., Nunavut, Ont., Que., Yukon; Alaska, Ariz., Calif., Colo., Maine, Mont., Nev., Tex., Vt., Wash., Wyo.; Eurasia; occurring on soil, often in late snowmelt areas in alpine and subalpine zones, at high elevations (Shaw, 2009). In Wyoming, it’s known from very few locations (Eckel, 2007; author’s data).

Summits: alpine fen-5; # 3450, on soaked clay near seepage, not abundant. S+. Det. by J.Shaw.

Wyoming Creek; 2; 1) # 5011, on wet sandy-clay soil along streamlets, assoc.: Ceratodon purpureus, Ptychostomum pseudotriquetrum. 2) # 5040, on peaty soil of vertical moss-lined banks, in shade under willows, assoc.: Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia georgico-uncinata.


112. P. wahlenbergii (Weber & Mohr) Andrews 6600-10800 ft. A species with bipolar distribution, widespread in Holarctic from the Arctic to North Africa, South China, southern Japan (Ignatov, Ignatova, 2003). One of the most geographically widespread and common species of the genus; it occurs on naturally or anthropogenically disturbed clay or rarely sandy soils; path banks, along streams (Shaw, 2009). It’s common in Wyoming.

Summits: alpine fen-2; # 2337, on wet sandy-clay soil in seepage zone. Det. by J. Shaw.
Summits: alpine fen-5; # 3414, on wet peaty soil, not abundant, det. by J.Shaw. S+.

Unnamed tributary of Frozen Lake; ## 2572, 2602, 2603, 2609; seepage slope, on soaked peaty soil in alpine moss fen, locally abundant.

Little Bear Creek-2; ## 3261, 3267; moss-lined bank, moist sandy-clay soil; assoc.: Hygrohypnum ochraceum.

Little Bear Creek-3; # 5370, moss-lined bank of creek, on wet sandy-clay soil, in shade under cliff.

Wyoming Creek-1; # 3471, willow wetlands, moss-lined bank, on shaded sandy-clay soil, not abundant. Det. by J. Shaw.

Clay Butte: slope facing to E; ## 3844, 3846; Picea engelmannii forest on steep slope, in dry ditches, on loam. Det. by J. Shaw.

Creek SW of Beartooth Butte; # 3859, on moist clay soil of creek bank, abundant, in shade under willows, not abundant.

Muddy Creek; # 6146, wet Picea engelmannii forest along the creek, on wet clay in small depression along the trail.

Swamp Lake Fen & vicinity; ## 5192, 5193; base of Cathedral Cliff, stream in Picea spp. forest, on wet humus between granite boulders lining the stream, in shade, not abundant.

Mniaceae

113. Cinclidium stygium Swartz 6580-7900 ft. An arctic-alpine species infrequent in Wyoming; it’s known here only from several locations in Park Co, all within Shoshone National Forest (see below). In Montana, it is listed as a species of conservation concern with status G5S1 (Montana Field Guide, …). In Wyoming, it’s not been collected enough to estimate whether or not it is rare.

Ghost Creek Fen; # 3748, ecotone zone between Carex spp. – Drosera anglica – Sphagnum warnstorffii fen and swamp Picea engelmannii + P. glauca forest; assoc.: Helodium blandowii, Ptychostomum pseudotriquetrum.

Swamp Lake Fen & vicinity; # 5107, Pentaphylloides floribunda + Salix sp. – Carex spp.+ Calamagrostos sp. - Bryidae, on wet peaty soil at stem bases, in shade, not abundant, assoc.: Drepanocladus aduncus, Plagiomnium ellipticum.


114. Mnium arizonicum Amann 6600-10930 ft. On Weber & Wittmann (2007, p. 109), this species is “almost a western North American endemic from Yukon to Baja California (but also
occurring in Greenland!”). It’s widely distributed in Wyoming from montane to alpine elevations. On the Beartooth Plateau, it often occurs in the alpine zone on soil over outcrops and in deeply shaded niches between granite debris.

Summits: alpine tundra-2; # 2347, wet alpine tundra, on soil at base of granite outcrop, in partial shade, assoc.: Dicranum spadiceum, Hypnum revolutum, Polytrichum juniperinum.

Summits: alpine tundra-3; # 2412, at base of granite outcrop, in partial shade, not abundant.

Summits: alpine tundra-5; ## 3313, 3315, 3316, 3325, 3326, 3327, 3331; humus soil over granite debris in alpine tundra, partially shaded, locally abundant, in pure mats or assoc.: Hypnum revolutum, Syntrichia ruralis.

Summits: alpine tundra-6; 1) # 3340, on wet loamy soil, locally abundant, in pure mats; 2) ## 3349, 3361, 3364, 3372-3374; on wet humus at bases of granite debris and in crevices of granite outcrops, in partial shade, more often in pure mats, assoc.: Syntrichia ruralis.

Summits: alpine fen-4; ## 3278, 3286; ecotone zone between alpine fen and tundra; at base of granite boulders, on wet humus, in shade, assoc.: Hypnum revolutum, Mnium thomsonii, Pohlia cruda.

Summits: Overlook Roadside Park; # 3534, at base and crevices of granite debris, on a thin layer of humus in partial shade.

Summits: granite outcrops in alpine tundra-1; ## 2532, 2533; in shaded niches on humus and loamy soil under granite debris and between them, mostly in pure tufts, assoc.: Syntrichia ruralis.

Clay Butte Fen; # 2931, Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, on shaded humus soil, ecotone with fen, assoc.: Timmia austriaca.

Beartooth Butte; ## 5276, 5279, 5284, 5288, 5293; scattered limestone debris on slope, on a thick layer of humus and loam on the bases of rocks, shaded by forbs and Picea engelmannii, not abundant.

Lake Creek Waterfalls; # 5820, granite outcrops along creek, sandy soil in crevices of outcrops, not abundant.

Lily Lake swamp forest; # 3027; Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae, in shaded niches under roots of spruce, on a thick layer of humus.

Index Creek; ## 5516, 5520; Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, on humus soil and litter beneath trees, assoc.: Hypnum revolutum, H. vaucheri, Syntrichia sp.

Coniferous forest near Clay Butte Fen; ## 5402, 5420; wet Pinus contorta + Abies lasiocarpa + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on humus, litter and rotting wood, in shade under trees, assoc.: Brachytheciastrum collinum, Sanionia uncinata.

**115. M. blyttii Bruch, Schimper & Gumbel** 6940-9000 ft. Essentially arctic-alpine species; it was previously known in Wyoming from a few occurrences in Freemont, Albany, Sheridan, Sublette Cos (Porter, 1935; Eckel, 2007). The locations in the Beartooth Plateau are first known in Park Co.

Pine forest along HWY 212; 1) ## 3903, 3904, 3910, 3914-3916; bank of brook, on sandy-clay soil, in shade, abundant, assoc.: Blepharostoma trichophyllum, Cephalozia pleniceps, Chiloscyphus pallescens, Aulacomnium palustre, Sanionia uncinata, 2) # 3908, rotting wood of spruce, in shade; assoc.: Blepharostoma trichophyllum, Lophozia sp., Brachythecium sp. s.l., Eurhynchiasterum pulchellum.

Crazy Creek CG Swamp; # 3187, swampy P. glauca + P. engelmannii forest, on wet humus, in partial shade; assoc.: Amblystegium serpens, Rhizomnium pseudopunctatum.

Coniferous forest near Clay Butte Fen; ## 5392, 5413, 5416; Pinus contorta + Abies lasiocarpa + Picea spp. forest, on wet humus soil and litter in shade of trees, assoc.: Ptychostomum pseudotriquetrum, Sciuro-hypnum latifolium, etc.

Lake Creek Waterfalls; # 5808, on wet humus in shade, between granite outcrops lining the creek under Picea glauca.


Little Bear Creek-4; # 6224, willow wetlands along creek, on wet clay beneath Salix sp., assoc.: Sciuro-hypnum latifolium.

Lake Creek Waterfalls; 1) ## 5817, 5818, 5821, 5823, 5824, 5846; humus and sandy-clay soil, in shade under Picea glauca, splash zone of waterfall, locally abundant, in pure mats and assoc.: Blindia acuta, Pohlia cruda, Sanionia uncinata. 2) # 5870, creek bank, Alnus incana stands, on wet sandy-humus soil, assoc.: Pohlia cruda.

**117. M. spinulosum Bruch, Schimper & Gumbel** 7480 ft. Widely distributed species. Its distribution includes Central Europe, Caucasus, Turkey, Middle Asia, South Siberia (Tilia forests), Far East, northern China, Japan, and North America (predominantly, zone of broad-leaved forests / nemoral zone) (Ignatov, Ignatova, 2003); it’s infrequent in Wyoming (Eckel, 2007; author’s data).

Index Creek; # 5518, Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, on humus and litter, in shade, assoc.: Sanionia uncinata, Timmia austriaca.

**118. M. thomsonii Schimper** 6950-10400 ft. A species with very wide distribution in the Holarctic. In Wyoming, it’s a common species (Eckel, 2007; author’s data).
Summits: alpine fen-4; # 3278, ecotone zone between alpine fen and tundra; at base of granite boulders, on wet humus, in shade, assoc.: Hypnum revolutum, Mnium arizonicum, Pohlia cruda.

Clay Butte Fen; # 2935, Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, ecotone with fen, on wet humus, in shade, assoc.: Distichium capillaceum.

Coniferous forest near Clay Butte Fen; # 5417, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnammed creek, on wet humus and sandy soil along the streamlet, in shade under trees, assoc.: Cratoneuron filicinum, Plagiomnium rostratum, Timmia austriaca.

Beartooth Creek; # 5460, Picea engelmannii – Pinus contorta forest on the creek shore; granite outcrop, in crevice filled with humus, in shade under trees, assoc.: Distichium capillaceum, Pohlia cruda.

Little Bear Creek-1, # 2686, bank of creek, on wet clay, in partial shade, not abundant.

Clarks Fork of Yellowstone River-1; ## 3158, 3160; huge granite outcrop in Picea glauca – Alnus incana forest, side facing to the north, on a layer of wet humus, assoc.: Pohlia sp., Syntrichia ruralis, Timmia austriaca.

Sawtooth Lake; # 6038, on wet humus between granite rocks, in shade, beside waterfall.

**119. Plagiomnium ellipticum (Bridel) T. Koponen** [Mnium ellipticum Bridel, M. rugicum Laur., M. affine var. rugicum (Laur.) Bruch, Schimper & Gumbel]. 6580-10700 ft. A disjunct species with bipolar distribution, widespread in the Holarctic. On the Beartooth Plateau, it’s one of the most common Mniaceae family representatives. It is mostly a subalpine to alpine wetland species, usually associated with different Bryidae species.

Summits: alpine fen-4: 1) ## 3273, 3274; pool banks, peaty soil, in shade, abundant, assoc.: Ptychostomum pseudotriquetrum, Sanionia georgico-uncinata cf. 2) # 3284, fen along streamlet, vertical walls of pools, wet peaty soil, assoc.: Brachythecium udum cf., Climacium dendroides.

Summits: alpine fen-5; ## 3434, 3447; around pools on soaked and wet peaty soil, locally abundant, in pure mats or assoc.: Sanionia georgico-uncinata, Sarmentypnum sarmentosum.

Creek SW of Beartooth Butte; ## 3858, 3873, 3875, 3876; creek bank, on wet sandy-clay and peaty soil, abundant, assoc.: Marchantia alpestris, Cratoneuron filicinum, Hygrohypnum spp., Palustriella falcata, Ptychostomum pseudotriquetrum.

Mud Lake Fen; ## 3111, 3112, 3120, 3122; in deep shade beneath Salix sp. and Pentaphylloides floribunda, on wet peaty soil, assoc.: Aulacomnium palustre, Drepanocladus acutus; also

Little Bear Creek-3; # 5366, wet sedimentary rocks lining the creek, on wet sandy soil and humus, assoc.: Hygrohypnum ochraceum, Ptychostomum pseudotriquetrum.

Swamp Lake Fen & vicinity; ## 5107, 5110, 5116, 5124, 5131, 5133, 5156, 5179; Pentaphylloides floribunda + Salix sp. – Carex spp. + Calamagrostis sp. – Bryidae, Schoenoplectus acutus + Typha latifolia – Bryidae and Cares sp.- Bryidae communities surrounding Swamp Lake, on wet and soaked peaty soil, especially on bases of stems, assoc.: Drepanoclados aduncus; also
beside granite rock at the edge of fen (near HWY 296) on wet peaty soil, in shade, abundant, in pure mats.

Crazy Creek CG Swamp; ## 3166, 3169, 3171, 3180, 3182, 3189, 3217; swampy Picea engelmannii + P. glauca forest, forest floor, on wet and soaked humus and peaty soil, more abundant along streamlets crossing the fen; in partial shade; assoc.: Chiloscyphus pallescens, Marchantia alpestris, Plagiochila porelloides, Aulacomnium palustre, Breidleria pratensis, Climacium dendroides, Helodium blandowii, Pleurozium schreberi, Rhizomnium pseudopunctatum, Tomentypnum nitens.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4865, 4869, 4893, 4897; etc.; Carex spp. – Bryidae fen, on soaked peaty soil, intermingled with many other Bryidae mosses all across the fen.

Littlerock Creek Fen; ## 3606, 3663, 3668; between and on Salix planifolia – Bryidae hummocks, on wet peaty soil in partial shade, not abundant, forms admixture to Aulacomnium palustre, Climacium dendroides, etc.

Unnamed tributary of Frozen Lake; # 2644, along the Byway, bank of stream, on wet clay beside drainage pipe, in shade.

Clay Butte Fen; 1) # 2955, north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peat soil, assoc.: Brachythecium salebrosum, Drepanocladus aduncus; 2) # 2976, north-west portion of fen, thickets of tall Salix sp., hummocks, in deep shade on wet humus, assoc.: Drepanocladus aduncus. 3) # 2988; Nuphar pool, on soaked peaty soil, partially submerged, abundant, assoc.: Ptychostomum pseudotriquetrum. 4) # 3004, 2nd Nuphar pool, on soaked peaty soil, assoc.: Calliergon giganteum, Drepanocladus aduncus.

Ghost Creek Fen; # 3731, 20 m north of Nuphar pool, forms admixture to Sphagnum warnstorfii and Aulacomnium palustre. 2) # 3728, eastern shore of fen, ecotone zone with Picea engelmannii forest, in shade, assoc: Sphagnum warnstorfii.

Meadow Lake Fen; ## 3769, 3772; beside granite boulder in the middle of fen, wet peaty soil, in shade, assoc.: Sciuro-hypnum latifolium, Leskeaceae.

Wyoming Creek-1; # 3481, stream bank, on moist clay soil, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Sanonia sp.

Wyoming Creek-2; ## 4973, 4987, 5041, 5073, 5101; head of creek, alpine Bryidae fen on seepage slope; forms carpets on soaked peaty soil along streamlet; also in admixture to Bryidae mosses of vertical moss-lined banks; in Sphagnum hummocks between streamlets of creek; sporadically all across the site, assoc.: Sanonia georgico-uncinata, Sarmentypnum sarmentosum, Sphagnum russowii, etc.

Rd 167: swampy mixed forest; ## 6186, 6188, 6189, 6190, 6191, 6194, 6195, 6199-6202; abundant on moist humus and peaty soil of swamp Picea glauca + Pinus contorta + Populus
tremuloides - Alnus incana forest, assoc.: Marchantia alpestris, Aulacomnium palustre, Brachythecium sp. s.l., Drepanoclados aduncus. S+.

Rd 801: swampy mixed forest; ## 6152, 6157, 6159; Picea glauca + Populus tremuloides forest, on wet rotting wood, humus and peaty soil, assoc.: Amblystegium serpens, Aulacomnium palustre, Brachythecium sp. s.l., Sanionia uncinata.

Sawtooth Lake; ## 5992-5994; western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Campylium protensum, Climacium dendroides, Pohlia bolanderi, P. cruda, Plagiothecium denticulatum, Polytrichum juniperinum, Sanonia uncinata, Sciuro-hypnum latifolium.

Sawtooth Palsa Fen; # 5711, Carex sp. – Bryidae community, on soaked peaty soil in carpets, not abundant.

Beartooth Creek; # 5463, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Marchantia alpestris, Brachythecium rivulare, Climacium dendroides, Rhizomnium pseudopunctatum, Sanionia uncinata, Sciuro-hypnum latifolium.

Willow Park; ## 5554, 5564; montane Carex spp. – Bryidae fen, on wet peaty soil in ditches.

E shore of Beartooth Lake; # 4834, willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Ptychostomum pseudotriquetrum.

Canyon Creek; # 5670, broad boggy valley of creek, Carex spp. – Sphagnum spp. fen along the widened portion of creek, forms admixture to Climacium dendroides in low hummocks on wet peaty soil.


Meadow Lake North Fen (Fantan Lake Fen) (Heidel et al., 2008).


Swamp Lake Fen (Heidel et al., 2008; on J. C. Elliott’s collection).
121. **P. rostratum** (Schrader) T. Koponen [*Mnium rostratum Schrader*]. 6600-10470 ft. Widely distributed in boreal and nemoral zones of the Northern hemisphere (Ignatov, Ignatova, 2003). In Wyoming, it’s encountered sporadically; prefers calcareous rocks and soil in woods (Eckel, 2007; author’s data).

Coniferous forest near Clay Butte Fen; ## 5403, 5408, 5413, 5414, 5417; wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and litter, in shade under trees.

Wyoming Creek-2; # 5066, willow thickets along the creek, on wet humus, in shade, assoc.: Pohlia nutans.

Swamp Lake Fen & vicinity; 1) # 5190, base of Cathedral Cliff, stream in Picea spp. forest, on wet marly substrate between granite boulders lining the stream, not abundant, assoc.: Cratoneuron filicinum, Drepanocladus aduncus, Leptobryum pyriforme. 2) # 5197, ecotone zone between calcareous fen and spruce forest; Picea engelmannii + Populus tremuloides – Bryidae community (swampy forest), on wet humus and litter, not abundant.

© 122. **Rhizomnium andrewsianum** (Steere) T. Koponen [*Mnium andrewsianum Steere*]. 9500 ft. The only reliably identified collection of this northern species in Wyoming was made by W. A. Weber (see below). The distribution of the species is mainly north Asian (Siberian) – North American; it occurs on stream banks and shaded niches of rock deposits in high elevation areas.


123. **R. magnifolium** (Horikawa) T. Koponen [*Mnium magnifolium Horikawa, M. punctatum var. elatum Schimper*]. 9250-9670 ft. A species with sporadic distribution in North and Central Europe, most sections of the Arctic, mountains of Siberia, Far East, China, Japan, North America (Ignatov, Ignatova, 2003).

Little Bear Creek-1; # 2695, peaty bank of creek, on sandy-clay soil, assoc.: Scapania sp., Polytrichastrum alpinum, in shade.

Sawtooth Lake; # 6062, creek on the western shore of lake, on granite underwater boulders, sandy-humus substrate, assoc.: Oncophorus virens.

124. **R. pseudopunctatum** (Bruch & Schimper) T. Koponen [*Mnium pseudopunctatum Bruch & Schimper*]. 6940-9670 ft. Widely distributed in the Arctic and in northern part of boreal zone; grows in boggy forests and on eutrophic fens (Ignatov, Ignatova, 2003); associated with a large number of species. In Wyoming, it is common (Eckel, 2007; author’s data).

Little Bear Creek-1, 1) ## 2697, 2703, 2705; boggy shore of creek, shade, soaked peaty soil, assoc.: Sphagnum warnstorffii. 2) # 2693, vertical wall of creek bank, on wet sandy-clay soil, in shade, assoc.: Pohlia cruda, Polytrichastrum alpinum.
Little Bear Creek-3; ## 5326, 5361; moss-lined bank of creek, in shade, on wet humus, assoc.: Polytrichastrum alpinum, Sanionia uncinata.

E shore of Beartooth Lake; # 4836, willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Hygrohypnum ochraceum, Ptychostomum pseudotriquetrum.

Little Bear Lake Fen-NW- 08 & 09; 1) ## 2801, 2808; in carpets, assoc.: Aulacornium palustre, Polytrichastrum alpinum, Sanionia uncinata, Sciuro-hypnum latifolium. 2) # 5627, ditch crossing the fen, on wet peaty soil of ditch walls, in shade, assoc.: Polytrichastrum alpinum.

Lily Lake Swamp forest; 1) # 3024, 3025, 3028; Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae, rotting wood, in shade, assoc.: Aulacornium palustre, Climacium dendroides, Hylocomium splendens, Pleurozium schreberi. 2) # 3029, on litter and humus beneath spruces, assoc.: Thuidium recognitum.

Lily Lake Fen; # 3089, hygrophilous Bryidae community on boggy lake shore, on wet peaty soil, assoc.: Aulacornium palustre.

Crazy Creek CG Swamp; ## 3169, 3187; swampy Picea spp. forest, on wet peaty soil and clay along streamlets, in partial shade; assoc.: Marchantia alpestris, Plagiochila porelloides Amblystegium serpens, Aulacornium palustre, Breidleria pratensis, Mnium blyttii, Plagiomnium ellipticum.

Ghost Creek Fen; 1) ## 3740, 3742, 3746, 3750, 3757; ecotone zone, on wet forest floor of swampy Picea engelmannii (+ P. glauca) forest, 0,02 km north of fen, assoc.: Marchantia alpestris, Aulacornium palustre, Helodium blandowii, Ptychostomum pseudotriquetrum, Sphagnum warnstorfii. 2) # 3747, same forest, brook bank, on wet peaty soil, in shade, assoc.: Chiloscyphus polyanthos, Marchantia alpestris, Pohlia cruda. 3) # 3719, same forest, 0.02 km east of fen, wet forest floor, assoc.: Aulacornium palustre, Helodium blandowii, Sphagnum warnstorfii, Straminergon stamineum.

Creek connecting Dollar & Sawtooth Lakes; ## 5786, 5789; willow wetlands along the creek, on wet peaty soil, assoc.: Polytrichastrum alpinum, Sphagnum russowii.

Sawtooth Lake; # 6031, northern shore, boggy bank of the lake covered with Sphagnum and Bryidae mosses, on wet peaty soil, assoc.: Climacium dendroides, Hypnum lindbergii.

Beartooth Creek; 1) # 5452, moss-lined bank of creek, on wet clay between granite debris, assoc.: Chiloscyphus pallescens, Drepanoclados aduncus. 2) # 5463; Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Marchantia alpestris, Brachythecium rivulare, Climacium dendroides, Plagiomnium ellipticum, Sanionia uncinata, Sciuro-hypnum latifolium.

NE & N shore of Beartooth Lake; 1) ## 5224, 5231, 5233; trail to Beauty Lake, wet Picea engelmannii forest and moss fen, on wet humus and peaty soil, in shade, assoc.: Marchantia alpestris, Aulacornium palustre, Climacium dendroides, Sphagnum warnstorfii, Straminergon

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stramineum. 2) # 5307, north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio tridentalis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, on wet peaty soil in low hummock, not abundant.

125. R. punctatum (Hedwig) T. Koponen [Mnium punctatum Hedwig]. 8950 ft. Rather widespread in Northern hemisphere; occurs in fens, on soil and rocks by streams in woods and on mountains. In Wyoming, the species is infrequent (Eckel, 2007; author’s data).

Pine forest along HWY 212; # 3905, brook bank, on humus and peaty soil, forms admixture to liverworts: Blepharostoma trichophyllum, Cephalozia pleniceps, Chiloscyphus pleniceps.

**Bartramia**

126. Bartramia ithyphylla Bridel 9250-10580 ft. Bartramia ithyphylla is essentially an arctic-alpine species with disjunct populations in the high mountains of Africa and in South America. In North America, it’s frequent in tundra and montane forest habitats with occasional occurrence at moderate to low elevations at northern latitudes (Griffin, 2003). In Wyoming, species grows on cliffs and boulders from the foothills to the alpine.

Unnamed tributary of Frozen Lake; ## 2590, 2593, 2594, 2596, 2598; dry steep rocky slope, on loamy soil under granite rock, shaded by Carex sp., assoc.: Brachytheciastrum collinum, Ceratodon purpureus, Polytrichastrum alpinum. S+.

Wyoming Creek-1; # 3477, stream bank, on wet clay soil, in shade under willows, assoc.: Lophozia sp., Sciuro-hypnum latifolium. S+.

Wyoming Creek-2; ## 5035, 5036, 5048, 5059, 5064; steep moss-lined banks, on peaty soil, in shade under willows, abundant. S+.

Sawtooth Lake; 1) # 5990, western boggy shore of the lake, shaded steep bank, on wet sandy-clay soil, assoc. Philonotis fontana s.l., Sanionia uncinata. S+. 2) # 6048, northern shore, creek near waterfall; on a layer of wet humus on granite boulders lining the creek, with Pohlia bolanderi, P. cruda, Timmia austriaca.

127. Philonotis fontana (Hedwig) Bridel sensu lato 6600-10800 ft. A species with almost cosmopolitan distribution, occurring in most pre-polar and boreal sections of both hemispheres and in mountains of tropics (Ignatov, Ignatova, 2003); very common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). Typical habitats are: springs, flushes and wet places, wet gravelly soil and tracks, seepage slopes. We are inclined to follow B. Shaw (pers. comm.) and P. Eckel (2007) in treating numerous Wyoming’s forms as one extremely polymorphic species.

Summits: alpine fen-2; # 2326, on wet peaty soil in seepage zone.

Summits: alpine fen-5; 1) # 3431, Caltha lepotepeala + Sedum sp. + Carex spp. – Bryidae, on soaked peat soil. 2) ## 3408, 3415; in almost still water of streamlet, semi-immersed, on soaked
peat, not abundant, assoc.: Sarmentypnum exannulatum. 3) ## 3416-3418; fen with shallow pools, soaked peaty soil, in pure mats and with Polytrichum juniperinum.

Summits: wet alpine meadow & fen; # 3395, alpine meadow, on wet clay between low hummocks, assoc.: Pohlia sp.

Index Creek; # 5486, on wet clay along the bank of creek.

NE & N shore of Beartooth Lake; 1) # 5244, 5249; Beartooth Creek, on underwater stones (sedimentary rock), semi-submerged in fast-flowing water of creek, locally abundant. 2) # 5317, north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio triangularis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, at bases of moss hummocks, on wet peaty soil, assoc.: Ptychostomum pseudotriquetrum.

Boggy shore of Island Lake; # 2367, Salix spp. – Bryidae fen, on soaked peaty soil, abundant.

Beartooth Lake CG: wet subalpine meadow and fen; # 4860-4862, 4869, 4874, 4885, 4895; Carex spp. – Bryidae fen, on soaked peaty soil along streamlets crossing the fen and in carpets, intermingled with the other Bryidae mosses all across the fen.

Creek SW of Beartooth Butte; # 3860, 3881; creek bank, on wet clay soil under willow, abundant, assoc.: Cratoneuron filicinum, Palustriella falcata.

Little Bear Creek-2; 1) # 3238, moist sandy-clay soil on the bank; 2) # 3262, 3263, soaked clay along the creek, under willows, assoc.: Dichodontium pellucidum, Sanionia uncinata.

Little Bear Creek-3; 1) # 5325, 5328, 5329, 5336, 5338; moss-lined bank of creek, in shade, on wet humus, assoc.: Scapania subalpina, Ptychostomum pseudotriquetrum. 2) # 5333, granite boulder semi-submerged in the water of creek, on a thick layer of wet humus, assoc.: Ceratodon purpureus, Pohlia bolanderi, Polytrichum juniperinum.

Two lakes along HWY 212; # 2657, 2673; boggy Picea engelmannii + Pinus albicaulis forest on the lake shore, on wet loamy soil, assoc.: Aulacomnium palustre, Sanionia uncinata.

Unnamed tributary of Frozen Lake; 1) # 2562, 2581, 2599, 2600, 2612, seepage slope, streams, underwater granite rocks covered with a thick layer of sand, fast-flowing water of stream; abundant on wet clay along streamlets, more often in pure tufts. 2) # 2627, seepage slope, soaked peaty soil, Caltha leptosepala – Carex spp. – Philonotis fontana, in slow-flowing water of stream, abundant.

Little Bear Lake Fen-NW- 08 & 09; # 2843, 5624; ditch crossing the fen, on wet clay in shade, assoc.: Marchantia alpestris, Aulacomnium palustre, Dichelyma falcatum, Hygrohypnum ochraceum, Polytrichastrum alpinum, Sanionia uncinata.

Little Bear Lake Fen-SE-08: 1) # 2868, in streamlet, on wet clay soil, assoc.: Ptychostomum pseudotriquetrum, Sciuro-hypnum latifolium. 2) # 2870; at the margin of fen, in streamlet, not abundant. 3) # 2872, near the streamlet, associated with Climacium dendroides. 4) # 2897, in low hummocks with Sciuro-hypnum latifolium & Tayloria lingulata.
Island Lake CG: subalpine meadow; # 2924, beside ground water source, on shaded loamy soil between granite outcrops, assoc.: Aulacomnium palustre, Plagiothecium denticulatum, Sciurohypnum latifolium.

Meadow Lake Fen; 1) # 3803, peaty bank of pool, assoc.: Sarmentypnum exannulatum. 2) # 3821, on wet clay along the streamlet, not abundant.

Small alpine lake; ## 3501, 3514, 3522; boggy shore of lake, on soaked peaty soil, assoc.: Brachythecium brandegei, Polytrichum juniperinum, Sciurohypnum latifolium.

Wyoming Creek-1; ## 3462, 3463, 3465, 3474, 3476, 3483, 3486; in partial shade, on wet sandy-clay soil of creek bank, assoc.: Marchantia alpestris, Polytrichastrum alpinum, Polytrichum juniperinum, Sanonia uncinata, Straminergon stramineum.

Wyoming Creek-2; 1) ## 4971, 4980; alpine Bryidae fen on seepage slope; forms carpets on soaked peaty soil along streamlet, locally abundant, assoc.: Ptychostomum pseudotriquetrum, Sarmentypnum sarmentosum, Straminergon stramineum. 2) ## 5018, 5023; on granite boulders inundated by fast-flowing waters of stream, in splash zone or semi-submerged, locally abundant, assoc.: Hygrohypnum molle. 3) ## 5041, 5057, 5067; on peaty and sandy and humus soil of vertical moss-lined banks, in shade under willows, associated with the many other Bryidae mosses.

Clay Butte: slope facing to E; ## 3837, 3838; Picea spp. forest on steep slope, in dry ditches, on loam.

Coniferous forest near Clay Butte Fen; # 5413, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and sandy soil along the streamlet, in shade under trees.

Beartooth Lake CG: coniferous forest; # 6206, ecotone zone between willow wetlands (south-eastern shore of lake) and upland community of Picea engelmanii + Pinus contorta forest; on wet peaty soil, abundant in hummocks, assoc.: Aulacomnium palustre, Polytrichum juniperinum.

Beartooth Creek; ## 5434-5436, 5438, 5443; moss-lined bank of creek, under Picea engelmanii and Salix sp, on wet clay.

Seepage slope along HWY 212; ## 6100, 6101, 6105; on wet loamy soil, abundant in shaded ditch, assoc.: Drepanocladus aduncus, Ptychostomum pallescens, Sanonia uncinata, Tortula obtusifolia.

“Dichelyma creek”; # 6082, on wet sandy-clay soil along boggy shore of creek, in shade beneath sedges.

Sawtooth Lake; 1) ## 5989, 5990, 5995; western boggy shore of the lake, shaded steep bank, on wet sandy-clay soil, assoc.: Bartramia ithyphylla & Sanonia uncinata. 2) # 6047, northern shore, creek near waterfall, in wet crevices of granite boulders lining the creek, assoc.: Plagiothecium denticulatum, Pohlia nutans.
Willow Park; 1) ## 5555, 5556; montane Carex spp. – Bryidae fen, on wet peaty soil in ditches. 2) ## 5594, 5595; stream bank near the road, on wet clay in stagnant water.

Clark Forks of Yellowstone River-2; # 5604, moss-lined bank of the river, humus soil, in shade beneath forbs. Sawtooth Palsa Fen; 1) ## 5694, 5695; granite outcrop in swale, on wet peaty soil, assoc.: Aulacomnium palustre, Polytrichastrum alpinum. 2) ## 5736, 5742; willow wetlands along stream crossing the fen, vertical banks, on wet clay, in shade beneath willows, locally abundant, assoc.: Marchantia alpestris.


!® 128. P. yezoana Bescherelle & Cardot in J. Cardot 7500 ft. Globally rare species (conservation rank G2G3), potential species of conservation concern in Wyoming. P. yezoana, originally described from Japan, is the East Asian and North American species of primarily oceanic temperate habitats. Wyoming population was discovered 1100 km away from the nearest coast, in the interior mountains of the state, approximately 500 km south-south-east of Montana’s and east-south-east of Idaho’s nearest known locations. The plants grew in typical for the species situation -on wet granite rocks in the splash zone of waterfall. The population is sterile, of small size and, possibly, has low efficiency of dispersal and vitality. The global conservation rank of P. yezoana implies “imperiled” to “vulnerable”, meaning rare and local throughout its range, being at moderate to high risk of extinction due to a restricted range, few populations and/or their declines. We recommend that P. yezoana be added to the Wyoming Natural Diversity Data list of threatened, endangered, and sensitive plants.

Lake Creek Waterfalls; ## 5849, 5850; sheltered granite outcrops lining the waterfall under the steep bank forested by Pseudotsuga menziesii, Picea glauca, & Pinus contorta; on wet humus covering an outcrop’s surface, shaded by spruce, in splash zone of the waterfall, not abundant but distinctive material, assoc.: Blindia acuta.

Orthotrichaceae *

Summits: alpine tundra-6; ## 3337, 3369, 3381, 3386; granite outcrops in tundra, on a thin layer of humus. S+.

Island Lake CG: spruce forest; # 2221, on wet granite rock beneath spruce. S+.


Summits: alpine tundra-5; # 3334, in crevices of granite outcrop, abundant.

Island Lake CG: spruce forest; # 2222, granite outcrop facing to the south, in shade beneath Picea engelmannii, abundant. S+.

Lake Creek Campground: wet coniferous forest; # 5933, on granite outcrop beneath spruce.

Crazy Creek; # 5612, on vertical surface of granite cliff in Pinus spp. forest along the creek, in shade. S+.

Coniferous forest near Clay Butte Fen; # 5389, granite outcrop in shade under trees, on a thick layer of humus. S+.


131. O. rupestre Schleicher ex Schwägrichen 6800-6950 ft. A widely distributed species; its range includes: Greenland, North America (Alta., B.C., N.W.T., Nun., Ont., Yukon; Alaska, Ariz., Calif., Colo., Idaho, Mont., Nev., N.Mex., Oreg., S.Dak., Utah, Wash., Wyo.), South America, Europe, Asia, North and East Africa, Asia (Japan), Atlantic Islands (Canary Islands), Pacific Islands (New Zealand), and Australia. It occurs on non-calcareous boulders and cliff faces in mesic areas of pine, spruce-fir or aspen forests, usually at higher elevations, rarely found in sterile condition at the base of trees, frequently collected in subalpine shaded situations; 100–3000 m. (Vitt, 2009). The species is common in Wyoming (Eckel, 2007; author’s data).

Clarks Fork of Yellowstone River-1; # 3159, Picea glauca forest, on granite outcrop facing to the north. S+.

Rd 167: Pseudotsuga forest; # 6178, on granite cliff in shade of Pseudotsuga menziesii. S+.
* By present, 40-50% of Orthotrichaceae specimens have been treated.
**Aulacomniaceae**

**132. Aulacomnium androgynum (Hedwig) Schwägrichen** 9250-10020 ft. A species with disjunct distribution; it’s widespread in Atlantic regions of Europe, in Caucasus, Japan, China, American Pacific, and some other regions with rather mild climate. This species is infrequent in Wyoming; it’s known here from a few occurrences, including Yellowstone National Park (Eckel, 2007). Locations on the Beartooth Plateau are first ones known in Park Co.

Two lakes along HWY 212; 1) # 2671, boggy Picea engelmannii forest on the lake shore, on wet humus, assoc.: Scapania sp., Dicranaceae spp., Sanionia uncinata, Straminergon stramineum. 2) # 2655, peaty bank of lake, in shade, assoc.: Scapania sp.

Sawtooth Lake; # 6052, northern shore, creek near waterfall; wet humus over granite boulders lining the creek.

**133. A. palustre (Hedwig) Schwägrichen** 6600-10800 ft. One of the most common and abundant species of fens and swampy forests of boreal zone of Northern Hemisphere. In Wyoming and adjacent states of Utah, Colorado, and Montana, it’s known from numerous collections (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data); normally associated with a number of species.

- **var. palustre**
  
  Summits: alpine fen-1; ## N 2318, 2319; forms low hummocks in alpine Salix spp. – Carex spp.  
  Bryidae fen along streamlet.
  
  Summits: alpine fen-2; ## 2324, 2331, 2332; on wet peaty soil in low hummocks, abundant.
  
  Summits: alpine fen-3; ## 2503, 2511; at bases of granite outcrops on wet humus and in Salix sp. – Aulacomnium palustre community on peaty soil, in partial shade, abundant, in pure mats or assoc.: Dicranoweissia crispula, Hypnum revolutum, Syntrichia ruralis (!).
  
  Summits: alpine fen-4; ## 3290, 3292, 3297, 3308; peaty banks of alpine pool, in shade, on wet bare peat, assoc.: Barbilophozia hatcheri, B. quadriloba, Brachythecium sp. s.l., Pohlia cruda, P. nutans, Polytrichastrum alpinum, Sanionia georgico-uncinata.
  
  Summits: alpine fen-5; # 3459, forms low hummocks in Caltha leptosepala + Sedum rhodanthum + Carex spp. – Bryidae community.
  
  Boggy shore of Island Lake; ## 2358, 2359, 2362-2364, 2370, 2376; moss fen, in low hummocks along boggy part of shore, on wet peaty soil, in pure mats or assoc.: Pohlia nutans, Sanionia uncinata.
  
  Unnamed tributary of Frozen Lake; ## 2541, 2552; seepage slope, on soaked peaty soil in alpine moss fen, abundant.
  
  Lily Lake Swamp Forest; ## 3019, 3020, 3024, 3026, 3041, 3046; on rotting wood and wet forest floor of Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae forest, in shade, assoc.: Marchantia alpestris, Breidleria pratensis, Climacium dendroides, Helodium
blandowii, Hylocomium splendens, Rhizomnium pseudopunctatum, Timmia austriaca, Tomentypnum nitens. S+ (# 3019, 3046). 2) # 3066, forested by Picea spp. boggy shore of Lily Lake, on soaked peaty soil, assoc.: Breidleria pratensis, Climacium dendroides, Mnium sp. s.l.

Lily Lake Fen; # 3089, hygrophilous Bryidae community on boggy shore of lake, on wet peaty soil, assoc.: Rhizomnium pseudopunctatum.

Lake Creek CG: wet coniferous forest; # 5891, moss-lined bank of creek, on wet clay beneath Picea and Alnus, assoc.: Climacium dendroides.

Crazy Creek CG Swamp; ## 3167, 3170, 3175, 3180; swampy Picea glauca + P. engelmannii forest, forest floor, on wet, soaked humus and peaty soil, especially along streamlets crossing the fen; in partial shade; assoc.: Marchantia alpestris, Climacium dendroides, Eurhynchiastrum pulchellum, Helodium blandowii, Plagiomnium rugicum, Pleurozium schreberi, Ptillium cristasta-castrensis, Rhizomnium pseudopunctatum, Tomentypnum nitens.

Pine forest along HWY 212; # 3903, wet sandy-clay soil of brook bank, in shade under trees, abundant, assoc.: Blepharostoma trichophyllum, Cephalozia pleniceps, Chiloscyphus pallescens, Mnium blyttii.

Beartooth Creek; 1) ## 5433, 5438, 5443; moss-lined bank of creek, under Salix sp., on wet humus, locally abundant. 2) # 5467, boggy forest near the creek, Picea engelmannii – Salix sp. – Saxifraga odontholoma + Mertensia ciliata + Senecio triangularis – Bryidae, on wet peaty soil.

Two lakes along HWY 212; 1) ## 2656, 2657, 2670, 2673, 2677, 2678, peaty banks of both lakes, abundant, assoc.: Lophozia wenzelii, Scapania sp., Aulacomnium palustre, Philonotis fontana s.l., Polytrichum juniperinum, Sanionia uncinata, Straminergon stramineum. 2) # 2661, boggy Picea engelmannii forest, on wet humus, assoc.: Ditrichum sp., Polytrichum juniperinum.

NE & N shore of Beartooth Lake; 1) ## 5220, 5223; trail to Beauty Lake, wet Picea engelmannii forest, stream bank, on wet rotting wood and humus, in shade under trees, not abundant, assoc.: Blepharostoma trichophyllum, Pohlia nutans, Sciurop-hynnum latifolium. 2) ## 5228-5231, 5233; small fragment of moss fen along unnamed creek in Picea engelmannii forest, abundant. 3) # 5302, 5303, 5305, 5315; north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio triangularis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, abundant in hummock, assoc.: Cephalozia pleniceps, Sphagnum warnstorffii, Straminergon stramineum, Tomentypnum nitens.

Little Bear Lake Fen-NW- 08 & 09; 1) ## 2775, 2800; in shaded ditch, on soaked peaty soil, assoc.: Warnstorfia exannulata. 2) ## 2770.1, 2779, on dry peat between Carex scopulorum - Sphagnum hummocks, assoc.: Ceratodon purpureus, Tortula sp. 3) # 2783, in shallow swale, assoc.: Bryum sp., Polytrichastrum longisetum, Sphagnum platyphyllum. 4) # 2778, in Carex scopulorum – Aulacomnium palustre hummocks, very abundant, assoc.: Scorpidium cossonii, Sarmentypnum exannulatum. 5) # 2801, forms carpets in association with Sanionia uncinata, Rhizomnium pseudopunctatum, Sciurop-hynnum latifolium. 6) ## 2832, 2840; forms hummock with
Sphagnum russowii. 7) # 2837, dry ditch, in shade, assoc.: Polytrichum juniperinum. 8) # 2841, dry mound, on peat soil along with Sanionia uncinata forms admixture to Dicranum scoparium. 9) # 2843, on ditch walls, wet clay, assoc.: Marchantia alpestris, Dichelyma falcatum, Hygrohypnum ochraceum, Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia uncinata. 10) # 2849, in mounds, assoc.: Oncophorus wahlenbergii, Pohlia nutans, Tomentypnum nitens. 11) # 2753, in dry hummocks. 12) # 2744, Aulacomnium mounds, on wet peaty soil, abundant, assoc.: Gymnocolea inflata, Tomentypnum nitens. 13) # 5624, ditch crossing the fen, on wet peaty soil of ditch walls, in shade, assoc.: Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia uncinata.

Little Bear Lake Fen-SE-08; ## 2879, 2882, 2888, 2907, 2908, 2911; in Carex spp. – Aulacomnium palustre hummocks; very abundant species, associated with Climacium dendroides, Polytrichum juniperinum, Sphagnum warnstorfii, Straminergon stramineum, and others.

Island Lake CG: subalpine meadow; # 2924, beside ground water source, on shaded loamy soil between granite outcrops, assoc.: Philonotis fontana s.l., Plagiothecium denticulatum, Sciurohypnum latifolium.

Ghost Creek Fen; ## N 3719, 3740, 3742-3746, 3749, 3750, 3757; ecotone zone, on wet forest floor of swampy Picea engelmannii (+ P. glauca) forest, in partial shade, abundant, assoc.: Cephalozia pleniceps, Chiloscyphus baldianus, Marchantia alpestris, Helodium blandowii, Ptychostomum pseudotriquetrum, Rizomnium pseudopunctatum, Sphagnum warnstorfii, etc. 2) # 3752, swampy Picea engelmannii forest at the edge of fen, on wet rotting log, in shade, not abundant, assoc.: Blepharostoma trichophyllum, Lepidozia reptans, Lophozia sp., Dicranaceae spp. 3) ## 3727, 3729, 3730, 3731, 3737, 3739; 15-20 meters north of Nuphar pool, in association with Sphagnum warnstorfii & Straminergon stramineum, forms hummocks. 4) ## 3733, 3738; in low Carex spp. – Sphagnum hummock, not abundant.

Clay Butte Fen; 1) # 2925, Picea engelmannii – Pinus albicaulis forest north-north-east of fen, wet peaty soil, assoc.: Polytrichum juniperinum; 2) # 3009, Nuphar pool, submerged in still water of pool, assoc.: Sarmentypnum exannulatum, Straminergon stramineum; 3) # 2942, decaying fallen tree at north-north-east edge of fen, on wet rotting wood covered with a layer of loam, assoc.: Campylium polygamum, Sanionia uncinata; 4) # 2947, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peaty soil; 5) # 2975, north-west portion of fen, thickets of tall Salix sp., hummocks, in deep shade, assoc.: Climacium dendroides, Drepanoclados aduncus, Ptychostomum pseudotriquetrum; 6) # 3005, 2nd Nuphar pool, on soaked peaty soil.

Littlerock Creek Fen; ## 3573, 3575, 3578, 3579, 3587, 3600, 3601, 3627, 3634, 3646, 3660, 3667; Salix planifolia - Aulacomnium palustre (+), dominating species of hummocks, very abundant all across the fen, forms pure tufts or assoc.: Dicranum elongatum, Polytrichum strictum, Sphagnum spp. Sect. Acutifolia.

Meadow Lake Fens; 1) ## 3764, 3767; granite boulder in the middle of Meadow Lake Fen, in shaded crevices of boulder, on peaty soil, assoc: Plagiothecium denticulatum, Polytrichum juniperinum, Tortula sp. 2) # 3823, in stands of Carex, assoc.: Drepanoclados polygamum. 3) ##
3793, 3796, 3808; at the edge of fen, well-drained site, on dry peaty soil, assoc.: Campylium stellatum, Polytrichum juniperinum, Sarmentypnum sarmentosum, Tomentypnum nitens.

Small alpine lake; ## 3512, 3525; boggy shore, wet peat and clay soil, assoc: Polytrichastrum alpinum, Polytrichum juniperinum, Sanionia uncinata.

Wyoming Creek-1; # 3481, stream banks, on wet sandy soil, abundant, assoc.: Plagiomnium ellipticum, Polytrichum juniperinum, Sanionia uncinata.

Wyoming Creek-2; ## 4977, 5073, 5101; alpine Bryidae fen on seepage slope; abundant in carpets and low hummocks, on soaked peaty soil; also in Sphagnum and willow hummocks between streamlets of creek.

Beartooth Lake CG: coniferous forest; ## 6204, 6206; ecotone zone between willow wetlands (south-eastern shore of lake) and upland community of Picea engelmannii + Pinus contorta forest; on wet peaty soil, abundant in hummocks, assoc.: Philonotis fontana s.l., Polytrichum juniperinum.

Mud Lake Fen; ## 3111, 3112, 3120; in deep shade beneath Salix sp. and Pentaphylloides floriabunda, on wet peaty soil, assoc.: Drepanocladus aduncus, Plagiomnium ellipticum.

Little Bear Creek-3; ## 5331, 5360, 5361; willow wetlands long the creek, on wet sandy, humus and peaty soil, in shade, abundant.

Little Bear Creek-4; # 6232, willow wetlands along creek, on wet peaty soil beneath Salix sp., assoc.: Sphagnum warnstorfi.

Rd 167: swampy mixed forest; # 6195, abundant on moist humus and peaty soil of swamp Picea glauca + Pinus contorta + Populus tremuloides + Alnus incana forest, in pure mats and assoc.: Plagiomnium ellipticum.

Rd 801: swampy mixed forest; ## 6148, 6149, 6150, 6151, 6152, 6164; Picea glauca + Populus tremuloides forest, on wet rotting wood, humus and peaty soil, assoc.: Amblystegium serpens, Plagiomnium ellipticum, Ptychostomum pseudotriquetrum, Sanionia uncinata, Tomentypnum nitens.

Lake WGN fen; # 6072, in Sphagnum hummocks, on peaty soil along the shore, assoc.: Sphagnum ruskowii.

Sawtooth Meadow; # 5770, boggy valley of unnamed creek, on soaked peaty soil along pool, abundant.

Top Lake Fen; 1) # 5777, boggy south-western shore of lake, on wet peaty soil, abundant in low hummock. 2) # 5780, boggy western shore of lake, on wet peaty soil, abundant in hummock, assoc.: Polytrichum commune.

Creek connecting Dollar & Sawtooth Lakes; # 5797, willow wetlands along the creek, on moss-lines bank of creek and in moss hummocks, on wet peaty soil, abundant.
Sawtooth Lake; 1) #5967, 5970; Salix sp. – Sphagnum platyphyllum fen along the western shore, on soaked peaty soil. 2) #5992, western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Campylium protensum, Sanionia uncinata, Plagiomnium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, P. cruda, Polytrichum juniperinum, Sciuro-hypnum latifolium. 3) #6015, northern shore of lake, moss-lined bank of stream, on wet peaty soil, shaded by Salix sp., assoc.: Sanionia uncinata, Straminergon stramineum. 4) #6027, 6032; northern shore, boggy bank of the lake covered with Sphagnum hummocks, on wet peaty soil, assoc.: Climacium dendroides, Polytrichastrum alpinum, Sphagnum warnstorffii. 5) #6042, northern shore, creek near waterfall; on granite boulders along the creek, forms admixture to Sphagnum warnstorffii.

Sawtooth Palsa Fen; 1) #5694, 5695; granite outcrop in swale, on wet peaty soil, assoc.: Philonotis fontana s.l., Polytrichastrum alpinum. 2) #5714, 5723, 5725, 5726; low Aulacomnium hummocks, wet peaty soil, locally abundant, assoc.: Polytrichastrum alpinum, Sanionia georgico-uncinata cf. 3) #5728, 5733; abundant on mounds / raised peat, assoc.: Polytrichum juniperinum, P. strictum, Straminergon stramineum. 4) #5757, ecotone zone between fen and wet subalpine tundra, in low hummock, on wet peaty soil, assoc.: Polytrichum juniperinum. 5) #5750, 5751, 5753, streamlet crossing the fen, willow thickets, peaty bank, locally abundant, assoc.: Polytrichum strictum, Polytrichastrum alpinum, Sphagnum warnstorffii.

Lake Creek Waterfalls; #5874, Alnus incana stands on creek shore, on wet peaty soil, assoc.: Climacium dendroides.

Beartooth Lake CG: wet subalpine meadow and fen; #4864, 4872, 4884, 4891, 4895, 4901, 4903 ; Carex spp. – Bryidae fen, on soaked peaty soil, in pure mats or intermingled with many other Bryidae mosses all across the fen, very abundant.

Willow Park; #5550, 5551; montane Carex spp. – Bryidae fen, on wet peaty soil, abundant.

Canyon Creek; 1) #5648, 5654, 5682; broad boggy valley of creek, Salix sp. – Carex spp. – Bryidae fen along the creek, forms carpets on wet peaty soil, abundant, assoc.: Polytrichum juniperinum, Sanionia uncinata, Sphagnum latifolium. 2) #5671, (Salix planifolia) – Carex spp. – Sphagnum spp. fen along the widened portion of creek, in low hummocks on wet peaty soil, shaded by dense Carex stands, assoc.: Calliergon cordifolium, Polytrichum juniperinum, Ptychostomum weigelii, Sphagnum riparium. 3) #5679, vertical walls of stream bank, on wet peaty soil, in shade under willows, locally abundant, assoc.: Polytrichastrum alpinum.


S. Jackson & palynologists group’s collections: 1) Swamp Lake, SL5, in forest on paludified area, white spruce, Equisetum; 6560 ft., pH: 7.7; assoc.: Tomentypnum nitens; 2002. 2) Little Moose Peatlands: a) LM9, on outermost edge of Sphagnum distribution away from lake, Salix, Carex, Potentilla, Pedicularis; 7960 ft., pH: 4.5; 2002; b) LM4, island/hummock, Potentilla, Betula
glandulosa, Carex, Drosera; 7960 ft., pH: 4.5; assoc.: Straminergon stramineum, 2002; 3) East Lily Peatland, ELP3-4, Carex, Chamaedaphne, Betula glandulosa, Potentilla, 8100 ft., pH: 3.9-4.2; 2002.

Swamp Lake Fen, Clay Butte Fen, Meadow Lake Fens, Ghost Creek Fen, Lake WGN Fen, Lily Lake East Fen, Little Moose Lake Fen, Littlerock Creek Fen, Lower Shepherder Fen, Rock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

- var. imbricatum Bruch, Schimper & Gumbel 10100-10700 ft. New to Wyoming. A variety of Aulacomnium palustre, restricted to the highest wet alpine areas (strongly suggesting the Arctic A. turgidum). “This is such a strikingly different plant in the field from the abundant lower altitude A. palustre that we feel it should be accorded specific status, especially in view of the fact that it occurs in isolated tundra sites in Austria (the type locality), Norway, Italy, and Russia (Lake Baikal)” (Weber, Wittmann, 2007, p. 39).

Summits: alpine fen-1; ## 2321, 2322; on wet peaty soil in low hummocks, assoc.: Abietinella abietina.

Summits: alpine fen-3; # 2519, Salix sp. – Aulacomnium palustre community on peaty soil, in partial shade, not abundant.

Summits: alpine fen-5; ## 3435-3438, 3441, 3442; abundant in hummock, on wet peaty soil, in pure mats.

Summits: dry creek in alpine tundra; ## 2425, 2427, 2428; Salix sp. – Bryidae fen, on dry peaty soil in low hummocks.

**Fontinalaceae**

134. Dichelyma falcatum (Hedwig) Myrin 6950-9600 ft. A holarctic species distributed mainly in mountains of Northern hemisphere. It’s usually attached to stones in cold, rocky streams in high elevation areas; in occurs on tree bases and roots, in and along brooks, wet depressions, and stream banks. Until recently, this species was known in Wyoming from the only occurrence in the Beartooth Plateau, based on W. Weber’s collection of 1973 (Eckel, 2007). On the author’s data, the species is widely distributed in at least in three counties of the state: Albany, Carbon, & Park Co. On the Beartooth Plateau, D. falcatum was encountered in the montane and subalpine zones.

Little Bear Lake Fen-NW-08; 1) # 2816, in low hummock, on wet peaty soil, in pure mat. 2) ## 2812, 2817, 2818; in wet depressions, on soaked peaty soil, assoc.: Hygrohypnum ochraceum, Sarmentypnum exannulatum, Sphagnum platyphllum. 3) ## 2843, 2847; attached to granite boulder on the bottom of deep ditch, on wet clay, in full shade, assoc.: Marchantia alpestris, Aulacomnium palustre, Hygrohypnum ochraceum, Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia uncinata.

Little Bear Lake Fen-SE-08; # 2880, in low hummock, pure mat.
Lake Creek CG: wet coniferous forest; # 5896, along the creek, on wet granite boulders covered with a layer of humus, in shade, not abundant.

“Dichelyma creek”; ## 6080, 6083, 6088, 6096; attached to granite boulders of moist bottom of temporary dry creek, very abundant.

Creek connecting Dollar & Sawtooth Lakes; # 5800, willow wetlands, granite boulders along creek bank, on peaty soil and humus.

Sawtooth Lake; 1) # 5985, western boggy shore of the lake, steep bank, attached to wet granite outcrop beside the water line. 2) # 6041, northern shore, creek near waterfall; on underwater granite boulders, assoc.: Hygrohypnum ochraceum. 3) ## 6054, 6055; north-western shore, on wet loamy soil along the trail, in deep shade beneath Picea engelmannii, immediately beside water line, abundant.


135. *Fontinalis antipyretica* Hedwig 6940-9400 ft. Widely distributed all across Holarctic, except for arid regions. It grows on rocks, sticks, logs, roots in slow- or fast-moving streams, ponds, ditches, swamps, and seasonally dry floodplains; occurs from low to high elevations. In Wyoming and adjacent states, the species is encountered rather often (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data).

- **var. antipyretica**

Creek connecting Dollar & Sawtooth Lakes; ## 5783-5785, 5799; attached to underwater granite boulders and bank of creek, to the depth of 1 meter.

W. Welch’s collections: Beartooth Mts., Crane Lake, in water, attached to rocks, W. Welch 15079 (WTU).

- **var. oregonensis** Renault & Cardot

E. Lawton’s collection: west of Beartooth Butte along the Clark Fork of the Yellowstone River, 6940 ft., E. Lawton, 2004 (WTU).

136. *F. hypnoides* C. J. Hartman 8100 ft. The distribution includes mainly boreal and nemoral regions of Holarctic (Ignatov, Ignatova, 2004). It grows in slow-flowing water of streams on rocks, boulders, base of trees, roots, occurs on swamps, in lakes, or ponds, at low to high elevations.

Muddy Creek; ## 6120, 6121, 6143; in slow-moving water of creek, on drowned woods and underwater granite boulders, locally very abundant.

*Climaciaceae*
Climacium dendroides (Hedwig) Weber & Mohr 6940-10680 ft. Widely distributed in Holarctic. One of the most common species of Wyoming swampy forests and adjacent fens, associated with a large number of species (Eckel, 2007; author’s data); very common on the Beartooth Plateau.

Summits: alpine fen-4; ## 3268, 3269, 3279, 3284, 3286, 3288; fen along streamlet, peaty bank of pools, assoc.: Barbilophozia hatcheri, Brachytrichium udum, Lophozia sp., Breidleria pratensis, Dicranum spadiceum, Plagiommium ellipticum, Polytrichastrum alpinum, Ptychostomum pseudotriquetrum, Sanionia georgico-uncinata cf.

Crazy Creek CG Swamp; ## 3166, 3182, 3185, 3217, 3220; swampy Picea glauca + P. engelmannii forest, wet forest floor, on wet humus at bases of spruces, in partial shade, more abundant near streamlets; assoc.: Helodium blandowii, Plagiommium ellipticum, Pleurozium schreberi, Tometypnum nitens.

Lily Lake Swamp Forest; 1) ## 3020, 3026, 3047; ecotone zone between fen and spruce woods, Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae; in shade, wet forest floor, locally abundant, assoc.: Aulacomnium palustre, Helodium blandowii, Timmia austriaca, Tometypnum nitens. 2) ## 3024, 3025; same community, on rotting wood, in shade, assoc.: Aulacomnium palustre, Hylomium splendens, Pleurozium schreberi, Rhizomnium pseudopunctatum. 3) # 3066, southern shore of Lily Lake, forested by Picea spp., on wet humus, assoc.: Aulacomnium palustre, Breidleria pratensis.

Lily Lake Fen; # 3080, edge of fen along shoreline of lake, at bases of spruce rotting trunk, on peaty and humus soil, shaded by sedges.

Little Bear Lake Fen-SE - 08 & 09; ## 2872, 2882, 2890, 2904; ecotone zone between fen and Picea engelmannii forest, beside streamlet, in low hummocks with Aulacomnium palustre, Breidleria pratensis, Philonotis fontana, Polytrichum juniperinum, Straminergon stramineum.

Clay Butte Fen; 1) ## 2949, 2952, 2956, 2966, 2967; north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peaty soil, in pure mats or assoc.: Amblystegium serpens, Calliergon giganteum, Plagiommium ellipticum, Sarmentypnum exannulatum. 2) # 2975, north-west portion of fen, Salix sp. thickets, on hummocks, in deep shade, assoc.: Aulacomnium palustre, Drepanocladus aduncus, Ptychostomum pseudotriquetrum.

Ghost Creek Fen; # 3729, 20 m north-east of Nuphar pool, not abundant, forms admixture to Aulacomnium palustre & Sphagnum warnstorfii, in low hummock.

Littlerock Creek Fen; ## 3589, 3663, 3668, 3670, 3674; Salix planifolia – Aulacomnium palustre, under Salix in shade, on hummocks, assoc.: Aulacomnium palustre, Breidleria pratensis, Plagiommium ellipticum.

Meadow Lake Fens; ## 3775, 3784, 3807; Salix planifolia thickets beside pool, assoc.: Polytrichum juniperinum, Sanionia uncinata, Sphagnum warnstorfii.
Beartooth Lake CG: coniferous forest; # 6205, ecotone zone between willow wetlands (south-eastern shore of lake) and upland community of Picea engelmannii + Pinus contorta forest; on wet peaty soil, abundant in hummocks.

Creek connecting Dollar & Sawtooth Lakes; # 5791, willow wetlands along the creek, on wet peaty soil, forms admixture to Sphagnum russowii.

Muddy Creek; ## 6132, 6133, 6135, 6136; wet Picea glauca + P. engelmannii forest on creek shore, in shaded niches and hollows under trees, on wet litter and humus, locally abundant, assoc.: Timmia austriaca.

Sawtooth Lake; 1) # 5994, western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Plagiomnium ellipticum. 2) ## 6027, 6031, 6032; northern shore, boggy bank of the lake covered with Sphagnum carpet, on wet peaty soil; assoc.: Aulacomnium palustre, Hypnum lindbergii, Polytrichastrum alpinum, Rhizomnium pseudopunctatum, Sphagnum warnstorfii.

Lake Creek Waterfalls; ## 5852, 5857, 5858, 5874, 5875; moss wetlands on the shore, on wet clay and peaty soil, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Ptychostomum pseudotriquetrum.

Lake Creek CG: wet coniferous forest; ## 5891, 5894, 5905; along the creek, on wet clay bank beneath Picea and Alnus and on granite boulders covered with wet humus, assoc.: Aulacomnium palustre, Sanionia uncinata.

Willow Park; 1) ## 5552, 5553; montane Carex spp. – Bryidae fen, on wet peaty soil in hummock, abundant. 2) # 5577; ecotone of Salix sp. – Carex sp. – Bryidae fen and Picea engelmannii forest, on humus and litter.

Beartooth Creek; # 5463, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebosum, Marchantia alpestris, Brachythecium rivulare, Plagiomnium ellipticum, Rhizomnium pseudopunctatum, Sanionia uncinata, Sciuro-hypnum latifolium.

E shore of Beartooth Lake; ## 4848, 4851, 4855, 4856; Salix planifolia – Carex spp. – Bryidae fen, forms carpets and low hummocks, on soaked peaty soil, locally abundant, assoc.: Breidleria pratensis, Calliergon giganteum, Drepanocladus longifolius, Sphagnum platyphyllum.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4858, 4861, 4862, 4865, 4869, 4871, etc.; Carex spp. – Bryidae fen, on soaked peaty soil, very abundant, intermingled with many other Bryidae mosses, forms carpets and low hummocks.

Wyoming Creek-2; # 4976, alpine Bryidae fen on seepage slope; in carpets on soaked peaty soil, forms admixture to Sarmentypnum sarmentosum, in poor mats.

NE & N shore of Beartooth Lake; # 5233, small fragment of moss fen along unnamed creek in Picea engelmannii forest, froms admixture to Aulacomnium palustre, Sphagnum warnstorfii.
Canyon Creek; # 5803, broad boggy valley of creek, ## 5660, 5664, 5670; (Salix planifolia –) Carex spp. – Sphagnum spp. fen along the widened portion of creek, forms low hummocks on wet peaty soil, shaded by dense Carex stands, locally abundant, assoc.: Plagiommium ellipticum, Sphagnum riparium, S. russowii.

W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], swales around small lakes, subalpine zone, Long Lake & Lower Sheepherder Lakes, 2900 m. s. m., W. A. Weber (COLO, RM).

Meadow Lake North Fen (Fantan North Fen) (Heidel et al., 2008).

**Amblystegiaceae**

138. **Amblystegium serpens** (Hedwig) Bruch, Schimper & Gumbel sensu lato (including A. serpens var. juratzkanum (Schimper) Rau & Herv.). 6600-10840 ft. Almost cosmopolitan species, occurring in cold and temperate climates of both hemispheres, also in high mountains of east Africa and Central and South America (Ignatov, Ignatova, 2004). Habitats of the species are: tree trunks, rotten wood, rocks, soil, swamps; it occurs from low to high alpine elevations. In Wyoming and adjacent states it is very common (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data).

Summits: alpine tundra-6; # 3371, on wet tundra soil, in partial shade beside granite outcrop, forms admixture to Syntrichia ruralis.

Creek SW of Beartooth Butte; # 3857, creek bank, in full shade under Salix, on willow stem covered with a layer of wet clay, assoc.: Cratoneuron filicinum. S+.

Clay Butte Fen; 1) # 2983, NW portion of fen, Salix thickets, on bare roots of shrubs, in shade, on a layer of wet humus and peat, assoc.: Drepanocladus polygamus. S+. 2) # 2940, decaying fallen tree at north-north-east edge of fen, forms admixture to Brachythecium salebosum. 3) # 2949, north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peaty soil, assoc.: Calliergon giganteum, Climacium dendroides, Sarmentypnum annulatum.

Swamp Lake Fen & vicinity; ## 5128, 5141; edge of fen (near HWY 296), on the base of granite rock, shaded by dense Alopecurus pratensis stand. S+; also in grasslands along the base of granite outcrops, forms admixture to Conardia compacta & Distichium capillaceum.

Coniferous forest near Clay Butte Fen; ## 5411, 5413, 5418; wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus, sandy soil and rotting wood along the streamlet and on the bases of trees, in shade under trees.

Mud Lake Fen; # 3132, Salix sp. and Pentaphylloides floribunda thickets, on wet peaty soil in deep shade at bases of stems.

Beartooth Butte; # 5293, scattered sedimentary rock debris on slope, on a thick layer of humus on the bases of rocks, shaded by Picea engelmannii, forms admixture to Syntrichia ruralis.
Crazy Creek CG Swamp; ## 3186, 3187; swampy Picea glauca – P. engelmannii forest, on forest litter and decaying spruce cones covered with humus. S+ (# 3186).

Rd 167: swampy mixed forest; ## 6196-6198, swamp Picea glauca + Pinus contorta + Populus tremuloides + Alnus incana forest, on wet humus and litter at bases of trees, not abundant. S+.

Rd 801: swampy mixed forest; ## 6152, 6155, 6156, 6165; Picea glauca + Populus tremuloides forest, on wet rotting wood and humus, in shade; assoc.: Aulacomnium palustre, Leptobryum pyriforme, Plagiommion ellipticum, Sanionia uncinata.

Clark Forks of Yellowstone River-2; ## 5598, 5600; on humus soil and rotting wood under Picea sp., in shade.


139. Campyliadelphus chrysophyllus (Bridel) Kanda [Campylium chrysophyllum (Bridel) J. Lange]. 7700-8280 ft. A species widely distributed in arctic and boreal zones all across Holarctic; it normally occurs on rocks and soil, often temporarily wet, calcareous or otherwise mineral-rich habitats, at low to tree line elevations. In Wyoming, it’s rather common (Eckel, 2007; author’s data). The locations on the Beartooth Plateau are the first ones known in Park Co.

Ghost Creek Fen, ecotone zone; # 3756, on shaded forest floor of swampy Picea engelmannii forest, assoc.: Helodium blandowii.

Lily Lake Fen; ## 3053, 3055; vertical walls of ditch, on soaked peaty soil shaded by willows, assoc.: Fissidens bryoides.

Lily Lake East Fen (Heidel et al., 2008).

140. Campylium protensum (Bridel) Kindberg [Campylium stellatum var. protensum (Bridel) C.E.O. Jensen]. 9250 ft. A species distributed in most of Holarctic, occurring on mineral-rich wetland habitats, in swampy forests, also lake and stream shores, from low to high elevations. In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Sawtooth Lake; ## 5992, 5993; western boggy shore of the lake, shaded steep bank, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Plagiomnium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, P. cruda, Polytrichum juniperinum, Sanionia uncinata, Sciurohypnum latifolium.

141. C. stellatum (Hedwig) Lange & C.E.O. Jensen 6560-10400 ft. A species distributed in most of Holarctic, occurring on mineral-rich fens, lake and river shores; from low to high elevations. It is common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). On the Beartooth Plateau, it’s a widespread species.

Summits: alpine fen-4; # 3277, on wet peat around pool, in shade, assoc.: Blepharostoma trichophyllum, Polytrichastrum alpinum, Sarmentypnum sarmentosum.

Little Bear Creek-1; ## 2699, 2701; creek bank, on wet clay & sand in shade, under willows.
Little Bear Creek-3; # 5362, willow wetlands long the creek, on wet humus and peaty soil, in shade, abundant, assoc.: Sanonia uncinata, Sciuro-hypnum latifolium.

Little Bear Lake Fen-NW-08; # 2791, in low hummock, assoc.: Ditrichum sp., Polytrichum juniperinum, Sanonia uncinata.

Little Bear Lake Fen-SE-08; # 2869, on edge of Sarmentypnum exannulatum swale, partially immersed.

Clay Butte Fen; # 2995, Nuphar pool, not abundant, assoc.: Drepanocladus aduncus, Palustriella falcata, Tomentypnum nitens.

Beartooth Creek; ## 5436, 5437; moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay and humus, intermingled with the other Bryidae mosses.

Mud Lake Fen; ## 3101, 3104, 3105; floating mat, admixed to dominants: Calliergon giganteum & Scorpidium cossonii.

Meadow Lake Fens; 1) # 3761, semi-immersed in Sphagnum platyphyllum swales. 2) # 3793, forms small carpet at the edge of fen, in relatively mesic site, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Tomentypnum nitens.

Unnamed tributary of Sawtooth Lake; # 6064-6067; willow wetlands along the shore, on wet sandy soil beneath Salix sp., in shade, locally abundant, in pure mats and assoc.: Oncophorus virens, Sanonia uncinata.

Sawtooth Lake; 1) # 6004, northern shore of lake, moss-lined bank of stream, on wet sandy-clay soil covering granite outcrops, shaded by Salix sp., assoc.: Sanonia uncinata. 2) ## 6033, 6034; on wet sandy soil beside waterfall, beneath Salix sp. in shade.


142. *Conardia compacta* (Müll. Halle) H. Robinson [Amblystegium compactum (Drumm.) Aust.]. 6600 ft. A species with disjunctive-holarctic distribution; scattered locations in Europe, North America (except the most northern areas), Asia. In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Swamp Lake Fen & vicinity; ## 5141, 5145, 5147, 5149, 5155, 5163, 5171, 5183; (Pentaphylloides floribunda + Salix sp. –) Carex spp. – Bryidae and Schoenoplectus acutus – Drepanocladus aduncus + Conardia compacta communities, abundant on soaked peaty and marly soil, shaded by stands of grasses, sedges and shrubs; also froms admixture to the other Bryidae
mosses and Marchantia alpestris on wet grasslands adjacent to the fen and on shaded sides of scattered granite outcrops.


143. Cratoneuron filicinum (Hedwig) Spruce 6600-9500 ft. Widespread all across Holarctic; very common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). This species is abundant in wet sites in the subalpine forests, willow carrs, and fens (especially calcareous).

Creek SW of Beartooth Butte; 1) ## 3856, 3862, 3863, 3865, 3873, 3876, 3877; creek bank, on wet sandy-clay soil, partially shaded, assoc.: Marchantia alpestris, Drepanocladus aduncus, Palustriella falcata, Philonotis fontana s.l., Plagiothecium ellipticum. 2) # 3857, creek bank, on rotten Salix stem (covered with a thin layer of wet clay), above slow-flowing water of creek, in full shade under willows, assoc.: Amblystegium serpens.

Coniferous forest near Clay Butte Fen; ## 5398, 5417; wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet sandy-clay soil and humus along the creek, in shade under trees.

Clarks Fork of Yellowstone River-1; # 3146, Picea glauca forest, shaded gully, on wet clay beneath spruce, locally abundant, assoc.: Plagiochila porellioides, Brachythecium s.l., Timmia austriaca.

Clarks Fork of Yellowstone River-2; # 5597, bank of the river, on humus soil beneath Picea sp.

Little Bear Creek-2; ## 3235, 3257; creek bank, wet sandy-clay soil, shaded by willows, abundant, assoc.: Bryum sp. s.l., Palustriella falcata.

Willow Park; # 5593, montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, stream course, on wet clay, not abundant.

Swamp Lake Fen and vicinity; ## 5185-5188, 5190; stream at base of Cathedral Cliff, on wet marly substrate between granite boulders lining the stream, locally abundant, mostly in pure mats.

NE & N shore of Beartooth Lake; 1) ## 5240, 5243, 5249; Beartooth Creek, on underwater stones (sedimentary rock), semi-submerged in fast-flowing water, locally abundant. 2) # 5246, Salix planifolia – Carex spp. + Saxifraga odontholoma + Epilobium sp. – Bryidae, on soaked peaty soil.

Beartooth Butte; 1) # 5256, dry course of stream, on rotting wood. 2) # 5297, steep slope, edge of Picea engelmannii forest, on wet loam and litter along the streamlet, partially shaded by trees, assoc.: Ptychostomum pseudotriquetrum.

**144. Drepanocladus aduncus (Hedwig) Warnstorf** 6580-10500 ft. Common and widely distributed species of cold and temperate zones of both hemispheres. It grows on mineral-rich wetlands, eutrophic fens, shores, ditches, or occasionally submerged in pools and lakes, sometimes also in swampy forests, from low to high elevations. In Wyoming and adjacent states, it is very common species (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). On the Beartooth Plateau, D. aduncus is widespread and associated with a large number of species.

Creek SW of Beartooth Butte; 1) # 3865, on moist clay soil of creek bank, abundant, assoc.: Cratoneuron filicinum. 2) # 3874, immersed in the water of creek, in shade under willows, forms admixture to Philonotis fontana s.l.

Swamp Lake Fen & vicinity; 1) ## 5106, 5107, 5112, 5113, 5120, 5157-5159, 5165, 5168, 5170, 5173, 5176; Salix sp. (+ Pentaphyllloides floribunda) – Carex spp., on wet peaty soil all across the fen in proper community type, shaded by dense Carex stands, assoc.: Marchantia alpestris, Brachythecium salebrosum, Plagiomnium ellipticum, Ptychostomum pseudotriquetrum, etc. 2) ## 5189-5191; base of Cathedral Cliff, stream in Picea spp. forest, on wet marly substrate between granite boulders lining the stream, locally abundant, in pure mats or assoc.: Cratoneuron filicinum, Leptobryum pyriforme, Plagiomnium rostratum. 3) ## 5196, 5197; ecotone zone between calcareous fen and spruce forest; Picea engelmannii + Populus tremuloides – Bryidae community (swampy forest), on wet humus and litter, not abundant. 4) # 5209, Swamp Lake shore, hydrophilous community Lemna sp. + Typha latifolia + Polygonum amphibium + Carex spp., forms mats on vascular plants stems, semi-submerged and fully submerged, not abundant.

Mud Lake Fen; ## 3112, 3119, 3120; in deep shade beneath Salix sp. and Pentaphyllloides floribunda, on wet peat soil, assoc.: Aulacomnium palustre, Plagiomnium ellipticum.

Clay Butte Fen; 1) # 2995, on soaked peat soil around Nuphar pool, abundant, assoc.: Campylium stellatum, Palustriella falcata, Tomentypnum nitens; 2) # 2955, north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peaty soil, assoc.: Brachythecium salebrosum, Plagiomnium ellipticum; 3) ## 2973, 2975, 2976; north-west portion of fen, thickets of tall Salix sp., in deep shade under willows, in pure mats or assoc.: Aulacomnium palustre, Climacium dendroides, Plagiomnium ellipticum, Ptychostomum pseudotriquetrum. 4) # 3004, 2nd Nuphar pool, on soaked peaty soil, assoc.: Calliergon giganteum, Plagiomnium ellipticum.

Rd 167: swampy mixed forest; ## 6186, 6187, 6189, 6200; abundant on moist humus and peaty soil of swamp Picea glauca + Pinus spp. + Populus tremuloides + Alnus incana forest, assoc.: Marchantia alpestris, Plagiomnium ellipticum.

Rd 801: swampy mixed forest; ## 6158, Picea glauca + Populus tremuloides forest, on wet peaty soil.

Seepage slope along HWY 212; ## 6101, 6102; on wet loamy soil in shaded ditch, assoc.: Philonotis fontana s.l., Ptychostomum pallescens, Sanionia uncinata, Tortula obtusifolia.
Willow Park; ## 5559, 5563, 5564; montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, vertical wall of ditch, wet peaty soil, in partial shade, not abundant, assoc.: Marchantia alpestris, Brachythecium acutum, Plagiommnium ellipticum.

Beartooth Creek; ## 5451, 5452; moss-lined bank of creek, on wet clay between granite debris, assoc.: Chiloscyphus pallescens, Marchantia alpestris, Rhizomnium pseudopunctatum.

Wyoming Creek-2; # 4985; alpine Bryidae fen on seepage slope, in dry stream course, on peaty soil, locally abundant.

NE & N shore of Beartooth Lake; ## 5247, 5251; Beartooth Creek, Salix planifolia – Carex spp. – Bryidae community along the shore of creek, on soaked peaty soil, not abundant, assoc.: Conocephalum salebrosum.


Lily Lake East Fen, Little Moose Lake Fen (Heidel et al., 2008).

145. D. longifolius (Mitten) Brotherus ex Paris [Drepanocladius capillifolius (Warnstorf) Warnstorf, D. crassicostatus Janssens]. 6970-8900 ft. Widespread species in boreal regions of Holarctic and in mountains of South America (Ignatov, Ignatova, 2004); grows in nutrient-rich habitats, submerged in lakes and pools (sometimes periodically dry), slowly flowing brooks, periodically wet depressions in meadows, from low to high elevations. In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Willow Park; ## 5558, 5560; montane Salix sp. - Carex spp. – Bryidae fen, Carex sp. stands in water course; fully submerged and semi-submerged in still water, abundant; on soaked peaty soil of ditches, assoc.: Drepanocladius polygamus.

E shore of Beartooth Lake; ## 4846, 4849, 4851, 4853, 4854, 4856; small pool in willow wetlands, fully submerged along with Ranunculus aquatilis; Salix planifolia – Carex spp. – Bryidae fen, forms carpets, on soaked peaty soil, locally abundant, assoc.: Sphagnum platyphyllum.

146. D. polygamus (Bruch, Schimper & Gumbel) Hedenäs [Campylium polygamum (Bruch, Schimper & Gumbel) C. E. O. Jensen]. 6970-9850 ft. A species with wide bipolar distribution; occurs in nutrient-rich wetlands, fens, on shores, in ditches, or submerged in pools and lakes, in swampy forests; from low to high elevations. It is widespread on the Beartooth Plateau, but in the rest of Wyoming, it’s not been collected enough to estimate whether or not it is common.

Creek SW of Beartooth Butte; ## 3861, 3878; submerged in the water of creek, in shade under willow.

Ghost Creek Fen; 1) ## 3703-3705; forms small carpets in Eriophorum chamissonis – Drosera anglica – Bryophyta community, assoc.: Scorpidiunm cossonii. 2) # 3718, west edge of fen, Calamagrostis canadensis - Carex sp., on open roots and stem bases of graminoid plants, covered with a layer of moist peat, assoc.: Bryum sp. s.l.
Lily Lake Fen; ## 3057, 3063, 3078, 3083; forms very scattered cover on soaked peaty soil between Carex spp. hummocks, on boggy bank of lake and on steep banks of streamlets crossing the fen, in shade.

Mud Lake Fen; ## 3124, 3127; boggy shore, Typha latifolia community, on soaked peaty soil on bases of Typha stems.

Meadow Lake Fens; # 3823, Carex spp. carpets, on soaked peaty soil at sedge stem bases, in shade, assoc.: Aulacomnium palustre, Ptychostomum weigeli.

Clay Butte Fen; 1) # 2983, north-west portion of fen, Salix sp. thickets, on bare roots of Salix, in shade, on wet humus and peat, assoc.: Amblystegium serpens. 2) # 2942, decaying fallen tree at north-north-east edge of fen, on wet rotting wood with a layer of loam, assoc.: Aulacomnium palustre, Sanionia uncinata; 3) ## 2951, 2957, 2958, 2964, 2968; north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, forms pure mats on wet peaty soil or assoc.: Calliergon giganteum.

Willow Park; # 5558, montane Salix sp. - Carex spp. – Bryidae fen, Carex sp. stands in water course; fully submerged and semi-submerged in still water, abundant; on soaked peaty soil of ditches, assoc.: Drepanocladus longifolius.

Beartooth Creek; # 5436, moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay.

Canyon Creek; # 5674, broad boggy valley of creek, Carex spp. – Sphagnum squarrosum + S. platyphyllum fen along the widened portion of creek, in carpets on soaked peaty soil, shaded by dense Carex stands, not abundant.

Ghost Creek Fen (Heidel et al., 2008).

147. *Hygrohypnum bestii* (Renaud & Bryhn ex Renaud) Holzinger ex Brotherus 8900-10500 ft. A widespread across Holarctic; occurs attached to rocks which are inundated by water of flowing streams. In Wyoming, it’s known from quite a few locations representing many counties (Eckel, 2007; author’s data).

Little Bear Creek-3; ## 5320, 5332, 5334, 5380, 5386; attached to underwater sedimentary rocks, semi-submerged and fully submerged in the water of creek, locally abundant.

NE & N shore of Beartooth Lake; ## 5236-5239, 5241, 5242; Beartooth Creek, on underwater stones (sedimentary rock), semi-submerged in fast-flowing water, locally abundant.

E. Lawton’s collections: Rd. from Beartooth Lodge to Red Lodge, e. of Summit at 10500 ft., near small glacial lake, Lawton 1972 (WTU); Falls Creek near Silver Gate, E. Lawton 2118 (WTU); northwest side of Bear Tooth Lake, E. Lawton 2079 (WTU).

Pine forest along HWY 212; #4179, brook in the forest, on moist sandy-clay soil of brook bank, in shade, associated with Chiloscyphus pallescens.

Coniferous forest near Clay Butte Fen; #5411, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on wet humus and sandy soil along the streamlet, in shade under trees.

Beartooth Creek; #5425, granite debris along the creek, attached to boulders seasonally covered with fast-flowing water, locally abundant.

Beartooth Butte; #5257, dry course of stream, on wet loamy soil.

149. H. molle (Hedwig) Loeske 8900-10500 ft. Widely distributed Holarctic species, common in the Rocky Mountains. Attached to stones and soil banks of streams, inundated by water.

Unnamed tributary of Frozen Lake; #2643, on wet granite rocks inundated by rapid flowing water of stream, semi-submerged.

Sawtooth Lake: 1) #6001, 6006, 6009, 6010, 6012; northern shore of lake, moss-lined bank of stream, on wet sandy and humus soil on granite boulders of stream, abundant, in pure mats or with Hygrohypnum ochraceum. 2) #6057, creek on the western shore of lake, on granite underwater boulders, sandy and humus substrate, in pure mats.

Beartooth Creek; #5427, 5429; granite debris along the creek, attached to boulders seasonally covered with fast-flowing water, locally abundant, in pure mats or assoc.: Scouleria aquatica.

Wyoming Creek-2; #4984, 4986, 5016, 5017, 5060, 5067; head of creek, seepage slope; on granite boulders inundated by fast-flowing waters of creek, in splash zone or semi-submerged (or fully submerged), locally abundant, mostly in pure mats.

W. A. Weber’s collections: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], snowbeds, 3200 m.s.m., W. A. Weber B-44313 (RM, COLO).

150. H. ochraceum (Turner ex Wilson) Loeske 8900-10560 ft. Widely distributed Holarctic species, common in the Rocky Mountains. Relatively common in Wyoming, growing on wet rocks in subalpine and alpine streams and rivulets, associated with a large number of species (Eckel, 2007; author’s data).

Little Bear Creek-1; #2700, steep creek bank, on moist clay and sandy soil, in shade under graminoid plants.

Little Bear Creek-2; 1) #3234, 3240, 3266, 3267.1; semi-immersed in rapid-flowing water of creek, attached to granite boulders on creek bottom, abundant. 2) #3267, on moist clay and sandy soil of creek bank, assoc.: Pohlia wahlenbergii.

Little Bear Creek-3; #5322, 5366, 5368, 5369, 5371; on wet rocks lining the creek, also attached to underwater sedimentary rocks, semi-submerged, on sandy-clay and humus substrates, abundant all across this part of creek, in pure mats or assoc.: Dichodontium pellucidum, Plagiomnium ellipticum, Ptychostomum pseudotriquetrum.
E shore of Beartooth Lake; # 4836A; willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Ptychostomum pseudotriquetrum, Rhizomnium pseudopunctatum.

Beartooth Lake CG: wet subalpine meadow and fen; # 4906, on granite outcrop on the fen, facing to swale, locally abundant. S+(!)

Unnamed tributary of Frozen Lake; ## 2611, 2621, 2622, 2647; on seepage slope, attached to underwater granite boulders of stream, on rocky and sandy-clay substrates, fully submerged, abundant.

Little Bear Lake Fen, NW-08 & 09; 1) ## 2796, 2809, 2812; in shade between Carex scopulorum hummocks, assoc.: Dichelyma falcatum, Mnium sp. s.l. 2) # 2815, on soaked peat of swale flats, associated with Polytrichastrum alpinum. 3) # 2786, shaded streamlet bank, on wet peat, assoc.: Scapania subalpina; 4) ## 2843, 5625; shaded walls of ditch, on wet clay, assoc.: Marchantia alpestris, Aulacomnium palustre, Dichelyma falcatum, Philonotis fontana s.l., Polytrichastrum alpinum, Sanionia uncinata. S+ (# 2812).

Wyoming Creek-1; # 3487, attached to underwater granite rocks of stream, almost fully submerged.

Unnamed tributary of Sawtooth Lake; # 6070, granite boulders along the shore in the splash zone of creek, on wet clay, in shade, assoc.: Ptychostomum pseudotriquetrum.

Sawtooth Lake; 1) ## 5979, 5987; western boggy shore, shaded steep bank of lake, on wet sandy-clay soil. 2) ## 5998-6001, 6008, 6013, 6014; northern shore, moss-lined bank of stream, on wet sandy-humus soil on granite boulders of stream, abundant, in pure mats or with Hygrohypnum molle. 3) # 6041, northern shore, creek near waterfall; on underwater granite boulders, assoc.: Dichelyma falcatum. 4) ## 6056, 6063, creek on the western shore of lake, on granite underwater boulders, wet sandy and humus substrate, in pure mats and assoc.: Oncophorus virens.

Creek connecting Dollar & Sawtooth Lakes; # 5795, willow wetlands along the creek, granite boulders along the creek bank, on wet peaty soil.

Canyon Creek; 1) # 5649, broad boggy valley of creek, Salix sp. – Carex spp. – Bryidae fen along the creek, abundant on soaked peaty soil. 2) # 5678, steep walls of stream bank, on wet peaty soil, in shade under willows, locally abundant.


Sawtooth Palsa Fen (Heidel et al., 2008).

151. Palustriella decipiens (De Notaris) Ochyra [Cratoneuron decipiens (De Notaris) Loeske]. Holarctic species with predominating montane distribution; occurs in calcium-rich habitats, springs and on wet rocks; from low to high elevations. An infrequent species in Wyoming. On Eckel (2007), it’s known from several occurrences in Albany, Park, & Teton Cos.

**152. P. falcata (Bridel) Hedenäs**  
*Cratoneuron commutatum var. falcatum (Bridel) Mönkemeyer, Cratoneuron falcatum (Bridel) G. Roth*. 6600-9500 ft. Holarctic species with very wide distribution; common in Wyoming. It occurs in calcium-rich habitats, springs and on wet rocks; from low to high elevations.

Creek SW of Beartooth Butte; 1) ## 3856, 3858, 3860, 3863, 3880; creek bank, on soaked sandy-clay soil, partially shaded, assoc.: Marchantia alpestris, Cratoneuron filicinum, Philonotis fontana s.l., Plagiomnium ellipticum, Ptychostomum pseudotriquetrum. 2) # 3875, creek bank, on wet peat soil inundated by running water of stream, forms admixture to Plagiomnium ellipticum.

Little Bear Creek-2; 1) # 3235, creek bank, wet clay soil, abundant, assoc.: Cratoneuron filicinum, Bryum sp. s.l. 2) ## 3264, 3265; on granite boulders along creek, inundated by fast-flowing cold water of creek, immersed, abundant.

Clay Butte Fen; ## 2990, 2995, 2998; in swale beside the Nuphar pool, abundant, assoc.: Campylium stellatum, Drepanocladus aduncus, Tomentum nitens.

Coniferous forest near Clay Butte Fen; # 5396, wet Pinus contorta + Picea glauca + P. engelmannii – Salix sp. + Ribes sp. forest along unnamed creek, on wet sandy-clay sunstrate on granite outcrops lining the creek, in shade under trees.

Willow Park; 1) # 5557, montane Salix sp. - Carex spp. – Bryidae fen, on wet peaty soil, abundant. 2) # 5596, streamlet bank, on wet clay.


® **153. Pseudocalliergon angustifolium Hedenäs**  
10100-10580 ft. Rare species with distribution in mountainous western North America and the Arctic. Its range includes Greenland, North America (Alta., B.C., N.W.T., Nunavut, Yukon, Alaska, Calif., Colo., Wyo.) northern Europe, eastern part of Russia (Chukotskiy Peninsula), Atlantic Islands (Iceland). The species occurs in forested and open habitats, rich fens or shallow, wet depressions on lime-rich ground, sometimes in or close to late snow-bed vegetation, from low to high elevations (Hedenäs, Miller, 2000). According to L. Hedenäs (personal comm.), in North America, P. angustifolium is known from relatively few collections, including those from Medicine Bow Mountains of south-eastern Wyoming (F. J. Hermann, 1962). The species was omitted in P. Eckel’s list (Eckel, 2007); collections that we are citing here serve to “reinstate” this species in Wyoming flora.

Summits: alpine fen-3; # 2491, Salix sp. – Aulacomnium palustre, peaty soil, not abundant.
Wyoming Creek-2; # 4968, head of creek, alpine Bryidae fen on seepage slope; in carpets on soaked peaty soil, forms admixture to Pseudocalliergon turgescens and Sarmentypnum sarmentosum.

Unnamed tributary of Frozen Lake; ## 2542, 2544, 2564, 2570; seepage slope, on soaked peaty soil in alpine moss fen, semi-submerged in the water of pool, locally abundant, in pure mats. # 2570 det. by L.Hedenas.

® 154. P. turgescens (T. Jensen) Loeske [Scorpidium turgescens (T. Jensen) Mönkemeyer, Calliergon turgescens (T. Jensen) Kindberg]. 10580-10660 ft. Rare arctic-alpine species with general distribution in Greenland, North America (Alta., B.C., Man., Nfld., N.W.T., Nunavut, Ont., Que., Yukon; Alaska, Colo., Mich., Minn., Mont., Wyo.), South America (Bolivia, Peru), Eurasia, Africa; occurs in mostly open habitats, lime-rich wetlands, small fens, depressions in soil or on flat limestone rocks, along rills or on rocks flushed with calcium-rich water, more rarely submerged in small lakes or pools; from low to high elevations (Hedenäs, Miller, 2000). In Montana, it’s listed as a species of conservation concern, with status G3G5S1 (Montana Field Guide, ...). In Wyoming, it’s known from two locations (see below).

Wyoming Creek-2; ## 4951-4953, 4968, 4969; head of creek, alpine Bryidae fen on seepage slope; forms carpets on soaked peaty soil along streamlet, locally abundant, in pure mats or assoc.: Pseudocalliergon angustifolium, Sarmentypnum sarmentosum.


NB Reliable identification of S. georgico-uncinata is problematic without sporogones, but unfortunately plants with sporogones are rare. In three specimens from the Beartooth Plateau, sporogones are in presence: Summits – alpine fen-5: # 3430; Littlerock Creek Fen: # 3558; Sawtooth Palsa Fen: # 5752.

Summits: alpine fen-1; # 2294, in hummocks on wet peaty soil along pools; cf.

Summits: alpine fen-3; # 2500, on peat soil in dry course of stream, assoc. Ptychostomum sp.; cf.
Summits: alpine fen-4; 1) ## 3268, 3269, 3290; fen along streamlet, peaty bank of alpine pools, assoc.: Barbilophozia hatcheri, Aulacomnium palustre, Brachythemium udum, Climacium dendroides, Pohlia nutans, Polytrichastrum alpinum; cf. 2) # 3310, abundant along the perimeter of pool, assoc.: Blepharostoma trichophyllum & other liverworts, cf. 4) ## 3273, 3274; at margins of streamlet, late snowbed, in shade, abundant, assoc.: Plagiomnium ellipticum, Ptychostomum pseudotriquetrum, cf.

Summits: alpine fen-5; 1) # 3407, on wet sandy-clay soil near alpine pool, assoc.: Pohlia sp. cf. 2) ## 3421, 3429, 3430, 3432, 3449, 3451, 3460; soaked peaty soil, in pure mats and with Plagiomnium ellipticum, Polytrichum juniperinum, Sarmentypnum exannulatum, S. sarmentosum. S+! (# 3430).

Summits: wet alpine meadow & fen; 1) # 3397, ecotone zone between alpine meadow and moss fen; on wet peaty soil, assoc.: Sarmentypnum exannulatum; cf. 2) # 3398, alpine meadow, wet humus, assoc.: Scapania sp., Polytrichum juniperinum; cf.

Unnamed tributary of Frozen Lake; ## 2557, 2560, 2600, 2608, 2626, 2630, 2654; on soaked peaty soil and wet clay along streamlets, in depressions of alpine moss fens, on snow patch margins; sporadically all across seepage slope, in pure mats or assoc.: Brachytheciaceae spp., Polytrichastrum sexangulare, Polytrichum juniperinum; cf.

Littlerock Creek Fen; ## 3558, 3561, 3564, 3569, 3597, 3602, 3612; Salix planifolia – Bryidae hummocks on wet peaty soil, rather abundant, mostly in pure mats. S+! (# 3558).

Wyoming Creek-2; 1) ## 4964, 4966, 4973, 4975, 4992, 5000, 5001; alpine Bryidae fen on seepage slope; forms carpets and low hummocks on soaked peaty soil along streamlets, locally abundant, in pure mats or assoc.: Meesia uliginosa, Plagiomnium ellipticum, Polytrichastrum alpinum, Sarmentypnum sarmentosum; cf. 2) ## 5026, 5027, 5034, 5043, 5046; vertical moss-lined bank of stream, on wet sandy, humus and peaty soil, in shade, abundant, assoc.: Lophozia wenzelii, Pohlia cruda, Polytrichastrum alpinum, etc.; cf.

Sawtooth Palsa Fen; 1) # 5696, granite outcrop in swale, on wet peaty soil, assoc.: Polytrichastrum alpinum; cf. 2) ## 5717, 5723, 5724, 5725; Carex sp. – Bryidae community, in carpets, assoc.: Aulacomnium palustre, Polytrichastrum alpinum; cf. 3) # 5752; Salix sp. - Sphagnum warnstorfi, on wet peaty soil. S+! 4) # 5735, stream crossing the fen, on wet clay of bank beneath Salix sp., assoc.: Plagiothecium denticulatum; cf.

156. S. uncinata (Hedwig) Loeske [Drepanoclados uncinatus (Hedwig) Warnstorf]. 6590-10680 (?) ft. (at high elevations sterile plants are easy to confuse with S. georgico-uncinata). Widely distributed and abundant species in the Arctic and boreal zone of Northern hemisphere; it occurs from the sea level to high up in the alpine region, both in forests and in more open habitats, on rocks, logs, stumps, trees, soil or (especially in the north) in mires (Hedenäss, 2000; Ignatov, Ignatova, 2004). One of the most common species of this portion of the Rocky Mountains (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data), associated with a large number of the other bryophytes. On the Beartooth Plateau, it is a widespread species.
Boggy shore of Island Lake; ## 2358, 2359, 2365; moss fen, in ditch, wet peaty soil, assoc.: Aulacomnium palustre, Blindia acuta.

Lake Creek CG: wet coniferous forest; 1) # 5901, Picea glauca(+) – Rubus parviflorus – Linnaea borealis, in low hummock, humus soil, in partial shade beneath trees. 2) ## 5902, 5905; along creek, on humus over granite boulders, in shade, assoc.: Climacium dendroides.

E shore of Beartooth Lake; ## 4835, 4837, 4841; willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Sciurohypnum latifolium.

Pine forest along HWY 212; 1) ## 3898, 3911; in shade beneath trees, on wet rotting Picea logs beside brook, abundant, assoc.: Lophozia sp., Brachythecium sp. s.l., Bryaceae spp. 2) ## 3902, 3904, 3913, 3916; brook bank, on wet clay and sandy soil, in shade, assoc.: Chiloscyphus pallescens, Mnium blyttii, Timmia austriaca.

Ghost Creek Fen; # 3685, ecotone zone of Picea engelmannii (+ P. glauca) forest and Drosera anglica - Sphagnum warnstorfii fen, on wet peaty soil, assoc.: Straminergon stramineum.

Two lakes along HWY 212; 1) ## 2657, 2677; steep bank of lake, on moist humus, in partial shade, assoc.: Scapania sp., Aulacomnium palustre, Philonotis fontana s.l., Pohlia sp., Straminergon stamineum; cf. 2) # 2671, swamp Picea engelmannii forest on the lake shore, on wet loamy soil, assoc.: Scapania sp., Aulacomnium androgynum, Dicranaceae spp., Straminergon stamineum; cf.

Little Bear Lake Fen-SW-08: 1) # 2791, 2841; hummocks, on dry peaty soil, assoc.: Aulacomnium palustre, Campylium stellatum, Dicranum scoparium, Ditrichum sp., Polytrichum juniperinum. 2) # 2803, 2843; shaded ditch walls, on wet peaty soil, assoc.: Marchantia alpestris, Aulacomnium palustre, Dichelyma falcatum, Hygrohypnum ochraceum, Philonotis fontana s.l., Polytrichastrum alpinum. 3) # 2801, in hollow between Carex scopulosa –Aulacomnium palustre hummocks in shade, assoc.: Rhizomnium pseudopunctatum, Sciurop-hypnum latifolium.

Lily Lake Swamp Forest; ## 3023, 3043; Picea glauca + Pinus contorta forest, on wet rotting wood, in shade, assoc.: Brachythecium sp. s.l.

Lily Lake Fen: 1) # 3093, between sedge hummocks, on wet bare peat, assoc.: Distichium capillaceum. 2) # 3067, lake shore, on rotting Picea trunk, assoc.: Polytrichum juniperinum; 3) # 3089; hygrophilous Bryidae community on boggy shore of lake, on wet peaty soil.

Meadow Lake Fens; # 3784, near the pool, Salix planifolia thickets, assoc.: Climacium dendroides.

Clay Butte Fen; 1) # 2946, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peat soil; 2) ## 2938, 2939, 2942; decaying fallen tree at north-north-east edge of fen, on wet rotting wood, forms admixture to Aulacomnium palustre, Drepanocladus polygamus; 3) # 2971, north-west portion of fen, thickets of tall Salix sp. beside the HWY 212, wet humus on willow roots, in deep shade.
Wyoming Creek-1; 1) ## 3464, 3491; sandy bank of creek, on moist sand, in partial shade under willow, abundant; cf. 2) ## 3465, 3469, 3472, 3473, 3480, 3482, 3485, 3486; vertical bank of creek, on wet clay, in shade, assoc.: Scapania sp., Aulacomnium palustre, Dicranum spadiceum, Philonotis fontana s.l., Plagiommium ellipticum, Polytrichastrum alpinum, Polytrichum juniperinum; cf. (sporogones are absent; possible confusion with S. georgico-uncinata).

Clarks Fork of Yellowstone River-1; ## 3146, 3150, 3151; Picea glauca forest, shaded gully, on wet clay, assoc.: Plagiochila porelloides, Brachythecium sp. s.l., Cratoneuron filicinum, Timmia austriaca, and in Picea engelmannii – Alnus incana community, beneath trees, assoc.: Pleurozium schreberi, Timmia austriaca.

Clarks Fork of Yellowstone River-2; # 5600, on humus soil of bank under Picea sp., in shade.

Little Bear Creek-2; 1) # 3237, moist sandy soil of creek bank, abundant, assoc.: Sciuro-hypnum latifolium; 2) ## 3262, 3263; soaked clay along the creek, assoc.: Dichodontium pellucidum, Philonotis fontana s.l.

Little Bear Creek-3; ## 5326, 5362; moss-lined bank of creek, in shade, on wet humus and peat, assoc.: Campylium stellatum, Rhizomnium pseudopunctatum, Sciuro-hypnum latifolium.

Beartooth Lake CG: coniferous forest; # 6207, ecotone zone between willow wetlands (southeastern shore of lake) and upland community of Picea engelmannii + Pinus contorta forest; on wet peaty soil, assoc.: Sciuro-hypnum latifolium.

Rd 801: swampy mixed forest; ## 6152, 6154, 6164; Picea engelmannii + Populus tremuloides forest, on wet rotting wood, humus and peaty soil, assoc.: Amblystegium serpens, Aulacomnium palustre, Plagiommium ellipticum, Tomentypnum nitens.

Muddy Creek; ## 6123, 6144; wet Picea glauca + P. engelmannii forest on creek shore, on wet clay on creek bank, on litter and rotting woods in the forest, in partial shade under trees; assoc.: Timmia austriaca.

Seepage slope along HWY 212; # 6101, on wet loamy soil in shaded ditch, assoc.: Drepanocladus aduncus, Philonotis fontana s.l.

“Dichelyma creek”; # 6090, on sandy-clay soil along boggy shore of creek, in shade beneath sedges.

Unnamed tributary of Sawtooth Lake; # 6065, willow wetlands along the shore, on wet sandy soil beneath Salix sp., in shade, assoc.: Campylium stellatum.

Sawtooth Lake; 1) ## 5970, 5990; Salix sp. – Sphagnum fen along western shore, on wet peaty soil in shade; assoc.: Aulacomnium palustre, Breidleria pratensis. 2) # 5992, same shore, shaded steep bank of lake, on peaty soil and wet clay, assoc.: Aulacomnium palustre, Campylium protensum, Plagiommium ellipticum, Plagiothecium denticulatum, Pohlia bolanderi, P. cruda, Polytrichum juniperinum, Sciuro-hypnum latifolium. 3) # 6002, northern shore of lake, moss-lined bank of stream, on wet peaty soil on granite boulders of stream, assoc.: Sphagnum warnstorffii,
Straminergon straminereum. 4) ## 6003, 6004; same bank of stream, on wet sandy-clay soil, shaded by Salix sp., assoc.: Campylium stellatum, Oncophorus virens. 5) # 6061, creek on boggy western shore of lake, on wet granite boulders lining the creek, assoc.: Ptychostomum pseudotriquetrum.

Lake Creek Waterfalls; # 5824, humus in shade under Picea glauca, in splash zone of waterfall, assoc.: Mnium marginatum.

Index Creek; ## 5497, 5518; Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, rotting wood, humus and litter, assoc.: Dicranum sp., D. polysetum, Mnium spinulosum.

Willow Park; # 5568, montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, wet peaty soil, in partial shade, not abundant.

Coniferous forest near Clay Butte Fen; # 5402, wet Pinus contorta + Picea spp. – Salix sp. + Ribes sp. forest along unnamed creek, on humus and rotting wood, in shade under trees, assoc.: Brachytheciastrum collinum, Mnium arizonicum.

Beartooth Creek; 1) ## 5436, 5437; moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay, intermingled with the other Bryidae mosses. 2) # 5463, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Marchantia alpestris, Brachythecium rivulare, Climacium dendroides, Plagiomnium ellipticum, Rhizomnium pseudopunctatum, Sciuro-hyphnum latifolium.

Swamp Lake Fen & vicinity; 1) # 5146, Pentaphylloides floribunda + Salix sp. – Carex spp. – Bryidae; on wet peaty soil in hummocks, sporadically all across the edge of fen, in the ecotone zone between fen and Picea spp. + Pseudotsuga menziesii (+ Populus tremuloides) forest. 2) ## 5201, 5202; north foothills of Cathedral Cliff, Picea spp. forest along the trail, on loamy soil, at base of granite outcrop, in shade.

Canyon Creek; # 5682, broad boggy valley of creek, Salix sp. – Carex spp. – Bryidae fen along the creek, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Sciuro-hyphnum latifolium.


Swamp Lake Fen, Meadow Lake North Fen (Fantan North Fen), Littlerock Creek Fen (?-YeKA. Possible confusion with Sanionia georgico-uncinata); Sawtooth Palsa Fen (?-YeKA. Possible confusion with S. georgico-uncinata) (Heidel et al., 2008).

157. Scorpidium cossonii (Schimper) Hedenäs [Drepanoclados intermedius (Lindberg) Warnstorff, Limprichtia cossonii (Schimper) L.E. Anderson]. 6560-9600 ft. Holarctic, predominantly arctic-alpine species with some relict populations on bogs in plain (Ignatov,
Ignatova, 2004); common in regions with calcium-rich soils or bedrock, often grows in eutrophic fens, springs, periodically water-filled depressions, shores, sometimes submerged. Common in Wyoming (Eckel, 2007; author’s data).

Little Bear Lake Fen-NW-08: 1) # 2778, in Carex scopulorum – Aulacomnium palustre + Sphagnum hummocks, forms admixture, assoc.: Aulacomnium palustre, Sarmentypnum exannulatum. 2) # 2798, shaded ditch walls, on wet peat soil.

Ghost Creek Fen; ## 3688, 3703; on soaked peat in Carex limosa – Drosera anglica – Sphagnum warnstorfii community, also forms carpet on “Eriophorum island”, assoc.: Drepanoclados polygamus.

Clay Butte Fen; 1) ## 2985, 2987, 3012, 3017; Nuphar pool, on soaked peat soil, partially submerged, abundant, assoc.: Calliergon giganteum. 2) # 3000, on south-west edge of fen, Carex limosa stands, assoc.: Calliergon giganteum. 3) # 3011, 2nd Nuphar pool, on soaked peat soil, semi-submerged in water of pool.

Mud Lake Fen; ## 3095, 3098, 3101, 3105, 3106, 3123, 3128; floating mat at the margin around the lake, Carex lasiocarpa – Menyanthes trifoliata – Scorpidium cossonii + Calliergon giganteum, on soaked peat soil, abundant, assoc.: Calliergon giganteum, Campylium stellatum, Ptychostomum pseudotriquetrum.


Swamp Lake Fen, Clay Butte Fen, Ghost Creek Fen, Lily Lake East Fen, Little Moose Lake Fen (Heidel et al., 2008).

158. **S. revolvens (Swartz ex Anynomo) Rubers in A. Touw & W. V. Rubers**

*Drepanoclados revolvens (Swartz ex Anynomo) Warnstorf, Limprichtia revolvens (Swartz ex Anynomo) Loeske*. 9600-10400 ft. Bipolar species known in Southern Hemisphere from New Zealand, islands of the Antarctic, mountains of South America; in Holarctic, this species is predominantly arctic-alpine (Ignatov, Ignatova, 2004); it’s more or less common except in regions with strongly calcium-rich soils or bedrock in the boreal and Arctic zones, farther south mainly in mountainous areas, intermittently mineral-rich and often spring-influenced fens, small periodically water-filled depressions, shores or, more rarely, submerged (Hedenäs, 2008). *S. revolvens*, a beautiful dark purple-blackish species of alpine fens and tundra pools, is infrequent in Wyoming. Until recently, it was known only from a few locations of the Big Horn Mountain, Wind River Range (Eckel, 2007) and Sheep Mountains (the author’s data). Occurrences on the Beartooth Plateau are the first ones known in Park Co. In Montana, *S. revolvens* is listed as a species of conservation concern, with status G4G5S2 (Montana Field Guide, …).
Summits: alpine fen-4; # 3271, on soaked peat around the pool, assoc.: Breidleria pratensis, Polytrichastrum alpinum, Sarmentypnum sarmentosum, not abundant.

Little Bear Lake Fen-SE-09; ## 5638, 5640; in shallow swales, locally abundant, assoc.: Sarmentypnum exannulatum, Sphagnum platyphyllum.

159. *S. scorpioides* (Hedwig) Limpricht 6560-6600 ft. Widely distributed in the Arctic and in northern part of boreal zone. Common in many areas in the north, and in the Arctic, rich or intermediate habitats in fens, pools, lake shores or submerged in lakes; 0--3550 m. General distribution includes Greenland, North America (Alta., B.C., Nfld., Man., N.B., Nfld., N.W.T., Nunavut, N.S., Ont., Que., Yukon; Alaska, Colo., Conn., Ind., Maine, Mich., Minn., Mont., Utah, Vt., Wis., Wyo.), South America, Eurasia, Australia. (Hedenas, 2008). In Montana, it is a rare species restricted to calcareous seeps and fens, and included to the list of species of conservation concern with status G4G5S2 (Elliott, 1993; Montana Field Guide, …). It’s also infrequent in Wyoming. In the study area, it’s known only from Swamp Lake Fen - listed sites below are located within it.


**Calliergonaceae**

160. *Calliergon cordifolium* (Hedwig) Kindberg 6600-9400 ft. Widely distributed in Holarctic, frequent in arctic and boreal zones; grows in wet and swamp coniferous and mixed forests, on wet meadows and graminoid fens, in shrub wetlands along streams and lakes (Ignatov, Ignatova, 2004). In Wyoming, it’s distributed sporadically (Eckel, 2007; author’s data).

Beartooth Creek; # 5468, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet peaty soil.

Canyon Creek; # 5671, broad boggy valley of creek, (Salix planifolia –) Carex spp. – Sphagnum spp. fen along the widened portion of creek, not abundant in low hummocks on wet peaty soil, shaded by dense Carex stands, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Ptychostomum weigelii, Sphagnum riparium.


161. *C. giganteum* (Schimper) Kindberg 6560-8980 ft. Widely distributed and abundant species in arctic and boreal zones of Holarctic, southward becoming a component of bogs and mountain communities; occurs in open habitats of bogs and fens, on boggy shores of lakes, in wet
meadows, on rocks along rivers and streams (Ignatov, Ignatova, 2004). In Wyoming, it’s a sporadically distributed species (Eckel, 2007; author’s data). Locations on the Beartooth Plateau are the first ones known in Park Co.

Mud Lake Fen; 1) # 3107, Carex lasiocarpa + Menyanthes trifoliata – Bryidae; forms carpets on soaked peat, assoc.: Scorpidium cossonii. 2) ## 3095, 3101, 3105, 3106, in floating mats, abundant, assoc.: Campylium stellatum, Scorpidium cossonii. 3) # 3128, on wet peaty soil in floating mats, assoc.: Ptychostomum pseudotriquetrum, Scorpidium cossonii.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4857, 4858, 4863; Carex spp. – Bryidae fen, on soaked peaty soil, locally abundant.

Clay Butte Fen; 1) ## 2985, 3012, 3014, 3017; on soaked peat soil, forms carpets around Nuphar pools in west-central portion of fen, partly submerged, abundant, associated with Scorpidium cossonii. 2) # 3000, south-west edge of fen, Carex limosa stands, assoc.: Scorpidium cossonii. 3) ## 2949, 2949, 2954, 2964; north-north-east portion of fen, Salix planifolia - Carex aquatilis, beneath willow, in shade, on wet and soaked peaty soil, in pure mats or assoc.: Amblystegium serpens, Climacium dendroides, Drepanocladus polygamus, Sarmentypnum exannulatum. 4) ## 2972, 2978; north-west portion of fen, thickets of Salix sp., in shade, on soaked peaty soil; 8) ## 3004, 3008; 2nd Nuphar pool, on soaked peat soil, assoc.: Drepanocladus aduncus, Plagiommium ellipticum.

E shore of Beartooth Lake; ## 4854, 4856; Salix planifolia – Carex spp. – Bryidae fen, forms admixture to mosses of carpets and low hummocks, on soaked peaty soil, not abundant.


Clay Butte Fen (Heidel et al., 2008).

® 162. **C. richardsonii** (Mitten) Kindberg 9600 ft. Predominantly arctic and subarctic species rarely found in boreal zone and in mountains southward; it grows almost exclusively on minerotrophic fens (Ignatov, Ignatova, 2004). In Montana, it’s rare and listed as a species of conservation concern with status G4S1 (Elliott, 1993; Montana Field Guide, …). In P. Eckel’s list (2007), the species was indicated for Wyoming under question mark with the reference to Crum & Anderson (1981) who mentioned a report from Wyoming but did not see a specimen. During 2007-2009 bryological work in Wyoming, the author found this rare species only twice: once on the Medicine Bow Mountains and the other time on the Beartooth Plateau, both at high elevations. Earlier, the species was mentioned also by M. Lenz for subalpine fens in the Bighorn Mountains of Wyoming (Lenz, 2006).

Little Bear Lake Fen-SE-08: # 2887, in low hummocks, forms admixture to Breidleria pratensis, not abundant.
163. Sarmentypnum exannulatum (Schimper) Hedenäs [Drepanocladium exannulatum (Schimper) Warnstorf, Warnstorffia exannulata (Bruch & Schimper) Loeske]. 6600-10750 ft. An extremely variable bipolar species, widely distributed and abundant in arctic and boreal zones, southward penetrating in mountains of Mexico, Himalayas, East Africa (Ignatov, Ignatova, 2004). It grows in intermediately mineral-rich fens, often around springs or in late snow-beds, also submerged in lakes, pools and swales; from low to high alpine elevations. In Wyoming and adjacent states, it is very common (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). One of the most widespread mosses on the Beartooth Plateau.

Summits: alpine fen-1; # 2306, on soaked peaty soil in pools, abundant, assoc.: Sarmentypnum sarmentosum. Det. by L. Hedenäs.

Summits: alpine fen-5; ## 3405, 3406, 3409, 3410, 3412, 3421, 3423-3426, 3428, 3440, 3443, 3446, 3454; in still water of shallow pools, semi-immersed and fully submerged, and around pools on soaked and wet peaty soil, forms carpets, very abundant, in pure mats or assoc.: Sarmentypnum sarmentosum.

Summits: wet alpine meadow & fen; # 3397, ecotone zone between alpine meadow and moss fen; on wet peaty soil, assoc.: Sanionia georgico-uncinata.

Little Bear Creek-2: # 3233, granite boulders of creek bottom, inundated by rapid-flowing water, on a layer of sand, semi-immersed, abundant.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4868, 4873, 4875, 4878, 4880, 4888, 4896, 4898, 4907; Carex spp. – Bryidae fen, on soaked peaty soil, very abundant all across the fen.

Two lakes along HWY212; # 2658, fully submerged in stagnant water of the bigger lake, locally abundant.

Little Bear Lake Fen-NW – 08 & 09; 1) ## 2760, 2781, 2782, 2785, 2787, 2789, 2790, 2792, 2802, 2804, 2810, 2811, 2813, 2836, 2845, 2848, 2852; in Carex utriculata + Carex spp. – Sarmentypnum exannulatum swales, submerged, very abundant, assoc.: Sarmentypnum sarmentosum, abundance of Pinnularia and other diatoms. 2) ## 2778, 2795, forms low hummocks and carpets in Carex scopulorum – Bryidae community, assoc.: Scapania sp., Aulacomnium palustre, Sarmentypnum sarmentosum, Scorpidium cossonii. 3) # 2800, on the bottom of ditch, peat soil, assoc.: Aulacomnium palustre. 3) ## 2814, 2817, 2818, 2820; on swale flats with Carex scopulorum, soaked peat, forms admixture to Dichelyma falcatum & Sphagnum platyphyllum. 4) # 2797, roadside of HWY 212, wet peaty soil, assoc.: Ceratodon purpureus, Polytrichum juniperinum. 5) # 2839, north-west side of HWY 212, in swale, submerged, assoc.: Sarmentypnum sarmentosum. 6) # 2835, on low hummock in association with Cephalozia pleniceps & Straminergon stramineum. 7) # 2853, in pure mat, shallow swales. 8) # 2846, in still water of deep swales, fully submerged and floating. 9) # 5616, on soaked peaty soil in carpets, in shade beneath Salix sp., locally abundant, assoc.: Tayloria lingulata. 10) ## 5621, 5622; west edge of fen, floating in pool. 11) # 5629, in swale approx. 20 m of the road, fully submerged, abundant.
Little Bear Lake Fen—SE – 08 & 09; 1) ## 2859, 2865, 2871, 2876, 2891, 2894, 2902, 2903, 2906; floating, fully- and semi-submerged in swales all across south-east part of fen. 2) ## 5638, 5640, 5641; in shallow swales, locally abundant, assoc.: Scorpidium revolvens, Sphagnum platyphyllum.

NB Specimens ## 2789, 2846, 2859, 2871 represent a form with more or less longly excurrent costa; leaf morphology strongly suggests Arctic Sarmentypnum tundrae (Arnell) Hedenäs. Similar form was found in pools and swales of Sawtooth Meadow and Meadow Lake fens (see below).

Ghost Creek Fen; 1) # 3736, in low hummocks, forms admixture to Sphagnum warnstorfii. 2) # 3702, floating mat, forms admixture to Sphagnum squarrosum & S. warnstorfii.

Clay Butte Fen; 1) ## 3006, 3009; submerged in Nuphar pool, assoc.: Aulacomnium palustre, Straminergon stramineum; 2) ## 2943, 2949, 2961; north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peaty soil, in pure mats or assoc.: Amblystegium serpens, Calliergon giganteum, Climacium dendroides; 3) # 2979, north-west portion of fen, thickets of Salix sp., in shade under willows, soaked peaty soil. 4) # 3018, 2nd Nuphar pool, on soaked peat soil, semi-submerged in still water of pool.

Littlerock Creek Fen; ## 3548-3552, 3562, 3603, 3642, 3661, 3665; submerged and semi-submerged, forms carpets along streamlets crossing the fen and in swales, very abundant, in pure mats or with Sarmentypnum sarmentosum.

Meadow Lake Fens; 1) ## 3801, 3812, 3814, 3815, 3825, 3827, 3828; abundant at the margins of deep swales; partly and fully submerged; # 3827 represents a form with longly excurrent costa. 2) # 3803, forms carpets in shallow swales, assoc.: Philonotis fontana s.l. 3) ## 3776, 3777; Salix planifolia thickets at the margin of swale; in swale, in shade under willow, submerged.

Mud Lake Fen; ## 3108, 3113, 3115; at bases of Carex spp. hummocks, on soaked peaty soil.

Wyoming Creek-1; ## 3462, 3466, 3467; stream bank, sandy-clay soil inundated by stream water; in pure mats or forms admixture to Philonotis fontana s.l.

Wyoming Creek-2; ## 4954, 4984, 4994, 4996, 4997, 4999, 5002, 5005, 5025, 5080-5082, 5094, 5099; alpine Bryidae fen on seepage slope; forms carpets on soaked peaty soil along streamlet; fully and semi-submerged in slow-flowing water of streamlets and stagnant water of pools; along the shores of lakes in the valley of creek, very abundant all across the upper and middle stream of creek, mostly in pure mats (in pools) or assoc.: Hygrohypnum molle, Sarmentypnum sarmentosum, Straminergon stramineum.

Sawtooth Meadow; 1) # 5766, boggy valley of unnamed creek, on soaked peaty soil along pool, forms admixture to Hypnum lindbergii. 2) ## 5764-5765; semi-submerged and fully submerged in water of pool, locally abundant, assoc.: Sphagnum platyphyllum; a form with longly excurrent costa.

Sawtooth Palsa Fen; ## 5693, 5706-5710, 5719-5722; Carex spp. – Straminergon stramineum + Sarmentypnum exannulatum community along swales, also forms floating mats in shallow and
deep swales and pools; semi- and fully submerged, on soaked peaty soil and stagnant water, abundant, mostly in pure mats.

Muddy Creek; # 6145, wet Picea glauca + P. engelmannii forest along the creek, on peaty soil in small depression along the trail.

“Dichelyma creek”; # 6084, on wet granite boulders on the bottom and along the creek, in partial shade.

Beartooth Creek; # 5472, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on soaked peaty soil, semi-submerged, not abundant.

Swamp Lake Fen & vicinity; ## 5152, 5165; (Schoenoplectus acutus + Typha latifolia) – Carex sp. - Bryidae community, on soaked peaty soil and semi-submerged, locally abundant, in shade.

NE & N shore of Beartooth Lake; # 5319, north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio tridentalis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, on soaked peaty soil between hummocks, in partial shade, not abundant.

Canyon Creek; 1) ## 5645, 5651; broad boggy valley of creek, moss fen; on walls and bottom of streamlet courses and in ditches, in shade, in pure mats or assoc.: Sciuro-hypnum latifolium, Sphagnum riparium; forms admixture. 2) ## 5675, 5676; Carex planifolia - Bryidae fen along the creek, pool 3x4 meters; fully submerged in still water, abundant.


Lake WGN Fen, Lower Sheepherder Fen, Meadow Lake Fen, Rock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).


Summits: alpine fen-1; ## 2295, 2299, 2304, 2312, 2320; on soaked peaty soil in pools, very abundant, in pure mats or assoc.: Straminergon stramineum.
Summits: alpine fen-4; 1) ## 3271, 3277; moss-lined banks of pool, in shade, on wet peat, assoc.: Blepharostoma trichophyllum, Breidleria pratensis, Campylium stellatum, Polytrichastrum alpinum, Scorpidium revolvens. 2) ## 3281, 3282; floating on the surface of big pools, not abundant; assoc.: Warnstorfia fluitans. 3) # 3307, on dry peaty soil, in shade under dense grasses; 4) ## 3299, 3309; in pool fully submerged in stagnant water.

Summits: alpine fen-5; ## 3427, 3428, 3444, 3447, 3452, 3453, 3455, 3456, 3458; in still water of shallow pools, semi-immersed and fully submerged, and around pools on soaked and wet peaty soil, forms carpets, very abundant, in pure mats or assoc.: Plagiomnium ellipticum, Sanionia georgico-uncinata, Sarmentypnum exannulatum.

Unnamed tributary of Frozen Lake; # 2548, seepage slope, on soaked peaty soil in alpine moss fen, locally abundant.

Little Bear Lake Fen-NW-08; 1) ## 2752, 2763, 2772, 2785, 2787, 2790, 2792, 2795, 2802, 2804, 2810, 2811, 2813, 2836, 2845, 2853; shallow swales with Carex scopulorum and other Carex spp., immersed, assoc: Sarmentypnum exannulatum, diatoms. 2) # 2839, deep swale immediately north-west of HWY 212, fully submerged, assoc.: Sarmentypnum exannulatum.

Little Bear Lake Fen-SE-08; ## 2864, 2867, 2874; immersed in swales; specimens are abundant in diatoms.

Littlerock Creek Fen; ## 3585, 3599, 3626, 3636, 3661, 3665; on and between Salix planifolia – Carex scopulorum – Aulacomnium palustre hummocks on wet peaty soil in pure mats; semi-submerged, forming admixture to Sarmentypnum exannulatum along swales.

Meadow Lake Fens; ## 3796, 3798; in shallow swales, assoc: Aulacomnium palustre, Tomentypnum nitens.

Wyoming Creek-2; ## 4954, 4955, 4957, 4960, 4962, 4968, 4969, 4971, 4973, 4976, 5012, 5013; alpine Bryidae fen on seepage slope; forms carpets on soaked peaty soil, rarely – semi-submerged in pools, locally very abundant, in pure mats or assoc.: Climacium dendroides, Philonotis fontana s.l., Plagiomnium ellipticum, Pseudocalliergon angustifolium, P. turgescens, Sanionia georgico-uncinata, Sarmentypnum exannulatum, Straminergon stramineum.


Littlerock Creek Fen (Heidel et al., 2008).

165. Straminergon stramineum (Bridel) Hedenäs [Calliergon stramineum (Bridel) Kindberg]. 7680-10680 ft. Widely distributed, predominantly Holarctic species. Widespread in mineral-poor to mineral-rich, but not calcareous, and nutrient-poor to -rich fens, shores, or irrigated rocks, from low to high elevations. It is common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data).
Summits: alpine fen-1; ## 2310, 2311; on soaked peaty soil along pools, abundant.

Two lakes along HWY 212; 1) # 2659, 2677; on wet peaty soil of boggy lake shore, in shade, assoc.: Scapania sp., Aulacomnium palustre, Sanionia uncinata. 2) # 2671, swampy Picea engelmannii forest on the shore, on wet loamy soil, assoc.: Scapania sp., Aulacomnium androgynum, Dicranaceae spp., Sanionia uncinata. 3) # 2666, boggy shore of the bigger lake, steep bank of the lake, on soaked peaty soil, assoc.: Blepharostoma trichophyllum, Scapania sp., Polytrichum juniperinum.

Sawtooth Palsa Fen; 1) ## 5692, 5698, 5700, 5701, 5705, 5713; Carex spp. – Straminergon stramineum community along swale, forms carpets on soaked peaty soil, very abundant, assoc.: Ptychostomum pseudotriquetrum. 2) ## 5731, 5733, 5734; abundant at base of Polytrichum mounds (raised peat), on soaked peaty soil. 3) # 5758, ecotone zone between fen and wet subalpine tundra, on peaty soil, not abundant.

Beartooth Lake CG: wet subalpine meadow and fen; # 4912, forms admixture to Sphagnum warnstorfii in hummocks, ecotone zone of fen and Picea engelmannii forest.

Little Bear Lake Fen-NW – 08 & 09; 1) ## 2830, 2835; base of Carex scopulorum - Sphagnum russowii mounds, assoc.: Cephalozia pleniceps, Sphagnum russowii, Oncophorus wahlenbergii. 2) ## 2842-2844; along with Cephalozia leucantha, Lophozia sp., Pohlia nutans, Polytrichastrum longisetum, and Tomentypnum nitens forms low hummocks on peaty soil. 3) ## 5631, 5632, 5636; swale 20 m of the road, on soaked peaty soil along swale, locally abundant, assoc.: Polytrichastrum longisetum, Sphagnum warnstorfii.

Little Bear Lake Fen-SE-08; 1) # 2860, edge of swale, semi-immersed, forms low hummocks with Sarmentypnum exannulatum. 2) ## 2888, 2890; abundant in Sphagnum hummocks, along with Aulacomnium palustre and Climacium dendroides, forms admixture to Sphagnum warnstorfii. 3) ## 2878, 2881, 2883, 2892, 2905, 2910; in Carex scopulorum – Bryidae hummocks, assoc.: Aulacomnium palustre, Breidleria pratensis, Climacium dendroides, unusual form of Polytrichastrum; in poor admixture.

Littlerock Creek Fen; ## 3553, 3554, 3555, 3559, 3568, 3569, 3639; on low Carex hummocks, also on and between large Salix planifolia – Carex scopulorum – Aulacomnium palustre hummocks, on shaded peaty soil; in pure mats or forms admixture to the other species.

Mud Lake Fen; # 3138, on wet peaty soil in floating mats, not abundant.

Ghost Creek Fen; 1) ## 3724, 3726; floating mats, Drosera anglica – Sphagnum warnstorfii, forms scattered admixture to Sphagnum, on soaked peaty soil. 2) # 3739, 20 meters north of Nuphar pool, dominating in shaded parts of hummocks; assoc.: Aulacomnium palustre, Sphagnum warnstorfii. 3) ## 3685, 3687, 3688, 3719, 3733, 3736, 3738; ecotone zone in the east of fen, swampy Picea engelmannii forest, in hummocks, assoc.: Aulacomnium palustre, Helodium blandowii, Rhizomnium pseudopunctatum, Sanonia uncinata, Scorpidium cossionii, Sphagnum
warnstorffii; 4) ## 3706, 3707; Eriophorum chamissonis – Straminergon stramineum (+), assoc.: Meesia longiseta.

Clay Butte Fen; # 3009, submerged in Nuphar pool, forms admixture to Sarmentypnum exannulatum.

Wyoming Creek-1; ## 3463, 3468; creek bank, in partial shade under willows, on soaked peat and moist sandy-clay soil, assoc.: Philonotis fontana s.l.

Wyoming Creek-2; ## 4971, 4972, 4991, 4999, 5007, 5033, 5074, 5091; alpine Bryidae fen on seepage slope; in carpets and low hummocks, on soaked peaty soil; on the bottom of dry streamlet, on vertical peaty banks of streamlets in shade beneath willows and sedges; in Sphagnum hummocks between streamlets of creek; locally abundant, assoc.: Philonotis fontana s.l., Polytrichastrum alpinum, Sarmentypnum sarmentosum, S. exannulatum, Sphagnum russowii.

Sawtooth Lake; ## 6002, 6015; northern shore of lake, moss-lined bank of stream, on wet peaty soil, assoc.: Aulacomnium palustre, Sanionia uncinata, Sphagnum warnstorffii.

NE & N shore of Beartooth Lake; 1) # 5233, small fragment of moss fen along unnamed creek in Picea engelmannii forest, froms admixture to Aulacomnium palustre & Sphagnum warnstorffii. 2) ## 5303, 5305, 5306, 5311; north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio tridentalis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, in hummock, assoc.: Cephalozia pleniceps, Aulacomnium palustre, Sphagnum subsecundum, S. warnstorffii, Tomentypnum nitens.


Ghost Creek Fen, Littlerock Creek fen, Lower Sheepherder Fen, Rock Creek Fen, Sawtooth Palsa Fen (Heidel et al., 2008).

166. Warnstorfia fluitans (Hedwig) Loeske in E. Nitardy, cf. [Drepanoclados fluitans (Hedwig) Warnstorf]. 10400-10560 ft. Widely distributed bipolar species, abundant in the Arctic and all across boreal zone (Ignatov, Ignatova, 2004). The species is known from many occurrences in Wyoming, including Yellowstone National Park; in the state, it normally occurs from moderate
to high elevations in poor and acidic, sometimes nutrient-rich habitats, poor fens or bog pools, depressions in rocks, along streams. Locations on the Beartooth Plateau are the first ones reported for Park Co.

Summits: alpine fen-4; 1) ## 3294-3296; in stagnant water of stream, fully submerged. 2) ## 3281, 3282; floating on the surface of pool, not abundant; assoc: Sarmentypnum sarmentosum. 3) # 3276, on pool bottom, fully submerged.

Unnamed tributary of Frozen Lake; ## 2612, 2623, 2625; 2636, 2637; seepage slope, attached to underwater boulders of slow-flowing stream, assoc.: Philonotis fontana s.l.

**Helodiaceae**

167. *Helodium blandowii* (Weber & Mohr) Warnstorf 6940-7900 ft. Holarctic species, widely distributed in south sectors of the Arctic and across the northern part of boreal zone (Ignatov, Ignatova, 2004). It’s characteristic for boggy and swamp coniferous and mixed forests. In Wyoming, it’s not been collected enough to estimate whether or not it is common.

Lily Lake Swamp Forest; ## 3026, 3048; *Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. - Bryidae*; on litter, humus and peaty soil in transition zone forest-fen, locally abundant, assoc.: *Aulacomnium palustre, Climacium dendroides, Tomentypnum nitens.*

Ghost Creek Fen; 1) ## 3740, 3749, 3750, 3756, 3757; 0.02 km north of fen, ecotone zone between *Drosera anglica – Sphagnum warnstorffii* fen and *Picea engelmannii (+ P. glauca)* forest, on wet forest floor, in shade, assoc.: *Marchantia alpestris, Aulacomnium palustre, Campyliadelphus chrysophyllus, Ptychostomum pseudotriqueatum, Rhizomnium pseudopunctatum, Sciuro-hypnum latifolium, Sphagnum warnstorffii.* 2) ## 3719, 3748; 0.05 km east of fen, ecotone zone between fen and *Picea engelmannii* forest, assoc.: *Aulacomnium palustre, Rhizomnium pseudopunctatum, Sphagnum warnstorffii, Straminergon stramineum.*

Crazy Creek CG Swamp; ## 3166, 3178, 3184; swamp *Picea glauca + P. engelmannii* forest, forest floor, on wet and soaked peaty soil, more abundant along streamlets crossing the fen; in partial shade, assoc.: *Climacium dendroides, Plagiommium ellipticum, etc.*

**Leskeaceae**

168. *Lescuraea radicosa* (Mitten) Mönkemeyer 8900-10500 ft. A species distributed in mountains of most part of the Holarctic, growing on rocks and cliffs scattered across forests; in Wyoming, it is a very variable and common species (Eckel, 2007; author’s data).

Little Bear Creek-4; ## 6226, willow wetlands along creek, on wet clay covering low granite outcrop, beneath *Salix sp. & Mertensia ciliata*, in partial shade, not abundant.
NE & N shore of Beartooth Lake; # 5211, trail to Beauty Lake, wet Picea engelmannii forest, stream bank, granite outcrop, on a thick layer of humus, in shade under trees, in pure mat, abundant.

Beartooth Lake CG: coniferous forest; # 6212, granite outcrops in Picea engelmannii + Pinus contorta forest, covered with a layer of humus, in shade.

Beartooth Creek; ## 5444-5446; moss-lined bank of creek, on shaded granite boulder, beneath Picea engelmannii and Salix sp., on wet humus.

Wyoming Creek-2; # 5015, on wet surfaces of granite debris along creek, not abundant.

Sawtooth Lake; 1) ## 6022, 6025; northern shore of lake, sandy beach, the base of granite outcrop, on a thin layer of humus, partial shade, in pure mats and with Polytrichum piliferum. 2) # 6036, beside waterfall, on wet granite rock, in broad crevice.

169. Pseudoleskeella tectorum (Funck ex Bridel) Kindberg ex Brotherus 6620 ft. Widely distributed in the Northern hemisphere and the smallest species of the genus, occurring on fairly dry sites in forests, often covering large areas of boulder faces and tree bases. The species is common in Wyoming (Eckel, 2007; author’s data).

Clark Forks of Yellowstone River-3; # 5954, river bank, on shaded humus substrate beneath Alnus incana, not abundant.

Thuidiaceae

170. Abietinella abietina (Hedwig) Fleischer 10250-10750 ft. Widely distributed all across Holarctic from southern sections of the Arctic through South Europe, Middle East, Himalayas, China; it’s know also in South Africa (Ignatov, Ignatova, 2004). In this portion of the Rocky Mountains, it’s encountered from foothills through the alpine, forming massive but loose mats over rock outcrops on steep slopes and on the forest floor; in alpine tundra it may grow on open gravelly soil as well as in protected sites on the sides of grass hummocks (Elliott, 1993; Weber, Wittmann, 2007; author’s data).

Summits: alpine fen-1; # 2301, in ecotone zone between alpine fen and tundra, on gravelly soil at base of granite outcrops, in partial shade, abundant, assoc.: Rhytidium rugosum.

Summits: alpine tundra-3; # 2399, on wet humus at base of granite outcrop, in partial shade, not abundant, assoc.: Rhytidium rugosum.

Summits: alpine tundra-4; ## 2475, 2482-2484; on dry tundra gravelly soil, abundant, assoc.: Hypnum revolutum, Rhytidium rugosum.

Summits: alpine tundra-6; ## 3339, 3341; on dry tundra soil, locally abundant, in pure mats.

171. Thuidium recognitum (Hedwig) Lindberg 7700 ft. A species and genus new to Wyoming. “Thuidium is common and species diverse in the eastern United States as well as in
most of the Northern Hemisphere. Its absence from western North America is nearly complete except for an arc of distribution that extends from eastern North America into the high Arctic thence southward in the mountains of Alaska and British Columbia barely reaching Washington State.” (Norris, Shevock 2004, p. 248-249). Of western states where the species was found, there are also Montana, Idaho, and South Dakota (Lawton, 1971; Crum & Anderson, 1981). Obviously, T. recognitum is an infrequent or even rare species in Wyoming; it’s never been collected here before.

Lily Lake swamp forest; ## 3020, 3029, 3030, 3047, swamp forest at the south-eastern edge of Lily Lake Fen. Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae, forest floor; in shade under recently fallen spruce, forms carpet on litter and humus, locally abundant, in pure mats or assoc.: Marchantia alpestris, Aulacomnium palustre, Climacium dendroides, Rhizomnium pseudopunctatum, Timmia austriaca.

**Brachytheciaceae**

172. *Brachytheciastrum collinum (Schleicher ex Müller Halle) Ignatov & Huttunen*

*Brachythecium collinum (Schleicher ex Müller Halle) Bruch, Schimper & Gumbel*. 7150-10580 ft. Widely distributed species occurring in Europe, Caucasus, South Siberia, Mongolia, Tibet, more often in arid regions such as Trans-Caucasus area, Middle East, Middle Asia, continental high elevation areas of western North America (Ignatov, Ignatova, 2007). In Wyoming and adjacent states, it is very common (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). This is “our most abundant species on slopes in the forested outer foothills where it inhabits sites that are dry except in springtime. It also occurs in optimum moss tundra and probably throughout the middle altitudes” (Weber, Wittmann, 2007, p. 43.). On the Beartooth Plateau, it’s one of the most frequent species, encountered also on calcareous substrates of limestones.

Pine forest along HWY 212; ## 3884, 3889; on dry rotting logs in Pinus contorta + P. albicaulis + Picea engelmannii forest.

Clay Butte: slope facing to E; 1) # 3855, Picea engelmannii forest on steep slope, in dry ditches, on loam; 2) # 3832, limestone sea-bed debris covering the slope, on a thin layer of loam in shade.

Clay Butte: slope facing to W; 1) # 4918, at base of seabed cliff along the road, on loamy soil, shaded by Ribes sp. and Arnica sp. 2) # 4926, summit, Abies lasiocarpa (? no cones) stands in front of Clay Butte lookout (behind the sign “No overnight camping”), on loamy soil and rotting wood and litter in shade beneath trees and Ribes sp., assoc.: Ceratodon purpureus. 3) # 4931, Picea glauca forest on west slope below Rd 142; on litter and humus, in shade. 4) # 4935, grasslands on west slope below Rd 142, debris of limestones, in crevices of seabed rock on a layer of loamy soil, in partial shade, relatively abundant.

Clay Butte Fen; 1) ## 2932, 2933; Picea engelmannii (+ Pinus albicaulis) forest in north-north-east portion of fen, on rotting wood of spruce, in shade, ecotone with fen, assoc.: Hypnum
revolutum, Pohlia nutans; 2) # 2945, north-north-east portion of fen, Salix sp. – Carex sp., on wet rotting wood; S+.

Coniferous forest near Clay Butte Fen; ## 5395, 5402; wet Pinus contorta + Picea spp. forest along unnamed creek, on rotting wood in shade, mostly in pure mats.

Unnamed tributary of Frozen Lake, dry slope; # 2593, on loamy soil under granite rock, in shade; assoc.: Bartramia ityphylla.

HWYs 212 & 296 intersection: slope facing to S; # 5889, at bases of granite boulders on south slope, in shade.

Beartooth Lake CG: coniferous forest; ## 6210, 6215, 6217; Picea engelmannii + Pinus contorta forest, on roots of spruce, covered with a layer of humus, in shade, and on loamy soil of granite outcrop, assoc.: Lophozia sp., Ceratodon purpureus, Dicranoweissia crispula.

Drainage pipe beside HWY 212; # 6110, on wet loamy soil around the pipe, in shade.

Aspen stands along HWY 212; # 6113, in shaded crevices of granite boulders and on bases of Populus tremuloides trunks.

Beartooth Creek; # 5461, Picea engelmannii – Pinus contorta forest on the creek shore; granite outcrop, in crevice filled with humus, in shade under trees.

Beartooth Butte; ## 5254, 5259, 5261, 5263, 5265; scattered limestone debris on slope, assoc.: Distichium spp., Syntrichia calcicola cf. S+ (# 5263).

W. A. Weber’s collection: Beartooth Mts., Cooke City to Red Lodge Highway [HWY 212. YeKA], Picea forest with Pinus flexilis and contorta, Vaccinium scoparium forest floor; in duff on forest floor, W. A. Weber B-44220 (COLO, RM).

173. B. velutinum (Hedwig) Ignatov & Huttunen cf. [Brachythecium velutinum (Hedwig) Bruch, Schimper & Gumbel]. 6970-10760 ft. Widely distributed species in most of Holarctic, from high Arctic southward to North Africa, Middle East, Himalayas, Tibet, central provinces of China (Ignatov, Ignatova, 2004). In this portion of the Rocky Mountains, it is not common, and occurs in extensive mats on vertical faces of shaded boulders near small streams (Weber, Wittmann, 2007).

Summits: alpine tundra-6; # 3383, on humus substrates in shaded niches of granite debris, in shade, not abundant, assoc.: Ptychostomum pallescens.

Crazy Creek; # 5614, rocks lining the creek, at the base of granite cliff, on wet humus, not abundant.

174. Brachythecium acutum (Mitten) Sullivant [B. pseudocollinum Kindberg, B. salebrosum auct.]. 6600-6980 ft. Endemic of North America; it has scattered distribution in eastern North America from Newfoundland and Nunavut southward to Missouri and Illinois, while in mountains of the West it penetrates to the south to Utah and California; occurs on wet soil and peat in fens or swamps, occasionally on rotten logs in swampy forests; from low to high alpine elevations
(Ignatov, 2009a). In Wyoming, it has not been collected enough to estimate whether or not it is common.

Willow Park; 1) # 5559, montane Salix planifolia - Carex spp. – Hypnum lindbergii + Aulacomnium palustre fen, vertical wall of ditch, wet peaty soil, in partial shade, not abundant, assoc.: Marchantia alpestris, Drepanocladus aduncus. 2) # 5583, Picea engelmannii + Pinus contorta forest at the edge of “Park”, in ditch, on wet clay, in shade, locally abundant. Det. by M. Ignatov.

Swamp Lake Fen & vicinity; # 5199, north foothills of Cathedral Cliff (seabed rock), Picea spp. forest along the trail, on loamy soil. Det. by M. Ignatov.

!© 175. B. brandegei (Austin) H. Rob. [Cirriphyllum brandegei (Austin) Grout]. 9630-10570 ft. New to Wyoming. A species previously considered an endemic of Colorado, where it was known from Park Co, Clear Creek Co, and Summit Co, according to W. A. Weber. In Colorado, it grows on wet soil in mountain tundra, rocks and wet cliffs, at the range of elevation from 3570 to 3900 m (Ignatov, 2009a). On Wyoming’s Beartooth Plateau, B. brandegei was discovered in four locations in the high subalpine and alpine.

Summits: alpine tundra-4; # 2485, on a thick layer of humus beneath dwarf willow and at base of granite outcrop, in partial shade, not abundant, assoc.: Polytrichum juniperinum. Det. by M. Ignatov.

Unnamed tributary of Frozen Lake; ## 2543, 2626, 2632; seepage slope, on wet clay and peaty soil along streamlets and in late snow melt areas, abundant; assoc.: Marchantia alpestris, Polytrichastrum sexangulare, Polytrichum juniperinum, Sanionia georgico-uncinata. ## 2626 & 2632 det. by M. Ignatov.

Small alpine lake; ## 3514, 3516; Carex sp. – Bryidae wetlands along the shore, on soaked peaty soil, not abundant, in pure mat and with Philonotis fontana s.l. Det. by M. Ignatov.

Clay Butte: slope facing to W; # 4934, grasslands on west slope below Rd 142, debris of limestones, on loamy soil at the base of seabed rock, in partial shade, not abundant. Det. by M. Ignatov.

Swamp Lake Fen & vicinity; ## 5195, 5196; ecotone zone between calcareous fen and spruce forest; Picea engelmannii + Populus tremuloides – Bryidae community (swampy forest), on humus and litter, not abundant. # 5195 det. by M. Ignatov.

**177. B. erythrorrhizon Bruch, Schimper & Gumbel** 7200-10520 ft. Widespread polymorphic species, distributed in North America and Eurasia; occurs on soil and rocks, mostly in mountains; 0–3460 m (in New Mexico) (Ignatov, 2009a). The species is rather frequent in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). Common on the Beartooth Plateau.

Pine forest along HWY 212; # 3890, in granite outcrop crevice filled with loam, in shade, not abundant.

Clay Butte: slope facing to E; # 3839, Picea engelmannii forest on steep slope, in dry ditches, on loam.

Beartooth Creek; # 5436, moss-lined bank of creek, under Picea engelmannii and Salix sp, on wet clay, intermingled with the other Bryidae mosses.

Coniferous forest near Clay Butte Fen; # 5403, wet Pinus contorta + Picea glauca + P. engelmannii – Salix sp. + Ribes sp. forest along unnamed creek, on humus and rotting wood, in shade under trees.

Island Lake CG: spruce forest; # 2217, Picea engelmannii – Vaccinium scoparium forest, granite outcrop, on a layer of humus, in shade beneath spruce, abundant.

Unnamed tributary of Frozen Lake; # 2635, seepage slope, late snowmelt area, on moist clay, not abundant, in pure mats. Det. by M. Ignatov.

Index Creek; # 5519, Pseudotsuga menziesii + Picea glauca forest along the creek, on granite rocks covered with a thick layer of humus and litter, in shade under trees, locally abundant. Det. by M. Ignatov; cf.

Fox Creek; # 5544, rocky bank of the creek, thickets of Rubus idaeus, on humus and litter, abundant. Det. by M. Ignatov.

Little Bear Creek-3; # 5353, huge granite rock along the creek, west-facing side of rock, splash zone, on wet clay, in shade, not abundant. Det. by M. Ignatov.

Beartooth Butte; ## 5278, 5290; south foothills, steep slope, in crevice of granite outcrop and sedimentary rock, on a layer of humus, partially shaded by tall grasses, locally abundant. Det. by M. Ignatov.

W. A. Weber’s collection: Beartooth Mts., Cooke City to Red Lodge Highway [HWY 212. YeKA], Picea forest with Pinus flexila and contorta, Vaccinium scoparium forest floor; on forest floor, W. A. Weber B-44219 (COLO, RM).

**178. B. rivulare Bruch, Schimper & Gumbel** 8900-10000 ft. Almost cosmopolitan species distributed all across the world: in Greenland, most of states and provinces of North America
(absent in some states of the south-east), on Atlantic and Pacific islands, in Eurasia, Africa, Australia and subantarctic islands; occurs on soil in wet places, including a lot of different types of habitats, e.g. semiliquid peat in alder and sedge swamps, alluvial sand banks along streams, temporary flooding depressions in relatively xeric areas, wet mountain tundra, etc.; not rare on rocks and logs, especially affected by temporary flooding; at elevation from 0 to 3400 m (Ignatov, 2009a). In Wyoming and adjacent states, it is very common (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). On the Beartooth Plateau, it’s known from several locations.

Beartooth Creek; # 5463, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Marchantia alpestris, Climacium dendroides, Plagiommium ellipticum, Rhizomnium pseudopunctatum, Sanionia uncinata, Sciurohypnum latifolium.


179. *B. salebrosum* (Weber & Mohr) Bruch, Schimper & Gumbel 6580-8980 ft. Widespread species distributed in North America, Eurasia, north Africa, and Australia; occurs on soil, rocks, tree bases, rotten logs, in exposed to quite shady habitats; 0-1500 m. On Ignatov (2009a), “this species was considered as widespread in North America, but a revision of so-named herbarium collections from the eastern North America demonstrated that they include mostly Brachythecium rotaeanum, B. acutum, B. campestre and marginal phenotypes of B. laetum. At the same time Brachythecium salebrosum, more or less identical with European plants occur in the western North America, and probably also in Eastern Canada.” We are inclined to think that the distribution of *B. salebrosum* in Wyoming is poorly known.

Clay Butte Fen; 1) # 2940, decaying fallen tree at north-north-east edge of fen, on wet rotting wood, assoc. Amblystegium serpens; 2) # 2955, north-north-east portion of fen, Salix planifolia - Carex aquatilis, under Salix, in shade, on wet peat soil, assoc.: Drepanocladus aduncus, Plagiommium ellipticum.

Rd 801: swampy mixed forest; # 6160, Picea glauca + Populus tremuloides forest, wet rotting wood, on a thin layer of humus, in shade.

Swamp Lake Fen & vicinity; # 5106, Salix sp. (+ Pentaphylloides floribunda) – Carex spp., on wet peaty soil and clay, shaded by dense Carex stands, not abundant.


mesic to rather wet habitats (Ignatov, 2009a). This robust species growing on moist tundra is rather rare in Wyoming; it is known from a few occurrences of Albany and Park Cos (Eckel, 2007; author’s data). In Montana, it is included to the list of species of conservation concern with status G4S1 (Montana Field Guide, …).


181. **B. udum I. Hagen** [*Brachythecium mildeanum var. udum (I. Hagen) Mönkemeyer, B. salebrosum subsp. udum (I. Hagen) J.J. Amann*]. 10100-10400 ft. Species new to Wyoming, with poorly known distribution in North America. According to Ignatov (2009a; pers. comm.), *B. udum* is widely distributed in Asiatic part of Russia (it’s rather common in Siberia) and frequent in the north of Europe; so far, in North America, it is known only from Alaska and Yukon. It occurs on wet soil and soil above rock in arctic and alpine habitats. On Wyoming’s Beartooth Plateau, it was discovered on summits, in alpine fens.

Summits: alpine fen-3; # 2493, banks of dry stream course, wet humus, det. by M. Ignatov.

Summits: alpine fen-4; ## 3269, 3270, 3284; fen along streamlet, Salix sp. – Bryidae, bank of alpine pool, on peaty soil, assoc.: Barbilophozia hatcheri, Climacium dendroides, Plagiomnium ellipticum, Polytrichastrum alpinum, Sanionia georgico-uncinata; # 3270 det. by M. Ignatov.

182. **Eurhynchiastrum pulchellum (Hedwig) Ignatov & Huttunen** [*Eurhynchium pulchellum (Hedwig) Jennings*]. 6940-8950 ft. A common species in most of Holarctic, with general distribution in North and Central America, Mexico, Eurasia, North and East Africa, on Atlantic and Pacific Islands; occurs on tree trunks in forests, on rocks (Ignatov, 2009). It’s rather common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, Eckel, 2007; author’s data). Locations on the Beartooth Plateau are the first ones known in Park Co.

Pine forest along HWY 212; # 3908, on wet decaying wood of spruce beside brook, in shade; assoc.: Blepharostoma trichophyllum, Mnium blyttii.

Lily Lake Swamp Forest; # 3039, on rotting wood in swamp Picea glauca + Pinus contorta forest, assoc.: Blepharostoma trichophyllum.

Crazy Creek CG Swamp; # 3167, swampy Picea glauca + P. engelmannii forest, forest floor, on wet humus, in partial shade, forms admixture to Aulacomnium palustre, Climacium dendroides, Pleurozium schreberi, Sanionia uncinata.

183. **Homalothecium aeneum (Mitten) E. Lawton** 6600 ft. Characteristic of species is under review.


Ghost Creek Fen; 1) # 3755, ecotone zone, swamp Picea engelmannii (+ P. glauca) forest, on rotting wood covered with a thin layer of humus, assoc.: Hypnum revolutum. 2) # 3744, ecotone zone, swamp Picea engelmannii forest, on wet forest floor, in shade, assoc.: Marchantia alpestris, Aulacomnium palustre.


!® 185. Sciuro-hyphnum glaciale (Schimper) Ignatov & Huttonen [Brachythecium glaciale Bruch, Schimper & Gumbel]. 10500 ft. A rare arctic-alpine species new to Wyoming; potential species of conservation concern. On Ignatov (2008), its general distribution includes Greenland, Que., north Europe, and north Asia; it occurs on soil, rocks, especially near glaciers, otherwise open, cold habitats. In North America, S. glaciale is known from very few locations. On Ignatov’s data, this species “has a wide distribution globally, but is probably locally common only in Scandinavia; in North America it is confirmed in Greenland and Newfoundland, but probably occurs also in other regions of the North American Arctic.” Obviously, Wyoming’s population is located close to the southern limit of species distribution in North America.

Small alpine lake; # 3508, boggy shore, on wet clay, not abundant, assoc.: Polytrichastrum alpinum. Det. by M. Ignatov.

186. S. latifolium (Kindberg) Ignatov & Huttonen [Brachythecium nelsonii Grout, B. latifolium Kindberg]. 7700-10570 ft. Widespread species with circumpolar distribution in Northern hemisphere, more common in mountain areas. Its range includes Greenland, North America (Alta, B.C., N.W.T., Que., Yukon; Alaska, Calif., Colo., Mont., N. Mex., Utah, Wash., Wyo.), northern Europe, and northern Asia; it occurs on rocks, soil, rather wet and more or less open places, wet tundra; 0-3500 m (Ignatov, 2008). It has rather high global conservation status - G3G5, however, it’s widely distributed all across Wyoming as well as in neighbouring states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). One of the most common Brachythecia of the Beartooth Plateau, associated with a large number of species.

Little Bear Creek-2; # 3237, creek bank, on moist clay soil, abundant, assoc.: Sanionia uncinata.

Little Bear Creek-3; ## 5329, 5362, 5364; moss-lined bank of creek, in shade, on wet humus and peat, assoc.: Campylium stellatum, Philonotis fontana s.l., Sanionia uncinata.

Little Bear Creek-4; ## 6222, 6224; willow wetlands along creek, on wet clay beneath Salix sp., not abundant. # 6222 det. by M. Ignatov.
Wyoming Creek-1; # 3477, creek bank, on wet clay soil, in shade under willows, assoc.: Lophozia sp., Bartramia ithyphylla, Brachythecium sp. s.l.

Wyoming Creek-2; ## 5045, 5047; on peaty soil of vertical moss-lined banks, in shade under willows, assoc.: Polytrichastrum alpinum.

Little Bear Lake Fen-NW- 08 & 09; 1) # 2801, forms admixture to Aulacomnium palustre, Rhizomnium pseudopunctatum, Sanionia uncinata; in low hummocks. 2) # 5624, on wet peaty soil in ditch, in deep shade, assoc.: Aulacomnium palustre, Philonotis fontana s.l., Polytrichastrum alpinum.

Little Bear Lake Fen-SE-08; 1) # 2868, in streamlet, assoc.: Philonotis fontana s.l. & Ptychostomum pseudotriquetrum. 2) # 2897, forms low hummocks in association with Philonotis fontana s.l & Tayloria lingulata.

E shore of Beartooth Lake; ## 4835, 4841; willow thickets on the bank of Little Bear Creek, on wet humus, in shade, assoc.: Sanionia uncinata.

NE & N shore of Beartooth Lake; # 5223, trail to Beauty Lake, wet Picea engelmannii + P. glauca forest, stream bank, on wet humus, in shade under trees, locally abundant, assoc.: Aulacomnium palustre.

Beartooth Lake CG: coniferous forest; # 6207, ecotone zone between willow wetlands (south-eastern shore of lake) and upland community of Picea engelmannii + Pinus contorta forest; on wet peaty soil, assoc.: Sanionia uncinata.

Beartooth Creek; # 5463, Saxifraga odotholoma + Mertensia ciliata + Senecio triangularis – Bryidae fen in small depression of former course of streamlet, on wet humus and peaty soil, assoc.: Conocephalum salebrosum, Marchantia alpestris, Brachythecium rivulare, Climacium dendroides, Plagiommium ellipticum, Rhizomnium pseudopunctatum, Sanionia uncinata.

Canyon Creek; 1) # 5645, broad boggy valley of creek, moss fen; on walls and bottom of streamlet courses and in ditches, in shade, in pure mats or assoc.: Sarmentypnum exannulatum & Sphagnum riparium; forms admixture. 2) # 5682, broad boggy valley of creek, Salix sp. – Carex spp. – Bryidae fen along the creek, assoc.: Aulacomnium palustre, Polytrichum juniperinum, Sanionia uncinata.

Unnamed tributary of Frozen Lake; ## 2546, 2555, 2571, 2633; seepage slope, on wet clay along streamlets and soaked peaty soil in alpine moss fen, abundant, assoc.: Polytrichum juniperinum.

Lily Lake swamp forest; # 3034, wet floor of Picea glauca + Pinus contorta – Alnus sp. – Linnacea borealis + Equisetum sp. – Bryidae forest, on litter and humus; assoc.: Aulacomnium palustre.

Island Lake CG: subalpine meadow; ## 2913, 2914; subalpine meadow, assoc.: Bryum sp. s.l., ecotone zone between meadow and Picea engelmannii forest, on wet loamy soil; # 2924, beside
ground water source, on shaded loamy soil between granite outcrops, assoc.: Aulacomnium palustre, Philonotis fontana s.l., Plagiothecium denticulatum.

Meadow Lake Fens; ## 3817, 3818; Salix planifolia thickets, on peaty soil, in shade, abundant; ## 3772, 3773; beside granite boulder in the middle of fen, on peaty soil, in shade, assoc.: Plagiomnium ellipticum.

Ghost Creek Fen; # 3757, ecotone zone between Drosera anglica – Sphagnum warnstorffii fen and Picea engelmannii forest, on peaty soil, assoc.: Marchantia alpestris, Aulacomnium palustre, Helodium blandowii, Rhizomnium pseudopunctatum.

Sawtooth Lake; ## 5982, 5984, 5992, 5997; western boggy shore, shaded steep bank of the lake, on wet sandy-clay soil, assoc.: Blepharostoma trichophyllum, Scapania sp., Polytrichastrum alpinum, etc.

Small alpine lake; # 3521-3524; boggy lake shore, on sandy-clay soil, assoc.: Philonotis fontana s.l.

Coniferous forest near Clay Butte Fen; ## 5392, 5404; on wet humus soil and litter in shade of overturned stumps of spruce and beneath live trees along the streamlet, assoc.: Mnium blyttii, Ptychostomum pseudotriquetrum, etc.


Sawtooth Palsa Fen (Heidel et al., 2008).


Beartooth Lake CG: coniferous forest; # 6207, upland community of Picea engelmannii + Pinus contorta forest approx. 50 meters south-east of lake; on loamy and humus soil beside granite outcrop. Det. by M. Ignatov.

Ghost Creek Fen; 1) # 3744, ecotone zone swamp Picea engelmannii (+ P. glauca) forest, in wet forest floor, in shade, assoc.: Marchantia alpestris, Aulacomnium palustre, Homalothecium nevadensis, Hypnum revolutum. 2) # 3752, ecotone zone, swamp Picea engelmannii forest, on wet rotting wood, in shade, not abundant, assoc.: Blepharostoma trichophyllum, Lepidopteris reptans, Lophozia sp., Aulacomnium palustre, Dicranaceae spp. 3) # 3759, swamp Picea engelmannii forest adjacent to Drosera anglica – Sphagnum warnstorffii fen, on humus layer covering rotting wood of spruce. Det. by M. Ignatov.
W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA], under late snow patch on steep slope N of switchback; rills and snowbeds, 3200 m.s.m., W.A. Weber, B-44307 (COLO, RM, US) [with B. salebrosum].

188. *S. plumosum (Hedwig)* Ignatov & Huttonen [*Brachythecium plumosum (Hedwig) Schimper*]. 6950–8100 ft. Widely distributed species; its range includes North, Central and South America, Eurasia, Africa, Atlantic and Pacific Islands, Australia, Antarctic Islands (Ignatov, 2008). It occurs on rocks along creeks, often temporarily submerged, wet, shaded rock cliff and rock outcrops, occasionally wet soil, more rarely bark of tree bases; 0–3050 m. In Wyoming, the species is distributed sporadically (it was omitted in Eckel’s list (2007)).

Muddy Creek; # 6129, wet Picea glauca + P. engelmannii forest along the creek, on rotting wood of spruce, in partial shade, locally abundant. Det. by M. Ignatov.

Lake Creek Waterfalls; # 5832, steep bank of creek, on humus soil in shade under Picea engelmannii. Det. by M. Ignatov.

Lake Creek CG: wet coniferous forest; # 5906, Picea glauca + Pinus contorta – Rubus parviflorus – Linnaea borealis, on granite boulders covered with a layer of humus, in shade. Det. by M. Ignatov.

189. *Tomentypnum nitens (Hedwig)* Loeske 6560–9850 ft. A species common and widespread across boreal and arctic areas of the Northern Hemisphere, reaching the high Arctic and extending south to New Mexico in high mountains; it occurs on minerotrophic fens. In Wyoming and adjacent states, it’s very common (Flowers, 1973; Elliott, 1993; Weber, Wittman, 2007; Eckel, 2007; author’s data).

Crazy Creek CG Swamp; ## 3183, 3277; swamp Picea glauca + P. engelmannii forest, on wet peaty soil with Climacium dendroides, Pleurozium schreberi, Sanionia uncinata & Ptilium cristacastrensis.

Lily Lake Swamp Forest; 1) # 3026, ecotone zone, swamp Picea glauca + Pinus contorta forest, abundant, assoc.: Aulacomnium palustre, Climacium dendroides, Helodium blandowii. 2) # 3019, on wet forest floor of Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae community, in shade, assoc.: Aulacomnium palustre.

Little Bear Lake Fen-NW-08; 1) # 2844, forms admixture to Straminergon stamineum in carpets. 2) ## 2744, 2849; on Aulacomnium mounds, not abundant, assoc.: Gymnocolea inflata, Aulacomnium palustre, Oncophorus wahlenbergii, Pohlia nutans.

Little Bear Lake Fen-SE-08; # 2899, in low hummocks with Carex scopulorum, not abundant, assoc.: Breidleria pratensis, Sphagnum warnstorfii.

Ghost Creek Fen; 1) # 3734, in low hummocks, forms admixture to Sphagnum warnstorfii. 2) # 3725, forms carpets in the eastern part of fen, along with Sphagnum teres, S. warnstorfii, Straminergon stamineum.
Clay Butte Fen; # 2995, in floating mats beside Nuphar pool, not abundant, assoc.: Campylium stellatum, Drepanocladus aduncus, Palustriella falcata.

Meadow Lake Fens; ## 3793, 3796; west part of fen, forms low hummocks, assoc.: Aulacomnium palustre, Campylium stellatum, Sarmentypnum sarmentosum.

Rd 801: swampy mixed forest; ## 6151, 6153, 6164; Picea glauca + Populus tremuloides forest, on peaty soil, assoc.: Aulacomnium palustre, Sanionia uncinata.

Sawtooth Lake; # 5978, Salix sp. – Sphagnum fen along the western shore, on wet peaty soil in shade.

Beartooth Lake CG: wet subalpine meadow and fen; # 4909, forms admixture to Sphagnum warnstorfi in hummocks.

NE & N shore of Beartooth Lake; ## 5303, 5305, 5311, 5316; north-eastern shore of Beartooth Lake, wetlands between streamlets of Little Bear Creek; Salix sp. – Senecio triangularis + Calamagrostis sp. + Caltha leptosepala – Sphagnum spp. fen, abundant in hummock, assoc.: Cephalozia pleniceps, Aulacomnium palustre, Sphagnum subsecundum, S. warnstorfi, Straminergon stramineum.

W. A. Weber’s collection: Beartooth Plateau, Cooke City to Red Lodge Highway [HWY 212. YeKA]; swales around small lakes, subalpine zone between Long Lake and lower Sheepherder Lakes, 2900 m.s.m., W. A. Weber B-44285 (COLO, RM).


Clay Butte Fen, Ghost Creek Fen (Heidel et al., 2008).

**Hypnaceae**

**190. Breidleria pratensis (Koch ex Spruce) Loeske** [*Hypnum pratense (Rabenh.) Koch ex Spruce*]. 6940-10680 ft. Circumboreal species distributed from the high Arctic (Spitzbergen) to Central Europe, mountains of South Siberia, northern provinces of China, Japan, also in North America; in most of the boreal zone it is a rare species (Ignatov, Ignatova, 2004). It mainly occurs on moist soil in fens and calcareous sites, from low to high altitudes. “It is inconspicuous and rarely collected, but expected to be frequent in willow carrs and wet tundra” (Weber, Wittmann, 2007, p. 98-99.) It is definitely one of the common mosses on the Beartooth Plateau but generally, in
Wyoming, it’s not been collected enough to estimate whether or not it is common: so far, it’s known only from Sheridan and Park Cos (Eckel, 2007; author’s data).

Summits: alpine fen-4; 1) # 3271, on moist peat of pool banks, assoc.: Polytrichastrum alpinum, Sarmentypnum sarmentosum, Scorpidium revolvens; 2) # 3288, vertical banks of alpine pool, in shade, on wet bare peat, assoc.: Climacium dendroides, Dicranum spadiceum.

Little Bear Lake Fen-SE-08: ## N 2887, 2889, 2893, 2904; in low hummocks, mostly forms admixture to the other mosses, assoc.: Aulacomnium palustre, Calliergon richardsonii, Climacium dendroides, Straminergon stramineum.

Beartooth Lake CG: wet subalpine meadow and fen; # 4866, Carex spp. – Bryidae fen, on wet clay along streamlet, not abundant.

Lily Lake Fen; ## 3066, 3081; boggy shore of Lily Lake, forested by Picea spp., on peaty soil, assoc.: Aulacomnium palustre, Chiloscyphus polyanthus, Climacium dendroides.

Crazy Creek CG Swamp; # 3169, swampy Picea glauca + P. engelmannii forest, on wet peaty soil, in partial shade, not abundant, forms admixture to Plagiochila porelloides, Aulacomnium palustre, Plagiommium ellipticum, Rhibozonium pseudopunctatum.

E shore of Beartooth Lake; # 4856, Salix planifolia – Carex spp. – Bryidae fen, forms admixture to mosses of carpets and hummocks, on wet peaty soil, not abundant.

Littlerock Creek Fen; # 3674, in hummocks, forms admixture to Climacium dendroides under Salix, in shade.

Sawtooth Lake; # 5970, Salix sp. – Sphagnum fen along the western shore, on wet peaty soil in shade; assoc.: Aulacomnium palustre, Sanionia uncinata.

Lily Lake East Fen (Heidel et al., 2008).

191. Hypnum cupressiforme Hedwig 10350-10840 ft. Extremely polymorphic and almost cosmopolitan species; absent in Antarctica, rare in taiga. It has a wide ecological amplitude. In this portion of the Rocky Mountains, it is “a common and variable species throughout the mountains, often growing near to H. revolutum but in slightly more mesic sites, along bases of boulders where there is often seepage, and along stream banks” (Weber, Wittmann, 2007, p. 100). In Wyoming, it has not been collected enough to estimate whether or not it is common.

Summits: alpine fen-2; # 2330, ecotone zone between alpine tundra and moss fen, on dry peaty soil.

Summits: dry creek in alpine tundra; # 2439, on humus beneath Salix sp., in shade.

Summits: alpine tundra-5; # 3330, granite debris in alpine tundra, on a layer of humus, partially shaded.

Summits: alpine tundra-6; # 3369, on wet tundra soil, in crevice of granite outcrop, forms poor admixture to Orthotrichum sp.
192. *H. lindbergii* Mitten *Calliergonella lindbergii* (Mitten) Hedenäs. 6930-9430 ft. Circumboreal, widely distributed species with the range including Greenland, North America, and Eurasia. It occurs in open sites, wet soil, humus, logs, lake and river margins, swamp forests, from low to high alpine elevations. *H. lindbergii* is mostly a species of temperate climates, most frequent in boreal and warm temperate regions. It’s pretty common in Wyoming (Eckel, 2007; author’s data).

Sawtooth Meadow; ## 5766, 5767; boggy valley of unnamed creek, on soaked peaty soil along pool, assoc.: *Sarmentypnum exannulatum*.

Sawtooth Lake; ## 6029, 6031; northern shore, boggy bank of the lake covered with *Sphagnum* and Bryidae mosses, on wet peaty soil, forms admixture to *Climacium dendroides*, *Rhizomnium pseudopunctatum*.

Beartooth Lake CG: wet subalpine meadow and fen; ## 4868, 4870; *Carex* spp. – Bryidae fen, on peaty soil and wet clay along streamlets, not abundant.

Willow Park; ## 5556, 5570, 5589-5591; montane *Salix* sp. - *Carex* spp. – Bryidae fen and ecotone zone with *Picea engelmannii* forest, on wet peaty soil, abundant.

Clarks Fork of Yellowstone River-1; # 3149, *Picea glauca* + *P. engelmannii* forest, shaded gully, on wet clay beneath spruce, not abundant.

Clarks Forks of Yellowstone River-2; ## 5601, 5602, 5607; moss-lined bank of the river, humus soil, in shade beneath forbs.

193. *H. revolutum* (Mitten) Lindberg 6600-10930 ft. Widely distributed in the Northern hemisphere circumpolar species, bipolar in distribution; occurs at sea level in the northern portion of its range, but is most frequent at higher elevations. Very common in Wyoming and adjacent states (Flowers, 1973; Elliott, 1993; Weber, Wittmann, 2007; Eckel, 2007; author’s data). In Colorado (as well as across all this portion of the Rocky Mountains), it’s “probably the most abundant and conspicuous pleurocarpous moss throughout the forested area, from the lower foothills up to the alpine. Typically it covers boulders with a smooth, shiny, green carpet of beautifully “braided stems”, covering several square ft and visible from a great distance” (Weber, Wittmann, 2007, p. 100). One of the most frequent species on the Beartooth Plateau.

Summits: alpine tundra-1; ## 2271, 2277, 2278; on humus at base of granite outcrops, in partial shade, locally abundant.

Summits: alpine tundra-2; # 2347, wet alpine tundra, on soil at base of granite outcrop, in partial shade, assoc.: *Dicranum spadiceum*, *Mnium arizonicum*, *Polytrichum juniperinum*.

Summits: alpine tundra-3; ## 2393, 2402, 2411, 2416, 2418; on sides and in crevices of granite outcrops, on soil beside outcrops in partial shade or in sun, abundant, in pure tufts or assoc.: *Polytrichum juniperinum*, *Syntrichia ruralis*. 138
Summits: alpine tundra-4; ## 2475, 2478; at bases of granite outcrops and beneath dwarf willows, on humus, in partial shade, assoc.: Abietinella abietina, Polytrichum juniperinum.

Summits: alpine tundra-5; 1) ## 3311, 3312, 3316, 3318-3321; granite debris in alpine tundra, on a layer of humus in crevices of rock, partially shaded, assoc.: Mnium arizonicum; 2) ## 3325, 3335; poor soil and granite debris in alpine tundra, very abundant, in pure mats and assoc.: Grimmia spp., Mnium arizonicum, Orthotrichum spp., Syntrichia ruralis.

Summits: alpine tundra-6; 1) ## 3342, 3343; on wet tundra soil, locally abundant, in pure mats; 2) # 3373, on wet tundra soil, in partial shade beside granite outcrop, assoc: Mnium arizonicum; 3) ## 3348, 3352-3354, 3356, 3357, 3378, 3385, 3389; on humus in shaded niches of granite debris, in shade, very abundant, in pure mats and assoc.: Grimmia spp., Mnium arizonicum, Orthotrichum spp., Syntrichia ruralis.

Summits: alpine fen-3; ## 2505, 2511; at bases of granite outcrops on humus, in shade, in pure mats or assoc.: Aulacomnium palustre, Dicranoweisia crispula, Syntrichia ruralis.

Summits: alpine fen-4; ## 3278, 3286, 3293; ecotone zone between alpine fen and tundra; at base of granite boulders, on wet humus, in shade, assoc.: Mnium arizonicum, M. thomsonii, Pohlia cruda; # 3286, mesic open sites of pool banks, on peaty soil, not abundant.

Summits: granite outcrops in alpine tundra-1; ## 2527-2529, 2539; on shaded niches on humus and loamy soil under granite debris and between them, abundant, in pure mats or assoc.: Sanionia sp., Syntrichia ruralis.

Summits: Overlook Roadside Park; ## 3531, 3540; at base and in crevices of granite debris, on a thin layer of humus in partial shade.

Clay Butte Fen; ## 2926, 2927, 2933; Picea engelmannii – Pinus albicaulis forest north-north-east of fen, at shaded bases of trees and on rotting wood of spruce, on humus and loamy soil, abundant, in pure mats or assoc.: Brachytheciacstrum collinum, Pohlia nutans.

Coniferous forest near Clay Butte Fen; # 5407, wet Pinus contorta + Picea glauca + P. engelmannii + Abies lasiocarpa – Salix sp. + Ribes sp. forest along unnamed creek, on rotting wood.

Beartooth Butte; ## 5293, 5294, 5296; scattered sedimentary rock debris on slope, on a thick layer of humus on bases of rocks, shaded by Picea engelmannii, forms admixture to Syntrichia ruralis.

Clarks Fork of Yellowstone River-1; 1) ## 3154, 3155, Picea glauca + Pinus contorta forest, at bases of spruces on wet loamy soil, in shade, abundant. 2) # 3157, huge granite outcrop in the same forest, on the side facing to the north.

Crazy Creek CG Swamp; 1) # 3198, swampy Picea glauca + P. engelmannii forest, at the base of spruce, mesic site. 2) # 3225, on shaded surfaces of huge granite outcrop in the forest, a layer of humus.
Littlerock Creek Fen; ## 3605, 3614; forms thick tufts on granite outcrop in Salix planifolia – Bryidae fen community, on humus, in partial shade.

Ghost Creek Fen; 1) # 3755, ecotone zone, swamp Picea engelmannii (+ P. glauca) forest, abundant on rotten wood, on a thin layer of humus, in shade, assoc.: Homalothecium nevadensis. 2) ## 3743, 3744; same forest, on wet forest floor, not abundant, assoc.: Marchantia alpestris, Aulacomnium palustre.

Wyoming Creek-1; # 3479, 0.2 km south of creek, in cracks of granite boulder, on a layer of wet loam, assoc.: Polytrichastrum alpinum.

Muddy Creek; # 6130, wet Picea glauca + P. engelmannii forest along the creek, on the base of spruce trunk, humus layer.

Index Creek; ## 5502, 5507, 5520; Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, granite boulders, on a thick layer of humus, on humus soil, litter, assoc.: Mnium arizonicum, Syntrichia ruralis.

Rd 167: swampy mixed forest; # 6193, swamp Picea glauca + Pinus contorta + Populus tremuloides - Alnus incana forest, at base of trees on litter and wet humus.

Rd 167: Pseudotsuga forest; ## 6177, 6183, 6184; on the base of granite cliff and on granite boulders of Pseudotsuga menziesii forest, in partial shade, abundant, mostly in pure tufts and assoc.: Orthotrichum spp., Syntrichia ruralis.

Lake Creek Waterfalls; # 5859, on humus soil near the bridge over the waterfall, in shade.

Aspen stands along HWY 212; # 6106, on granite boulder beneath Populus tremuloides in shade, abundant.

WY-MT state line: spruce forest; ## 5473-5478; on shaded side of huge boulder under Picea engelmannii, abundant, assoc.: Grimmia sp., Hypnum vaucheri, Orthotrichum sp., Syntrichia ruralis.


194. H. vaucheri Lesquereux 6600-10900 ft. Widely distributed all across Holarctic; it’s encountered in xerophilic habitats within the Arctic (northward to Spitzbergen) and in boreal zone; very characteristic for steppe regions where limestones outcrops are widespread; all across Europe, in Northern and Eastern Africa, Middle East, Himalayas, Central China, Japan, North America; grows on soil, stones, occasionally on tree trunks (Ignatov, Ignatova, 2004). H. vaucheri is very frequent on the Beartooth Plateau. In the rest of Wyoming, it has not been collected enough to estimate whether or not it is common.

Summits: alpine tundra-2; # 2347, wet alpine tundra, on soil at base of granite outcrop, in partial shade, assoc.: Dicranum spadiceum.
Summits: alpine tundra-3; ## 2394, 2400, 2407; on sides and in crevices of granite outcrops, on soil beside outcrops in partial shade or in sun, abundant, in pure tufts or assoc.: Dicranum spadiceum, Syntrichia ruralis.

Summits: alpine tundra-5; # 3332, poor soil and granite debris in alpine tundra, in admixture to Grimmia sp. and Orthotrichum sp.

Summits: alpine fen-2; ## 2327, 2334; on wet peaty soil in seepage zone.

Clay Butte: slope facing to E; ## 3829, 3831, 3835, 3847, 3854; limestone debris covering the slope, abundant.

Clay Butte: slope facing to W; ## 4941, 4942, 4946; grasslands on west slope below Rd 142, limestone debris, in crevices of seabed rock, on a layer of loamy soil, assoc.: Syntrichia calcicola cf.

Beartooth Butte; ## 5268, 5286; scattered limestone debris on slope, on humus and loamy substrates in crevices and shaded surfaces of rock.

Index Creek; ## 5505, 5516; wet Pseudotsuga menziesii + Picea glauca + Pinus contorta forest along the creek, granite boulders, on a thick layer of humus; on litter, assoc.: Syntrichia ruralis.

Fox Creek; # 5541, rocky bank of the creek, thickets of Rubus idaeus, on humus and litter between granite debris.

WY-MT state line: spruce forest; ## 5473-5478; on shaded side of huge boulder under Picea engelmannii, abundant, assoc.: Hypnum revolutum, Syntrichia ruralis.

Swamp Lake Fen & vicinity; # 5136, grasslands along the fen, granite outcrop, side facing to the east (to the fen), on humus, assoc.: Syntrichia ruralis.

Rd 167: Pseudotsuga forest; # 6182, on the base of granite cliff, in shaded crevice, locally abundant.

195. Isopterygiopsis pulchella (Hedwig) Iwatsuki 7500-10400 ft. A species distributed in regions with cold climate in both hemispheres; common in the Arctic and northern part of boreal zone; penetrating southward in mountains of Northern Africa, Caucasus, Middle Asia, Himalayas, northern provinces of China, Japan; also in the U. S. and Canada (Ignatov, Ignatova, 2004). In this portion of the Rocky Mountains, I. pulchella is normally encountered on soil, crevices of talus, on trees and rotting logs in spruce-fir forests at high elevations (Elliott, 1993; Weber, Wittmann, 2007). In Wyoming, the species has scattered distribution: it’s known from several locations in Albany, Teton and Park Cos (Porter, 1935; Spence, 1985; author’s data).

Summits: alpine fen-4; # 3275, vertical banks of alpine pool, in shade, on wet bare peat, assoc.: Blepharostoma trichophyllum, Lophozia sp., Dicranum spadiceum, Distichium capillaceum.

Lake Creek Waterfalls; ## 5833, 5834; steep bank of creek, on wet humus soil in shade under Picea engelmannii, in splash zone of waterfall. S+.
196. Ptilium crista-castrensis (Hedwig) De Notaris 6940 ft. General distribution includes North America, Europe, Asia where it occurs in terrestrial habitats in forests of temperate, boreal and subarctic zones. A common moss of boreal forest floor across Northern North America, but rare in Wyoming where it was previously known only from two occurrences on E.Lawton’s collections (1953): from Park Co and Yellowstone National Park (Eckel, 2007).

Crazy Creek CG Swamp; ## 3167, 3168, 3179, 3216, 3217; swamp Picea glauca + P. engelmannii + Pinus spp. forest, at the base of spruce and pine, on shaded humus soil and litter, locally abundant, in pure mat or assoc.: Aulacomnium palustre, Climacium dendroides, Pleurozium schreberi, Sanionia uncinata.

E. Lawton’s collection: west of Beartooth Butte Crazy Creek Campground, along Crazy Creek, Aug. 22, 1953, E. Lawton, 2018 (WTU).

Pterigynandraceae

197. Heterocladium dimorphum (Bridel) Bruch, Schimper & Gumbel 6600 ft. A species with European and North American distribution; occurring on stones and soil over rocks in mountains of cold and moderate zones of Holarctic (Ignatov, Ignatova, 2004). Until recently, it was known in Wyoming only from Yellowstone National Park, on T. C. Frye’s collection of 1934 (Eckel, 2007).

Swamp Lake Fen & vicinity; # 5142, edge of fen (near HWY 296), on the base of granite rock, shaded by dense Alopecurus pratensis stand, in pure mats, not abundant.

Hylocomiaceae

198. Hylocomium splendens (Hedwig) Bruch, Schimper & Gumbel 7700 ft. This fairly common moss of boreal forest floor across Northern North America is infrequent in Wyoming where it was previously known from few occurrences in Johnson & Sheridan Cos and Yellowstone National Park (Porter, 1937; Eckel, 2007).

Lily Lake Swamp Forest; ## 3024, 3027.1, 3040, 3041; Picea glauca – Alnus sp. – Linnaea borealis + Equisetum sp. – Bryidae forest, on litter, humus, and rotting woods, in shade, locally abundant, assoc.: Aulacomnium palustre, Climacium dendroides, Rhizomnium pseudopunctatum.

199. Pleurozium schreberi (Bridel) Mitten 6940-7700 ft. One of the most abundant mosses in the subarctic regions of the Northern hemisphere. In Wyoming, it is more typical for northern territories of the state but generally uncommon. It was previously known on the only collection made in 1925 by T.C.Frye in Yellowstone National Park (Eckel, 2007).

Crazy Creek CG Swamp; ## 3167, 3121, 3123, 3127; swampy Picea glauca + P. engelmannii forest, on forest floor, wet humus and litter, at the base of spruce, locally abundant, assoc.:
Climacium dendroides, Plagiommnia ellipticum, Ptilium crista-castrensis, Tomentypnum nitens, etc.

Lily Lake Swamp Forest; ## 3025, 3045; Picea glauca + Pinus contorta – Alnus sp. – Linnaea borealis + Equisetum sp. - Bryidae; forest floor, on litter at base of spruce and on humus over rotting wood, locally very abundant, assoc.: Aulacomnium palustre, Climacium dendroides, Rhizomnium pseudopunctatum.

Clarks Fork of Yellowstone River-1; ## 3151, 3153; Picea glauca + Pinus contorta – Alnus incana forest, in shade beneath trees, on humus, assoc.: Sanionia uncinata, Timmia austriaca.

**Rhytidiaceae**

200. *Rhytidium rugosum* (Hedwig) Kindberg 10250-10940 ft. Widely distributed all across Holarctic, abundant in most of mountain systems of both hemispheres. In this portion of Rocky mountains, it occurs from protected north slopes in the foothill canyons up to the alpine tundra (Weber, Wittmann, 2007). This large, coarse and shaggy moss is infrequent in Wyoming; it is known here only from several locations of Albany and Park Cos (Porter, 1935, Eckel, 2007, the author’s data).

Summits: alpine fen-1; # 2301, in ecotone zone between alpine fen and tundra, on gravelly soil at base of granite outcrops, in partial shade, abundant, assoc.: Abietinella abietina.

Summits: alpine tundra-3; ## 2399, 2405; on wet soil at the base of granite outcrop, in partial shade, not abundant, assoc.: Abietinella abietina.

Summits: alpine tundra-4; ## 2464, 2482, 2484; at bases of granite outcrops, on humus, wet loamy and gravelly soil, locally abundant, assoc.: Abietinella abietina.

Summits: dry creek in alpine tundra; # 2429, on humus beneath Salix sp., in shade.


**Plagiotheciaceae**

201. *Plagiothecium denticulatum* (Hedwig) Bruch, Schimper & Gumbel 8970-9850 ft. A very common and variable species with almost cosmopolitan distribution; especially frequent in forests of boreal zone. In Wyoming, it occurs in woods on rotten logs, stumps, bases of trees, or on humus or soil frequently overlying boulders and cliffs; shade-loving species. Locations on the Beartooth Plateau are the first ones known in Park Co.

Little Bear Creek-1, ## 2685, 2688; peaty bank of creek, on clay-peat soil, in shade.
Island Lake CG: subalpine meadow; # 2924, beside ground water spring, on shaded loamy soil between granite outcrops, assoc.: Aulacomnium palustre, Philonotis fontana s.l., Sciuro-hypnum latifolium.

Meadow Lake Fens; # 3764, granite boulder in the middle of fen, in boulder crevices, on a layer of wet loam and peat, assoc.: Aulacomnium palustre, Bryaceae spp., Polytrichum juniperinum, Syntrichia sp.

Lake WGN fen; # 6073, vertical boggy bank of the lake, on soaked peaty soil, in shade, assoc.: Lophozia sp., Pohlia nutans, Polytrichastrum alpinum, Sphagnum russowii.

Sawtooth Lake; 1) ## 5986, 5987, 5992; western boggy shore, shaded steep bank of the lake, on wet sandy-clay soil, assoc.: Hygrohypnum ochraceum. 2) # 6039, waterfall; on wet humus between granite rocks, in deep shade, assoc.: Pellia neesiana. 3) # 6047, northern shore, creek near waterfall; in wet crevices of granite boulders lining the creek, in deep shade; assoc.: Philonotis fontana s.l., Pohlia nutans.

Sawtooth Palsa Fen; # 5735, stream crossing the fen, on wet clay of bank beneath Salix sp., in admixture to Aulacomnium palustre, Pohlia obtusifolia, Sanionia georgico-uncinata.

NE & N shore of Beartooth Lake; # 5222, trail to Beauty Lake, bank of unnamed stream, wet Picea engelmannii + P. glauca forest, in shade between tree trunks, on wet humus, not abundant.

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Appendix

GPS data of collecting sites

2008

011* – Island Lake CG: spruce forest. ## 2216-2225**; N 44° 56’24.4”, W 109°32’22.2”, el. 9520-9550 ft., 12.08.08.

014 – Summits: alpine tundra-1. ## 2269-2290; N 45° 00’10.9”; W 109°24’51.9”, el. approx. 10250 - 10300 ft, 12.08.08

015 – Summits: alpine fen-1. # 2291-2322; N 44°59’46.1”, W 109°25’16.1”, el. 10450 ft., 12.08.08.


018-019 - Boggy shore of Island Lake. ## 2358-2392; N 44° 56.602’-692’, W 109°32.238-304’, el. approx. 9530 ft, 12.08.08.


* site numbers

** specimen numbers


030 - Two lakes along HWY 212. ## 2655-2680; N 44°56.890’-900’, W 109°30.280-300’, el. approx. 10020 ft. 14.08.08.

031 - Little Bear Creek-1. ## 2681-2712; N 44°56.485-490’, W 109°30.980-985’, el. approx. 9670 ft. 14.08.08.

034 - Little Bear Lake Fen-NW-08. ## 2743-2783; N 44°56.324-398’, W 109°31.135-150’, el. approx. 9600 ft. 15.08.08.

034.1 – Island Lake CG: subalpine meadow. ## 2912-2924; N 44°56.398-405’, W 109°32.280-300’, el. 9500 ft. 16.08.08.

035 - Little Bear Lake Fen-SE-08. ## 2854-2911; N 44°56.930-932’, W 109°42.903-918’, el. approx. 7700 ft. 17.08.08.

037-038 - Lily Lake Fen. ## 3053-3094; N 44°56.930-932’, W 109°42.903-918’, el. approx. 7700 ft. 17.08.08.

037 – N 44°56.930’, W 109°42.918’; # 3053-3065.
038 – N 44°56 932’, W 109°42.903’; # 3066-3094.

043-044 - Crazy Creek CG Swamp. ## 3166-3232; N 44°56.472-500’, W 109°46.317-366’, el. approx. 6940 ft 18.08.08.


045 - Little Bear Creek-2. ## 3233-3267; N 44°56.295’, W 109°32.560’, el. approx. 9480 ft., 18.08.08.

047 – N 44° 59.750’, W 109° 25.382’; ## 3294-3296;


061 - Wyoming Creek-1. ## 3462-3491; N 44° 58.952’, W 109° 24.364’, el. 10300 ft., 20.08.08.


064 - Small alpine lake. ## 3498-3525; N 44° 58.512’, W 109° 27.165’, el. approx. 10500 ft. 20.08.08.


067 – N 44° 58.030’, W 109° 24.858’; ## 3560-3586;
068 – N 44° 58.014’, W 109° 24.843’; ## 3587-3623;
069 – N 44° 58.003’, W 109° 24.835’; ## 3624-3649;
073-081 - Ghost Creek Fen. ## 3676-3760; N 44°55.329-362', W 109°39.356-468', el. approx. 7900 ft., 22.08.08.
073 – N 44°55.332', W 109°39.412'; ## 3676-3690;

082-089 - Meadow Lake Fens. ## 3761-3828; N 44°55.226-472', W 109°32.664-739', el. approx. 9850 ft., 22.08.08.
082 – N 44°55.275', W 109°32.735'; ## 3761-3773.
083 – N 44°55.278', W 109°32.684'; # 3774-3787.
084 – N 44°55.263', W 109°32.672'; # 3788-3791.
085 – N 44°55.226', W 109°32.664'; # 3792.
086 – N 44°55.329', W 109°32.702'; # 3793-3800.
087 – N 44°55.341', W 109°32.713'; # 3801-3823.
088 – N 44°55.453', W 109°32.728'; # 3824-3826.
089 – N 44°55.472', W 109°32.739'; # 3827-3828.

090-094 – Clay Butte: slope facing to E. ## 3829-3855; N 44°56.828-912', W 109°37.400-501', el. 9560-9700 ft., 22.08.08.
091 – N 44°56.870', W 109°37.439', el. 9630 ft.; # 3836-3846.
092 – N 44°56.870', W 109°37.442', el. 9650 ft.; # 3847-3851.
093 - N 44°56.909', W 109°37.424', el. 9630 ft.; # 3852.
094 - N 44°56.912', W 109°37.400', el. 9560 ft.; # 3853-3855.

094.1 - Creek SW of Beartooth Butte. ## 3856-3881; N 44°56.940-963', W 109°37.276-355', el. approx. 9500 ft., 22.08.08.

097 – Pine forest along HWY 212. ## 3882-3916; N 44°56.374', W 109°36.678', el. approx. 8950 ft., 23.08.08.

098 - Aspen grove along HWY 212. ## 3917-3927; N 44°55.677', W 109°40.643', el. approx. 7700 ft., 23.08.08.

2009

203-205 - E shore of Beartooth Lake. ## 4834-4856; N 44°56.848-894', W 109°35.150-206', el. approx. 8900 ft., 18.08.09.
204 – N 44°56.859’, W 109°35.205’ el. 8900 ft.; ## 4846-4847.


206 – N 44°56.726’, W 109°35.103’, el. 8960 ft.; ## 4857-4858.
212 – N 44°56.709’, W 109°35.121’, el. 8940 ft.; ## 4883-4896.


218 – N 44°57.112’, W 109°37.821’, el. 9700 ft.; # 4915.
231 – N 44°57.144’, W 109°37.902’, el. 9600 ft.; # 4948.


236 – N 44°58.754', W 109°25.005', el. 10530 ft.; ## 4981-4982.
238 – N 44°58.758', W 109°24.987', el. 10500 ft.; # 4984.
244 – N 44°58.784', W 109°24.896', el. 10500 ft.; # 5007.
251 – N 44°58.775', W 109°24.846', el. 10460 ft.; ## 5026-5034.

263 - 288 - Swamp Lake Fen & vicinity. ## 5106-5209; N 44°50.261-707', W 109°34.476-36.081', el. 6570-6610 ft., 21.08.09
269 – N 44°50.689', W 109°36.053', el. 6590 ft.; ## 5150-5151.
274 – N 44°50.593', W 109°36.000', el. 6590 ft.; #5165-5167.
275 – N 44°50.593', W 109°35.990', el. 6610 ft.; #5168-5170.
276 – N 44°50.592', W 109°35.980', el. 6560 ft.; #5171-5172.
277 – N 44°50.573', W 109°35.925', el. 6580 ft.; #5173-5174.
278 – N 44°50.571', W 109°35.925', el. 6600 ft.; #5175.
283 – N 44°50.292', W 109°34.786', el. 6570 ft.; #5195-5196.
284 – N 44°50.319', W 109°34.819', el. 6590 ft.; #5197.
287 – N 44°50.331', W 109°34.716', el. 6600 ft.; #5207.
288 – N 44°50.506', W 109°34.476', el. 6610 ft.; #5208-5209.

289 – N 44°57.209', W 109°35.292', el. 8970 ft.; #5210-5222.
292 – N 44°57.168', W 109°35.368', el. 8900 ft.; #5228-5235.
293-294 – N 44°57.089', W 109°35.538-543', el. 8900 ft.; #5236-5251.
310 – N 44°57.139; W 109°35.512', el. 8870 ft.; #5299-5300.
311-312 – N 44°57.142-144', W 109°35.295-304', el. 8870 ft.; #5301-5319.

295-309 - Beartooth Butte. #5252-5298; N 44°57.112-323', W 109°35.620-756', el. 8950-9250 ft., 22.08.09.
295 – N 44°57.112', W 109°35.620', el. 8950 ft.; #5252.
296 – N 44°57.122', W 109°35.624', el. 8970 ft.; #5253.
297 – N 44°57.190', W 109°35.630', el. 9030 ft.; #5254-5255.
298 – N 44°57.201', W 109°35.621', el. 9020 ft.; #5256-5258.
299 – N 44°57.199', W 109°35.629', el. 9020 ft.; #5259-5260.
300 – N 44°57.311', W 109°35.668', el. 9120 ft.; #5261-5263.
301 – N 44°57.323', W 109°35.688', el. 9150 ft.; #5264-5266.
302 – N 44°57.323', W 109°35.691', el. 9150 ft.; #5267-5272.
307 – N 44°57.280', W 109°35.750', el. 9200 ft.; #5288-5292.
308 – N 44°57.263', W 109°35.756', el. 9210 ft.; #5293-5297.
309 – N 44°57.167', W 109°35.660', el. 8990 ft.; # 5298.


315 – N 44°56.369', W 109°32.809'; ## 5331-5341.
318 – N 44°56.361', W 109°32.847'; # 5366.
319 – N 44°56.361', W 109°32.851'## 5367-5374.
320 – N 44°56.355', W 109°32.848'; ## 5375-5378.


327-334 - Beartooth Creek. ## 5423-5472; N 44°56.265-291', W 109°36.007-018', el. approx. 8900 ft., 23.08.09.

330 – N 44°56.266', W 109°36.013'; # 5432.
332 – N 44°56.265', W 109°36.018'; ## 5446-5452.
334 – N 44°56.291', W 109°36.010'; ## 5463-5472.

335 - WY-MT state line: spruce forest. ## 5473-5483; N 45°00.127', W 109°51.282', el. approx. 7770 ft., 24.08.09.


340 – N 44°59.408', W 109°51.120', el. 7480 ft.; ## 5493-5532.
342 – N 44°59.430', W 109°51.205', el. 7500 ft. # 5536.

343-344 - Fox Creek. ## 5537-5549; N 44°58.788-796', W 109°50.507-541', el. approx. 7200 ft., 24.08.09.
344 - N 44°58.788’, W 109°50.541’, el. 7220 ft.; # 5547-5549.

345 – N 44°57.807’, W 109°49.142’; ## 5550-5557.
346 – N 44°57.811’, W 109°49.126’; # 5558.
349 – N 44°57.792’, W 109°49.106’; ## 5587-5592.


366-368 - Little Bear Lake Fen-SE-09. ## 5638-5642; N 44°56.258-293’, W 109°30.924-932’, el. approx. 9600 ft. 25.08.09.

370-377 - Canyon Creek. ## 5643-5691; N 44°54.969-55.017’, W 109°29.881-899’, el. approx. 9400 ft. 25.08.09.
373 – N 44°54.969’, W 109°29.886”; ## 5672-5674.
377 – N 44°55.010', W 109°29.881'; # 5684.


379 – N 44°53.646', W 109°27.646', el. 9670 ft.; # 5705.
382 – N 44°53.607', W 109°27.694', el. 9670 ft.; # 5710-5718.
383 – N 44°53.600', W 109°27.676', el. 9660 ft.; ## 5719-5722.
384 – N 44°53.597', W 109°27.672', el. 9670 ft.; ## 5723-5727.
386 – N 44°53.606', W 109°27.630', el. 9650 ft.; ## 5730-5731.


398-402 – Creek connecting Dollar & Sawtooth Lakes. ## 5783-5800; N 44°54.782-796', W 109°29.158-172', el. approx. 9400 ft., 25.08.09.

399 – N 44°54.790', W 109°29.158'; ## 5786-5793.
400 – N 44°54.794', W 109°29.162'; # 5794.
401 – N 44°54.796', W 109°29.172'; ## 5795-5798.
402 – N 44°54.782', W 109°29.159'; ## 5799-5800.

403-410 - Lake Creek Waterfalls. ## 5806-5876; N 44°55.465-810', W 109°41.593-42.168', el. approx. 7500 ft., 26.08.09.

403 – N 44°55.576', W 109°41.888'; ## 5806-5810.
404 – N 44°55.552', W 109°41.849'; # 5811.
405 – N 44°55.488', W 109°41.674'; ## 5812-5845, 5849-5851.
408 – N 44°55.536’, W 109°41.701’; ## 5854-5858.
409 – N 44°55.532’, W 109°41.677’; ## 5859-5875.
410 – N 44°55.810’, W 109°42.168’; # 5876.


413 – N 44°55.321’, W 109°42.441’; ## 5891-5900.


418 – N 44°53.966’, W 109°40.311’; ## 5944-5951.
420 – N 44°53.962’, W 109°40.315’; # 5955-5956


441-444 – Unnamed tributary of Sawtooth Lake. ## 6064-6070; N 44° 54.008-027', W 109° 29.143-197', el. approx. 9400 ft., 27.08.09.

441 – N 44° 54.027', W 109° 29.143'; ## 6064-6067.
442 – N 44° 54.021', W 109° 29.175'; ## 6068-6069.
443 – N 44° 54.008', W 109° 29.197'; # 6070.
444 - N 44° 54.005', W 109° 29.226'; no bryophyte specimens.

445-447 - Lake WGN fen. ## 6071- 6076; N 44° 54.532-542', W 109° 29.914-927', el. approx. 9600 ft., 27.08.09.

445 – N 44° 54.542', W 109° 29.927'; ## 6071-6072.
446 – N 44° 54.532', W 109° 29.914'; # 6073.
447 – N 44° 54.532', W 109° 29.915'; ## 6074-6076.

448 - Lake WNG forest. ## 6077-6079; N 44° 54.554', W 109° 29.885', el. 9600 ft., 27.08.09.


450 – N 44° 54.827', W 109° 30.419'; # 6086-6089.

452 – Rd 149: roadside tundra communities. ## 6097-6098; N 44° 55.308’, W 109° 31.190’, el. approx. 9700 ft., 27.08.09.


454-455 - Seepage slope along HWY 212. ## 6100-6105; N 44° 55.810-816’, W 109° 37.979-999’, el. approx. 8700 ft., 28.08.09.

455 - N 44° 55.810’, W 109° 37.979’; ## 6102-6105.


458 - Drainage pipe beside HWY 212. ## 6110-6111; N 44° 55.619’, W 109° 38.224’, el. approx. 8330 ft., 28.08.09.


   466 – N 44°55.478', W 109°43.347'; ## 6167-6168.


   478 – N 44°56.758', W 109°35.045'; ## 6224-6227, 6233.

   479 – N 44°56.763', W 109°35.056', el. 8940 ft.; # 6228.
   480 – N 44°56.774', W 109°35.097', el. 8900 ft.; ## 6229-6230.