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Source: *Evansia*, 32(4):195-215.

Published By: The American Bryological and Lichenological Society, Inc.

DOI: <http://dx.doi.org/10.1639/0747-9859-32.4.195>

URL: <http://www.bioone.org/doi/full/10.1639/0747-9859-32.4.195>

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A lichen species list for Denali National Park and Preserve, Alaska, with comments on several new and noteworthy records

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***Abstract.* We present a substantially revised and updated lichen flora for Denali National Park and Preserve (DNPP) based on a series of field investigations conducted from 2001 to 2011. During this period, we increased the number of lichen taxa recorded in DNPP by 175 species through new collections made at 46 inventory sites and 44 vegetation monitoring study areas within the 2.4 million ha DNPP. The revised checklist we present here includes 459 taxa (in 158 genera) that occur in DNPP. We discuss the major lichen community composition patterns in this vast and previously under-studied region, and provide notes for 24 of the most noteworthy taxa discovered during our fieldwork, including geographic and ecological summaries. We identify remaining knowledge gaps and needs for future lichen inventory work in DNPP, including surveys for microlichens.**

***Keywords.* Biogeography, Alaska, subarctic, lichens.**

INTRODUCTION

Lichens, symbioses between a fungus and a cyanobacterial and/or algal partner, are an important component of Alaska's ecosystems. Lichens greatly enhance nutrient pools, fixing a significant proportion of fixed nitrogen in the nutrient-poor ecosystems of the far north (Longton 1992). In addition, lichens are a critical food source, serving as important winter forage for caribou and Dall sheep (Nichols 1974; Boertje 1984; Joly et al. 2010). Many lichen species are sensitive indicators of change in air quality and precipitation chemistry (Nash and Gries 1995; Gough and Crock 1997). Evidence suggests that predicted changes in climate patterns may impact these important and sensitive biological communities (Cornelissen et al. 2001; van Herk et al. 2002).

The lichen flora of Denali National Park and Preserve (DNPP), a 2.4 million ha subarctic wilderness park in south-central Alaska (Fig. 1) has attracted the attention of naturalists and lichenologists since the mid-twentieth century, with the first substantial collections being made in 1951. In the Park's first large-scale collection effort that included lichens, Dr. Hannah Croasdale and Elizabeth Sherrard spent 18 days collecting freshwater algae, bryophytes, and lichens along the 90-mile Park Road corridor and sections of the George Parks Highway. Because these two were primarily bryologists, Grace E. Howard received the lichen collections for review and reported 86 lichen taxa in the first published account of interior Alaska lichens (Howard 1963). Soon after, in 1958, William A. Weber and Leslie A. Viereck collected nonvascular plants in conjunction with Viereck's successional studies in the Park (see Viereck 1966), increasing the number of lichen taxa documented in the park to 218 (Weber and Viereck 1967). Over the next decades, sporadic lichen work in DNPP occurred in conjunction with larger scale but spotty inventories of Alaskan lichens (e.g. Schindler 1990).

These studies contributed to an improved understanding of lichen distribution in DNPP, Alaska, and more broadly in North America. However, they provided an incomplete representation of the lichen flora of DNPP because they were spatially restricted with no effort made to acquire a comprehensive catalog of the species. Most historic collections in this region were made within the 90-mile Park Road corridor and virtually all collections were confined within the 860,000 ha original boundary of Mt. McKinley National Park, expanded to its current size and renamed Denali National Park and Preserve in 1980 (Fig. 1).

We sought to rectify the historical imbalance in the spatial distribution of lichen collecting and compile a more complete and systematic macrolichen flora for DNPP by undertaking two large-scale investigations : 1) a long-term vegetation monitoring program (2001–2011; Roland et al. 2005); and 2) a targeted reconnaissance cryptogam inventory briefly described here, and in detail elsewhere (Stehn et al. 2013a). We report an updated list of lichen species documented within DNPP that resulted from these projects, and specifically discuss the most important and noteworthy additions to the lichen flora of DNPP.

METHODS

Study area

Bisected by the Alaska Range, which separates the Cook Inlet basin from the interior lowlands (Fig. 1), DNPP encompasses two major climate zones, a maritime-influenced zone to the south and a highly continental climate in the interior. A diverse topography, variable lithology, and a range of landscape surface ages ranging from recently deglaciated to unglaciated refugial areas (Briner and Kaufman 2008) contribute to the physical, ecological, and floristic diversity of the area (see Roland 2004; Roland and Schmidt 2015).

Field work

Lichen occurrence data presented here was collected during fieldwork for two major projects: the long-term vegetation monitoring program, and the Denali nonvascular plant inventory. We describe methods used for these two projects briefly here, and in detail in Stehn et al. (2013a).

Beginning in 2001, we initiated a landscape-scale vegetation monitoring program within DNPP to establish a quantitative baseline of vegetation conditions across multiple scales and species groups (Roland et al. 2005, Roland et al. 2013, Roland and Schmidt 2015, Nelson et al. 2015). Because of the ecological importance of nonvascular plants in this region (e.g., Longton 1992; Joly et al. 2010), these organisms were included in the program strategy. In a two-stage systematic design, we employed a macro-grid of 10 to 20 km spacing (based on a random start) as our 128,000 ha study area within DNPP. Each macro-grid point became the systematically-placed

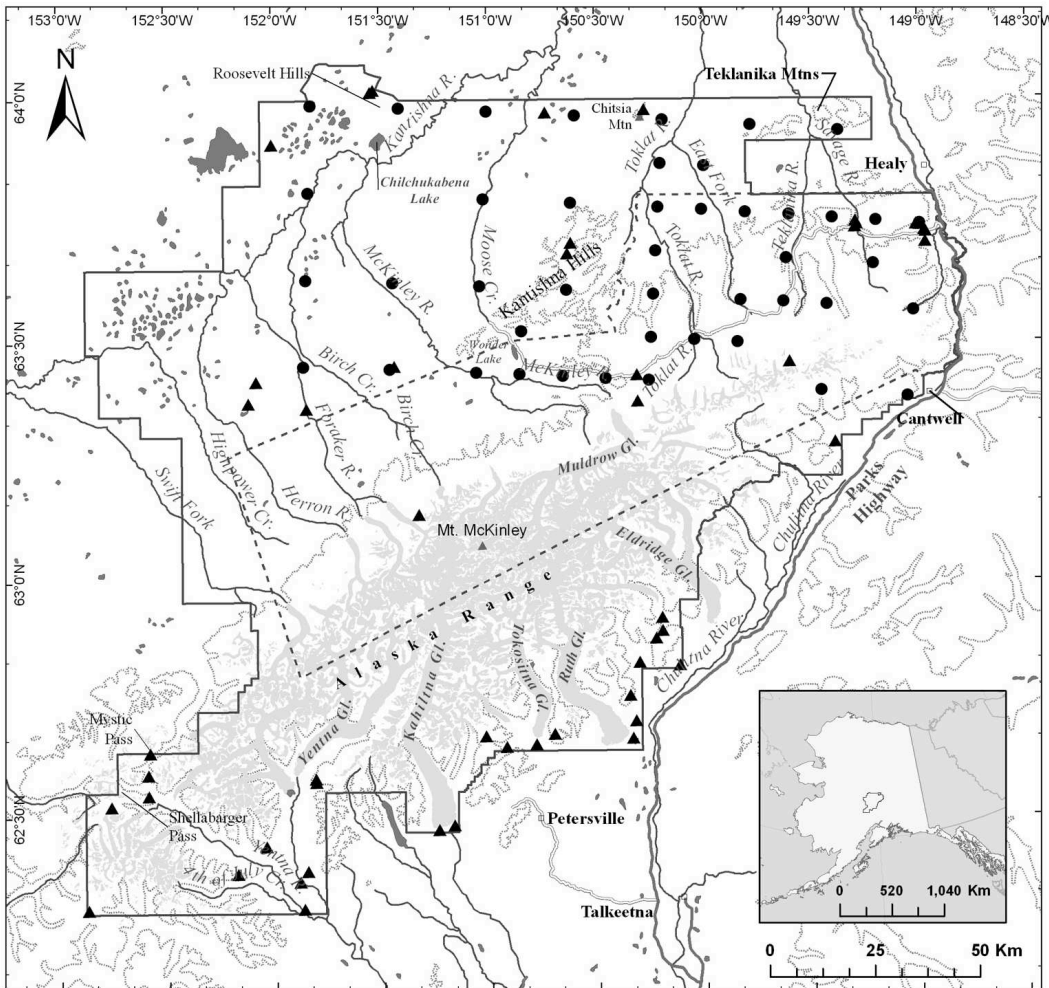


Figure 1. Map of study area showing major geographical features, the Denali National Park and Preserve boundary, and the Park Road. The boundary of Mt. McKinley National Park as it was known from 1917–1980 is shown as a dashed line. Vegetation monitoring mini-grid study areas are indicated with circles. Nonvascular inventory sites are indicated with a triangle. Dotted lines represent the 914 meter (3000 feet) elevation contour.

corner of a “mini-grid” of five rows of five systematically-placed 200 m² circular plots (henceforth, vegetation monitoring plots, or plots) spaced 500 m apart. At each plot, technicians recorded an ocular estimate of cover for each terricolous nonvascular species present in four 1 m² quadrats, which were systematically placed along the two perpendicular 8 m transects forming the circular plot. For more information on plot selection methods, see Roland et al. (2005) and Stehn et al. (2013a). We recorded presence of macrolichens at 4112 1 m² quadrats within 1028 plots distributed among 44 mini-grids, for a total area sampled of over 4 km². Microlichens, i.e. crustose species, and epiphytes were excluded from the sampling.

To supplement data collected from our randomized grid design, we conducted targeted field inventory work with the objective of compiling a voucher-based list of bryophytes and macrolichens occurring within the boundaries of DNPP. In preparation, we first compiled park based floristic records into a current species list, and then consolidated available regional data to generate an expected species list. We visited 46 sites, selected by identification of collection gaps and potential hotspots of diversity (i.e. siliceous or calcareous lithology), in the fall of 2007 and

2008, employing targeted searches of rare and/or diverse microhabitats. The primary focus of our inventory work was macrolichens, although microlichens of particular interest were occasionally collected at study sites opportunistically. A thorough microlichen inventory is yet to be attempted in DNPP or vicinity, and would likely yield substantial novel information about this oft-overlooked group. For more information on specific site selection for our inventory, see Stehn et al. (2013a).

The second and third authors made determinations of voucher collections in the laboratory using compound and dissecting microscopes, sending difficult specimens to taxonomic group experts as necessary. We placed most important and rare specimens on permanent loan at the University of Alaska, Museum of the North Herbarium (ALA; Accession # 2012.1.Cryp) in Fairbanks, Alaska, while other collections listed, those of more common species, and duplicate collections are stored at the DNPP herbarium (NPS Accession # 527). Lichen species nomenclature follows Esslinger (2014) except for *Peltigera occidentalis*, which follows Goward et al. (1995).

Commonness ratings

We assigned commonness ratings for all lichens encountered by first classifying each inventory site and vegetation monitoring plot within mini-grids by coarse geography (Table 1): north or south of the Alaska Range, and high (≥ 900 m) or low (< 900 m) elevation (a value which approximates elevational treeline at our latitude), and then tallying the number of occurrences of each taxon in each geographic category. We considered an individual occurrence a voucher collection at an inventory site, or a taxon's presence within a 1 m² quadrat in a vegetation monitoring plot. We used the resulting tallies to assign relative commonness ratings based on the likelihood of encountering a taxon in an appropriate habitat (Duncan and Meacham 1986). We then adjusted these rankings based on our collective empirical knowledge, because the sampling distribution between the coarse geographic regions (Table 1) and sampling strategies at inventory sites and vegetation monitoring plots differed. Thus, occurrences of oft-collected taxa from inventory sites and very common taxa in monitoring plots may have been otherwise inflated. We did not assign commonness ratings to subspecies and varieties, instead merging their occurrences with those of their parent taxon.

Table 1. Geographic distribution of sampling effort. “High elevation” includes sites ≥ 900 m above sea level. “Low elevation” includes sites < 900 m above sea level. Because some monitoring study areas (mini-grids) contain sites at both high and low elevations, we categorized them here by their most prevalent elevation group.

Code	Description	# Inventory Sites	# Monitoring Study Areas	Total # Sites
NH	North of the Alaska Range, high elevation	7	16	23
NL	North of the Alaska Range, low elevation	14	22	36
SH	South of the Alaska Range, high elevation	11	2	13
SL	South of the Alaska Range, low elevation	14	4	18
Total # Sites		46	44	90

Range maps

We compared specimen locations with previously documented ranges to evaluate the significance of any range extension resulting from our work. To accomplish this, we queried published literature for maps and voucher records, as well as the Consortium of North American Lichen Herbaria (CNALH 2015) to assemble locations for herbarium specimens collected in Washington, Oregon, the Canadian provinces of British Columbia and Alberta, the Canadian Yukon and Northwest Territories, and eastern Russia. When the collection record did not include geographic coordinates, we attempted to approximate the location for display purposes based on the written description of the location. We included both published and unpublished collection records in our maps to display the maximum species range, since many thorough lichen inventories and monitoring projects are currently in progress (Table 1, Walton and Stehn 2014).

RESULTS

In the course of the two projects listed above, we have collected and determined more than 7,300 lichen specimens since 2001 (6531 from vegetation monitoring plots, 796 from inventory sites). Including those species that do not require a voucher for identification, we have recorded more than 26,000 individual occurrences of 375 lichen species across 1028 vegetation monitoring plots (within 44 mini-grids) and 46 inventory sites.

Our extensive field collecting efforts across the park landscape yielded a large amount of new information about the composition and distribution of Denali's macrolichen flora and contributed valuable data to species specific taxonomic (e.g. Nelson et al. 2012; Nelson and Wheeler 2013) and biogeographical questions (e.g. Nelson et al. 2011; Stehn et al. 2013b, Nelson et al. 2015). The lichen occurrence data presented here adds to a growing body of information concerning species distributions within various groups occupying DNPP, including trees (Roland et al. 2013), all vascular plants (Roland 2004; Carlson et al. 2013; Roland and Schmidt 2015), fungi (Zhurbenko and Laursen 2003), rare epiphytic lichens (Stehn et al. 2013b) and bryophytes (Stehn et al. 2013a). These discoveries contribute to an increased understanding of the biogeography of south-central, interior, and arctic Alaska. This information will assist managers of DNPP charged with safeguarding these important botanical resources.

General patterns in lichen community composition and dominance

Micro-and macro-scale landscape gradients including elevation, topography, disturbance and climate, as well as vascular vegetation community structure likely contribute to the varied composition and structure of lichen communities within DNPP. One thorough investigation of specific patterns in lichen community composition in DNPP has thus far been conducted (Nelson et al. 2015), and others are planned for future publications. Here we provide a general summary of broad patterns in lichen occurrence and composition observed during 10 years of fieldwork based on collections.

The macrolichen flora of moderately well-drained forested sites on slopes and along stream courses were dominated by the erect and highly branched lichens *Cladonia arbuscula*, *C. rangiferina*, *C. stygia*, *C. amaurocraea*, and *C. stellaris* with frequent occurrence of less dominant simple cladoniiform species such as *C. gracilis*. Appressed foliose lichens, such as *Peltigera aptosa* and *P. leucophlebia*, and three-dimensional (erect) foliose lichens, such as *Cetraria islandica* and *C. laevigata* also were quite common in these sites. Forested sites underlain by permafrost or those grading into wetlands supported a similar flora, with members of the genera *Peltigera* and *Cladonia* dominating, especially on the drier microhabitats. Wet lowland sites are almost devoid of lichens, except in the case of epiphytes growing on trees and shrubs surrounding the wetlands such as *Vulpicida pinastri*, *Tuckermannopsis sepincola*, and *Bryoria* spp..

Forests south of the Alaska Range supported a somewhat different macrolichen flora, likely due to increased moisture in combination with warmer winter temperatures in this maritime-influenced area, and the greater proportion of well-developed and vertically stratified

tree canopies extant in this region. Epiphytic lichens, especially cyanolichens such as *Collema furfuraceum* and *Nephroma helveticum* prospered in this moisture-rich environment. However, the presence of deciduous trees and a dominant shrub component can limit the abundance of terricolous lichens due to the copious amounts of leaf litter produced, which can smother terricoles. Epiphytic species commonly found here, but rarely in the drier climates north of the Alaska Range include *Usnea longissima* and *Lobaria pulmonaria*. Noteworthy taxa from low elevation south-side forests in DNPP include the globally red-listed *Erioderma pedicellatum* (see Nelson et al. 2009, Stehn et al. 2013b) and *Parmelina yalungana* (Nelson et al. 2012).

The macrolichen flora of non-forested sites in DNPP was greatly influenced by factors associated with coarse-scale environmental gradients such as elevation, slope, and aspect, but also by finer-scale gradients such as time since fire or disturbance (see Nelson et al. 2015) and substrate and moisture availability. In mid-elevation (~650–900 m) sites, lichen community composition was largely dependent on a particular site's position in the gradient between exposed, low alpine-like and larger-statured, woody and more forest-like conditions. Forest and open scrub birch (*Betula nana*) areas were dominated by the same set of lichens common in the lowlands, with the addition of some species that seem to require greater access to mineral soil, such as *Flavocetraria cucullata*, whereas closed *Alnus* spp. and *Salix* spp. thickets supported very few if any lichens. Open tundra and meadow plant communities in the subalpine with a higher percentage of mineral soil were characterized by *Thamnolia subuliformis*, *Flavocetraria nivalis*, *Dactylina arctica*, and *Cladonia uncialis*.

Alpine sites were generally characterized by a fine-scale mosaic of small patches of saxicolous lichen taxa that persist in scattered, small protected microhabitats to avoid the frequent cryoturbation and slope disturbances in these geomorphically active environments. Common species of this zone included *Sphaerophorus fragilis*, *Bryocaulon divergens*, *Parmelia omphalodes*, *Alectoria ochroleuca*, *Asahinea chrysantha* and *Melanelia hepatizon*. Lichens were often the most species-rich group in this region, often representing even higher cover values than vascular plants. Many of the more noteworthy collections from our work were made in the alpine areas of DNPP, including *Placynthium stenophyllum* var. *isidiatum* and *Umbilicaria americana*. As with bryophytes (see Stehn et al. 2013a), alpine seeps and stream rivulets in particular provided new and interesting taxa such as *Peltigera gowardii* and *Dermatocarpon rivulorum*.

Updated list of the species

Prior to the work described herein, 284 lichen taxa in 145 genera (including 273 species, 6 varieties and 10 subspecies) were known to occur in DNPP. Of the 284 lichen taxa previously documented from DNPP, 199 taxa, or 70%, were encountered again during the course of this project. The updated DNPP species list that we present synthesizes both collection records of lichens that were found in published sources and new records based on specimens collected during the two projects we describe here. It was beyond the scope of this project to verify records in the published literature or to review other collectors' herbarium specimens.

We report an updated lichen flora for DNPP containing 459 taxa in 158 genera (including 431 species, 10 varieties and 17 subspecies). This includes 175 new taxa (including 164 species, 4 varieties and 7 subspecies) to the DNPP flora from our work. However, since the last species list for the Denali area was published (Weber and Viereck 1967), considerable taxonomic revision of certain families has occurred, including descriptions of new genera and species, as well as adjustments in the delineations of families, genera, and species.

In our updated species list (available as supplementary material when viewing this article as full text online at bioone.org), we indicate taxa that were discovered for DNPP (formerly Mt. McKinley National Park) through this fieldwork with an asterisk (*), listing the collection numbers of up to five collections. We include in this notation a few particularly noteworthy taxa whose discovery in DNPP has previously been published (i.e., *Erioderma pedicellatum*, *Parmelina yalungana*) when the collections originated from this work. Species additionally

marked with an “i” are new to interior Alaska, defined as the region between the Alaska Range and the Brooks Range. Species additionally marked with an “n” or an “s” mark northern and southern range extensions for those species within Alaska. We assign general commonness ratings for taxa within each coarse geographical region (see Table 1 for distribution of sampling effort in these regions), abbreviated as follows: NH = high elevation (≥ 900 m) sites north of the Alaska Range, NL = low elevation sites north of the Alaska Range, SH = high elevation sites south of the Alaska Range, SL = low elevation sites south of the Alaska Range. The commonness rating is based on the number of occurrences in our dataset only, with categories defined as follows: abundant = very likely to be encountered and nearly always found in appropriate habitats; common = likely to be encountered in appropriate habitats; uncommon = unlikely to be encountered and sometimes not present in appropriate habitats; rare = extremely unlikely to be encountered, often not present in appropriate habitats, and often restricted to a small number of sites. If a commonness rating is missing for a coarse geographical region, it is because our dataset contains no records from within that region. For taxa that we did not encounter during fieldwork, but were previously reported in literature, we list the source.

“Species notes” follow for those taxa whose discovery in DNPP we consider especially noteworthy, for example, if the taxon is globally rare and/or represents a range extension into interior Alaska. A few of these taxa have already been published, and we present them here in an ecological context as significant finds of the projects described herein. The number that corresponds to the species note and distribution map (Fig. 2) occurs in brackets after the commonness rating. We list locality coordinates of noted species in Table 2.

Species Notes

1. *Bryoria capillaris* – ALASKA RANGE: Chitsia Mountain, *Nelson 07-823*; COOK INLET LOWLANDS: Coffee River Valley, *Nelson 11-037*. This circumboreal species is typically oceanic and appears to be most abundant further south along the Pacific Coast. The north-side of the Alaska Range Denali collection is a first for interior Alaska. It occurred at Chitsia Mountain, on the northern end of the Kantishna Hills, a region whose vascular plant flora hosts a set of coastal disjuncts and is the southern range limit of a few arctic species (Roland 2004). The Coffee River Valley collection is 250 km from the nearest locality on the Kenai Peninsula (*Root 2297*, OSC144777).
2. *Cladonia singularis* – ALASKA RANGE: Primrose Ridge, *Walton 5843*, *Walton 5942*; Polychrome Pass, *Scelza 07-466*; Nika Ridge, *Nelson 07-136*, *Nelson 07-156*; Bearpaw Ridge, *Walton 8379*; Kankone Peak, *Nelson 06-135*. The species was described from Washington (Hammer 1993) and has rarely been reported, although examination of older herbarium specimens has led to specimens being redetermined as *C. singularis*. Our collections all occurred in alpine sites, primarily in rocky tundra at elevations ranging from 792-1269 meters. The nearest locality and only other interior Alaska station for this species is at Eagle Summit, 250 km to the northeast (*Thomson 18198*, WISL0013127, as determined by T. Ahti 2013).
3. *Collema curtisporum* – SOUTH CENTRAL MOUNTAINS: Cascade Creek, *Nelson 10-335*, *Nelson 11-099*. This jelly lichen is known from the Pacific Northwest where it is a species of concern and Scandinavia, where it is red-listed (IUCN 2007). The Denali collections are the furthest north in North America, extending *C. curtisporum*'s range approximately 300 km north and 480 km from the nearest collection at Katmai National Park (*Walton 17083*, ALAL033672).
4. *Dendrioscopia wrightii* – COOK INLET LOWLANDS: on *Betula* sp., Midway Lakes, *Nelson 07-843*; Ruth Glacier Forest, *Lasselle 002*, *003*, *004*, *Nelson 07-844*, *07-845*, *07-846*,

Walton 10124, 10130, 10189, 10190; Yentna River, *Nelson 07-842*; SOUTH CENTRAL MOUNTAINS: on *Betula* sp., Cascade Creek, *Nelson 10-328*. This mostly western hemisphere species was recently segregated from the genus *Sticta* (Moncada et al. 2013) and is known in Alaska primarily from riparian forests in the southeast panhandle (e.g., Geiser et al. 1998) and a few sites in south-central (K. Dillman, personal communication), including Cordova (Derr 2010) and Valdez (J. Walton, personal observation). It is currently being evaluated as a species of conservation concern in Alaska (K. Dillman, personal communication). Our collection of *D. wrightii* extends the species' range inland and northward approximately 400 km. Additionally, several vouchers of "Dendriscocaulon" (COOK INLET LOWLANDS: Ruth Glacier Forest, *Brady 10-012, Nelson 07-847, Nelson 08-455*; Kahiltna Glacier Forest, *Nelson 09-455*; SOUTH CENTRAL MOUNTAINS: Cascade Creek, *Nelson 10-329*) have been collected in Denali. This species is the cyanobacterial morph of various *Lobaria* and *Sticta* species, and difficult to link to a species (Tønsberg and Goward 2001).

5. *Enchylium polycarpon* – SOUTH CENTRAL MOUNTAINS: on limestone, Mystic/Shellabarger Pass, *Nelson 07-1796*. A species of calcareous rocks, *E. polycarpon* has a temperate to arctic range and is found in both hemispheres. Previous collections in Alaska have come from the arctic (Thomson 1984). The Denali record extends its range southwards in the state by 640 km to Mystic Pass, which, as one of the lowest passes in the central Alaska Range, exhibits a transitional climatic mixing of north and south side vegetation as well as has many exposed limestone outcrops (Roland 2004).
6. *Erioderma pedicellatum* – COOK INLET LOWLANDS: on *Picea glauca* twigs, Coffee River Valley, *Nelson 07-806*; Kahiltna Glacier Forest, *Nelson 07-800, 07-801, Walton 10153, 10158*; Ruth Glacier Forest, *Brady 10-057, 10-060, Nelson 08-406*; SOUTH CENTRAL MOUNTAINS: on *Picea glauca* twigs, Cascade Creek, *Nelson 08-407, Walton 11393*; Northeast of Spink Lake, *Nelson 08-408*. This foliose cyanolichen is considered one of the most endangered lichens in the northern hemisphere (Scheidegger 2003). Its original discovery in DNPP was a major global range extension, as it was previously known from Scandinavia and eastern Canada (Nelson et al. 2009). An occupancy model of the species within Denali estimated the population to be greater than 100,000 thalli, tenfold larger than the rest of the worldwide population (Stehn et al. 2013b). Further discoveries of the species in south-central (Katmai National Park and Preserve; Miller and Walton 2013) and southwestern Alaska (Valdez; J. Walton, personal observation) extend its range and likely increase its abundance.
7. *Fuscopannaria ahlneri* – COOK INLET LOWLANDS: on *Picea glauca* twigs, Coffee River Valley, *Nelson 11-031, Nelson 11-056*; Ruth Glacier Forest, *Brady 10-026; Brady 10-055*; SOUTH CENTRAL MOUNTAINS: on *Picea glauca* twigs, Cascade Creek, *Nelson 10-354*. This uncommon species has a range that is incompletely circumboreal, known in Alaska from southeast and south-central. The Denali collections are northernmost records of *F. ahlneri* in North America, extending the species' range northward by 150 km to moist mixed spruce-hardwood forests of the upper Susitna basin. The nearest Alaska collection is from similar habitats to the south (*Root 227, OSC2012-000149*). *F. ahlneri* is considered a species of conservation concern for Alaska (AKNHP 2015).
8. *Fuscopannaria ramulina* – SOUTH CENTRAL MOUNTAINS: on *Picea glauca* twigs, Cascade Creek, *Nelson 10-362*. This squamulose lichen is found on the bark and twigs of conifers. Described from Juneau (Jørgensen 2000), it is also known from British Columbia (Goward and Spribille 2005). The Denali collection is the northernmost

worldwide, extending its extent by 350 km to the north of the nearest locality 1000 km away on the Chilkoot Trail (*Spribille 24928*; Spribille et al. 2010).

9. *Fuscopannaria viridescens* – ALASKA RANGE: Primrose Ridge, *Walton 7835*, *Walton 7854*. A squamulose lichen of tundra soil and mosses, this species was described from Alaska (Jørgensen and Zhurbenko 2002) and thus far remains known solely from Alaska and the high arctic of Siberia. Denali collections of *F. viridescens* were the first observed to contain cephalodia (Nelson and Wheeler 2013). The Denali record reported here complements a previously reported DNPP collection (*Zhurbenko 00323*; Zhurbenko 2009) marking a southern range extension of 700 km. All Denali collections were from above 1200 m in elevation.
10. *Hypogymnia pulverata* – COOK INLET LOWLANDS: on *Picea glauca* branch, Ruth Glacier Forest, *Nelson 08-389a*; *Nelson 08-389b*; *Nelson 08-390*; *Walton 11352*. Though widespread across Asia and the southern hemisphere, until recently this species was considered rare in North America. Now reported from several locations in south-central Alaska (Nelson et al. 2011), the Denali collections are the northernmost localities, occupying moist mixed spruce-hardwood forests of the upper Susitna basin.
11. *Lecanora aleutica* – SOUTH CENTRAL MOUNTAINS: West Fork Yentna River, *Nelson 08-963*. This Alaskan endemic was described, as the name implies, from the Aleutians. Other specimens have been collected from rock and wood at coastal localities along the Bering Sea. We collected our specimen on rocks in a north-facing, alpine basin dominated by dwarf shrub tundra but interspersed with herbaceous-dominated rivulets. This collection marks a dramatic eastward and inland range extension for this rare microlichen, 760 km from the nearest locality (*Talbot SEM122*, WIS-L-0022028), although another inland station for the species was reported from Nunavut, Canada (*Oldenburg 50-1413*, WIS-L-0022019).
12. *Lichinodium canadense* – SOUTH CENTRAL MOUNTAINS: Cascade Creek, *Nelson 10-333*; COOK INLET LOWLANDS: Coffee River Valley, *Nelson 11-078*. This small fruticose jelly lichen was described from British Columbia, where it is restricted to old-growth forests (Goward 1994) and listed as a species of concern (Goward et al. 1998). It is otherwise known solely from Alaska and Washington. The Denali specimens are the third and fourth localities within the state, and the furthest north records worldwide, a range extension of 400 km from the nearest locality in the Chugach National Forest (Derr 2010). Our collections were found on *Populus trichocarpa* bark, in mature mixed spruce-hardwood forests of the upper Susitna basin.
13. *Lobaria pulmonaria* – ALASKA RANGE: on hardwood boles, Upper Moose Creek, *Walton 9081*; COOK INLET LOWLANDS: on hardwood boles, Coffee River Valley, *Nelson 07-1939*; Midway Lakes, *Nelson 07-1934*, *Walton 11339*; Ruth Glacier Forest, *Brady 10-020*, *Nelson 08-425*, *08-454*, *Walton 11350*; Tokositna Glacier terminus, *Nelson 08-423*, *Walton 11489*; Yentna River, *Nelson 07-1936*; SOUTH CENTRAL MOUNTAINS: on hardwood boles, Cascade Creek, *Walton 11392*. While this incompletely-circumpolar species is common in southern regions of Alaska, there are few reports north of the Alaska Range. Our collection from the floodplain forests of Upper Moose Creek (*Walton 9081*) in the Kantishna Hills indicate that this species can persist in the drier climate north of the Alaska Range given a source of adequate humidity.

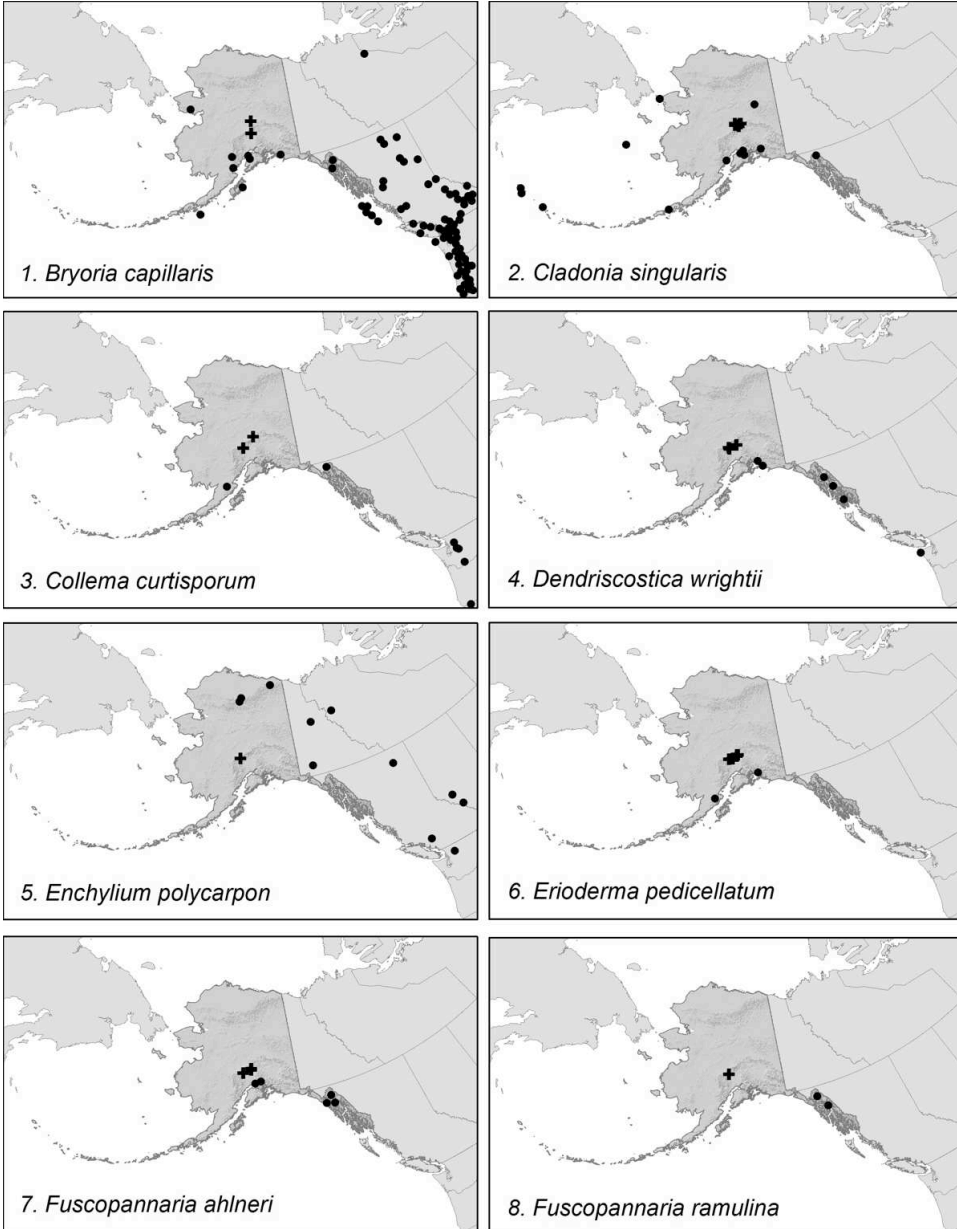
14. *Parmelia hygrophila* – COOK INLET LOWLANDS: on *Picea glauca* branch, Coffee River Valley, *Nelson 11-052, 11-097*; Kahiltna Glacier Forest, *Nelson 07-802, 07-803, 09-400*; Ruth Glacier Forest, *Brady 10-034, 10-056, Nelson 07-854*; SOUTH CENTRAL MOUNTAINS: on *Picea glauca* branch, Cascade Creek, *Nelson 10-319*. A species common to the Pacific coast of North America, *P. hygrophila* has previously been found in Southeast Alaska (e.g., Geiser et al. 1998), the Kodiak archipelago (Dillman 2010), just south of the eastern Alaska Range (Thomson and Ahti 1994) and in an unpublished locality just south of the central Alaska Range (Denali State Park, *Coloff 089, MONT-L-0004729*). Our collections thus confirm the status of this species as occasional in lowland, moist mixed hardwood-spruce forests in south-central Alaska.
15. *Peltigera gowardii* – SOUTH CENTRAL MOUNTAINS: on rocks in creek, Skihi Creek, *Nelson 07-833; Walton 11399; Walton 11400; Walton 11401*. The species was recently segregated from *Peltigera hydrothyria* (with assessment of DNPP material; Lendemer and O'Brien 2011; see also Miadlikowska et al. 2014), and occurs in clear, pristine mountain and meadow streams as far south as the Pacific Northwest (Washington, Montana). It is a strictly aquatic lichen known previously from two sites in the southeast (Dillman et al. 2012). This species is currently listed as a species of conservation concern in Alaska (AKNHP 2015) and Canada (COSEWIC 2013). The Denali collections were made in a high elevation rivulet in a north-facing basin of dwarf shrub tundra and herbaceous-dominated seepages, in the maritime-influenced zone of DNPP south of the Alaska Range crest.
16. *Peltigera occidentalis* – ALASKA RANGE: Polychrome Pass, *Walton 9756*; Fish Creek Ridge, *Walton 9420, Walton 9497*; East Sushana, *Walton 10733*; Upper Sushana, *Walton 7680*; Upper Moose Creek, *Walton 9117*; Nika Ridge, *Nelson 07-070, Nelson 07-121*; YUKON-KUSKOKWIM BOTTOMLANDS: Middle Moose Creek, *Walton 10675*; Bear Creek, *Nelson 06-259, Nelson 06-278*; Sandless Lake, *Walton 8829, Walton 8837*. This globally rare species is incompletely circumpolar, and previously recorded in Alaska from the arctic (McCune et al. 2009), alpine areas in the southeast (Spribille et al. 2010) and from a collection near the Yukon border (*Talbot 181, WIS-L-0106678*). Our collections are the first in interior Alaska, where the species appears occasionally in both rocky sub-alpine sites and lowland sites.
17. *Placynthium stenophyllum* var. *isidiatum* – SOUTH CENTRAL MOUNTAINS: Simpson Pass, *Nelson 07-2075*. A rare squamulose lichen found growing over calcareous rock, this taxon is limited to North America (Henssen 1963). In Denali, we found this species on rock in a maritime-influenced stream valley dominated by low alpine shrub and graminoid-herbaceous vegetation. The Denali collection is the second Alaskan report, 950 km away from a locality in White Pass (*Spribille 24485, Klondike Goldrush National Historic Park catalog number unknown*), extending the northern extent of the species worldwide by 350 km.
18. *Pseudocyphellaria perpetua* – COOK INLET LOWLANDS: on *Picea glauca* twigs, Coffee River Valley, *Nelson 11-035*; Tokositna Glacier terminus, *Walton 11381*; SOUTH CENTRAL MOUNTAINS: on *Picea glauca* twigs, Cascade Creek, *Nelson 10-313*. This charismatic macrolichen occurs in North America and Siberia. In Alaska, it occurs in the southeast, the interior, and the Alaska Peninsula, most commonly in humid birch-spruce forests (Dillman et al. 2012). Our collections are 150 km north of the nearest locality in south-central Alaska (*Root 2193, OSC-2011-002486*), and also occurred in humid mixed spruce-hardwood forests. This species is taxonomically uncertain, due to ongoing

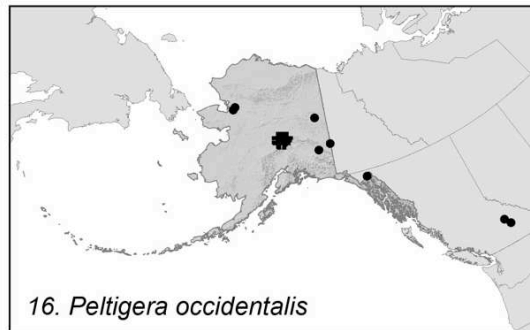
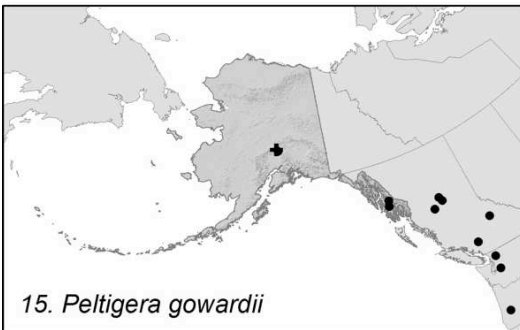
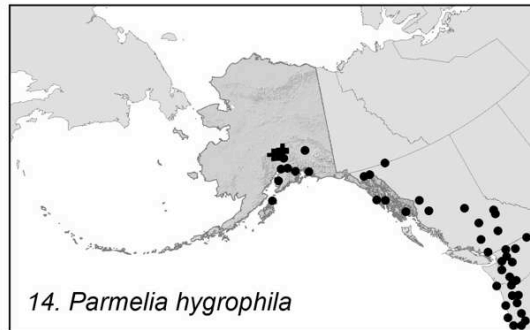
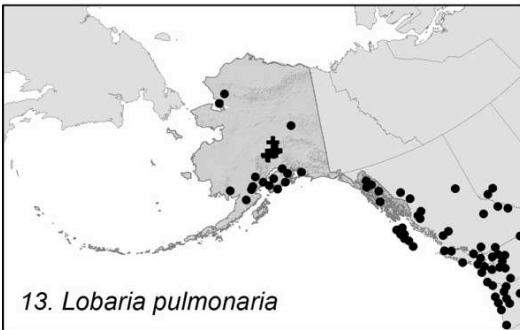
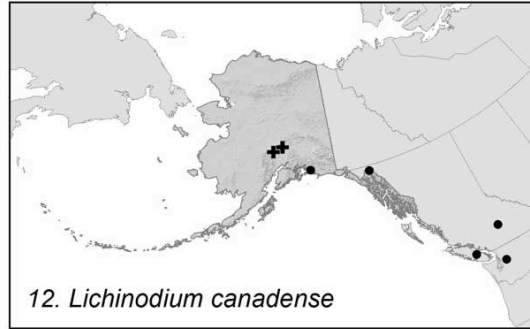
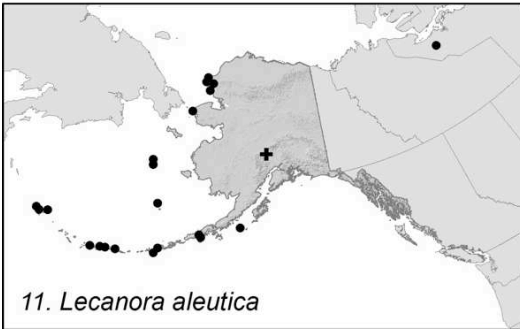
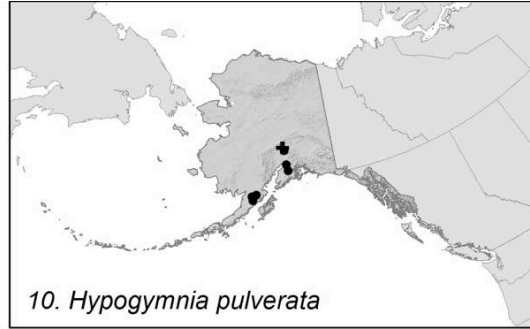
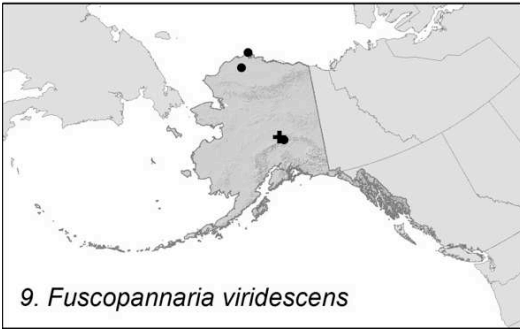
phylogenetic analyses (Summerfield and Eaton-Rye 2006) and may be revised in the future (P. Nelson, personal communication). It is potentially a morphotype of the more common *P. crocata*.

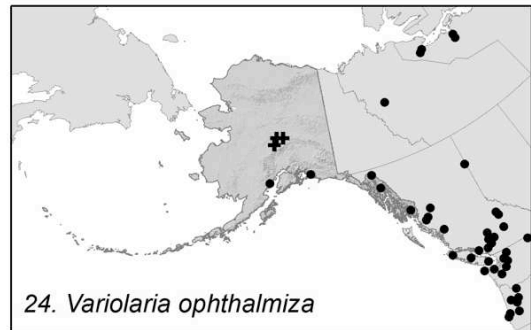
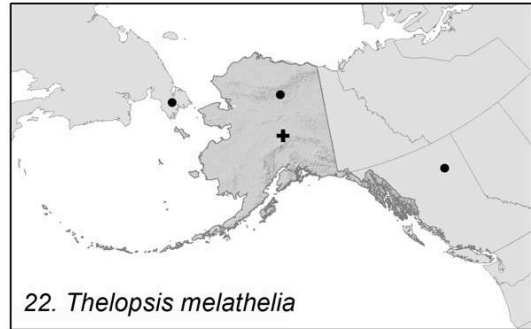
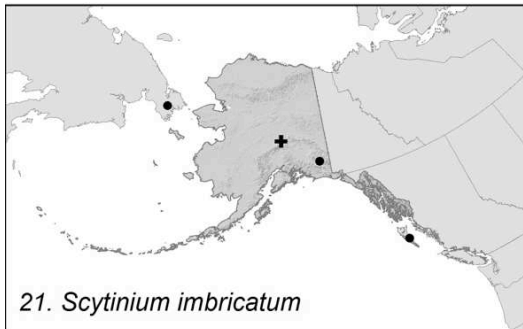
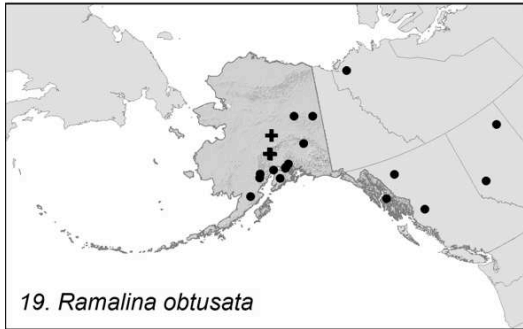
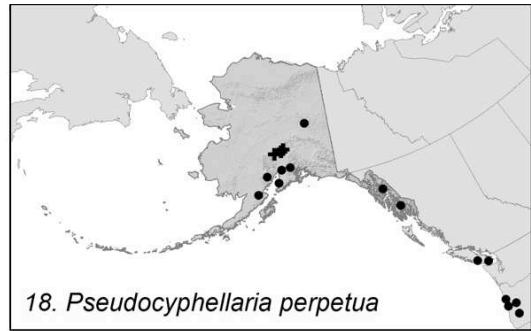
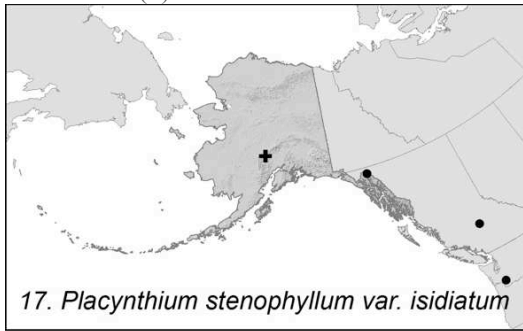
19. *Ramalina obtusata* – COOK INLET LOWLANDS: Midway Lakes, *Nelson 07-821*; SOUTH CENTRAL MOUNTAINS: Cascade Creek, *Nelson 08-427*, *Nelson 10-321*, *Nelson 10-348*; KUSKOKWIM MOUNTAINS: Roosevelt Hills, *Walton 11311*. The north-side of the Alaska Range collection (*Walton 11311*) is 300 km from the only other interior locality in the White Mountains (Krog 1968). *R. obtusata* is listed as a species of concern in Alaska (AKNHP 2015), but this should be revised given an increase in the number of collections in recent years.
20. *Rostania occultata* – YUKON-KUSKOKWIM BOTTOMLANDS: on bark of *Alnus*, Beaverlog Lakes, *Nelson 10-403B*. This jelly lichen is widely scattered in the Northern Hemisphere, from the Sonoran desert to the Scandinavian arctic (Nash et al. 2001). Our collection is the second report from Alaska, 370 km northwest of the specimen from south-central Alaska (*Tønsberg 29616*, University of Bergen catalog number unknown), and the furthest north locality in North America. It was found on the bark of *Alnus viridis* in a *Populus tremuloides* forest on a bluff edge.
21. *Scytinium imbricatum* – ALASKA RANGE: Igloo Canyon, *Nelson 10-179*. A small jelly lichen formerly belonging to the genus *Leptogium*, *S. imbricatum* is known from Europe, North America and Chukotka (Dillman et al. 2012), though it is not abundant in any locale. Our collection came from a stabilized rock outcrop on a dwarf shrub tundra slope. This is the second collection in Alaska, 450 km northeast of a specimen from Wrangell-St Elias National Park (*Thor 8749*, Swedish Museum of Natural History catalog number unknown).
22. *Thelopsis melathelia* – ALASKA RANGE: Chitsia Mountain, *Nelson 07-2073*. This terricolous microlichen is globally underreported, occurs in Europe, North America and Siberia (Dillman et al. 2012). The Denali specimen is the second collection in Alaska, 450 km south of the only other Alaskan collection, a specimen found in the Brooks Range (*Thor 8902*, Swedish Museum of Natural History catalog number unknown). Although the complete range of this species is yet to be revealed or understood, our collection occurred at Chitsia Mountain, in a region whose vascular plant flora hosts a set of coastal disjuncts and is the southern range limit of a few arctic plant species (Roland 2004).
23. *Umbilicaria americana* – COOK INLET LOWLANDS: on shaded vertical rock outcrop, Coffee River Valley, *Nelson 07-840*. Distinguished from closely related arctic-alpine *Umbilicaria vellea* by size and type of rhizines (Poelt and Nash 1993), *U. americana* occurs in North America, ranging from Baja California to southern Canada (Nash et al. 2001). This is the first published record of its presence in Alaska, and the northernmost locality worldwide. Our specimen was collected on a vertical rock outcrop shaded by moist mixed spruce-hardwood forest. Specimens have also been found in Lake Clark National Park (*Walton 18958*, ALA B42473). The species is likely more widely distributed in Alaska, but frequently overlooked.
24. *Variolaria ophthalmiza* – ALASKA RANGE: Chitsia Mountain, *Nelson 07-1665*; KUSKOKWIM MOUNTAINS: Castle Rocks, *Nelson 08-479*; Roosevelt Hills, *Nelson 08-704*. A circumboreal species, primarily thought to be coastal, *V. ophthalmiza* occurs in southeast (e.g., Dibben 1980, Spribille et al. 2010) and south-central (Talbot et al. 1992)

Alaska. Our Denali specimen is 350 km north of the nearest previously locality on Chisik Island (*Talbot 447*, University of Wisconsin catalog number unknown).

Figure 2. Species occurrences from vouchered collections in Alaska, Yukon Territory, Northwest Territories, British Columbia, Alberta, Washington, Oregon, and eastern Russia. Plus signs indicate collections recorded as part of Denali National Park and Preserve vegetation monitoring or nonvascular inventory (2001–2011).







DISCUSSION

The 175 new species documented within the boundaries of DNPP were collected nearly equally from north and south of the Alaska Range crest, even though our sampling efforts were not equal (66% of sites visited were north of the range, see Table 1). Sites north of the Alaska Range, but difficult to access from the park road, revealed 85 new taxa, both at rugged, high elevation sites in the range proper (52 new taxa) and low elevation sites in the vast expanse of boreal forest north of the mountains (33 new taxa). Sites south of the Alaska Range, where little

Table 2. Collection localities referenced in species notes. Inventory sites are denoted with an asterisk (*).

Locality Name	Latitude	Longitude	Elevation (m)
Bear Creek	63.974°N	150.999°W	162
Bearpaw Ridge	63.786°N	150.612°W	856
Beaverlog Lakes	63.988°N	151.817°W	908
Cascade Creek*	62.437°N	152.047°W	339
Chitsia Mountain*	63.976°N	150.271°W	1035
Coffee River Valley*	62.827°N	150.307°W	291
East Sushana	63.944°N	149.775°W	554
Fish Creek Ridge	63.933°N	149.368°W	850
Igloo Canyon	63.581°N	149.625°W	1145
Kahiltna Glacier Forest*	62.472°N	151.247°W	247
Kankone Peak	63.598°N	150.645°W	1224
Middle Moose Creek	63.616°N	151.036°W	432
Midway Lakes	62.384°N	151.855°W	146
Nika Ridge	63.760°N	149.598°W	907
Polychrome Pass	63.493°N	149.832°W	1235
Primrose Ridge	63.753°N	149.398°W	1405
Roosevelt Hills*	64.014°N	151.543°W	286
Ruth Glacier Forest*	62.703°N	150.326°W	205
Sandless Lake	63.965°N	150.591°W	191
Simpson Pass*	62.302°N	152.874°W	969
Skihi Creek*	62.894°N	150.200°W	804
Tokositna Glacier terminus*	62.653°N	150.790°W	255
Upper Moose Creek	63.522°N	150.846°W	767
Upper Sushana	63.766°N	149.801°W	784
West Fork Yentna River*	62.378°N	152.180°W	836
Yentna River*	62.302°N	151.872°W	88

collection effort had occurred in the past, yielded 85 taxa new to DNPP, primarily contributed by surveys of the epiphytic lichen flora there, which not surprisingly proved to be quite species-rich in this humid environment.

Our most noteworthy collections were of two general types: species with either humid Pacific coastal geographic distributions or arctic distributions. Of the latter, we collected most species from high elevations within our study area. *Enchylium polycarpon*, *Fuscopannaria viridescens*, and *Verrucaria muralis*, for example, all occurred in sites above 900 m in elevation. Species most frequently found in oceanic climates near the coast may not be expected to appear in DNPP (an area greater than 150 km from the coast at all points), but sites south of the Alaska Range in the upper Susitna basin provided ample habitat to host the moisture-dependant lichens *Dendrocosticta wrightii*, *Fuscopannaria ahlneri*, *Hypogymnia apinnata*, *Lobaria pulmonaria*, and *Parmelia hygrophila*. The climate of DNPP south of the Alaska Range is considered a maritime-continental transitional one, with nearly twice the mean annual precipitation and approximately 3°C warmer mean annual temperature than areas north of the Alaska Range (Shulski and Wendler 2007). We collected additional lichen species previously known to have coastal distributions north of the Alaska Range at sites of biogeographical significance. For

example, we found *Variolaria ophthalmiza* and *Ramalina obtusata* in the Roosevelt Hills, an area that was likely unglaciated during the last glacial maximum (Briner and Kaufman 2008).

Our contribution to the knowledge of macrolichen species occurrence in DNPP resulting from this work is significant, but it is likely that additional taxa will be discovered in this large and diverse region with additional focused field collection efforts in the future. This is particularly true south of the Alaska Range, where our sampling was limited (comprising 34% of sampled sites, see Table 1) but also highly productive, leading to the discovery of 50% of the new species found. Thirty-four of our new taxa additions were microlichens (crustose or pin lichens), but we stress that microlichens were not the focus of our work, and were excluded from sampling in 49% of sites visited (that is, the mini-grids). Future studies that include the lesser known or taxonomically uncertain groups such as pin lichens and crustose species are certain to reveal many more species in and around DNPP as has been the case elsewhere in Alaska (e.g., Spribille et al. 2010).

Considerable lichenological work has now been performed or is occurring in many regions of Alaska, including the Aleutian Island chain (e.g., Talbot et al. 1991, 1997, 2002), south-central (e.g., Eyerdam 1949, Thomson 1950), the southeastern panhandle (e.g., McCullough 1965, Geiser et al. 1998), the arctic (e.g., Moser et al. 1979, Thomson 1984, Thomson 1987, Zhurbenko et al. 1995), the interior (e.g., Howard 1963, Weber and Viereck 1967, Thomson and Ahti 1994, Talbot et al. 2007, McCune and Rosentreter 2014) and in national parks throughout the state (see Walton and Stehn 2014). Much of this work has been compiled into a provisional state checklist available online (http://herbarium.msu.edu/AK_List.html), and formal publication of the states' lichen species and their distributions is in progress (Spribille et al. *In review*). Such a summation of current knowledge regarding lichen distribution patterns in the North American arctic and sub-arctic will offer valuable new insights towards conservation of this important natural heritage, as well as an increased understanding of taxonomic problems being explored worldwide.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Cheryl Bartlett, George Brady, Larissa Laselle, and Jay Scelza for assistance collecting in the field and Karen Hutten, Martin Hutten, and Dave Kofranek for their determination work. Bruce McCune, Toby Spribille, Tim Wheeler, Pers Jørgensen and Trevor Goward provided verification of some specimens. The National Park Service, Denali National Park and Preserve, and the N.P.S. Inventory and Monitoring Program provided the funding for this project.

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Supplementary information for Stehn, S. E., Walton, J. K., Nelson, P. R., Hampton-Miller, C. J. and Roland, C. A. 2015. A lichen species list for Denali National Park and Preserve, Alaska, with comments on several new and noteworthy records. *Evansia* 32(4):

- Alectoria ochroleuca* (Hoffm.) A. Massal. – common in NH, uncommon in NL, SH.
Allantoparmelia almquistii (Vainio) Essl. – (Krog 1963; Weber & Viereck 1967; Krog 1968; Schindler 1990).
Allantoparmelia alpicola (Th. Fr.) Essl. – uncommon in NH.
Amandinea punctata (Hoffm.) Coppins & Scheid. – (Weber & Viereck 1967).
Amundsenia approximata (Lynge) Søchting, Arup & Frödén – (Søchting et al. 2014).
Amygdalaria elegantior (H. Magn.) Hertel & Brodo – (Weber & Viereck 1967; Brodo & Hertel 1987; Gowan 1989).
 **Amygdalaria panaeola* (Ach.) Hertel & Brodo – uncommon in SH, rare in NH, SL. *Nelson 06-452; Nelson 07-1779; Nelson 08-823; Walton 12306.*
Amygdalaria pelobotryon (Wahlenb. in Ach.) Norman – rare in SH.
Anamylopsora pulcherrima (Vain.) Timdal – (Timdal 1991)
Anaptychia bryorum Poelt – rare in NH.
 i**Anomalobaria anomala* (Brodo & Ahti) B. Moncada & Lücking – common in SL. *Nelson 07-1940; Nelson 07-1940; Nelson 11-091.*
Arctoparmelia centrifuga (L.) Hale – uncommon in NH, rare in NL, SL.
Arctoparmelia incurva (Pers.) Hale – rare in NH, NL, SL.
Arctoparmelia separata (Th. Fr.) Hale – common in NH, uncommon in NL, SH.
Arthrorhaphis alpina (Schaerer) Sant. – (Weber & Viereck 1967).
Asahinea chrysantha (Tuck.) W. L. Culb. & C. F. Culb. – common in NH, uncommon in NL, SH.
Asahinea scholanderi (Llano) W. L. Culb. & C. F. Culb. – uncommon in NH, NL, rare in SH.
Aspicilia aliena (Zahlbr.) Oksner – (Schindler 1990).
Aspicilia cinerea (L.) Körber s.l. – (Howard 1963; Weber & Viereck 1967; Schindler 1990).
Aspicilia disserpens (Zahlbr.) Räsänen – (Weber & Viereck 1967).
Aspicilia supertegens Arnold – (Weber & Viereck 1967).
Aspilidea myrinii (Fr.) Hafellner – (Schindler 1990).
Athallia holocarpa (Hoffm.) Arup, Frödén & Søchting – (Weber & Viereck 1967).
Bacidia bagliettoana (A. Massal. & de Not. in A. Massal.) Jatta – (Weber & Viereck 1967).
Baeomyces placophyllus Ach. – rare in NL, SH.
Baeomyces rufus (Hudson) Rebert. – rare in NH, SL.
Bellemerea alpina (Sommerf.) Clauzade & Cl. Roux – rare in SH, SL.
Bilimbia lobulata (Sommerf.) Hafellner & Coppins – (Weber & Viereck 1967).
Blastenia ferruginea (Hudson) Th. Fr. – (Weber & Viereck 1967).
 **Blennothallia crispa* (Hudson) Otálora, P. M. Jørg. & Wedin – rare in NH. *Walton 6040; Walton 6216.*
Brodoa oroarctica (Krog) Goward – uncommon in NH, rare in NL, SH.
Bryobilimbia diapensiae (Th. Fr.) Fryday, Printzen & S. Ekman – (Weber & Viereck 1967).
Bryocaulon divergens (Ach.) Kärnefelt – common in NH, uncommon in NL, SH.
Bryonora castanea (Hepp) Poelt – (Weber & Viereck 1967).
Bryoplaca jungermanniae (Vahl) Søchting, Frödén & Arup – (Weber & Viereck 1967).
 i**Bryoria capillaris* (Ach.) Brodo & D. Hawksw. – rare in NH, NL, uncommon in SL. [**Sp. Note 1**].

- i* *Bryoria fremontii* (Tuck.) Brodo & D. Hawksw. – rare in NL, SL. *Bartlett 02-0415; Nelson 11-022.*
- Bryoria furcellata* (Fr.) Brodo & D. Hawksw. – (Brodo & Hawksworth 1977).
- * *Bryoria fuscescens* (Gyelnik) Brodo & D. Hawksw. – uncommon in SL. *Brady 10-036a; Nelson 09-399; Nelson 10-343.*
- Bryoria glabra* (Motyka) Brodo & D. Hawksw. – uncommon in SL.
- * *Bryoria implexa* (Hoffm.) Brodo & D. Hawksw. – uncommon in SL. *Nelson 09-423; Nelson 11-098.*
- Bryoria lanestris* (Ach.) Brodo & D. Hawksw. – uncommon in SL.
- Bryoria nadvornikiana* (Gyelnik) Brodo & D. Hawksw. – (Howard 1963; Weber & Viereck 1967; Krog 1968).
- Bryoria nitidula* (Th. Fr.) Brodo & D. Hawksw. – uncommon in NH, rare in NL, SH.
- * *Bryoria pseudofuscescens* (Gyelnik) Brodo & D. Hawksw. – uncommon in SL. *Nelson 09-460; Nelson 10-334; Nelson 10-345; Nelson 11-063; Nelson 11-073.*
- Bryoria simplicior* (Vainio) Brodo & D. Hawksw. – uncommon in SL.
- * *Bryoria trichodes* (Michaux) Brodo & D. Hawksw. – rare in SL. *Nelson 10-307.*
- * subsp. *americana* (Motyka) Brodo & D. Hawksw. – *Nelson 09-426.*
- Buellia disciformis* (Fr.) Mudd – rare in SL.
- * *Buellia erubescens* Arnold – rare in SL. *Nelson 07-830.*
- i* *Calicium viride* Pers. – uncommon in SL. *Brady 10-032; Nelson 08-468; Nelson 08-469; Nelson 08-470.*
- Caloplaca cerina* (Ehrh. ex Hedwig) Th. Fr. – (Weber & Viereck 1967).
- Caloplaca insularis* Poelt – (Weber & Viereck 1967).
- Calvitimela armeniaca* (DC.) Hafellner – (Weber & Viereck 1967).
- Candelariella vitellina* (Hoffm.) Müll. Arg. – rare in NH.
- Catapyrenium cinereum* (Pers.) Körber – (Weber & Viereck 1967).
- * *Cavernularia hulthenii* Degel. – rare in SL. *Nelson 09-408.*
- Cetraria aculeata* (Schreb.) Fr. – common in NH, uncommon in SH, rare in NL.
- Cetraria ericetorum* Opiz – common in NH, rare in NL, uncommon in SH.
subsp. *ericetorum* Opiz
- * subsp. *reticulata* (Räsänen) Kärnefelt – *Bartlett 02-0638; Nelson 06-059; Nelson 07-610; Walton 4921; Walton 8301.*
- Cetraria islandica* (L.) Ach. – abundant in NH, common in NL, uncommon in SH.
subsp. *crispiformis* (Räsänen) Kärnefelt
subsp. *islandica* (L.) Ach.
- * *Cetraria kamczatica* Savicz – uncommon in NH, SH. *Nelson 07-430; Walton 9250A; Walton 9885; Walton 10037A.*
- Cetraria laevigata* Rass. – abundant in NH, NL, uncommon in SH.
- Cetraria nigricans* Nyl. – common in NH, rare in NL, SH.
- Cetraria odontella* (Ach.) Ach. – (Krog 1968).
- Cetrariella commixta* (Nyl.) A. Thell & Kärnefelt (Thell et al. 2009) – uncommon in NH, rare in NL.
- Cetrariella delisei* (Bory ex Schaerer) Kärnefelt & Thell – uncommon in NH, rare in NL, SH.
- * *Chaenotheca brachypoda* (Ach.) Tibell – rare in SL. *Nelson 08-458.*
- * *Chaenotheca chrysocephala* (Ach.) Th. Fr. – uncommon in SL. *Nelson 08-459; Nelson 08-460; Nelson 08-461; Nelson 08-462; Walton 10239.*

- **Chaenotheca furfuracea* (L.) Tibell – rare in NL, rare in SL. *Nelson 08-463*.
- **Chaenotheca laevigata* Nád. – rare in SL. *Nelson 10-308; Nelson 10-323*.
- **Chaenotheca stemonea* (Ach.) Müll. Arg. – rare in SL. *Nelson 10-317*.
- **Chaenotheca trichialis* (Ach.) Th. Fr. – rare in SL. *Nelson 10-372*.
- Cladonia acuminata* (Ach.) Norrl. – common in NH, uncommon in NL, SH.
- Cladonia alaskana* Evans – (Krog 1968).
- **Cladonia albonigra* Brodo & Ahti – uncommon in NH, NL. *Bartlett 02-0301; Nelson 06-307; Walton 3514; Walton 3618; Walton 7089D*.
- Cladonia amaurocraea* (Flörke) Schaerer – abundant in NH, NL, uncommon in SH, SL.
- Cladonia arbuscula* (Wallr.) Hale & W. L. Culb. – common in NH, NL, uncommon in SH.
subsp. *beringiana* (Wallr.) Hale & W. L. Culb.
- Cladonia bacilliformis* (Nyl.) Sarnth. – uncommon in NH, NL, SL.
- **Cladonia bellidiflora* (Ach.) Schaerer – uncommon in SH. *Brady 10-043; Stehn 09-198; Walton 8995; Walton 11455*.
- **Cladonia borealis* S. Stenroos – abundant in NH, common in NL, uncommon in SH, rare in SL. *Nelson 07-1949; Nelson 08-253; Walton 5136; Walton 6805; Walton 8428*.
- Cladonia botrytes* (K. G. Hagen) Willd. – common in NL, rare in NH.
- Cladonia cariosa* (Ach.) Sprengel – rare in NH, NL, SL.
- Cladonia carneola* (Fr.) Fr. – uncommon in NH, NL, rare in SL.
- Cladonia cenotea* (Ach.) Schaerer – common in NH, NL, SL.
- Cladonia chlorophaea* (Flörke ex Sommerf.) Sprengel – sensu lato group; abundant in NH, NL, common in SL, rare in SH.
- i**Cladonia ciliata* Stirton f. *flavicans* (Flörke) Ahti & DePriest – rare in NH, NL. *Scelza 07-447; Walton 9051*.
- Cladonia coccifera* (L.) Willd. – common in NH, uncommon in NL, rare in SH.
- Cladonia coniocraea* (Flörke) Sprengel – common in NH, NL, SL, rare in SH.
- Cladonia cornuta* (L.) Hoffm. – abundant in NL, common in NH, SL, rare in SH.
subsp. *cornuta* (L.) Hoffm.
subsp. *groenlandica* (E. Dahl) Ahti
- Cladonia crispata* (Ach.) Flotow – uncommon in NH, NL.
- i* var. *cetrariiformis* (Delise) Vainio – *Walton 5430*.
var. *crispata* (Ach.) Flotow
- Cladonia cristatella* Tuck. – common in NH, NL, uncommon in SH.
- Cladonia cyanipes* (Sommerf.) Nyl. – common in NH, abundant in NL, rare in SH, SL.
- **Cladonia decorticata* (Flörke) Sprengel – rare in NH, NL, SH, SL. *Nelson 06-018; Nelson 07-567*.
- Cladonia deformis* (L.) Hoffm. – common in NH, NL, SL, rare in SH.
- **Cladonia digitata* (L.) Hoffm. – rare in SL. *Nelson 08-404*.
- **Cladonia ecmocyna* Leighton – uncommon in NH, rare in NL, SH, SL. *Nelson 07-649; Nelson 07-678; Nelson 10-065; Walton 8050B; Walton 8321E*.
- * subsp. *ecmocyna* Leighton – *Walton 5568*.
- * subsp. *intermedia* (Robbins) Ahti – *Bartlett 02-0835; Bartlett 02-0905; Nelson 06-041; Nelson 07-439*.
- Cladonia fimbriata* (L.) Fr. – common in NH, NL, rare in SH, SL.
- Cladonia furcata* (Hudson) Schrader – common in NH, uncommon in NL.
- Cladonia gracilis* (L.) Willd. – abundant in NH, NL, uncommon in SH, SL.

- subsp. *elongata* (Jacq.) Vainio
subsp. *gracilis* (L.) Willd.
subsp. *turbinata* (Ach.) Ahti
* subsp. *vulnerata* Ahti – *Bartlett 02-0426; Bartlett 02-0441; Walton 4403; Walton 15098.*
- **Cladonia grayi* G. Merr. ex Sandst. – rare in NH, uncommon in NL. *Bartlett 02-0948; Bartlett 02-1158; Nelson 06-276; Walton 7089C; Walton 8853.*
- Cladonia macilenta* Hoffm. – uncommon in NH, NL, rare in SH, SL.
var. *bacillaris* (Ach.) Schaerer
- i**Cladonia macroceras* (Delise) Ahti – common in NH, uncommon in NL. *Bartlett 02-0555; Nelson 07-479; Nelson 08-160; Walton 5134; Walton 5880.*
- Cladonia macrophylla* (Schaerer) Stenh. – uncommon in NH, NL.
- **Cladonia macrophyllodes* Nyl. – rare in NH, NL, SH. *Bartlett 02-0640; Bartlett 02-0685; Nelson 07-494; Nelson 07-683.*
- **Cladonia merochlorophaea* Asahina – rare in NH, uncommon in NL. *Nelson 06-300; Nelson 07-229; Nelson 08-373; Stehn 11-137; Walton 7968C.*
- Cladonia mitis* (Sandst.) Ruoss – uncommon in NH, NL, rare in SH.
- **Cladonia multififormis* G. Merr. – uncommon in NH, NL. *Bartlett 02-0747; Nelson 07-327; Nelson 08-013; Scelza 07-553; Walton 9130.*
- i**Cladonia ochrochlora* Flörke – rare in NH, common in NL, SL. *Nelson 07-1946; Nelson 07-1951; Nelson 07-1959; Nelson 08-245; Walton 8942.*
- Cladonia phyllophora* Hoffm. – common in NH, NL, rare in SH.
- Cladonia pleurota* (Flörke) Schaerer – uncommon in NH, NL, uncommon in SH, rare in SL.
- Cladonia pocillum* (Ach.) O. J. Rich. – common in NH, rare in NL, uncommon in SH.
- Cladonia pyxidata* (L.) Hoffm. – abundant in NH, common in NL, uncommon in SH.
- Cladonia rangiferina* (L.) F. H. Wigg. – common in NH, SH, abundant in NL, rare in SL.
- **Cladonia scabriuscula* (Delise) Nyl. – abundant in NH, common in NL, SL, rare in SH. *Nelson 07-1958; Nelson 08-227; Walton 6808; Walton 7643; Walton 8897.*
- **Cladonia singularis* S. Hammer – uncommon in NH, rare in NL. [**Sp. Note 2**].
- Cladonia squamosa* (Scop.) Hoffm. – uncommon in NH, NL, rare in SH, SL.
var. *subsquamosa* (Nyl. ex Leighton) Vainio
- Cladonia stellaris* (Opiz) Pouzar & Vězda – common in NH, NL, uncommon in SH, rare in SL.
- Cladonia straminea* (Sommerf.) Flörke – uncommon in NH, rare in NL.
- **Cladonia stygia* (Fr.) Ruoss – abundant in NH, common in NL, rare in SH, SL. *Bartlett 02-0585; Bartlett 02-0600; Bartlett 02-0923; Scelza 07-503; Walton 5617.*
- Cladonia subfurcata* (Nyl.) Arnold – rare in NH, NL, SL.
- Cladonia subulata* (L.) F. H. Wigg. – uncommon in NH, NL, SH.
- Cladonia sulphurina* (Michaux) Fr. – uncommon in NH, NL, SL.
- Cladonia symphyarpa* (Flörke) Fr. – (Schindler 1987).
- Cladonia trassii* Ahti – common in NH, uncommon in NL, rare in SH.
- i**Cladonia umbricola* Tønberg & Ahti – uncommon in NH, NL. *Brady 09-113; Nelson 06-173; Nelson 07-265; Walton 7948; Walton 9498A.*
- **Cladonia uncialis* (L.) Weber ex F. H. Wigg. – common in NH, NL, uncommon in SH, rare in SL. *Bartlett 02-0394; Scelza 07-568; Stehn 10-091; Walton 3845; Walton 9000.*
- i**Cladonia verruculosa* (Vainio) Ahti – rare in NH, NL. *Nelson 06-213; Walton 9045; Walton 09108B.*

- Cladonia verticillata* (Hoffm.) Schaerer – group, includes *C. cervicornis* (Ach.) Flotow; common in NH, uncommon in NL, rare in SH, SL.
- Cladonia wainioi* Savicz – rare in NH.
- Cliostomum griffithii* (Sm.) – rare in SL.
- Coenogonium pineti* (Ach.) Lücking & Lumbsch – (Dillman et al. 2012).
- n**Collema curtisporum* Degel. – rare in NH, SL. [Sp. Note 3].
- i**Collema flaccidum* (Ach.) Ach. – rare in NH. *Walton 6156*.
- Collema furfuraceum* (Arnold) Du Rietz – common in SL, rare in NH, NL.
- **Collema leptaleum* Tuck. – uncommon in SL.
- n**Collema subflaccidum* Degel. – rare in SL. *Nelson 10-320*.
- **Collema tenax* (Sw.) Ach. – rare in NH, NL, SH. *Nelson 06-218; Nelson 07-1816; Nelson 07-1817; Nelson 09-398*.
- Dactylina arctica* (Richardson) Nyl. – common in NH, uncommon in NL, SH.
- Dactylina beringica* C. D. Bird & J. W. Thomson – uncommon in NH.
- Dactylina ramulosa* (Hooker) Tuck. – common in NH, SH.
- **Dendroscosticta wrightii* (Tuck.) B. Moncada & Lücking – common in SL. [Sp. Note 4].
- i**Dermatocarpon miniatum* (L.) W. Mann – rare in SH. *Nelson 07-841*.
- **Dermatocarpon rivulorum* (Arnold) Dalla Torre & Sarnth. – common in SH, uncommon in NH, SL. *Nelson 07-807; Nelson 08-420; Nelson 08-448; Walton 11370; Walton 11375*.
- **Dibaeis baeomyces* (L. f.) Rambold & Hertel – rare in NL. *Walton 3487*.
- **Dimelaena oreina* (Ach.) Norman – rare in NL. *Nelson 08-697*.
- Diploschistes scruposus* (Schreber) Norman – rare in NH, NL, SH, uncommon in SL.
- **Enchylium polycarpon* (Hoffm.) Otálora, P. M. Jørg. & Wedin – rare in SH. [Sp. Note 5].
- **Ephebe lanata* (L.) Vainio – rare in SL. *Nelson 11-100*.
- Epilichen scabrosus* (Ach.) Clem. – rare in NH, SH, SL.
- Erioderma pedicellatum* (Hue) P. M. Jørg. – common in SL. [Sp. Note 6].
- Euopsis pulvinata* (Schaerer) Nyl. – rare in SH.
- Evernia divaricata* (L.) Ach. – (Weber & Viereck 1967).
- Evernia mesomorpha* Nyl. – rare in NL, SL.
- Flavocetraria cucullata* (Bellardi) Kärnefelt & Thell – abundant in NH, NL, uncommon in SH.
- Flavocetraria minuscula* (Elenkin & Savicz) Ahti, Poryadina & Zhurbenko – rare in NL.
- Flavocetraria nivalis* (L.) Kärnefelt & Thell – abundant in NH, common in NL, SH.
- **Fuscopannaria ahlneri* (P. M. Jørg.) P. M. Jørg. – uncommon in SL, rare in NL. [Sp. Note 7].
- **Fuscopannaria praetermissa* (Nyl.) P. M. Jørg. – uncommon in NH, rare in NL. *Scelza 07-539; Nelson 06-158; Nelson 06-160; Nelson 09-132; Nelson 09-385*.
- **Fuscopannaria ramulina* P. M. Jørg. & Tønsberg – rare in SL. [Sp. Note 8].
- Fuscopannaria viridescens* P. M. Jørg. & Zhurb. – rare in NH. [Sp. Note 9].
- Gowardia nigricans* (Ach.) P. Halonen, L. Myllys, S. Velmala, & H. Hyvärinen – common in NH, rare in NL, uncommon in SH.
- Gyalecta foveolaris* (Ach.) Schaerer – (Weber & Viereck 1967).
- Gyalolechia xanthostigmoidea* (Räs.) Söchting, Frödén & Arup – (Söchting & Tønsberg 1997).
- **Heterodermia japonica* (M. Satô) Swinscow & Krog – rare in SL. *Nelson 11-025; Nelson 11-066*.
- **Heterodermia speciosa* (Wulfen) Trevisan – common in SL, rare in SH. *Nelson 07-813; Nelson 07-815; Nelson 07-820; Nelson 09-457; Nelson 10-363*.
- Hymenelia epulotica* (Ach.) Lutzoni – (Weber & Viereck 1967).

- **Hypogymnia apinnata* Goward & McCune – uncommon in SL. *Nelson 07-808; Nelson 07-812.*
Hypogymnia austerodes (Nyl.) Räsänen – sensu lato group (Goward et al. 2012); common in NH, NL, SL.
Hypogymnia bitteri (Lyngé) Ahti – common in SL, rare in NL.
 **Hypogymnia occidentalis* L. Pike – common in SL. *Brady 10-045; Nelson 09-406; Nelson 09-466A; Nelson 10-318; Nelson 11-051.*
Hypogymnia physodes (L.) Nyl. – common in SL, uncommon in NH, NL.
 Hypogymnia pulverata* (Nyl. ex Crombie) Elix – uncommon in SL. [Sp. Note 10**].
Hypogymnia subobscura (Vainio) Poelt – uncommon in NH.
 **Hypogymnia tubulosa* (Schaer.) Hav. – rare in SL. *Brady 10-029.*
 **Hypogymnia vittata* (Ach.) Parrique – rare in SL. *Nelson 07-818.*
Icmadophila ericetorum (L.) Zahlbr. – rare in NL, SH.
 **Illosporium carneum* Fr. – rare in SH. *Walton 11389.*
 **Imshaugia aleurites* (Ach.) S. F. Meyer – rare in NH, SL, uncommon in NL. *Bartlett 02-0010; Nelson 08-417; Nelson 08-452; Walton 7885.*
 i**Ionaspis lacustris* (With.) Lutzoni – rare in SL. *Nelson 10-402.*
Ionaspis odora (Ach.) Th. Fr. Ex Stein – (Weber & Viereck 1967).
 **Japewia tornoënsis* (Nyl.) Tønsberg – uncommon in SL. *Nelson 08-765; Nelson 08-889.*
 **Lasallia caroliniana* (Tuck.) Davydov, Peršoh & Rambold – rare in NH. *Stehn 09-292; Stehn 09-276.*
Lasallia pensylvanica (Hoffm.) Llano – rare in NL.
 **Lathagrium cristatum* (L.) Otálora, P. M. Jørg. & Wedin – rare in NH. *Nelson 06-224B.*
Lathagrium fuscovirens (With.) Otálora, P. M. Jørg. & Wedin – (Howard 1963; Weber & Viereck 1967).
 **Lathagrium undulatum* Laurer ex Flotow – rare in NH, SH.
 * var. *granulosum* Degel. – *Nelson 07-852; Nelson 07-853.*
 Lecanora aleutica* H. Magn. – rare in SL. [Sp. Note 11**].
Lecanora chlarotera Nyl. – (Weber & Viereck 1967).
Lecanora epibryon (Ach.) Ach. – (Weber & Viereck 1967).
Lecanora impudens Degel. – (Weber & Viereck 1967).
Lecanora muralis (Schreber) Rabenh. – (Weber & Viereck 1967).
Lecanora polytropa (Ehrh. ex Hoffm.) Rabenh. – rare in NH.
Lecidea lapicida (Ach.) Ach. – (Weber & Viereck 1967).
Lecidella euphorea (Flörke) Hertel – rare in SL.
 i**Lecidella stigmatea* (Ach.) Hertel & Leuckert – rare in NH. *Walton 12456.*
Lecidoma demissum (Rutstr.) Gotth. Schneider & Hertel – uncommon in NH, rare in SH.
 i**Leciophysma finmarkicum* Th. Fr. – rare in NH. *Nelson 06-199; Nelson 09-017.*
Lempholemma polyanthes (Bernh.) Malme – rare in NH.
Leptogium burnetiae C. W. Dodge – (Schindler 1990).
Leptogium hirsutum Sierk – rare in NH.
Leptogium saturninum (Dickson) Nyl. – common in NH, SL, uncommon in NL.
 **Lichenomphalia hudsoniana* (H. S. Jenn.) Redhead, Lutzoni, Moncalvo & Vilgalys – uncommon in NH. *Nelson 06-078; Walton 5978; Walton 7867.*
 **Lichenomphalia umbellifera* (L. : Fr.) Redhead, Lutzoni, Moncalvo & Vilgalys – rare in NL. *Walton 3647; Walton 3687.*
 Lichinodium canadense* Henssen – uncommon in SL. [Sp. Note 12**].

- **Lichinodium sirosiphoideum* Nyl. – rare in SL. *Nelson 11-102*.
- i**Lobaria hallii* (Tuck.) Zahlbr. – common in SL, rare in NL. *Nelson 07-1931; Nelson 07-834; Nelson 08-430; Nelson 10-338; Walton 8304*.
- Lobaria linita* (Ach.) Rabenh. – abundant in NH, common in SH, uncommon in NL, SL.
- Lobaria pseudopulmonaria* Gyelnik – uncommon in NH, rare in NL. (including *L. retigera*; Weber and Viereck 1967).
- **Lobaria pulmonaria* (L.) Hoffm. – common in SL, rare in NL, SH. [Sp. Note 13].
- Lobaria scrobiculata* (Scop.) DC. – common in SL, uncommon in NL, rare in NH.
- Masonhalea richardsonii* (Hooker) Kärnefelt – abundant in NH, uncommon in NL, SH.
- Massalongia carnosa* (Dickson) Körber – rare in NH.
- Megaspora verrucosa* (Ach.) Hafellner & V. Wirth – rare in NH, SH. *Nelson 07-1671; Nelson 08-994; Walton 11973*.
- i**Melanelia agnata* (Nyl.) Thell – rare in NH. *Bartlett 02-0541; Walton 6162*.
- Melanelia hepaticum* (Ach.) Thell – common in NH, uncommon in NL, SH, rare in SL.
- Melanelia stygia* (L.) Essl. – common in NH, uncommon in NL, rare in SH.
- n**Melanelixia subaurifera* (Nyl.) O. Blanco et al. – rare in SL. *Nelson 09-416*.
- **Melanohalea exasperatula* (Nyl.) O. Blanco et al. – uncommon in SL, rare in NL. *Nelson 10-352; Nelson 11-059; Nelson 11-074; Walton 6796*.
- Melanohalea infumata* (Nyl.) O. Blanco et al. – (Krog 1962).
- **Melanohalea olivacea* (L.) O. Blanco et al. – rare in NL. *Walton 3479; Walton 3832; Walton 3995*.
- **Melanohalea septentrionalis* (Lyngé) O. Blanco et al. – uncommon in NL, SH, SL. *Brady 10-008; Nelson 08-026; Nelson 09-409; Scelza 07-502; Walton 8746*.
- **Melanohalea subolivacea* (Nyl.) O. Blanco et al. – rare in NL, SL. *Bartlett 02-0456; Nelson 11-020; Nelson 11-075; Walton 9057*.
- Melanohalea trabeculata* (Ahti) O. Blanco et al. – uncommon in SL.
- Micarea misella* (Nyl.) Hedl. – (Weber & Viereck 1967).
- Montanelia disjuncta* (Erichsen) Divakar, A. Crespo, Wedin & Essl. – rare in NH.
- **Montanelia panniformis* (Nyl.) Divakar, A. Crespo, Wedin & Essl. – uncommon in NH, rare in NL. *Nelson 06-081; Nelson 07-260; Stehn 09-252; Walton 8660; Walton 9431*.
- **Montanelia sorediata* (Ach.) Divakar, A. Crespo, Wedin & Essl. – uncommon in NH, rare in NL. *Nelson 08-018; Walton 6250; Walton 09414B*.
- Montanelia tominii* (Oxner) Divakar, A. Crespo, Wedin & Essl. – (Weber & Viereck 1967).
- **Mycobilimbia berengeriana* (A. Massal.) Hafellner & V. Wirth – rare in NH. *Nelson 08-995*.
- Mycobilimbia carnealbida* (Mull. Arg.) S. Ekman & Printzen – common in SL.
- Mycobilimbia pilularis* (Körber) Hafellner & Türk – rare in SH.
- **Mycobilimbia tetramera* (De Not.) Vitik. – uncommon in SL. *Nelson 07-835; Nelson 07-836*.
- **Mycoblastus affinis* (Schaerer) T. Schauer – uncommon in SL. *Nelson 07-1759; Nelson 07-1760; Nelson 07-848*.
- i**Mycoblastus sanguinarius* (L.) Norman – common in SL, rare in NL. *Nelson 08-678; Nelson 08-775; Nelson 08-789; Nelson 08-859; Nelson 08-876*.
- Myriospora smaragdula* (Wahlenb. ex Ach.) K. Knudsen & L. Arcadia – (Weber & Viereck 1967).
- Nephroma arcticum* (L.) Torss. – common in NH, NL, SH, SL.
- Nephroma bellum* (Sprengel) Tuck. – common in SL, uncommon in NL, rare in NH, SH.
- Nephroma expallidum* (Nyl.) Nyl. – abundant in NH, common in NL, uncommon in SH.

- **Nephroma helveticum* Ach. – common in SL, rare in NH, NL.
 * subsp. *helveticum* Ach. – Nelson 07-2011; Nelson 07-2019.
 * subsp. *sipeanum* (Gyelnik) Goward & Ahti – Walton 11510; Walton 11511.
 i**Nephroma isidiosum* (Nyl.) Gyelnik – abundant in SL, rare in SH. Brady 10-013; Nelson 07-2018; Nelson 07-2020; Nelson 09-433; Nelson 11-057.
 n**Nephroma laevigatum* Ach. – rare in SL. Nelson 08-442.
Nephroma parile (Ach.) Ach. – common in NH, NL, SL.
 **Nephroma resupinatum* (L.) Ach. – common in SL, rare in NL, SH. Nelson 07-2010; Nelson 07-2021; Nelson 08-435; Walton 11341; Walton 11508.
Ochrolechia frigida (Sw.) Lynge – (Howard 1963; Weber & Viereck 1967).
 **Ochrolechia upsaliensis* (L.) A. Massal. – uncommon in NH. Walton 5203.
Ophioparma lapponica (Räsänen) Hafellner & R. W. Rogers – uncommon in NH, rare in NL.
Ophioparma ventosa (L.) Norman – (Howard 1963; May 1997).
 **Orphniospora moriopsis* (A. Massal) D. Hawksw. – rare in NL. Nelson 08-694.
Pannaria conoplea (Ach.) Bory – rare in SL.
Parmelia fraudans (Nyl.) Nyl. – uncommon in NH, rare in NL.
 **Parmelia hygrophila* Goward & Ahti – common in SL. [Sp. Note 14].
Parmelia omphalodes (L.) Ach. – common in NH, uncommon in NL, SH, rare in SL.
 subsp. *omphalodes* (L.) Ach.
Parmelia saxatilis (L.) Ach. – uncommon in SL, rare in NH, NL, SH.
 **Parmelia skultii* Hale – rare in NH. Nelson 07-394.
 **Parmelia squarrosa* Hale – uncommon in SL. Brady 10-003; Brady 10-040; Nelson 09-429; Nelson 10-346; Nelson 11-045.
Parmelia sulcata Taylor – common in SL, uncommon in NH, NL.
 n**Parmeliella triptophylla* (Ach.) Müll. Arg. – common in SL, rare in NL. Nelson 06-036; Nelson 08-830; Nelson 09-414; Nelson 10-327; Nelson 11-026.
 **Parmelina yalungana* (Zahlbr.) P. R. Nelson & Kepler (Nelson et al. 2012) – rare in SL. Nelson 07-804a.
Parmeliopsis ambigua (Wulfen) Nyl. – uncommon in NH, NL, rare in SL.
Parmeliopsis hyperopta (Ach.) Arnold – common in NH, SL, abundant in NL, rare in SH.
Peltigera aphthosa (L.) Willd. – abundant in NH, NL, uncommon in SH, SL.
Peltigera canina (L.) Willd. – common in NH, NL, rare in SH.
 **Peltigera collina* (Ach.) Schrader – uncommon in SL, rare in NL, SH. Bartlett 02-2016; Nelson 07-2028; Nelson 07-2036; Nelson 07-2037; Walton 10651.
Peltigera didactyla (With.) J. R. Laundon – common in NH, NL, uncommon in SH, rare in SL.
 **Peltigera elisabethae* Gyelnik – common in NH, uncommon in NL, rare in SH, SL. Bartlett 02-0769; Brady 09-007; Nelson 07-2029; Stehn 09-160; Walton 7623.
 **Peltigera extenuata* (Vainio) Lojka – rare in NH, SL. Nelson 08-416; Walton 15100.
 **Peltigera gowardii* Lendemer & H. O'Brien – rare in SL. [Sp. Note 15].
 **Peltigera horizontalis* (Hudson) Baumg. – uncommon in SL, rare in NH, NL. Nelson 07-1969; Nelson 07-2024; Nelson 08-087; Nelson 08-092; Walton 7883.
 **Peltigera kristinssonii* Vitik. – common in NH, uncommon in NL, rare in SH. Nelson 08-389; Nelson 08-160; Scelza 07-511; Stehn 09-010; Walton 8605.
Peltigera lepidophora (Nyl. ex Vainio) Bitter – common in NH, uncommon in NL, rare in SH.
Peltigera leucophlebia (Nyl.) Gyelnik – common in NH, NL, SL, uncommon in SH.
Peltigera malacea (Ach.) Funck – abundant in NH, NL, uncommon in SH.

- **Peltigera membranacea* (Ach.) Nyl. – common in SL, uncommon in NH, NL, rare in SH. *Bartlett 02-0815; Nelson 07-1974; Nelson 07-2033; Nelson 08-248; Nelson 09-182.*
- **Peltigera neckeri* Hepp ex Müll. Arg. – common in NH, uncommon in NL. *Bartlett 02-0749; Nelson 07-149; Stehn 09-243; Walton 8569; Walton 15111.*
- i**Peltigera neopolydactyla* (Gyelnik) Gyelnik – common in SL, uncommon in NH, NL. *Brady 09-093; Nelson 07-2030; Nelson 08-263; Stehn 10-347; Walton 8970.*
- **Peltigera occidentalis* (E. Dahl) Kristinsson – rare in NH, uncommon in NL. [**Sp. Note 16**].
- Peltigera polydactylon* (Necker) Hoffm. – common in NH, NL, uncommon in SL.
- i**Peltigera ponojensis* Gyelnik – uncommon in NH, rare in NL, SH. *Nelson 07-657; Nelson 08-137; Stehn 10-233; Walton 5090; Walton 5124.*
- **Peltigera praetextata* (Flörke ex Sommerf.) Zopf – abundant in NH, uncommon in NL, SH, SL. *Nelson 07-478; Nelson 07-1965; Nelson 07-1966; Nelson 07-2025; Nelson 07-2034.*
- Peltigera retifoveata* Vitik. – common in NH, uncommon in NL.
- Peltigera rufescens* (Weiss) Humb. – abundant in NH, common in NL, SH.
- Peltigera scabrosa* Th. Fr. – common in NH, abundant in NL, rare in SH.
- Peltigera venosa* (L.) Hoffm. – common in NH, uncommon in SH, rare in NL, SL.
- Pertusaria carneopallida* (Nyl.) Anzi – (Weber & Viereck 1967; Dibben 1980).
- Pertusaria dactylina* (Ach.) Nyl. – common in NH.
- **Pertusaria oculata* (Dickson) Th. Fr. – rare in NH. *Nelson 08-593.*
- Pertusaria panyrga* (Ach.) A. Massal. – rare in NL.
- Pertusaria saximontana* Wetmore – (Zhurbenko & Lumbsch 2006).
- Pertusaria subdactylina* Nyl. – (Dibben 1980).
- Phaeophyscia constipata* (Norrlin & Nyl.) Moberg – uncommon in NH, rare in NL, SH.
- i**Phaeophyscia endococcina* (Körber) Moberg – uncommon in NH, rare in NL. *Walton 3057; Walton 3194; Walton 7570; Walton 4155a.*
- Phaeophyscia orbicularis* (Necker) Moberg – rare in NH, NL, SH, SL.
- **Phaeophyscia sciastra* (Ach.) Moberg – rare in NH. *Nelson 07-827; Walton 7533.*
- i**Phaeorrhiza nimbose* (Fr.) H. Mayrh. & Poelt – rare in NH. *Nelson 07-2071.*
- Phaeorrhiza sareptana* (Tomin) H. Mayrhofer & Poelt – rare in NH.
- Physcia alnophila* (Vainio) Loht., Moberg, Myllys & Tehler – uncommon in NH, NL, SL.
- Physcia caesia* (Hoffm.) Fürnr. – common in NH, uncommon in SH.
- **Physcia dubia* (Hoffm.) Lettau – uncommon in SH, rare in NH. *Nelson 07-1823; Nelson 07-1824; Nelson 07-1825.*
- **Physcia phaea* (Tuck.) J. W. Thomson – rare in NH. *Walton 5073.*
- Physconia detersa* (Nyl.) Poelt – common in SL.
- Physconia muscigena* (Ach.) Poelt – common in NH, SH, rare in NL.
- Pilophorus robustus* Th. Fr. – rare in NH.
- Placidium lachneum* (Ach.) Breuss – (Weber & Viereck 1967).
- Placopsis gelida* (L.) Lindsay – (Weber & Viereck 1967).
- i**Placynthiella icmalea* (Ach.) Coppins & P. James – rare in NL. *Walton 3931.*
- Placynthiella uliginosa* (Schrader) Coppins & James – rare in NL.
- Placynthium nigrum* (Hudson) Gray – (Weber & Viereck 1967).
- n**Placynthium stenophyllum* (Tuck.) Fink – rare in SH.
- n* var. *isidiatum* (Tuck.) Fink – [**Sp. Note 17**].
- **Platismatia glauca* (L.) Culb. & C. Culb. – uncommon in SL, rare in SH. *Nelson 08-1012; Walton 11343; Walton 11395.*

- Polyblastia cucurbitula* J. W. Thomson & B. M. Murray – (Thomson & Murray 1988).
- Polyblastia theleodes* (Sommerf.) Th. Fr. – (Howard 1963; Weber & Viereck 1967).
- Polycauliona candelaria* (L.) Frödén, Arup, & Söchting – rare in NH, NL, SL.
- Polycauliona polycarpa* (Hoffm.) Frödén, Arup, & Söchting – rare in NH.
- i**Polychidium muscicola* (Sw.) Gray – rare in NH, NL. *Nelson 08-500; Walton 5833; Walton 15188.*
- Porpidia albocaerulescens* (Wulfen) Hertel & Knoph – (Howard 1963).
- Porpidia flavocaerulescens* (Hornem.) Hertel & A. J. Schwab – (Weber & Viereck 1967; Fryday 2005).
- Porpidia macrocarpa* (DC.) Hertel & A. J. Schwab – (Weber & Viereck 1967).
- Protoblastenia rupestris* (Scop.) J. Steiner – uncommon in SH, rare in NH.
- Protopannaria pezizoides* (Weber) P. M. Jørg. & S. Ekman – common in NH, SH, uncommon in SL, rare in NL.
- Protoparmelia badia* (Hoffm.) Hafellner – rare in SH, SL.
- Protothelenella sphinctrinoides* (Nyl.) H. Mayrhofer & Poelt – (Weber & Viereck 1967).
- Pseudephebe minuscula* (Nyl. ex Arnold) Brodo & D. Hawksw. – common in NH, rare in NL.
- Pseudephebe pubescens* (L.) M. Choisy – common in NH, rare in NL, SH.
- i**Pseudocyphellaria crocata* (L.) Vainio – abundant in SL, rare in NL. *Nelson 07-2200; Nelson 07-2207; Nelson 08-1103; Nelson 10-400.*
- **Pseudocyphellaria perpetua* McCune & Miadl. – uncommon in SL. [**Sp. Note 18**].
- **Psora decipiens* (Hedwig) Hoffm. – uncommon in SH, rare in NH. *Nelson 07-2001; Nelson 07-2004; Nelson 07-837.*
- **Psora himalayana* (Church. Bab.) Timdal – common in SH. *Nelson 07-2002; Nelson 07-2003; Nelson 07-1899.*
- Psora rubiformis* (Ach.) Hooker – rare in NH.
- Psoroma hypnorum* (Vahl) Gray – common in NH, SH, uncommon in NL.
- Pycnothelia papillaria* Dufour – (Zhurbenko et al. 2005).
- **Ramalina dilacerata* (Hoffm.) Hoffm. – uncommon in SL. *Nelson 10-347; Brady 10-009.*
- n**Ramalina farinacea* (L.) Ach. – rare in SL. *Nelson 10-355.*
- **Ramalina obtusata* (Arnold) Bitter – uncommon in SL, rare in NL. [**Sp. Note 19**].
- Ramalina roesleri* (Hochst. ex Schaerer) Hue – uncommon in SL.
- **Ramalina thrausta* (Ach.) Nyl. – common in SL. *Nelson 09-403; Nelson 10-357; Nelson 11-082.*
- n**Ramboldia cinnabarina* (Sommerf.) Kalb, Lumbsch & Elix comb. nov. – uncommon in SL. *Nelson 07-832; Nelson 08-411.*
- i**Rhizocarpon alpicola* (Anzi) Rabenh. – rare in NH, SH. *Nelson 06-451; Nelson 08-746.*
- Rhizocarpon chioneum* (Norman) Th. Fr. – uncommon in SH.
- Rhizocarpon copelandii* (Körber) Th. Fr. – (Weber & Viereck 1967).
- Rhizocarpon eupetraeum* (Nyl.) Arnold – (Schindler 1990).
- Rhizocarpon geographicum* (L.) DC. – rare in NH, SH, SL.
- i**Rhizocarpon grande* (Flörke ex Flotow) Arnold – rare in NL. *Nelson 08-540.*
- s**Rhizocarpon intermediellum* Räsänen – rare in NL. *Nelson 08-525.*
- Rhizocarpon rittokense* (Hellbom) Th. Fr. – (Weber & Viereck 1967; Schindler 1990).
- Rhizocarpon superficiale* (Schaerer) Vainio – rare in SH.
- Rhizocarpon viridiatrum* (Wulfen) Körber – (Weber & Viereck 1967).
- Rhizoplaca chrysoleuca* (Sm.) Zopf – rare in NL.

- Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt – (Howard 1963).
- Rinodina archaea* (Ach.) Arnold – (Weber & Viereck 1967).
- Rinodina mniaraea* (Ach.) Körber – (Weber & Viereck 1967).
- Rinodina turfacea* (Wahlenb.) Körber – rare in NL.
- i**Ropalospora lugubris* (Sommerf.) Poelt – rare in NL. *Nelson 08-699*.
- i**Rostania ceranisca* (Nyl.) Otálora, P. M. Jørg. & Wedin – uncommon in NH. *Nelson 06-198*;
Nelson 07-750; *Nelson 09-012*; *Nelson 09-139*; *Nelson 10-049*.
- **Rostania occultata* (Bagl.) Otálora, P. M. Jørg. & Wedin – rare in NL. [**Sp. Note 20**].
- Rusavskia elegans* (Link) S. Y. Kondr. & Kärnefelt – uncommon in NH, rare in NL.
- **Rusavskia sorediata* (Vainio) S. Y. Kondr. & Kärnefelt – rare in SL. *Nelson 11-101*.
- Sagiolechia rhexoblephara* (Nyl.) Zahlbr. – (Weber & Viereck 1967).
- Santessoniella arctophila* (Th. Fr.) Henssen – (Weber 1965; Henssen 1997; Jørgensen 2000).
- Schaereria brunnea* Björk, T. Sprib. & T. B. Wheeler – (Dillman et al. 2012).
- i**Schaereria cinereorufa* (Schaerer) Th. Fr. – rare in NH. *Nelson 06-130*.
- s**Scytinium gelatinosum* (With.) Otálora, P. M. Jørg. & Wedin – uncommon in NH. *Nelson 09-112*; *Nelson 09-161*; *Nelson 10-182*.
- n**Scytinium imbricatum* (P. M. Jørg.) Otálora, P. M. Jørg. & Wedin – rare in NH. [**Sp. Note 21**].
- Scytinium lichenoides* (L.) Otálora, P. M. Jørg. & Wedin – uncommon in NH, SH, rare in NL.
- i**Scytinium tenuissimum* (Dickson) Otálora, P. M. Jørg. & Wedin – uncommon in NH. *Nelson 07-493*; *Nelson 07-606*; *Nelson 07-1812*; *Walton 5993*.
- Solorina bispora* Nyl. – uncommon in NH, SH.
- Solorina crocea* (L.) Ach. – abundant in SH, common in NH, rare in NL, SL.
- Solorina octospora* (Arnold) Arnold – (Weber & Viereck 1967; Krog 1968).
- Solorina saccata* (L.) Ach. – common in NH, SH, rare in NL.
- Solorina spongiosa* (Ach.) Anzi – rare in NL.
- Sphaerophorus fragilis* (L.) Pers. – common in NH, rare in NL.
- Sphaerophorus globosus* (Hudson) Vainio – common in NH, rare in NL, SH.
- **Spilonema revertens* Nyl. – rare in SH. *Nelson 08-400*.
- i**Sporastatia polyspora* (Nyl.) Grummann – rare in SH. *Nelson 08-732*.
- Sporastatia testudinea* (Ach.) A. Massal. – (Weber & Viereck 1967).
- Staurothele clopimoides* (Bagl. & Carestia) J. Steiner – (Weber & Viereck 1967).
- Staurothele fissa* (Taylor) Zwackh – (Thomson 1991).
- Stereocaulon alpinum* Laurer ex Funck – common in NH, rare in NL, SH.
- Stereocaulon arenarium* (Savicz) I. M. Lamb – uncommon in NH.
- **Stereocaulon botryosum* Ach. – rare in NH. *Walton 4637*; *Walton 4788*; *Walton 5076*.
- Stereocaulon condensatum* Hoffm. – uncommon in NH.
- Stereocaulon depressum* (Frey) I. M. Lamb – (Weber & Viereck 1967, synonymy after Lamb 1977).
- Stereocaulon glareosum* (Savicz) H. Magn. – uncommon in NH, rare in NL, SH.
- **Stereocaulon grande* (H. Magn.) H. Magn. – common in NH, uncommon in NL, SH. *Bartlett 02-0584*; *Nelson 07-351*; *Walton 4618*; *Walton 7149*; *Walton 7631*.
- i**Stereocaulon intermedium* (Savicz) H. Magn. – rare in NH. *Walton 5738*; *Walton 5808*;
Walton 6054.
- Stereocaulon paschale* (L.) Hoffm. – common in NH, NL, uncommon in SH.
- Stereocaulon rivulorum* H. Magn. – uncommon in NH, SH, rare in NL.

- n**Stereocaulon sasakii* Zahlbr. – uncommon in NH. *Bartlett 02-0575; Walton 4919; Walton 5606.*
- n* var. *tomentosoides* I. M. Lamb – *Walton 4872; Walton 6178; Walton 15104.*
- **Stereocaulon spathuliferum* Vainio – rare in NH. *Walton 3229.*
- **Stereocaulon sterile* (Savicz) I. M. Lamb ex Krog – rare in NH. *Walton 5799; Walton 6016.*
- Stereocaulon subcoralloides* (Nyl.) Nyl. – (Howard 1963).
- Stereocaulon tomentosum* Fr. – common in NH, NL, uncommon in SH.
- Stereocaulon vesuvianum* Pers. – rare in NH, SH.
- Sticta arctica* Degel. – uncommon in NH, rare in NL.
- **Sticta limbata* (Sm.) Ach. – uncommon in SL. *Nelson 08-402; Nelson 09-407.*
- Tephromela atra* (Hudson) Hafellner – (Weber & Viereck 1967).
- Thamnotia subuliformis* (Ehrh.) W. L. Culb. – common in NH, uncommon in NL, rare in SH.
- Thamnotia vermicularis* (Sw.) Ach. ex Schaerer – abundant in NH, common in NL, uncommon in SH.
- s**Thelopsis melathelia* Nyl. – rare in NH. [**Sp. Note 22**].
- **Thrombium epigaeanum* (Pers.) Wallr. – rare in SH in SL. *Nelson 07-1803.*
- **Toninia sedifolia* (Scop.) Timdal – rare in NL, SL. *Nelson 08-1001.*
- Toninia squalida* (Ach.) A. Massal. – (Weber & Viereck 1967).
- Trapeliopsis granulosa* (Hoffm.) Lumbsch – (Howard 1963).
- **Trapeliopsis viridescens* (Schrader) Coppins & P. James – rare in NL, SH, SL. *Nelson 08-508; Nelson 08-1027; Walton 14496; Walton 14502; Walton 14505.*
- Tremolecia atrata* (Ach.) Hertel – (Weber & Viereck 1967).
- **Tuckermannopsis americana* (Sprengel) Hale – rare in NL. *Nelson 09-178; Walton 15174.*
- i**Tuckermannopsis chlorophylla* (Willd.) Hale – common in SL. *Brady 10-038; Nelson 08-429; Nelson 08-422; Nelson 08-444; Walton 10167.*
- Tuckermannopsis sepincola* (Ehrh.) Hale – abundant in NL, common in NH, rare in SH, SL.
- i**Umbilicaria americana* Poelt & T. H. Nash – uncommon in SL. [**Sp. Note 23**].
- **Umbilicaria angulata* Tuck. – rare in NH, NL. *Nelson 06-079; Walton 3838.*
- **Umbilicaria arctica* (Ach.) Nyl. – rare in NH. *Stehn 09-249; Walton 5151.*
- Umbilicaria cinereorufescens* (Schaerer) Frey – rare in NH, SH.
- Umbilicaria cylindrica* (L.) Delise ex Duby – common in NH, rare in SH.
- Umbilicaria deusta* (L.) Baumg. – rare in SH.
- Umbilicaria hyperborea* (Ach.) Hoffm. – common in NH, uncommon in NL, SH.
var. *hyperborea* (Ach.) Hoffm.
var. *radicula* J. E. Zetterst.) Hasselrot
- Umbilicaria lyngei* Schol. – rare in NH.
- Umbilicaria proboscidea* (L.) Schrader – common in NH, SH, rare in NL.
- **Umbilicaria rigida* (Du Rietz) Frey – rare in NH. *Nelson 06-087.*
- Umbilicaria scholanderi* (Llano) Krog – (Llano 1950; Llano 1956; Krog 1968).
- Umbilicaria torrefacta* (Lightf.) Schrader – common in NH, rare in NL, SH.
- Umbilicaria vellea* (L.) Hoffm. – rare in NL.
- Umbilicaria virginis* Schaerer – uncommon in NH, rare in SH.
- Usnea hirta* (L.) Weber ex F. H. Wigg. – (Krog 1968).
- **Usnea lapponica* Vainio – uncommon in SL. *Nelson 11-039; Nelson 11-095; Nelson 11-096.*
- **Usnea longissima* Ach. – uncommon in SL. *Brady 10-047; Nelson 07-826; Nelson 08-415; Nelson 08-440; Nelson 08-453.*

Usnea substerilis Motyka – rare in NH.

i**Variolaria ophthalmiza* Nyl. – rare in NH, NL. [Sp. Note 24].

i**Verrucaria muralis* Ach. – rare in SH. *Nelson 07-1799*.

Vestergrenopsis isidiata (Degel.) E. Dahl – (Henssen 1963; Weber & Viereck 1967).

Vulpicida pinastri (Scop.) J.-E. Mattsson & M. J. Lai – common in NH, abundant in NL, uncommon in SL, rare in SH.

Vulpicida tilesii (Ach.) J.-E. Mattsson & M. J. Lai – common in NH, rare in NL, SH.

i**Xanthoparmelia coloradoënsis* (Gyelnik) Hale – rare in NH, NL. *Nelson 08-405; Walton 11474*.

Xanthoparmelia stenophylla (Ach.) Ahti & D. Hawksw. – (Krog 1962; Weber & Viereck 1967).

Xylographa parallela (Ach. ex Fr.) Behlen & Desberger – (Weber & Viereck 1967).

Xylographa vitiligo (Ach.) J. R. Laundon – (Anderson 1967).