Using Calicioid Lichens and Fungi as Biomonitors of Pollution in Five Class I Wilderness Areas in Eastern North America

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ABSTRACT: After evaluating the condition of mature, spore-bearing apothecia (and their inferred ability to produce viable spores) of calicioid lichens and fungi collected in each of five Class I Wilderness Areas in eastern North America, then comparing the results with an identical evaluation of mature, spore-bearing apothecia of calicioid lichens and fungi collected up to 27 years earlier in forests adjacent to or within 45-125 miles of these wilderness areas, it is clear that air pollution has considerably degraded, and likely reduced, the calicioid lichen flora in these wilderness areas. Fifty percent (50%) of the calicioid lichens collected in the Presidential Range-Dry River Wilderness Area in the White Mountain National Forest in New Hampshire, 75% of the calicioid lichens collected in Great Gulf Wilderness Area in the White Mountain National Forest, 50% of the calicioid lichens collected in the Lye Brook Wilderness Area in the Green Mountain National Forest in Vermont, 33% of the calicioid lichens collected in the Schoodic section of Acadia National Park on the coast of Maine, and 50% of the calicioid lichens collected in Great Smoky Mountain National Park in Tennessee and North Carolina are in poor to extremely poor condition. In comparison, 20 years earlier, 9% of the calicioid lichens collected at Gibbs Brook Research Natural Area and 11% of the calicioid lichens collected at Nancy Brook Research Natural Area, both in the White Mountain National Forest and adjacent to its two Wilderness Areas, were in poor to extremely poor condition. Similarly, 20 years earlier, none (0%) of the calicioid lichens collected at Gifford Woods State Park and 25% of the calicioid lichens collected at The Cape Research Natural Area, both in Vermont and within 45 miles of Lye Brook Wilderness Area, were in poor to extremely poor condition. Finally, 25 years ago, 12% of the calicioid lichens collected at Big Reed Forest Reserve (85 miles northwest of Acadia National Park) and 7-13 years ago, none (0%) of the calicioid lichens collected at Baxter State Park (125 miles northwest of Acadia National Park) were in poor to extremely poor condition. No earlier collections of calicioid lichens and fungi were available for comparison with those collected at Great Smoky Mountains National Park. *Chaenotheca brunneola*, *C. ferruginea*, and *C. stemonea* are considered the most pollution-tolerant of the calicioid lichens investigated, while most, if not all, of the calicioid fungi are pollution-tolerant. In all eleven of the forests under investigation , 82-100% of the calicioid fungi were in good to excellent condition, suggesting that it is the damaging effects of pollution on the algal partner in the calicioid lichens that has led to their decline.

The intimate physiological relationship between lichen thalli and the environment, the perennial nature of lichens and their sensitivity to disturbance, dependence on nutrients and chemicals not derived from their substratum, an ability to concentrate compounds from weak solutions, and also the range of species with different requirements and sensitivities, means that lichens act as continuous monitors of the environment. An appreciation of their qualities as biological monitors, and the study of the parameters limiting the occurrence of particular species, has led to their use as indicators of a variety of environmental factors.

--Hawksworth and Hill (1984)

As an alternative to direct measurement of specific pollutants in an environment or the degree to which a forest has been disturbed by a natural disaster or cutting practices, living organisms have long been used to assess environmental quality. The canary in the coal mine is an excellent and well-known early example: By monitoring the health of these birds, miners would know when concentrations of the odorless gas methane were reaching dangerous levels.

Since the mid-1980's, I've been using lichen biomonitors to assess the ecological continuity of forest ecosystems in the Acadian forest of northeastern North America (Selva 1994, 1996, 2002, 2003). Among the old-forest indicator lichens selected for the assessment indices used in these studies was a group of species known, collectively, as the calicioid lichens and fungi. The lichenized (i.e., the calicioid lichens) and non-lichenized (i.e., the calicioid fungi) species are together distinguished by their tiny, 1-2 mm tall, stipitate apothecia. Each apothecium has a thin stalk that rises from the substrate and flares out at the top into a cup-like excipulum. The spores are sitting in the excipulum, the entire spore mass expanding upward or overflowing out of the cup as they mature. The height to which the spores rise, downward to the bottom of the excipulum, is called the capitulum or head—like the head of a pin, hence the colloquial name "pin" lichens for the group as a whole. When one looks down on the apothecia, under a dissecting microscope, the spores in the excipulum are easy to see. Most calicioid species prefer microhabitats that many collectors don't tend to investigate and, as a result, they remain one of the forest's most elusive and poorly known inhabitants. They colonize a variety of substrates, including the bark and wood of numerous angiosperm and gymnosperm species, as well as bryophytes and rock. Most species seem to depend on the occurrence of mature forests containing trees of different ages, a multistoried canopy, and with dead and dying trees both standing upright and littering the forest floor.

Among the many forests that have had their continuities assessed were the Class I Wilderness Areas at Great Smoky Mountains National Park in Tennessee and North Carolina (Selva 2006, 2009, 2011) and the Schoodic section of Acadia National Park in Maine (Selva 2010). In both of these wilderness areas my overall impression of the collecting—when compared to the other forests where these species have been collected over the past 30 years—was that specimens were noticeably "few and far between" and difficult to find. Most notable, however, was the poor

condition of the spore-bearing apothecia. While most of the calicioid fungi were in relatively good condition, the vast majority of the calicioid lichens were much worse off, with broken stalks, multiple heads, deformed, misshapen or empty capitula, tattered excipula, or with the spores pulled away from the excipula and looking dry and crusty. In species with pruinose apothecia, the pruina was often thin and faint, or with little if any present, and in many collections the apothecia were found draped in fungal hyphae or caked with algae or the soredia of other lichenized species. Inasmuch as I had never seen such wholesale devastation before, I had genuine concerns for the health of these ecosystems while at the same time wondered if the calicioid lichens and fungi could be used to assess and monitor ecosystem pollution.

Calicioid Lichens and Fungi as biomonitors of pollution

Lichens are classified, scientifically, with the fungi in the Kingdom Fungi. Like all organisms, these species need carbon to survive. The saprophytic fungi satisfy their need for carbon by absorbing it from dead organisms (e.g., leaf litter or the wood of dead trees); the parasitic fungi satisfy their need for carbon by absorbing it from living organisms (e.g., the bark of living trees); and the *lichenized* fungi satisfy their need for carbon by having it provided to them by a photosynthetic partner—i.e., an algal or cyanobacterial partner—with which they are living symbiotically. As a result, lichens do not need the carbon stored in bark or wood substrates, and can even grow on rock substrates devoid of carbon altogether. Should something happen to the photosynthetic partner, the fungal partner is cut off from its carbon supply and the lichen will die.

One thing that leads to the death of the algal partner is increased acidity. Consequently, with the increased acidity that comes with acid rain—i.e., the sulfuric acid and nitric acid that result when sulfur dioxide and nitrous oxides in the atmosphere mix with rainwater, the algal partner in a lichen symbiosis is the first to die, resulting in the death of the lichen. Several factors contribute to the sensitivity of lichens to pollution. In lacking roots, they do not have access to nutrients in soil so depend entirely on what is deposited on them from the atmosphere or washed over them from above. In lacking the outer, waxy cuticle that protects higher plants from damage, lichens absorb both nutrients and pollutants from wet and dry atmospheric deposition (McCune et al. 2006). "Enzymatic mediated physiological processes such as photosynthesis and respiration are very sensitive to pH and are impaired by added acidity. All lichens are thus sensitive to sulfur dioxide, although some are more sensitive than others. In general, sensitivity increases in the following series: crustose < foliose < fructicose (U. S. Forest Service). All of the calicioid species being investigated here are crustose species. The net effect on lichen communities is always a decrease in diversity as sensitive species are lost but no new species replace them" (U.S. Forest Service).

One of the earliest lichenologists to recognize the potential of using lichens as biomonitors was Nylander (1866). Based on the number of lichens he collected in various parts of Paris, Nylander concluded that the specimens he found in the Jardin du Luxembourg outside the city were healthier than any he found inside the city proper. While thousands of articles have since

been written on the subject, the only calicioid species recognized as pollution-tolerant is *Chaenotheca ferruginea*.

Pollution in the Wilderness Areas of eastern North America

In an effort to determine if the calicioid lichens and fungi can, as a group, be used successfully as biomonitors of air pollution, five Class I Wilderness Areas in the eastern United States were selected as study areas: The Presidential Range-Dry River Wilderness Area in the White Mountain National Forest in New Hampshire, Great Gulf Wilderness Area, also in the White Mountain National Forest, the Lye Brook Wilderness Area in the Green Mountain National Forest of Vermont, the Schoodic section of Acadia National Park on the coast of Maine, and Great Smoky Mountains National Park in Tennessee and North Carolina.

The problems associated with acid rain, ozone, and heavy metal pollution in our eastern North American wilderness areas are many and have raised great concern. For example, visibility is reduced when certain gases and fine particulates such as dust and smoke from forest fires enter the atmosphere, but visibility is reduced to more dangerous levels by inputs of particularly small NO_3 (nitrate) particles—often the result of automobile and power plant emissions, and small SO_4 (sulfate) particles—largely the result of emissions from coal-burning power plants. Between 70 and 98 percent of this pollution can be traced to sulfates created when power plants located outside the region emit sulfur dioxide that reacts in the atmosphere and is blown into our region on prevailing winds. Acadia National Park on the coast of Maine, one of our most popular parks, has some of the dirtiest air in the country. It has been said that "Acadia is in the unfortunate location of being 'the nation's tailpipe'". Pollution reaching Acadia "travels from as far away as Sudbury, Canada, the Midwestern states, and the metropolitan New York City/Philadelphia region" (Appalachian Mountain Club 2004).

Sulfate and nitrate compounds also impact the region's soil and water, resulting in the death of aquatic organisms and poor water quality in streams and lakes. The Appalachian Mountain Club has collected rainwater from near the summit of Mount Washington in the White Mountains of New Hampshire and "found it to have a pH equal to that of vinegar" (Appalachian Mountain Club 2004). The recreational experience for visitors to these national parks and wilderness areas are reduced when the places they seek out for natural beauty, solitude, and recreation are degraded (Driscoll at al. 2001).

In 2004, three conservation groups, Appalachian Voices, the National Parks Conservation Association, and Our Children's Earth released a report on the state of pollution in our national parks. Called Code Red: America's Five Most Polluted National Parks (Ayers et al. 2004), the report ranks the most polluted national parks as follows:

1. **Great Smoky Mountains National Park in Tennessee and North Carolina**
2. Mammoth Cave National Park in Kentucky
3. Shenandoah National Park in Virginia

4. **Acadia National Park in Maine**
5. Sequoia-Kings Canyon National Parks in California

According to the report, "full and faithful enforcement of clean air programs that restore park air quality is long overdue. Nationwide, air pollution is one of the largest threats to the plants, animals, and experience of visitors in America's national parks, ruining scenic views and posing health risks. Summer visibility is improving at only two of the 13 parks evaluated: Mammoth Cave and Shenandoah, but all other parks show no change. Unhealthful ozone pollution is getting worse at more than half of the evaluated parks, with the others showing no improvement. In the Great Smoky Mountains, our most polluted national park, ozone pollution rivals urban areas, and even exceeds that of New York City, and Washington, D.C." (Ayers et al. 2004). Since 2004, extensive air monitoring programs in our national parks and wilderness areas have shown that air quality is improving, but the damage has already happened.

Methods

The five Class I Wilderness Areas under investigated were visited in the years noted in parentheses: The Presidential Range-Dry River Wilderness Area (2012), Great Gulf Wilderness Area (2011, 2013), Lye Brook Wilderness Area (2013), the Schoodic section of Acadia National Park (2010), and Great Smoky Mountains National Park (2005, 2008, and 2010). In addition, calicioid specimens collected in the Presidential Range-Dry River Wilderness Area and Great Gulf Wilderness Area are being compared with specimens collected 20 years earlier in forests adjacent to these wilderness areas, at Nancy Brook Research Natural Area (1992) and Gibb's Brook Research Natural Area (1993). The Lye Brook specimens are being compared with specimens collected in Vermont 20 years earlier, at Gifford Woods State Park (1992) and The Cape Research Natural Area (1992), both of which are approximately 45 miles from the wilderness area. Finally, specimens collected in the Schoodic section of Acadia National Park are compared with calicioid specimens collected in Maine 27 years ago at Big Reed Forest Reserve (1986, 1987; approximately 85 miles away) and 7-13 years earlier at Baxter State Park (1997, 1998, 2002, 2003; approximately 123 miles away).

Specimens of calicioid lichens and fungi were collected, preserved, and identified according to standard methods and techniques, and nomenclature, according to Esslinger (2012). All specimens are housed in the herbarium at the University of Maine at Fort Kent (UMFK). The collections from each tree, or rock, substrate were placed into one or more folded paper packets and given a collection number. If a collection number is represented by more than one packet, these packets (never more than 3) are labeled, for example, 100a, 100b, and 100c. Each packet may hold from one to several different calicioid species, each species represented by a lichenized or nonlichenized thallus and, typically, hundreds of stipitate, spore-bearing apothecia measuring 0.25 to 2.0 mm tall. Given the small size of the apothecia, it is virtually impossible to identify them in the field. Consequently, collecting is done by visiting the diversity of microhabitats in which they reside. Since you can't always tell what species you're collecting—it may even be a slime mold, the species collected at each of the locations under investigation have, by their nature, been collected randomly. Some species may have been collected once in a particular forest while others may have been collected three, eight, or fifteen times.

If pollution is leading to the degradation and/or elimination of a calicioid species from the ecosystem, it is undoubtedly interfering in some way with its ability to reproduce. Consequently, all specimens of each species are evaluated on the condition of its mature, spore-bearing apothecia and assigned a number (Table 1). Any specimen with fewer than 10 apothecia was not evaluated.

Table 1. All specimens of each species collected are represented by a number (from 1 to 5) that corresponds to the conditions of its mature spore-bearing apothecia and their inferred ability to produce viable spores (e.g., the stalk is broken and no longer has a spore-bearing capitulum, the excipulum is empty, the spores have pulled away from the excipulum and are dry and crusty, the apothecia are completely covered with fungal hyphae or soredia from other species, or the apothecia are being completely overrun by another species). In those specimens where the condition is assessed as midway between two numbers, a 1½, 2 ½, 3 ½, or 4 ½ is assigned. Some allowance for broken apothecia is made, considering their fragility and the collecting process of placing material into folded paper packets and transporting them back to the lab. If, for every 20 or so mature apothecia, 1 is broken, that damage is attributed to collection and transport.

1	No injury/in excellent condition (all of the mature apothecia are bearing viable spores)
2	Trace injury/in good condition (up to ¼ of the mature apothecia are not bearing viable spores)
3	Light injury/in poor condition (between ¼ and ½ of the mature apothecia are not bearing viable spores)
4	Moderate injury/in very poor condition (between ½ and ¾ of the mature apothecia are not bearing viable spores)
5	Heavy injury/in extremely poor condition (> ¾ of the mature apothecia are not bearing viable spores)

The numbers assigned to each of the specimens in all of the packets collected at each of the locations under investigation are recorded for each species. Each number is associated with a W, a B, or an R, which indicates its wood, bark, or rock substrate (Tables 2-12).

In Tables 13-23, for each of the sites under investigation, the percentage of lichenized specimens in good to excellent condition (i.e., assigned numbers 1 and 2) is compared with the percentage of lichenized specimens in poor to extremely poor condition (i.e., assigned numbers 3, 4, and 5), and the percentage of nonlichenized specimens in good to excellent condition (i.e., assigned numbers 1 and 2) is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (i.e., assigned numbers 3, 4, and 5). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to

extremely poor condition, i.e., 50%:50%, are recorded but not considered further.

Results and Conclusions

The following conclusions can be drawn from the data presented in Tables 13-23:

Fifty percent (50%), or three of the six species of calicioid lichens collected in the Presidential Range-Dry River Wilderness Area are in poor to extremely poor condition. One hundred percent (100%) of the 5 calicioid fungi collected there are in good to excellent condition (Table 13). Seventy-five percent (75%), or nine of the twelve species of calicioid lichens collected in Great Gulf Wilderness Area are in poor to extremely poor condition. One hundred percent (100%) of the calicioid fungi collected there are in good to excellent condition (Table 14). Twenty years earlier, in forests adjacent to these two wilderness areas, the calicioid lichens were in much better condition: Only eleven percent (11%), or one in nine of the calicioid lichens were in poor to extremely poor condition at the Nancy Brook Research Natural Area (Table 15) and only nine percent (9%), or one in eleven of the calicioid lichens in the Gibb's Brook Research Natural Area (Table 16) were in poor to extremely poor condition. One hundred percent (100%) of the calicioid fungi—nine species at Nancy Brook and ten species at Gibb's Brook—were in good to excellent condition. The conclusion to be drawn is that, while the condition of the calicioid fungi have remained unchanged over the past 20 years, the calicioid lichens are dying out because their algal partners are being killed by pollution.

Fifty percent (50%), or four of the eight species of calicioid lichens collected in the Lye Brook Wilderness Area, are in poor to extremely poor condition. Eighty-two percent (82%), or nine of the eleven species of calicioid fungi are in good to excellent condition (Table 17). Twenty years earlier, none of the three calicioid lichens collected were in poor to extremely poor condition at Gifford Woods State Park (Table 18) and 25%, or one in four of the calicioid lichens at The Cape Research Natural Area (Table 19) was in poor to extremely poor condition. One hundred percent (100%) of the calicioid fungi—seven species at Gifford Woods and eight species at The Cape—were in good to excellent condition. The conclusion to be drawn is that the condition of the calicioid lichens is worse today than it was 20 years ago. As pollution kills the algal partner in the calicioid lichens, the calicioid fungi are better served by their saprophytic and parasitic lifestyles.

Thirty-three percent (33%), or three of the nine calicioid lichens collected in the Schoodic section of Acadia National Park, are in poor to extremely poor condition. One hundred percent (100%) of the six calicioid fungi are in good to excellent condition (Table 20). More than twenty-seven years earlier, at Big Reed Forest Reserve, only seven percent (7%), or one in

fifteen of the calicioid lichens were in poor to extremely poor condition (Table 21) and from seven to thirteen years earlier, at Baxter State Park, none of the nineteen calicioid lichens were in poor to extremely poor condition (Table 22). One hundred percent (100%) of the seventeen calicioid fungi at Big Reed Pond Reserve were in good to excellent condition and ninety-six percent (96%), or twenty-three out of twenty-four calicioid fungi were in good to excellent condition at Baxter State Park. The Schoodic section of Acadia National Park is located on the coast of Maine, while Big Reed Forest Reserve and Baxter State Park are both inland sites. The calicioid fungi are in much better condition than the calicioid lichens in the Schoodic section of Acadia National Park, as the ability of the algal partner in the calicioid lichens to photosynthesize has been compromised because the environment is too acidic. It appears there are consequences when you're "the nation's tailpipe".

Fifty percent (50%), or nine of the eighteen calicioid lichens in Great Smoky Mountains National Park, are in poor to extremely poor condition. Eighty-nine percent (89%), or seventeen of the nineteen species of calicioid fungi were in good to excellent condition (Table 23). As was seen above, the calicioid fungi are doing much better in the park than are the calicioid lichens. This is believed to be the consequence of pollution in the park killing the algal partner in the calicioid lichens. No other locations in the region were previously evaluated to provide comparison.

Great Smoky Mountains National Park is one of the areas included in this investigation where calicioid lichens and fungi were collected in old-growth forests. Twenty to twenty-five percent of the park are old-growth forests (U. S. Forest Service). To provide some perspective to an earlier statement that specimens of calicioid lichens and fungi were difficult to find and noticeably "few and far between" at Great Smoky Mountains National Park, the following comparison is made: In a park that covers 816 square miles, a quarter of which is old-growth forests, forty-one species of calicioid lichens and fungi were collected and identified (Table 23). In comparison, forty-three species of calicioid lichens and fungi were collected at Baxter State Park (Table 22), a park that is much smaller than Great Smoky Mountains National Park, covering an area of 314 square miles. The reason why the calicioid species at Great Smoky Mountains National Park is "few and far between" and difficult to find is because pollution has taken a toll on the calicioid flora. Even today, fifty percent (50%) of the calicioid lichens are in poor to extremely poor condition (Table 23).

The most polluted ecosystems that have been investigated in this study are The Presidential Range-Dry River Wilderness Area, Great Gulf Wilderness Area, Lye Brook Wilderness Area, the Schoodic section of Acadia National Park, and Great Smoky Mountains National Park. Three calicioid lichens—*Chaenotheca brunneola*, *Chaenotheca ferruginea*, and *Chaenotheca stemonea*—each found in three of these five wilderness areas, have apothecia in good to excellent condition, suggesting to me that they are among the most tolerant of the group. Prior to this study, the only calicioid species that had been recognized as pollution-tolerant was

Chaenotheca ferruginea. During the current investigation, it had been found on numerous occasions overrunning *Chaenotheca chrysocephala* , an apparently less tolerant species.

In the mid-1980's and mid-1990's, lichenologist Clifford Wetmore visited Acadia National Park (in 1983), the White Mountain National Forest Wilderness Areas (in 1988), and the Lye Brook Wilderness area (in 1994) where he collected lichens and conducted a sulfur analysis and multi-element determinations on bulk collections of four or five different species. While he collected no calicioid lichens or fungi at Acadia National Park and only 4 calicioid lichens in both the White Mountain National Forest Wilderness Areas and at Lye Brook Wilderness Area, the conclusions he reached in each of the reports he submitted were virtually identical and support the conclusions I've made for the locations I visited during the 1983-1994 time period: "There is no indication that the lichens of [Acadia National Park] are being damaged by air quality. The lichen flora is diverse with many species present in all sections of the park. Many species in the group most sensitive to sulfur dioxide are present and their distribution in the park does not show any significant voids that are not due to normal ecological conditions. There is no evidence of damaged or dead lichens in any area. The elemental analyses do not show abnormal accumulations of polluting elements at any locality" (Wetmore 1984, 1989, 1995).

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Table 2. ***The Presidential Range-Dry River Wilderness Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	
Calicium lenticulare	
Calicium parvum	
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	
Calicium trabinellum	2W 2W 3W 1W 1W 1W 1W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1W 1W 1W 3W 3W 4W
Chaenotheca chlorella	
Chaenotheca chrysocephala	4W
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	1B 1B 1B 1B 1B 1B
Chaenotheca furfuracea	
Chaenotheca gracilenta	

Chaenotheca gracillima

Chaenotheca hispidula

Chaenotheca hygrophila

Chaenotheca laevigata

Chaenotheca nitidula

Chaenotheca servitii

Chaenotheca sphaerocephala

Chaenotheca stemonea

Chaenotheca trichialis 3W 2W 2W 3W 3W

Chaenotheca xyloxena 4W 4W

Chaenothecopsis amurensis

Chaenothecopsis asperopoda

Chaenothecopsis australis

Chaenothecopsis brevipes

Chaenothecopsis consociata

Chaenothecopsis debilis

Chaenothecopsis dibbleandersoniarum

Chaenothecopsis dolichocephala

Chaenothecopsis edbergii

Chaenothecopsis fennica

Chaenothecopsis haematopus

Chaenothecopsis marcineae

Chaenothecopsis nana

Chaenothecopsis nigra

Chaenothecopsis norstictica

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	
Chaenothecopsis pusiola	2W 1W 1W 1W 1W 1W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1W
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	1W 1W 1W 1W 1W 1W 2W 1W 2W 1W 2W 1W 3W 1W 2W 2W 1W
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	1B 1B 1B 1B 1B 1B 2B
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum	
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	
Stenocybe flexuosa	
Stenocybe major	1B 3B 1B 1B 1B 2B
Stenocybe pullatula	

Table 3. ***Great Gulf Wilderness Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	4B 1W 2W 3W 2W 3W 3W 4W 4W
Calicium lenticulare	4B 4B
Calicium parvum	3B 4B 4B 4B 3B 3B 3B 3B 4B 3B
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	1W 1W 3W
Calicium trabinellum	4W 4W 2W 3W 5W 3W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1W 1W 1W 3W 3W 4W
Chaenotheca chlorella	
Chaenotheca chrysocephala	3B 3B
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	1B 4B 3B 3B 2B 1B 4B 3B 2B 4B
Chaenotheca furfuracea	3B
Chaenotheca gracilenta	

Chaenotheca gracillima

Chaenotheca hispidula

Chaenotheca hygrophila

Chaenotheca laevigata

Chaenotheca nitidula

Chaenotheca servitii

Chaenotheca sphaerocephala 1B

Chaenotheca stemonea 2B 2B

Chaenotheca trichialis 2W 3W 1W 2W 3B 1B 2B 4W 5W 4W 4W

Chaenotheca xyloxena 3W 4W 4W

Chaenothecopsis amurensis

Chaenothecopsis asperopoda

Chaenothecopsis australis

Chaenothecopsis brevipes

Chaenothecopsis consociata

Chaenothecopsis debilis 1W 1W 2W 1W 1W

Chaenothecopsis dibbleandersoniarum

Chaenothecopsis dolichocephala

Chaenothecopsis edbergii

Chaenothecopsis fennica

Chaenothecopsis haematopus

Chaenothecopsis marcineae

Chaenothecopsis nana 2W 3W 2W 3W 3W 1B 1B

Chaenothecopsis nigra

Chaenothecopsis norstictica

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	2B 1B 2B 1B 1B 1B
Chaenothecopsis pusiola	1W 1W 1W 1W 1W 3W 1W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	2W
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1W 1W 1W 1W 1W
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	1W 1B
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	1B
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	1W 1W 1W 2W 1B 1W 1W
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	2B
Phaeocalicium matthewsianum	1B
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum

Phaeocalicium populneum

Phaeocalicium praecedens

Sclerophora amabilis

Sclerophora coniophaea

Sclerophora farinacea

Sclerophora nivea

Sclerophora peronella

Sphaerophorus fragilis

Sphaerophorus globosus

Sphinctrina anglica

Sphinctrina leucopoda

Sphinctrina tubaeformis

Sphinctrina turbinata

Stenocybe flexuosa

Stenocybe major 2B 3B 1B 3B

Stenocybe pullatula

Table 4. ***The Nancy Brook Research Natural Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	1W 1W 2.5B 2W 3W
Calicium lenticulare	
Calicium parvum	
Calicium pinastri	1B
Calicium quercinum	
Calicium salicinum	
Calicium trabinellum	1W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1W 1.5W
Chaenotheca chlorella	
Chaenotheca chrysocephala	3B 2B 2W 4B 3B 2B 4.5B 1.5B 3B 3B 2B
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	2B 2B 2B 1.5B 3B 2B 1.5B 1B 2B 3B 1.5B 1.5B 2B 1B 1B 1B
Chaenotheca furfuracea	*1B 1B*

Chaenotheca gracilenta	
Chaenotheca gracillima	
Chaenotheca hispidula	
Chaenotheca hygrophila	
Chaenotheca laevigata	
Chaenotheca nitidula	
Chaenotheca servitii	
Chaenotheca sphaerocephala	2B 3B
Chaenotheca stemonea	
Chaenotheca trichialis	2W 2B 2W 1B 1.5W
Chaenotheca xyloxena	1.5W
Chaenothecopsis amurensis	
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	
Chaenothecopsis consociata	1B
Chaenothecopsis debilis	
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	
Chaenothecopsis edbergii	
Chaenothecopsis fennica	
Chaenothecopsis haematopus	
Chaenothecopsis marcineae	
Chaenothecopsis nana	
Chaenothecopsis nigra	

Chaenothecopsis norstictica	
Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	1B 2B 1.5B 1B 1B 1B 1B 1.5B 1B 1B 1B 1.5B 3B
Chaenothecopsis pusiola	2W 1.5W 1W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	1B 1B
Chaenothecopsis viridireagens	
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	1B
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	1W 1W 3W 2B 1.5W
Phaeocalicium botulinum	1B 1B
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	1B 1B 1B 1B 1B

Phaeocalicium minutissimum

Phaeocalicium polyporaeum

Phaeocalicium populneum

Phaeocalicium praecedens

Sclerophora amabilis

Sclerophora coniophaea

Sclerophora farinacea

Sclerophora nivea

Sclerophora peronella

Sphaerophorus fragilis

Sphaerophorus globosus

Sphinctrina anglica

Sphinctrina leucopoda

Sphinctrina tubaeformis

Sphinctrina turbinata

Stenocybe flexuosa

Stenocybe major 2B 2.5B 1.5B

Stenocybe pullatula

Table 5. ***Gibb's Brook Research Natural Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	2W 2W 4.5W 1.5W
Calicium lenticulare	
Calicium parvum	3W 1B 1.5B 1B 1B 1B
Calicium pinastri	1W
Calicium quercinum	
Calicium salicinum	1.5W
Calicium trabinellum	
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	2.5W 1.5W 2W 1B
Chaenotheca chlorella	
Chaenotheca chrysocephala	4.5B 3B 3B 2B 1B 3B 1B 4.5W 2B 1.5B 3B 3B
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	1B 3B 3B 2B 1.5B 1B 1.5B 1.5B 1.5B 1.5B 1B 1B 1B 1.5B 4B
Chaenotheca furfuracea	1B

Chaenotheca gracilenta

Chaenotheca gracillima

Chaenotheca hispidula

Chaenotheca hygrophila

Chaenotheca laevigata

Chaenotheca nitidula

Chaenotheca servitii

Chaenotheca sphaerocephala 1.5B 1.5B

Chaenotheca stemonea 2B

Chaenotheca trichialis 2B 1.5W 2W 4W 2.5W 3W 1.5B 3W

Chaenotheca xyloxena

Chaenothecopsis amurensis

Chaenothecopsis asperopoda

Chaenothecopsis australis

Chaenothecopsis brevipes

Chaenothecopsis consociata

Chaenothecopsis debilis

Chaenothecopsis dibbleandersoniarum

Chaenothecopsis dolichocephala

Chaenothecopsis edbergii

Chaenothecopsis fennica

Chaenothecopsis haematopus

Chaenothecopsis marcineae

Chaenothecopsis nana

Chaenothecopsis nigra

Chaenothecopsis norstictica	
Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	2B 2W 2.5B 2.5B 1B 1B 1.5B 1.5B 1.5B 2B 1B 1.5B 1B 1B 1.5B
Chaenothecopsis pusiola	3W 2.5W 1.5W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	1B
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1B 1B
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	1W
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	2.5W 2.5W 1W 1.5W 1W 1W 1W
Phaeocalicium botulinum	1B
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	1B 1B

Phaeocalicium minutissimum	
Phaeocalicium polyporaeum	
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	1B 1B 2B
Stenocybe flexuosa	
Stenocybe major	1B 2B 1B 1B 1B
Stenocybe pullatula	

Table 6. ***The Lye Brook Wilderness Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	1W 2W 2W 3W 1W 3W 3W 3W 2W 3W
Calicium lenticulare	
Calicium parvum	
Calicium pinastri	3B
Calicium quercinum	
Calicium salicinum	3W 2W 3W
Calicium trabinellum	1W 1W 3W 2W 3W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1W 2W
Chaenotheca chlorella	
Chaenotheca chrysocephala	4B 1B 4W 5W
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	2B 2B 3W 1W 4W 1W
Chaenotheca furfuracea	
Chaenotheca gracilenta	

Chaenotheca gracillima

Chaenotheca hispidula

Chaenotheca hygrophila

Chaenotheca laevigata

Chaenotheca nitidula

Chaenotheca servitii

Chaenotheca sphaerocephala

Chaenotheca stemonea

Chaenotheca trichialis 4W 3W 4W 2W 3W 3B 3W 2W 5W 3W 3W

Chaenotheca xyloxena 2W 2W

Chaenothecopsis amurensis

Chaenothecopsis asperopoda

Chaenothecopsis australis

Chaenothecopsis brevipes

Chaenothecopsis consociata

Chaenothecopsis debilis 1W 1W

Chaenothecopsis dibbleandersoniarum

Chaenothecopsis dolichocephala

Chaenothecopsis edbergii

Chaenothecopsis fennica

Chaenothecopsis haematopus

Chaenothecopsis marcineae

Chaenothecopsis nana

Chaenothecopsis nigra 1B 1B 1B

Chaenothecopsis norstictica

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	
Chaenothecopsis pusiola	3W 3W 3W 3W 1W 1W 1W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	1W 1W
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1W 1W
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	1W 1W
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	1W 1W 2W 1W 1W 2W 1W 3W 2W
Phaeocalicium betulinum	1B 1B
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum	1B 1B 2B 1B 1B 3B
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	
Stenocybe flexuosa	
Stenocybe major	1B
Stenocybe pullatula	5B

Table 7. ***Gifford Woods State Park****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	
Calicium lenticulare	
Calicium parvum	
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	
Calicium trabinellum	
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	
Chaenotheca chlorella	
Chaenotheca chrysocephala	
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	
Chaenotheca furfuracea	1B
Chaenotheca gracilenta	

Chaenotheca gracillima	
Chaenotheca hispidula	2B
Chaenotheca hygrophila	
Chaenotheca laevigata	
Chaenotheca nitidula	
Chaenotheca servitii	
Chaenotheca sphaerocephala	
Chaenotheca stemonea	
Chaenotheca trichialis	1W 2W
Chaenotheca xyloxena	
Chaenothecopsis amurensis	
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	
Chaenothecopsis consociata	
Chaenothecopsis debilis	2W 2B 2.5W
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	
Chaenothecopsis edbergii	
Chaenothecopsis fennica	
Chaenothecopsis haematopus	
Chaenothecopsis marcineae	
Chaenothecopsis nana	1B
Chaenothecopsis nigra	
Chaenothecopsis norstictica	

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	2B 2B
Chaenothecopsis pusiola	1.5W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	2W 2W 3W
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum	1B 1B 2.5B 2B 1B 3B
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	1B 1B
Stenocybe flexuosa	
Stenocybe major	
Stenocybe pullatula	

Table 8. ***The Cape Research Natural Area****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	
Calicium lenticulare	
Calicium parvum	1.5B
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	
Calicium trabinellum	
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	
Chaenotheca chlorella	
Chaenotheca chrysocephala	
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	1B
Chaenotheca furfuracea	1.5B
Chaenotheca gracilenta	

Chaenotheca gracillima	
Chaenotheca hispidula	
Chaenotheca hygrophila	
Chaenotheca laevigata	
Chaenotheca nitidula	
Chaenotheca servitii	
Chaenotheca sphaerocephala	
Chaenotheca stemonea	
Chaenotheca trichialis	3.5W
Chaenotheca xyloxena	
Chaenothecopsis amurensis	
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	
Chaenothecopsis consociata	
Chaenothecopsis debilis	
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	
Chaenothecopsis edbergii	
Chaenothecopsis fennica	
Chaenothecopsis haematopus	
Chaenothecopsis marcineae	
Chaenothecopsis nana	1W
Chaenothecopsis nigra	1W
Chaenothecopsis norstictica	

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	2W 2W
Chaenothecopsis pusiola	
Chaenothecopsis rubescens	
Chaenothecopsis savonica	
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	2W 1W
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	1B
Mycocalicium fuscipes	
Mycocalicium subtile	1.5W 3W
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	
Phaeocalicium matthewsianum	
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum	1.5B
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	1B
Stenocybe flexuosa	
Stenocybe major	
Stenocybe pullatula	1B

Table 9. ***The Schoodic Section of Acadia National Park***. *Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate: wood (W), bark (B), and rock (R).*

Calicium abietinum	1W
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	1W 3W 1W 3.5W 1W 5W
Calicium lenticulare	3B 3B
Calicium parvum	2B
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	
Calicium trabinellum	3W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1W 2W 1W 2W 1.5W 2W 3W 4W 3W
Chaenotheca chlorella	
Chaenotheca chrysocephala	1B 1B 1B 2B 4B 2W 4W 4B 4B 3B 5B 5W 4B 5B 2W 3B 4B 2.5B 2B 5B 4.5B 4B 4B 4W 3B 3B 3B 3B 2W
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	2B 3B 1.5B 2B 4B 1B 3B 3B 1.5B 1B 1.5B 4B
Chaenotheca furfuracea	
Chaenotheca gracilenta	

Chaenotheca gracillima

Chaenotheca hispidula

Chaenotheca hygrophila 1B 2B 3W

Chaenotheca laevigata

Chaenotheca nitidula

Chaenotheca servitii

Chaenotheca sphaerocephala

Chaenotheca stemonea 1W 2W 3W 1B

Chaenotheca trichialis 3B 2W

Chaenotheca xyloxena

Chaenothecopsis amurensis

Chaenothecopsis asperopoda

Chaenothecopsis australis

Chaenothecopsis brevipes

Chaenothecopsis consociata

Chaenothecopsis debilis

Chaenothecopsis dibbleandersoniarum

Chaenothecopsis dolichocephala

Chaenothecopsis edbergii

Chaenothecopsis fennica

Chaenothecopsis haematopus

Chaenothecopsis marcineae

Chaenothecopsis nana

Chaenothecopsis nigra

Chaenothecopsis norstictica

Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	1B 1B 1B 2W 3W
Chaenothecopsis pusiola	1W
Chaenothecopsis rubescens	
Chaenothecopsis savonica	
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	
Mycocalicium fuscipes	
Mycocalicium subtile	
Phaeocalicium betulinum	
Phaeocalicium compressulum	1B 1B 1B 1B
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	1B
Phaeocalicium matthewsianum	1B 1B 1B
Phaeocalicium minutissimum	

Phaeocalicium polyporaeum

Phaeocalicium populneum

Phaeocalicium praecedens

Sclerophora amabilis

Sclerophora coniophaea

Sclerophora farinacea

Sclerophora nivea

Sclerophora peronella

Sphaerophorus fragilis

Sphaerophorus globosus

Sphinctrina anglica

Sphinctrina leucopoda

Sphinctrina tubaeformis

Sphinctrina turbinata

Stenocybe flexuosa

Stenocybe major

Stenocybe pullatula 1B 1B

Table 10. ***Big Reed Forest Reserve****. Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	
Calicium lenticulare	1B 1.5B 1B
Calicium parvum	1.5B 1B 2B 1B 1B 1.5B 1B 1B 2B 3B 1B 1.5B 1B 2B 1B 1B 1.5B 1B 1.5B 1B
Calicium pinastri	1B 1B 1B 1B
Calicium quercinum	
Calicium salicinum	1B
Calicium trabinellum	4.5W 3W 2.5W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	1.5W 3B 3W
Chaenotheca chlorella	1.5W
Chaenotheca chrysocephala	2B 1.5B 2B 2B 1B 2.5B 2B 1B 1B 1.5B 1B 2W 1.5B
Chaenotheca cinerea	
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	3.5W 1B 1B
Chaenotheca furfuracea	1B 1.5B 2B

Chaenotheca gracilenta	2B
Chaenotheca gracillima	
Chaenotheca hispidula	2B 1.5B 4W
Chaenotheca hygrophila	
Chaenotheca laevigata	2.5B 2.5B
Chaenotheca nitidula	
Chaenotheca servitii	
Chaenotheca sphaerocephala	2B
Chaenotheca stemonea	1B 1B
Chaenotheca trichialis	3B 1.5W 1B 1.5B 3W 3B 3B 2.5B 2B 2W
Chaenotheca xyloxena	2.5W
Chaenothecopsis amurensis	
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	1B 1B
Chaenothecopsis consociata	
Chaenothecopsis debilis	1W 1W
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	
Chaenothecopsis edbergii	
Chaenothecopsis fennica	
Chaenothecopsis haematopus	
Chaenothecopsis marcineae	
Chaenothecopsis nana	1B 1B 1B
Chaenothecopsis nigra	

Chaenothecopsis norstictica	
Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	1B 1.5B 1.5B 1B 1B 1B 1B 1B 1B 3W 1B 2W 1B 1B 1B 1B 1B 1B 1B 1B 1B 1B 1B 1B 1B
Chaenothecopsis pusiola	1.5W 1.5B
Chaenothecopsis rubescens	1B 1B 1B 1B 1B 1B 1B 1B
Chaenothecopsis savonica	1W 1B
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1B 2W
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	
Microcalicium arenarium	1R
Microcalicium conversum	
Microcalicium disseminatum	1B 1B 1B
Mycocalicium albonigrum	1W 1W
Mycocalicium fuscipes	
Mycocalicium subtile	1.5W 1.5W 1B 1B 3W 1B 1.5W 1W 1W 1B 2B 1B 1B 2W 1B
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	

Rhaeocalicium matthewsianum	
Phaeocalicium minutissimum	
Phaeocalicium polyporaeum	1B 2B
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	1B
Sphinctrina turbinata	1B 1B 1B 1B 1B 1B 1W 1B 1B 1B
Stenocybe flexuosa	
Stenocybe major	1.5B 1.5B 2.5B 4B 2.5B
Stenocybe pullatula	1B 1.5B 1B 1B 1B

Table 11. ***Baxter State Park***. *Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	
Calicium adaequatum	
Calicium adspersum	
Calicium denigratum	
Calicium glaucellum	
Calicium lenticulare	1B 1B 1B 1B 1B 1B
Calicium parvum	2B 2B 1.5B 2B 2B 1.5B 3B 1B 1B 1B 1B 1.5B 1B 1B 1B 1B 2B 1.5B 1B 1.5B 2.5B 2B 1.5B 1B 1B 2B 1B 2.5B
Calicium pinastri	1W
Calicium quercinum	1B
Calicium salicinum	4W 2.5W 1.5W 2.5B 2W 1W 1W
Calicium trabinellum	1.5W 4W 1W 1W 1.5W 1.5W 1.5W 1W 3W 2W 4W 1W 1.5W 1.5W 1W 1.5W 2W 4.5W 1W
Calicium viride	
Chaenotheca brachypoda	1B 1B
Chaenotheca brunneola	2W 2W 2W 1.5W 1.5W 1B 2W 2W 1W 2.5W 4W
Chaenotheca chlorella	
Chaenotheca chrysocephala	5B 5B 2B 1B 3B 3B 3B 1.5B 1B 5B 3B 4B 1B 1B 1.5B 1B 1B 2.5B 1B 1B 1.5B 4B 2B 1B 2B 1B 1B 1B 2B 1B 1.5B 2B 1.5B 1B 1.5B 2B 2B 2B 1.5B
Chaenotheca cinerea	1B 1B 1B 1B 1B
Chaenotheca erkahomattiorum	

Chaenotheca ferruginea	3B 1W 2B 1.5W 2B 1B 1.5B 1.5B 2B 2B
Chaenotheca furfuracea	1B 1B 1B 1B 2B
Chaenotheca gracilenta	
Chaenotheca gracillima	
Chaenotheca hispidula	1B 1.5B 1B 2W 1W 1W 3B 1B
Chaenotheca hygrophila	
Chaenotheca laevigata	1B 2B 1B 1.5B 1W 1W 1B 2B 2B
Chaenotheca nitidula	*1.5W 4W 2.5W 2W*
Chaenotheca servitii	
Chaenotheca sphaerocephala	1.5B 1B 1B 1.5B 1B 1B 1.5B 2B 1.5B 2B 1B 1B 2.5B 4B
Chaenotheca stemonea	1B 2B
Chaenotheca trichialis	1B 1B 2B 1.5B 1.5B 1B 1.5W 1B 1B 1W 2W 4W 2.5W 2W 2W 1B 2W 1W 1B 2W 1B 2B 2B 3W 3W 3W 3W 2W 1B 2W 2.5W 2B 3B 1.5W 1B 1B 2.5W 2.5B 2B 1B 3B 2.5B 2B 1B
Chaenotheca xyloxena	1.5W 2W 3.5W
Chaenothecopsis amurensis	
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	1B 1B 1B 1B 1B
Chaenothecopsis consociata	1B 2B 1B 1B 1B
Chaenothecopsis debilis	1B 1W 1W 1B 1B 1W 1B 1.5W 1B 1W 2.5B
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	
Chaenothecopsis edbergii	
Chaenothecopsis fennica	2W
Chaenothecopsis haematopus	

Chaenothecopsis marcineae	
Chaenothecopsis nana	1B 1B 1B 1W
Chaenothecopsis nigra	
Chaenothecopsis norstictica	
Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	1B 1B 1B 1B 2B 2B 1.5B 1B 1B 1B 1B 2B 3B 2B 1B 1.5B 1B 1B 1B 1B 1.5B 1B 2.5B 1.5B 1B 1B 1B 1B 1B 1B 1.5B 1B 1.5B 1B 1.5B 1B 1B 1B 1B 1B 1B 1.5B 1B 1B
Chaenothecopsis pusiola	1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1W 1B 1W
Chaenothecopsis rubescens	1.5B 1B 1B 1B 1B 1B 1B 1B 1B
Chaenothecopsis savonica	1B 1W 2W 1B 1W 2W 1B 1B 1B 1B
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	1B
Chaenothecopsis viridireagens	1W 1W 1B 1B 1W 1B 1B 1B 1B 1B 2W 1W
Cyphelium lucidum	1B
Cyphelium tigillare	
Microcalicium ahlneri	1B 1B
Microcalicium arenarium	
Microcalicium conversum	1B
Microcalicium disseminatum	1B 1B
Mycocalicium albonigrum	1B 1B 1.5W 1W 1W 1W 1W 1W 1.5W
Mycocalicium fuscipes	

Mycocalicium subtile	2W 1B 1B 1W 1W 2.5W 3W 2W 3B 2B 2.5W 2W 1W 3W 2.5W 2.5W 1W 1W 1.5W 1W 1W 1W 1W 1W 2W 2W 1W 2W 2.5W 4W 1W
Phaeocalicium betulinum	1B 2B 2B 1B 1B 1B
Phaeocalicium compressulum	1B 1B
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	1B 1B 1B 1B 1B 1B
Phaeocalicium matthewsianum	1B 1B 2B
Phaeocalicium minutissimum	
Phaeocalicium polyporaeum	1B 1B 2.5B 3B 1B 4.5B 2.5B
Phaeocalicium populneum	3B
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	
Sphinctrina tubaeformis	
Sphinctrina turbinata	1B 1B 1B 1B 1B 1B 1B 2.5B 1B 1B 1B 1B 1B
Stenocybe flexuosa	
Stenocybe major	1B 1.5B 1.5B 1B 1.5B 1B 1B 1B
Stenocybe pullatula	1.5B 2.5B 1.5B 1B 1B 1B 1B

Table 12. ***Great Smoky Mountains National Park.*** *Each of the numbers below represents the relative condition of the mature, spore-bearing apothecia of an individual specimen (See Table 1). The letters represent the substrate upon which the specimen was found: wood (W), bark (B), and rock (R).*

Calicium abietinum	3W
Calicium adaequatum	
Calicium adspersum	1.5B
Calicium denigratum	
Calicium glaucellum	5W 5W 4W 4.5W 2W 4W 2W
Calicium lenticulare	1W 5W 2W 5W 3W 3W 2W 1B 2B 5B 4W 1W 1B 3W 1W 2W 2W 2W 1W 1.5W 1.5W 2W 1.5W 1W 2W 5B
Calicium parvum	*5B 5B 1.5B 2B 3B 4B 4B 4.5B 4.5B 2B*
Calicium pinastri	
Calicium quercinum	
Calicium salicinum	4W 1W 1W
Calicium trabinellum	3W 3.5W 5W 3.5W 3W 2W 3W 1.5W 1W 2W
Calicium viride	
Chaenotheca brachypoda	
Chaenotheca brunneola	4W 3.5W 4W 4W 2W 4W 3.5W 4W 3.5W 3W 4W 4.5W 3W 3W 1W 3W 3W 2B 1B 1.5B 3B 3W 3.5W 4W 2W 3B 1W 4W 4W 2W 4W
Chaenotheca chlorella	4W 2B
Chaenotheca chrysocephala	4.5B 2B 2.5B 5B 3B 1.5B 1.5B 2B 4B

Chaenotheca cinerea	2B 2W 2.5B
Chaenotheca erkahomattiorum	
Chaenotheca ferruginea	3W 2B 1.5W 3B 2B 4B 3W 4W 2.5B 1B 2B 3B 2B 4.5W
Chaenotheca furfuracea	1W 2B 2B 2W 1B 1B 1S
Chaenotheca gracilenta	
Chaenotheca gracillima	3B
Chaenotheca hispidula	2W 3B 3W 5W 3.5B 4W
Chaenotheca hygrophila	2W 1W
Chaenotheca laevigata	2B 2B 1.5B 2B 2B
Chaenotheca nitidula	
Chaenotheca servitii	
Chaenotheca sphaerocephala	
Chaenotheca stemonea	2B 2B 1.5B 2W 2.5W 2W 2.5W 1W 3W 1.5W 1B 1W 2W
Chaenotheca trichialis	3.5W 2B 2B 2B 4W 4W 5W 4.5W
Chaenotheca xyloxena	3W 3W 3W 3.5W
Chaenothecopsis amurensis	1B 1B 1B
Chaenothecopsis asperopoda	
Chaenothecopsis australis	
Chaenothecopsis brevipes	1B 1B
Chaenothecopsis consociata	
Chaenothecopsis debilis	3B 2B 2W 1W 1W 1W 1W 2B 1B 1B 2.5B 3B 3W 4W 1B 2W 4W
Chaenothecopsis dibbleandersoniarum	
Chaenothecopsis dolichocephala	1B 1B 3B 1B 3B 1B 1B 4B 4B 3B 3B 2B 3B
Chaenothecopsis edbergii	1B 1B 1B 1B 1B 1B 2B 1B
Chaenothecopsis fennica	

Chaenothecopsis haematopus	
Chaenothecopsis marcineae	
Chaenothecopsis nana	3B 1.5B
Chaenothecopsis nigra	1B 1B 2W 2W 1.5W 2W
Chaenothecopsis norstictica	
Chaenothecopsis ochroleuca	
Chaenothecopsis pusilla	1W 1W 1B 1B 1B 3W 1B 1B 2B 3W 3W 3W 3W 2W 2W 3W 1B 3B 2W 3.5W 3.5W 3.5W 1.5W 1.5W 3W 3W 3W 4W 1W 2W 5W 3W 3W 2W 3B 3B
Chaenothecopsis pusiola	1W 1W 3W
Chaenothecopsis resinicola	1B
Chaenothecopsis rubescens	1B 2B 1B 1B 1B 1B 1.5B 4B
Chaenothecopsis savonica	2W 1W 1W 1W 1B 2W
Chaenothecopsis subparoica	
Chaenothecopsis tsugae	
Chaenothecopsis ussuriensis	
Chaenothecopsis viridialba	
Chaenothecopsis viridireagens	1W 3W 2W 2W 2W 3B
Cyphelium lucidum	
Cyphelium tigillare	
Microcalicium ahlneri	1W 1W 1W 1W 1B 1B 1W 1W 2W 1W 1W
Microcalicium arenarium	
Microcalicium conversum	
Microcalicium disseminatum	
Mycocalicium albonigrum	1B 1B 3B 2B 2W 3W 1.5B 3W 1B 3W
Mycocalicium fuscipes	2W 2W 3W 1W 1W 3W 1.5W 2W 2W 1.5W 1.5W 2W 1.5W 1.5W 1.5B 2B 4W 1B 3W

Mycocalicium subtile	3W 1W 2W 1B 2B 2W 1.5W 1W 1W 2.5W 1W 1.5W 1.5W 4W 3B 1W 3W 4W 4W 3W
Phaeocalicium betulinum	
Phaeocalicium compressulum	
Phaeocalicium curtisii	
Phaeocalicium flabelliforme	2B 3W
Phaeocalicium matthewsianum	
Phaeocalicium minutissimum	
Phaeocalicium polyporaeum	2B 2B 3B 2B 1.5B 2B 2B 1.5B 1B 3B 5B 2.5B 2B 4B 1B 5B
Phaeocalicium populneum	
Phaeocalicium praecedens	
Sclerophora amabilis	
Sclerophora coniophaea	
Sclerophora farinacea	
Sclerophora nivea	
Sclerophora peronella	
Sphaerophorus fragilis	
Sphaerophorus globosus	
Sphinctrina anglica	
Sphinctrina leucopoda	1.5B 1B
Sphinctrina tubaeformis	
Sphinctrina turbinata	1B
Stenocybe flexuosa	
Stenocybe major	
Stenocybe pullatula	

Table 13. ***Presidential Range-Dry River Wilderness Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	6
Nonlichenized Species	5

Lichenized Species
(% of collections w/1, 2 ratings)

Calicium trabinellum	*86%*
Chaenotheca brunneola	*83%*
Chaenotheca ferruginea	*100%*

Nonlichenized Species
(% of collections w/1,2 ratings)

Chaenothecopsis pusiola	*100%*
Chaenothecopsis viridireagens	*100%*
Mycocalicium subtile	94%
Phaeocalicium matthewsianum	*100%*
Stenocybe major	*83%*

Lichenized Species
(% of collections w/3, 4, 5 ratings)

Chaenotheca chrysocephala	*100%*
Chaenotheca trichialis	*60%*
Chaenotheca xyloxena	*100%*

Nonlichenized Species
(% of collections w/3, 4, 5 ratings)

None

Lichenized Species
(% of collections w/50/50% ratings)

None

Nonlichenized Species
(% of collections w/50/50% ratings)

None

Table 14. ***Great Gulf Wilderness Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	13
Nonlichenized Species	12

Lichenized Species (% of collections w/1, 2 ratings)	
Calicium salicinum	*67%*
Chaenotheca sphaerocephala	*100%*
Chaenotheca stemonea	*100%*

Nonlichenized Species (% of collections w/1,2 ratings)	
Chaenothecopsis debilis	*100%*
Chaenothecopsis nana	*57%*
Chaenothecopsis pusilla	*100%*
Chaenothecopsis pusiola	*86%*
Chaenothecopsis savonica	*100%*
Chaenothecopsis viridireagens	*100%*
Microcalicium ahlneri	*100%*
Microcalicium disseminatum	100%
Mycocalicium subtile	100%
Phaeocalicium flabelliforme	*100%*
Phaeocalicium matthewsianum	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)	
Calicium glaucellum	*67%*
Calicium lenticulare	*100%*
Calicium parvum	*100%*
Calicium trabinellum	*83%*
Chaenotheca chrysocephala	*100%*
Chaenotheca ferruginea	60%
Chaenotheca furfuracea	*100%*
Chaenotheca trichialis	*55%*

Nonlichenized Species (% of collections w/3, 4, 5 ratings)
None

Nonlichenized Species

Chaenotheca xyloxena	*100%*

(% of collections w/50/50% rating)

Stenocybe major *50/50%*

Lichenized Species
(% of collections w/50/50% ratings)

Chaenotheca brunneola	50/50%

Table 15. ***Nancy Brook Research Natural Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	10
Nonlichenized Species	9

Lichenized Species
(% of collections w/1, 2 ratings)

Calicium glaucellum	*80%*
Calicium pinastri	*100%*
Calicium trabinellum	*100%*
Chaenotheca brunneola	*100%*
Chaenotheca ferruginea	*88%*
Chaenotheca furfuracea	*100%*
Chaenotheca trichialis	*100%*
Chaenotheca xyloxena	*100%*

Nonlichenized Species
(% of collections w/1,2 ratings)

Chaenothecopsis consociata	*100%*
Chaenothecopsis pusilla	*92%*
Chaenothecopsis pusiola	*100%*
Chaenothecopsis viridialba	*100%*
Microcalicium disseminatum	*100%*
Mycocalicium subtile	*80%*
Phaeocalicium betulinum	*100%*
Phaeocalicium matthewsianum	*100%*
Stenocybe major	*100%*

Lichenized Species
(% of collections w/3, 4, 5 ratings)

Chaenotheca chrysocephala	55%

Nonlichenized Species
(% of collections w/3, 4, 5 ratings)

None

Lichenized Species
(% of collections w/50/50% ratings)

Chaenotheca sphaerocephala	50/50%

Nonlichenized Species
(% of collections w/50/50% ratings)

None

Table 16. ***Gibb's Brook Research Natural Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	11
Nonlichenized Species	10

Lichenized Species (% of collections w/1, 2 ratings)		Nonlichenized Species (% of collections w/1,2 ratings)	
Calicium glaucellum	*75%*	*Chaenothecopsis pusilla*	*100%*
Calicium parvum	*83%*	*Chaenothecopsis pusiola*	*67%*
Calicium pinastri	*100%*	*Chaenothecopsis savonica*	*100%*
Calicium salicinum	*100%*	*Chaenothecopsis viridireagens*	*100%*
Chaenotheca brunneola	*100%*	*Microcalicium ahlneri*	*100%*
Chaenotheca ferruginea	*80%*	*Mycocalicium subtile*	*100%*
Chaenotheca furfuracea	*100%*	*Phaeocalicium betulinum*	*100%*
Chaenotheca sphaerocephala	*100%*	*Phaeocalicium matthewsianum*	*100%*
Chaenotheca stemonea	*100%*	*Sphinctrina turbinata*	*100%*
Chaenotheca trichialis	*63%*	*Stenocybe major*	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)		Nonlichenized Species (% of collections w/3, 4, 5 ratings)
Chaenotheca chrysocephala	*58%*	None

Lichenized Species (% of collections w/50/50% ratings)	Nonlichenized Species (% of collections w/50/50% ratings)
None	None

Table 17. ***The Lye Brook Wilderness Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	9
Nonlichenized Species	11

Lichenized Species (% of collections w/1, 2 ratings)		Nonlichenized Species (% of collections w/1,2 ratings)	
Calicium trabinellum	*60%*	*Chaenothecopsis debilis*	*100%*
Chaenotheca brunneola	*100%*	*Chaenothecopsis nigra*	*100%*
Chaenotheca ferruginea	*67%*	*Chaenothecopsis savonica*	*100%*
Chaenotheca xyloxena	*100%*	*Chaenothecopsis viridireagens*	*100%*
		Microcalicium ahlneri	*100%*
Lichenized Species (% of collections w/3, 4, 5 ratings)		*Mycocalicium subtile*	89%
		Phaeocalicium betulinum	100%
		Phaeocalicium polyporaeum	*83%*
Calicium pinastri	100%	*Stenocybe major*	100%
Calicium salicinum	*67%*		
Chaenotheca chrysocephala	*75%*	Nonlichenized Species (% of collections w/3, 4, 5 ratings)	
Chaenotheca trichialis	*82%*		
		Chaenothecopsis pusiola	57%
Lichenized Species (% of collections w/50/50% ratings)		*Stenocybe pullatula*	100%
		Nonlichenized Species (% of collections w/50/50% ratings)	
Calicium glaucellum	50/50%		

None

Table 18. ***Gifford Woods State Park****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	3
Nonlichenized Species	7

Lichenized Species
(% of collections w/1, 2 ratings)

Chaenotheca furfuracea	*100%*
Chaenotheca hispidula	*100%*
Chaenotheca trichialis	*100%*

Lichenized Species
(% of collections w/3, 4, 5 ratings)

None

Lichenized Species
(% of collections w/50/50% ratings)

None

Nonlichenized Species
(% of collections w/1,2 ratings)

Chaenothecopsis debilis	100%
Chaenothecopsis nana	*100%*
Chaenothecopsis pusilla	*100%*
Chaenothecopsis pusiola	100%
Mycocalicium subtile	67%
Phaeocalicium polyporaeum	83%
Sphinctrina turbinata	*100%*

Nonlichenized Species
(% of collections w/3, 4, 5 ratings)

None

Nonlichenized Species
(% of collections w/50/50% ratings)

None

Table 19. ***The Cape Research Natural Area****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	4
Nonlichenized Species	9

Lichenized Species (% of collections w/1, 2 ratings)	
Calicium parvum	*100%*
Chaenotheca ferruginea	*100%*
Chaenotheca furfuracea	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)	
Chaenotheca trichialis	100%

Lichenized Species
(% of collections w/50/50% ratings)

None

Nonlichenized Species (% of collections w/1,2 ratings)	
Chaenothecopsis nana	*100%*
Chaenothecopsis nigra	*100%*
Chaenothecopsis pusilla	*100%*
Microcalicium ahlneri	100%
Mycocalicium albonigrum	100%
Phaeocalicium polyporaeum	100%
Sphinctrina turbinata	100%
Stenocybe pullatula	100%

Nonlichenized Species
(% of collections w3, 4, 5 ratings)

None

Nonlichenized Species
(% of collections w/50/50% ratings)

Mycocalicium subtile	50/50%

Table 20. ***The Schoodic section of Acadia National Park.*** *For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	11
Nonlichenized Species	6

Lichenized Species (% of collections w/1, 2 ratings)		Nonlichenized Species (% of collections w/1,2 ratings)	
Calicium abietinum	*100%*	*Chaenothecopsis pusilla*	*80%*
Calicium parvum	*100%*	*Chaenothecopsis pusiola*	*100%*
Chaenotheca brunneola	*67%*	*Phaeocalicium compressulum*	*100%*
Chaenotheca ferruginea	*58%*	*Phaeocalicium flabelliforme*	*100%*
Chaenotheca hygrophila	*67%*	*Phaeocalicium matthewsianum*	*100%*
Chaenotheca stemonea	*75%*	*Stenocybe pullatula*	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)		Nonlichenized Species (% of collections w/3, 4, 5 ratings)
Calicium lenticulare	100%	None
Calicium trabinellum	*100%*	
Chaenotheca chrysocephala	*69%*	

Lichenized Species (% of collections w/50/50% ratings)		Nonlichenized lichens (% of collections w/50/50% ratings)
Calicium glaucellum	50/50%	None
Chaenotheca trichialis	50/50%	

Table 21. ***Big Reed Forest Reserve****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	17
Nonlichenized Species	17

Lichenized Species (% of collections w/1, 2 ratings)		Nonlichenized Species (% of collections w/1,2 ratings)	
Calicium lenticulare	*100%*	*Chaenothecopsis brevipes*	100%
Calicium parvum	*95%*	*Chaenothecopsis debilis*	*100%*
Calicium pinastri	*100%*	*Chaenothecopsis nana*	*100%*
Calicium salicinum	*100%*	*Chaenothecopsis pusilla*	*96%*
Chaenotheca chlorella	*100%*	*Chaenothecopsis pusiola*	*100%*
Chaenotheca chrysocephala	*100%*	*Chaenothecopsis rubescens*	*100%*
Chaenotheca ferruginea	*67%*	*Chaenothecopsis savonica*	*100%*
Chaenotheca furfuracea	*100%*	*Chaenothecopsis viridireagens*	*100%*
Chaenotheca gracilenta	*100%*	*Microcalicium arenarium*	*100%*
Chaenotheca hispidula	*67%*	*Microcalicium disseminatum*	*100%*
Chaenotheca laevigata	*100%*	*Mycocalicium albonigrum*	*100%*
Chaenotheca sphaerocephala	*100%*	*Mycocalicium subtile*	*93%*
Chaenotheca stemonea	*100%*	*Phaeocalicium polyporaeum*	*100%*
Chaenotheca trichialis	*60%*	*Sphinctrina tubaeformis*	*100%*
		Sphinctrina turbinata	*100%*
Chaenotheca xyloxena	*100%*	*Stenocybe major*	*80%*
		Stenocybe pullatula	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)		Nonlichenized Species (% of collections w/3, 4, 5 ratings)
Calicium trabinellum	67%	None
Chaenotheca brunneola	67%	

Lichenized Species (% of collections w/50/50% ratings)	Nonlichenized Species (% of collections w/50/50% ratings)
None	None

Table 22. ***Baxter State Park****. For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	19
Nonlichenized Species	24

Lichenized Species (% of collections w/1, 2 ratings)	
Calicium lenticulare	*100%*
Calicium parvum	*96%*
Calicium pinastri	*100%*
Calicium salicinum	*86%*
Calicium trabinellum	*79%*
Chaenotheca brachypoda	*100%*
Chaenotheca brunneola	*91%*
Chaenotheca chrysocephala	*77%*
Chaenotheca cinerea	*100%*
Chaenotheca ferruginea	*90%*
Chaenotheca furfuracea	*100%*
Chaenotheca hispidula	*87%*
Chaenotheca laevigata	*100%*
Chaenotheca nitidula	*75%*
Chaenotheca sphaerocephala	*93%*
Chaenotheca stemonea	*100%*
Chaenotheca trichialis	*84%*
Chaenotheca xyloxena	*67%*
Cyphelium lucidum	*100%*

Nonlichenized Species (% of collections w/1,2 ratings)	
Chaenothecopsis brevipes	*100%*
Chaenothecopsis consociata	*100%*
Chaenothecopsis debilis	*100%*
Chaenothecopsis fennica	*100%*
Chaenothecopsis nana	*100%*
Chaenothecopsis pusilla	*98%*
Chaenothecopsis pusiola	*100%*
Chaenothecopsis rubescens	*100%*
Chaenothecopsis savonica	*100%*
Chaenothecopsis viridireagens	*100%*
Microcalicium ahlneri	*100%*
Microcalicium conversum	*100%*
Microcalicium disseminatum	*100%*
Mycocalicium albonigrum	*100%*
Mycocalicium subtile	*87%*
Phaeocalicium betulinum	*100%*
Phaeocalicium compressulum	*100%*
Phaeocalicium flabelliforme	*100%*
Phaeocalicium matthewsianum	*100%*
Phaeocalicium polyporaeum	*71%*
Sphinctrina turbinata	*100%*
Stenocybe major	*100%*
Stenocybe pullatula	*100%*

Lichenized Species (% of collections w/3, 4, 5 ratings)
None

Lichenized Species (% of collections w/50/50% ratings)	Nonlichenized Species *(% of collections w/3, 4, 5 ratings)*	
None	*Phaeocalicium populneum*	*100%*

Nonlichenized Species (% of collections w/50/50% ratings)
None

Table 23. ***Great Smoky Mountains National Park.*** *For each of the species collected at this location, the percentage of lichenized specimens in good to excellent condition is compared with the percentage of lichenized specimens in poor to extremely poor condition (on the left) and the percentage of nonlichenized specimens in good to excellent condition is compared with the percentage of nonlichenized specimens in poor to extremely poor condition (on the right). Species in which the percentage of specimens in good to excellent condition is equal to the percentage of specimens in poor to extremely poor condition, i.e., 50%:50% are recorded but not considered further.*

Lichenized Species	20
Nonlichenized Species	21

Lichenized Species (% of collections w/1, 2 ratings)	
Calicium adspersum	*100%*
Calicium lenticulare	*69%*
Calicium salicinum	*67%*
Chaenotheca chrysocephala	*56%*
Chaenotheca cinerea	*100%*
Chaenotheca furfuracea	*100%*
Chaenotheca hygrophila	*100%*
Chaenotheca laevigata	*100%*
Chaenotheca stemonea	*92%*

Lichenized Species (% of collections w/3, 4, 5 ratings)	
Calicium abietinum	*100%*
Calicium glaucellum	*71%*
Calicium parvum	*70%*
Calicium trabinellum	*60%*
Chaenotheca brunneola	*74%*
Chaenotheca gracillima	*100%*
Chaenotheca hispidula	*83%*
Chaenotheca trichialis	*63%*
Chaenotheca xyloxena	*100%*

Nonlichenized Species (% of collections w/1,2 ratings)	
Chaenothecopsis amurensis	*100%*
Chaenothecopsis brevipes	*100%*
Chaenothecopsis debilis	*71%*
Chaenothecopsis edbergii	*100%*
Chaenothecopsis nigra	*100%*
Chaenothecopsis pusiola	*67%*
Chaenothecopsis resinicola	*100%*
Chaenothecopsis rubescens	*88%*
Chaenothecopsis savonica	*100%*
Chaenothecopsis viridireagens	67%
Microcalicium ahlneri	100%
Mycocalicium albonigrum	60%
Mycocalicium fuscipes	79%
Mycocalicium subtile	65%
Phaeocalicium polyporaeum	*69%*
Sphinctrina leucopoda	*100%*
Sphinctrina turbinata	*100%*

Nonlichenized Species (% of collections w/3, 4, 5 ratings)	
Chaenothecopsis dolichocephala	*54%*
Chaenothecopsis pusilla	*53%*

Lichenized Species (% of collections w/50/50% ratings)		Nonlichenized Species (% of collections w/50/50% ratings)	
Chaenotheca chlorella	50/50%	*Chaenothecopsis nana*	50/50%
Chaenotheca ferruginea	50/50%	*Phaeocalicium flabelliforme*	50/50%

Funding for the 2011-2013 visits to National Forest sites was provided by the USDA Forest Service. Funding for this compilation report was provided for, in part, by the USDA Forest Service. This report was completed in 2014.