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The bryophyte flora of Fall Creek Falls State, : Park Van Buren and Bledsoe counties, Tennessee, USA

Keith Charles Bowman

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To the Graduate Council:

I am submitting herewith a thesis written by Keith Charles Bowman entitled "The bryophyte flora of Fall Creek Falls State, : Park Van Buren and Bledsoe counties, Tennessee, USA." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Botany.

David K. Smith, Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

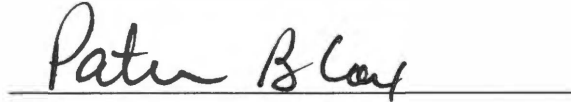
To the Graduate Council:

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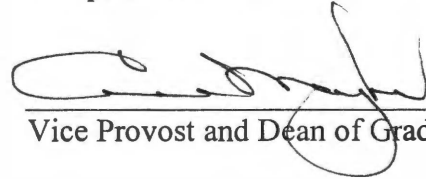


David K. Smith, Major Professor

We have read this thesis and
recommend its acceptance:



Accepted for the Council:



Vice Provost and Dean of Graduate Studies

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THE BRYOPHYTE FLORA OF
FALL CREEK FALLS STATE PARK,
VAN BUREN AND BLEDSOE COUNTIES, TENNESSEE, U.S.A.

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Keith C. Bowman

May 2003

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ABSTRACT

Fall Creek Falls State Park is located in Van Buren and Bledsoe Counties, Tennessee, U.S.A. It is an 8800+ ha (22,000+ acre) resort park in east Tennessee that lies in two physiographic provinces, the Cumberland Plateau and the Eastern Highland Rim. The park contains a high diversity of habitats, including unique habitat types such as waterfalls, cave entrances, and limestone sinks. The park flora is little known, except for a study by Caplenor in 1955, which focused on the vascular flora of the park. An initial examination showed evidence of visitation by Dr. A. J. Sharp and Dr. A. Clebsch around 50 years ago, with only minor contributions from the area over the last 50 years. The results of all previous work showed only a combined total of 94 bryophyte taxa for Van Buren and Bledsoe Counties. This study has three main objectives: catalogue the bryophyte taxa of Fall Creek Falls State Park, as a resource for future management planning within the park; expand the bryophyte floras of Van Buren and Bledsoe Counties; and analyze phytogeographical data on the distribution of the flora of the park. Collections were made over a 16 month period from May of 2001 to September 2002. They were made using a focused collecting technique that relied on information from topographic, soils, and geology maps, as well as information from park officials and others familiar with the vegetation of the area. Rich sites were sampled carefully, in order to collect all possible additions to the park flora. This collecting protocol helped to meet the first two objectives for this study. A total of 228 taxa were collected, adding 164 taxa to the flora of Van Buren County and 16 to Bledsoe County. These taxa were then examined using distributional data from a variety of bryological literature and it was found that there were six phytogeographical categories in which they could be grouped:

cosmopolitan, those taxa with a distribution throughout the northern hemisphere and some presence in the southern hemisphere; widespread global distribution, similar to cosmopolitan, but lacking distribution on one northern hemisphere continent; widespread northern hemisphere, similar to cosmopolitan, but without a known presence in the southern hemisphere; global disjuncts, taxa with distributions that contain large geographic discontinuity between locations; widespread North American; and Eastern North American endemics, which can be further subdivided into Appalachian and Southern Appalachian endemics. Overall, Fall Creek Falls State Park is diverse in habitat types which equates to a rich bryophyte flora, with a wide global distribution.

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CHAPTER I

INTRODUCTION

Fall Creek Falls State Park and Natural Area, one of the few parks that are nearly self-sustaining, is a jewel of the Tennessee State Park system. Located within the Cumberland Plateau, the majority of the park property lies in Van Buren County with the southeast corner of the park in Bledsoe County. The landscape within the boundaries of the park is quite variable, including both upper plateau surface and deep humid gorges. The park is owned by the state of Tennessee and managed by the Department of Environment and Conservation.

Currently, with the high volume of traffic, the park is faced with the dilemma of accommodating all the potential visitors without compromising the integrity of the natural surroundings. The park managers have developed a Strategic Management Plan (SMP) for the operation and future improvements of the park. The number one goal included in this plan is the protection of the park's natural diversity and scenic beauty. To attain this goal the plan also includes several other objectives that must be met, including the completion of a listing of the Park's floral and faunal diversity, implementation of a program to monitor air and water quality in the park, and acquisition of additional lands to provide adequate protection of park resources (FCF TPED-EIS, 2000).

Park officials have endeavored to remain true to their plan by acquiring approximately 2500 acres in the upstream areas of the Cane Creek watershed to protect the water quality of Cane Creek in the park (FCF TPED-EIS, 2000) and supporting this and other studies to catalogue the park's biodiversity. Since the park is not a closed

system they also face challenges of providing a park for the use and enjoyment of the public. The SMP also contains objectives for continued development and renovation that will allow the park to accommodate the ever-increasing number of day use and overnight visitors to the park. The recent construction and renovation of the inn, conference center, and cabins is a partial fulfillment of those objectives.

Though a study of the vegetation of Fall Creek Falls State Park was carried out by Caplenor (1955 and 1965), no comprehensive studies have examined the bryophytes of the park. Prior to this study only 67 species of mosses and 27 species of liverworts had been reported from within Van Buren and Bledsoe Counties, the counties in which the park is located. These species represent over half of the total reported collections for these two counties. The majority of the collections reported in the database were made by A.J. Sharp and Alfred Clebsch about 50 years ago, with the most recent entry in 1979 (TENN, 2002).

With the ever-increasing level of visitation in the park, the need to know the diversity of organisms within the park increases. The increased visitation increases the chance of losing the more sensitive species. In order to manage the park to minimize the loss of such species it is imperative to know what species are present. Management plans must be tailored to the communities and individual species that currently exist in the park. Whether the organisms are native or non-native, natural or invasive, park managers need to know what organisms are located within the park's boundaries. Besides management needs, there is interest both from park officials and the public concerning biodiversity, therefore the species richness of the park is also of value. In response to such interests and as per direction of the SMP, the park has recently aided in the initiation

of two studies concerning the floral diversity within the park boundaries. The first is a study focusing on all the vascular plants of the park lands (Fleming, 2003) and the second is the current study, which is concerned with the bryophytes, non-vascular plants, found within the park. The objectives of this study were to:

1. Catalogue the bryophyte species of Fall Creek Falls State Park. This information may be used to influence current and future management policy for the natural resources within the park and as a baseline for future studies and conservation efforts.
2. Expand on the limited existing knowledge of the bryophyte flora of Van Buren and Bledsoe Counties.
3. Analyze the collections for phytogeographical and ecological information based on regional and global distributions.

CHAPTER II

THE STUDY AREA

Location and Description

Located between 35°36'–35°44' north latitude and 85°16'–85°26' west longitude, Fall Creek Falls State Park and Natural Area is recognized throughout the southeast as a tourist destination. It can be reached via a two-hour drive from either Knoxville or Nashville or a one hour drive from Chattanooga, though there does not exist a direct route from any of these major cities (FCF TPED-EIS, 2000). Due to the location and the relative isolation from the major state and interstate highways the park is considered a destination park. Families come and stay in one of many types of accommodations offered by the park, including campgrounds, cabins, and an inn. While enjoying their stay within the park there are a variety of activities that can occupy visitors of all ages. They may choose a leisurely walk on one of the many trails that wind through the forested areas of the park or a more strenuous hike through the gorges. Horseback riding, swimming, and golf are available to visitors, as well. If an interest in the natural surroundings is sparked, visitors can take advantage of a variety of nature programs offered throughout the summer months by park staff.

The park's main attractions are several scenic views and waterfalls, including the park's namesake, Fall Creek Falls. Fall Creek Falls is a 256 foot tall waterfall that has the distinction of being the tallest waterfall east of the Rocky Mountains. Also included in the Park's attractions are Cane Creek Falls, Cane Creek Cascades, Piney Falls, and spectacular views from Milligan's Overlook and Buzzard's Roost of Cane Creek Gorge,

a 300 foot deep gorge surrounded by sheer sandstone cliffs (Medley, 1987; FCF TPED-EIS, 2000).

Fall Creek Falls State Park consists of three land use areas: developed areas, wildlife management areas, and Class II Natural Areas. Each is managed using a multiple land use concept with focus on the primary land use of that area. The Strategic Management Plan (SMP) lists goals and objectives for the management of these areas and also provides a systematic approach to guide the future of the park.

The developed area consists of a core area of approximately 650 acres that has been intensively developed with overnight and day use facilities. The overnight accommodations include the Park Inn, 29 cabins, 227 campsites, two group lodges, and two group camps. Recreational facilities of the resort park are tennis courts, picnic grounds, ball fields, an 18-hole golf course, an Olympic-size swimming pool, hiking and backpacking trails, bike trails, horse stables, a nature center, and an amphitheater available for use by visitors. The park boasts a 345 acre lake which is available for boating and fishing, and hunting is allowed in some areas of the park during specified times of the year. The Park's naturalists also conduct educational programs including such topics as stream and forest ecology, geology, park history, astronomy, and other interpretive programs. Besides the regular offerings, there are special seasonal and holiday events and festivals throughout the year, for example in the spring they organize a wildflower weekend with guided hikes and speakers.

The approximately 3200 ha (8,000 ac.) wildlife management area (WMA) is cooperatively managed by the park management and the Tennessee Wildlife Resource

Agency (TWRA) for limited hunting. Neither agency has developed a formal plan for managing the WMA for game and non-game species.

In the mid-1970's the Tennessee General Assembly designated a portions of the park as a Class II Natural Areas. This was done in accordance with the Tennessee Natural Areas Preservation Act of 1971. Their designation was based on the criterion that the areas possess unique natural or scientific values, which made it worthy of preservation. The Class II Natural Areas are accessible by trails and there are back-country campsites for visitors to enjoy their beauty. Currently other sites within the park are under study and may be recommended to the Tennessee General Assembly to be designated as Class II Natural Areas. One such site is 1520 ha (3800 ac.) in the Cane Creek Gorge that was recently acquired to preserve the scenic quality from Milligan's Overlook and Buzzard's Roost (FCF TPED-EIS, 2000).

Origins and Geomorphology

Fall Creek Falls State Park is located within two physiographic provinces: the Cumberland Plateau and the Eastern Highland Rim (FCF TPED-EIS, 2000). The majority of the park lies within the Cumberland Plateau, part of the much larger Appalachian Plateau. The Appalachian Plateau extends from New York to southwest Alabama (Medley, 1987; FCF TPED-EIS, 2000). According to Fenneman (1938) the northern gorge areas, which lie on the western edge of the Cumberland Plateau, "properly belong" to the Eastern Highland Rim section of the Interior Low Plateaus. These northern gorges contain the karst areas of the park, which are "characterized by sink-

holes, caves and underground drainage” and often feature exposed carbonate rocks (FCF TPED-EIS, 2000).

The Cumberland Plateau area is a region with an average elevation of 550 m (1800 ft.) above sea level and a gently rolling topography. The slope of the land is between two and 10 percent with many areas within the park with steeper slopes. Separating the Cumberland Plateau from the Eastern Highland Rim is a steep escarpment of 240 m to 305 m (800 to 1000 ft.) in height. The topography of the Eastern Highland Rim varies from relatively flat to rolling. The average elevation ranges from 275 to 335 m (900 to 1100 ft.) above sea level, with slopes between two and five percent (FCF TPED-EIS, 2000).

Within the park’s boundaries are formations that are known locally simply as “Gulfs”. The gulfs are embayments that have formed through constant, slow erosion of the underlying rock by streams, mostly draining into Cane Creek, the main stream in the park. Cane Creek Gulf is over 180 m (600 ft.) deep at the northern boundary of the park and approximately 1.6 km (one mile) wide (Medley, 1987). Cane Creek, part of the Upper Cumberland River drainage basin, is the drainage channel for a large portion of the area beyond the park boundaries (FCF TPED-EIS, 2000).

Geology and Hydrology

The Cumberland Plateau sits on a foundation of relatively durable rock of Pottsville Sandstone. These underlying rock strata contain alternating layers of shale and sandstone. The Highland Rim section of the Interior Low Plateau, the largest and considered the most representative section, has an underlying rock strata of Mississippian

age rock, older than the Pottsville group found on the neighboring Cumberland Plateau. This older rock is composed mostly of different types of limestone, which are much less resistant to erosion than the sandstone cap of the Cumberland Plateau (Fenneman, 1938).

The streams of the area are supported on sandstone and conglomerate rock. This composition is relatively more resistant to chemical and physical weathering than the “softer” stones, shale and siltstone. The layer directly beneath this resistant caprock is composed of shale and carbonate rocks, which are more susceptible to weathering and erosion. The layering of rock with differential resistance to erosion and weathering is what is responsible for the formation of the many unique landforms found in the park and the surrounding area, including the numerous waterfalls, natural bridges, and caves. The formation of such landforms occurs over large time periods through a cycle of collapse and erosion. For example, in the formation of a waterfall this cycle is as follows. It begins when the streams carve through the resistant sandstone layer and exposes the underlying shale and carbonate rocks. These “softer” underlying rocks are worn away faster than the overlying layer allowing for the undercutting of the sandstones. These sandstone layers collapse and fall into the stream channel forming an increased distance between upper stream bed and lower stream bed and therefore a waterfall (FCF TPED-EIS, 2000).

This general geology allows for a unique hydrologic system where ground and surface waters are constantly coming into contact with each other within these karst gorge areas. Large extensive conduit cave systems form between the overlying Pennsylvanian-aged resistant cap rock layers and the underlying Mississippian-aged carbonate rocks. The surface-flowing streams will disappear from the surface and flow

into the subterranean caverns at points near the cap rock/carbonate interface. The water may move several miles before resurfacing in the form of a spring further down toward the base of the escarpment. Due to the alternating layers of more resistant and less resistant rock formations of the Cumberland Escarpment, streams may sink and reappear several times as they make their way from the Cumberland Plateau to the Eastern Highland Rim (FCF TPED-EIS, 2000). These underground systems manifest themselves through the large variation in surface water levels during different seasons. The surface-flow may be continuous during the wetter seasons of the year and almost non-existent at points where it has disappeared underground during the drier seasons.

Soils

The soils of the overall area have been described as Hartsells-Lonewood-Ramsey-Gilpin soils. These soils are highly acidic, except in areas of limestone, “moderately deep, well drained, loamy, and form from sandstones and shale (FCF TPED-EIS, 2000).” The Hartsells soils are found on gently rolling topography on the Cumberland Plateau with slopes from two to 12 percent. They have an average depth of 86 cm (34 in.) and are underlain by sandstone bedrock. The Lonewood soils are found on the “broad smooth areas of the Cumberland Plateau” with the same slope range in which the Hartsells soils (two to 12 percent) are found. They are much deeper with underlying shale at an average depth of 165 cm (65 in.) below the surface. The Ramsey soils are found on a variety of slopes ranging from five to 75 percent at elevations of 457 to 610 m (1500 to 2000 ft.). These soils have low water holding capacity and are shallow, with an average depth of only 46 cm (18 in.) above sandstone bedrock. Finally, the Gilpin soils

are found on the slopes of 12 to 40 percent that occur in the more dissected regions of the Plateau. They have an average depth to bedrock of about 81 cm (32 in.) and overlay siltstone and shale bedrock (Moore *et al.*, 1981).

The soils vary between physiographic regions. The soils of the Highland Rim and the Cumberland Plateau are both well drained and infertile. However, the soils of the Highland Rim are rich in clay while those of the Cumberland Plateau are pale-colored and loamy (Medley, 1987; Moore *et al.*, 1981). Caplenor (1965) described the soils in the gorges in more detail. The soils of the upper portions of the gorges were described as being limited to areas between sandstone boulders and depressions in the larger boulders. These soils were composed of black humus and fine sand. He noted that the soil on the southwestern side of Cane creek is nearly devoid of surface stones, which are common in much of the surrounding soil of the region, and is dark brownish-gray in color with a B horizon consisting of pale red clay. The final specific description for the soils of the gorges is for the talus of Cane Creek Gulf near Piney Creek, which differs with exposure. The soils of the southwest-facing talus were described as yellowish-red clay, while those of the northeast-facing talus were characterized by heavy humus (Caplenor, 1965).

The soil structure and the lack of natural fertility make for soils that are highly responsive to the techniques utilized in modern agriculture. The result has been some of the state's highest agricultural yields. This high productivity is also largely influenced by the favorable climate of the region. These soils are also highly suited for timber growth, which explains the large tracts of land dedicated to commercial timber and pulpwood production (Medley, 1987; Moore *et al.*, 1981).

Climate

The regional climate has been described as humid mesothermal, basically a region of moderate temperatures and high humidity. The climate is mostly the result of the influence from two air masses. One air mass carries warm, moist air from the Gulf of Mexico while the other carries cool, dry continental air from the northwest (Moore *et al.*, 1981). On average, the area experiences 115 days of precipitation a year. The long-term yearly average precipitation is 132 cm (52 in.); annual totals range from about 89 cm (35 in.) in dry years to 178 cm (70 in.) in wet years (FCF TPED-EIS, 2000). The rainfall, temperatures, and therefore growing seasons do vary between the different physiographic regions. The annual rainfall for Van Buren County in the Highland Rim is nearly 135 cm (53 in.) and increases to almost 145 cm (57 in.) on the Cumberland Plateau. The average annual temperature is 15.1 °C (59.2 °F) on the Highland Rim, which is about 2.7 °C (5 °F) warmer than on the Cumberland Plateau (12.4 °C; 54.3 °F). This seemingly small difference in average annual temperature equates to a difference of 26 days in the length of the average growing season. The Highland Rim has an average growing season of 202 days and the Cumberland Plateau an average growing season of only 176 days (Medley, 1987; Moore *et al.*, 1981).

Although overall climate is important to the vegetation of a region, bryophytes, due to their small size, are found growing in a microenvironment that can differ greatly from the macroenvironment in which these sites are found. Specific conditions in which they can differ include temperature, moisture and substrates (Schofield, 1985). In 1939, Sharp stated that bryophytes are more responsive to microclimate than the surrounding vascular plants. The microclimate varies greatly from one habitat to the next and

depending on how narrow a definition of the habitat, it may actually vary within a habitat. These microenvironmental differences, whether climatic, substrate, or otherwise, are difficult to measure within a study area, especially one the size of Fall Creek Falls State Park. These measurements were also beyond the scope of this study, though the influences of these conditions were quite observable through the patchy nature of the bryophyte distribution.

History of the Area

Formed in 1840 of parcels from White, Warren, and Bledsoe Counties, Van Buren County is on the eastern edge of Middle Tennessee and encompasses portions of both the Eastern Highland Rim and the Cumberland Plateau. Bledsoe County lies just to the southeast of Van Buren County. Named for long hunter Abraham Bledsoe, the county was part of the land made available for settlement with the signing of the Third Treaty of Tellico with the Cherokees in 1805 (Medley, 1987).

The middle and western regions of Tennessee were not easily reached due to the topography of the Cumberland Plateau and the lack of navigable waterways. The presence of Cherokee Native American Indians also made for slow penetration into the region (FCF TPED-EIS, 2000). As was often the case, long hunters proceeded settlers into the new territory and in some ways facilitated settlement. Through their expeditions for pelts they found routes through and around the rocky terrain and also scouted the land. One such long hunter was Thomas Sharp Spencer, for whom the county seat of Van Buren County, Spencer, is named. It is believed that his first trip to Middle Tennessee took place in 1776, which eventually led to his being the first white settler to

build a home and clear the land for farming. Nearly 35 years after Spencer's first trip and only five years following the signing of the Third Treaty of Tellico, Bledsoe County had grown to a population of 3259 (Medley, 1987). By the 1830's there were at least five roads established in the area of Fall Creek Falls, which allowed for greater accessibility of the region. Today, nearly 200 years later the population of what is now known as Bledsoe County is only about 10,200 and the population in Van Buren County is only about 5,100 (FCF TPED-EIS, 2000).

Settlement near and within the present day park boundaries probably did not occur until the late 1800's. Some of the first families to settle within what is today Fall Creek Falls State Park probably did so near the cascades of Cane Creek, in the vicinity of a gristmill and sash saw mill, which are no longer present. Records show that the earliest man to live within what is today known as the park was Eli P. Crossett. Others also owned land within the present day park boundaries, such as the Grover family, who are believed to have owned the falls from which the park takes its name. Whether through purchase, inheritance, or land grants, a large portion of the current park territory was in private hands by the end of the 19th century (Medley, 1987).

The pre-Civil War farms in the region were generally less than 500 acres, with only a few larger plantations that utilized slave labor. Following the Civil War, the average size of the farms decreased in size greatly, with few greater than 100 acres. The timber industry became a major presence through their purchase of large portions of the region for timber. Many people gave up the hard life of farming and went to work for the timber companies and the industries that supported them, such as saw mills, with hopes of an easier life. By the end of the 19th century, people were also looking to the railroad

and local governments for employment and more and more continued to give up farming. The Great Depression saw another large shift in the economy of the region. The closing down of the railroad and timber industries caused a great exodus of people from the area, all hoping to find work in other parts of the country. Those that stayed turned back to the land to make their living. Small scale farming and moonshining became the means of survival (FCF TPED-EIS, 2000). This region needed economic help as did much of the rest of the country and this help came in the form of the National Parks Service (NPS), the Civilian Conservation Corps (CCC), and the Works Progress Administration (WPA).

History of the Park

In 1935 the NPS proposed the creation of a recreation and demonstration park at Fall Creek Falls. James M. Taft is credited with the idea of the park and he also had a large role in convincing others of the need for the park. Taft was so convinced of the need that he went so far as to use his own money to buy the option on the land, which eased the later purchase by the government. The proposal included plans to purchase Cane Creek and Falls Creek watersheds. In the end, however, less than half of the proposed area was purchased (15,777 acres) with the land centered on Cane Creek Gulf. The majority of the land was purchased from the Inman Land Company, which took possession of the land when people died or moved away. Due to the erosion and unproductiveness of the land, the average cost was less than seven dollars an acre, with much of the gorge areas selling for fifty cents or a dollar an acre.

The surveying of the land and construction of the park facilities began in 1936, under the administration of the NPS. The construction was completed by the Civilian

Conservation Corps and the Works Progress Administration. The construction and surveying took nearly two years to complete. At the same time, Taft, working with area Boy Scouts and others, set out to construct the park's first trail system. The new park brought new employment opportunities and other economic prospects into the area (Medley, 1987).

In May of 1944 the Department of the Interior deeded the land to the State of Tennessee with the restriction that it only be used for a public park, and for recreational and conservation purposes (Medley, 1987; FCF TPED-EIS, 2000). For 20 years after its transfer into the hands of the state, the only facilities available were campsites, hiking trails, overlooks, and a swimming area, as further development was held at a minimum. It wasn't until 1968, when the master plan for the development of Fall Creek Falls State Resort Park was created, that park development became a priority. Many of the local people opposed the plan because they wanted to protect the natural state of the park and believed that further development would destroy the beauty. However, with the need for new and improved facilities and the expectation on local economic revitalization, the development progressed as planned. Since the dedication of the new park infrastructure in 1972, the annual visitation has continued to increase with nearly 1.3 million visitors to the park during the 1996-97 fiscal year (FCF TPED-EIS, 2000).

Local Economy

Fall Creek Falls State Park has played a very important role in the economy of the area since its inception in the late 1930's, and today still continues to be an important component. Both Van Buren and Bledsoe Counties are composed of rural, residential,

and agricultural communities and have very limited commercial and industrial development.

Historically, employment was commonly found with logging and mining outfits, which operated within and near the park boundaries. Logging was very important, since it satisfied the local lumber needs and cleared land needed for farming. With the improved market access brought by railroads, logging grew significantly in the 1920's. Heavy logging continued even after the area became a park and was turned over to the State in 1944. In fact, one of the largest stands of virgin timber in the park once stood on the present site of the Inn and was logged for timber that was used in the construction of the park facilities. Today, logging does not play a significant role in the local economy.

Coal mining, once a significant component of the past economy of the area is not very important. A Department of Energy report in 1997 stated that neither Bledsoe nor Van Buren Counties had any active coal producing operations. However, there is still a great deal of coal reserves in the area, with estimates in the hundreds of millions of tons. Though not active within the county at present, Skyline Coal Company maintains a substantial holding of property in lease within Van Buren County. While the severance tax on the recoverable coal could be substantial, so could the environmental damage done during its extraction (FCF TPED-EIS, 2000).

Today, it is tax revenue from the park that forms the largest portion of the revenue base for Van Buren County. During the fiscal year 1996–1997, this amounted to an estimated \$182,250, or nearly 40 percent of the county's total revenue base. In this same year, the park generated nearly 92 percent of its \$4.5 million operating budget with the "stay use" visitors contributing 85 percent of the total revenue (FCF TPED-EIS, 2000).

This earning potential takes pressure from the state budget and allows for more investment in needed programs, such as health care and education.

Besides providing tax revenue to Van Buren County, the park is being used as a cornerstone in a plan to attract jobs and industries to the area. In response to the loss of jobs as a result of the North American Free Trade Agreement with Mexico and Canada, the Federal Government has stepped in with economic developmental loans for 35 communities in 19 states. The City of Spencer in Van Buren County, a short distance from the park, is one such community. The tourist industry that is associated with the park is the base on which the multi-year development plan will build in hopes of strengthening the local economy. The officials, both local and state level, involved in the planning process hope to use this as an enticement for drawing new jobs and industries to the area in order to boost the stagnant and faltering local economy (FCF TPED-EIS, 2000).

Vegetation

The vegetation of an area is highly influenced by many factors including, but not limited to, local geology, soils, topography, climate, and past and present land-use, which is influenced by economy and population. Knowing and understanding these factors can be important in understanding the past, present, and even the future vegetation of an area. For bryophytes, in particular, there have been a number of studies that have shown correlations between bryophyte taxa and specific local environmental factors such as substrate composition, pH, and water table levels compared to soil surface (Janssens, 1983; Schofield, 1985; Janssens, *et al.*, 1992). These environmental factors are

influenced by: the dominant vegetation, which can cause increases in organic material, changes in pH and the soils' ability to drain, and provides a substrate for the epiphytic species of bryophytes; the geology, which is responsible for the base material of the soils, which can influence soil pH, and the stone itself provides an important substrate; and land-use, which can provide unnatural substrates and change the structure and composition of the soils, as well as, the dominant vegetation.

Through archeological finds the Fall Creek Falls area is known to have been an isolated upland forest community dominated by oak, hickory and chestnut prior to visitation by Europeans (FCF TPED-EIS, 2000). With the devastation brought by the chestnut blight the forest composition has been changed. Today the area is dominated by oak-hickory forest types with pine as a key component (Medley, 1987; FCF TPED-EIS, 2000). Caplenor (1965) described the gorges as containing a variety of community types, including hemlock, hemlock-yellow birch, hemlock-basswood, mixed mesophytic, oak-hickory, and chestnut oak communities. These communities tend to have a predictable distribution within the gorges. The communities with hemlock as a major component tend to be found in the deep and narrow zones or those that are shaded by the cliffs. The communities of a mixed mesophytic composition are located mostly on the north and east facing slopes in the more open portions of the gorges, while the south and the west slopes are vegetated by the oak-hickory and chestnut oak communities (Caplenor, 1955). In general, the plant life found in the park is similar to that of the Great Smoky Mountains and the Blue Ridge Mountains at comparable elevations (Medley, 1987).

The current vegetation of the park has undoubtedly been influenced by a variety of human activities, including farming, logging, and burning, that have occurred prior to

and after the original formation of the park. Even so, Caplenor (1965) noted that there was evidence that virgin forest could still be found at several locations within the gorge system of the park. These sites included Fall Creek Gulf and portions of Cane Creek Gulf and Johnny Branch Gulf. Decades old fallen logs and the lack of fire scars spoke of the lack of anthropomorphic or other fire events.

The vegetation studies of this region have had the dominant vascular plants as a focus. The non-vascular plants have been almost all but overlooked. Though the bryophytes are not the dominant vegetation on the landscape, they play vital roles in most if not all of the different plant communities found within the park. Within certain sites they dominate the vegetation and others they form the ground layer beneath the dominant vegetation. This localized importance coupled with the diversity of habitats within the park leads to the belief that bryophyte richness will be greater than many other similar areas that have already been studied.

CHAPTER III

BRYOLOGICAL INVESTIGATIONS IN TENNESSEE

This section follows the history reported by Yvonne Mescall in her thesis in 1979, though several changes have been made and the account has been brought more up to date by adding studies that have taken place over the last 24 years. The history of bryological investigations in Tennessee goes back to the mid- 1800's when William Sterling Sullivant collected bryophytes in East Tennessee on a trip in 1843, which was only the first of several trips. Sullivant also introduced his assistant Leo Lesquereux to the southeast. Lesquereux made several trips between the years of 1844 and 1856 collecting specimens for Sullivant, which culminated in the 1856 publication of *Musci Exsiccati Americani* (Andre, 1971). These initial collecting trips paved the way for other bryologists to journey into Tennessee and in the 75 years following the 1856 publication by Sullivant and Lesquereux there have been many publications reporting additions to the bryoflora of Tennessee including Sullivant and Lesquereux (1865), Howe (1896), Evans (1897, 1910a, 1910b, 1910c, 1922), Haynes (1916), and Andrews (1921). Perhaps one the most important publications concerning Tennessee bryophytes was Sharp's 1939 paper, in which he compiled the reported collections from these studies. The compilation included a mere 54 species.

When one researches bryological studies in Tennessee the name Dr. Aaron J. Sharp becomes prominent very quickly. Sharp began working at the University of Tennessee at Knoxville in 1929 and immediately began turning out publications with focus on both the cryptogamic and vascular floras of Tennessee with 23 publications in the 9 years between 1929 and 1938. He continued to contribute with publications into his

later years. Many of those papers added greatly to the knowledge of bryophytes in Tennessee (Andre, 1971; Pursell and Sharp, 1959; Sharp, 1939, 1942, 1944, 1947, 1972, 1989; Sharp and Iwatsuki, 1967).

During the same time that Sharp was making his contributions, many others were lending a hand. These additions took a variety of forms including lists of bryophytes species in particular areas (Schwarz, 1933; Cain, 1935; and Clebsch, 1947a, 1947b, 1954, 1974), reports of species new to Tennessee (Blomquist, 1939, 1940; Sharp *et al.*, 1968), family studies with keys (Wingo, 1936), and genera studies (Morrison, 1938). The majority of this work has been in the area of floristics, though there have been some ecological studies published. Perhaps the most significant ecological study of bryophytes in Tennessee is *Taxonomic and Ecological Studies on Eastern Tennessee Bryophytes* written by Sharp in 1939. This paper, besides compiling previous collections by other authors, discusses a variety of ecological information, including habitat and phytogeography and species correlation, as well as invasion and successional data for over 400 species of bryophytes. Several other studies examined bryophyte communities and the environmental factors that influenced their distributions (Cain and Sharp, 1938; Billings and Drew, 1938; Quarterman, 1947, 1949; and Clebsch, 1974).

More recent studies have included thesis work by several University of Tennessee students: R. A. Hattaway (1973), who described the bryoecology of three limestone sinks in East Tennessee; Y. M. Mescall (1979), who studied the bryophyte flora of Savage Gulf, Tennessee; and E. R. Choberka (1998), who completed a detailed study in the Great Smoky Mountains National Park concerning the ecology of the bryophytes that were growing on the logs of Fraser fir, which had become quite common due to the die off of

the firs in recent decades. Besides student work, a number of technical reports [unpublished], available as draft documents from specific agencies (eg. U.S. Forest Service, National Park Services, private consultants, etc.), have contributed to the more recent investigation of bryophytes in east Tennessee. Several of these reports pertain to bryophytes of the Great Smoky Mountains National Park (Smith *et al.*, 1991; Smith and Risk, 1993; Smith *et al.*, 1995). Other reports focus on the non-vascular taxa of specific areas of East Tennessee (Smith and Davison, 1992; Davison *et al.*, 1999; Smith *et al.*, 1999). Other reports are combined studies examining both the vascular and non-vascular flora of different areas of East Tennessee (Wofford *et al.*, 1999; Smith *et al.*, 2000).

Even considering all the work that has been done in the field of bryology many would still agree with what Andre stated in 1971, “the bryological flora of wide areas of Tennessee is still unknown.”

CHAPTER IV

COLLECTION AND PREPARATION OF DATA

The immense size of the park does not allow for a complete survey of the entire area, especially for a project of this nature. The clumped distribution of bryophytes makes the use of a random plot based survey technique unreliable. Since this study is attempting to develop as complete a list of the bryophytes within the park as possible, a more focused method of site selection was chosen. The site types within the park boundaries include deep gorges with their rivers, streams, and waterfalls; hardwood covered slopes with a variety of stone outcroppings; cool protected karst formations, such as sinks and caves; drier upland forest; wetlands; and ephemeral streams. Due to the diversity of habitats within the park, sites were chosen to incorporate a variety of site types, with particular focus on sites with conditions highly favorable to different groups of bryophytes. Using topographic, soil, and geologic maps, as well as insight from park officials and others knowledgeable of particular habitats, the sites were selected. Site selection also made use of the extensive trail system within the park.

Once chosen the site was visited and sampled thoroughly using standard techniques of collection. Each sample was given a collection number, which was used in cataloguing the data. If possible, field identifications were made and added to the data taken on location and ecological conditions in which the collection was growing. All field identifications were verified in the lab. A single site may have been visited multiple times to collect seasonal species or if the initial findings warranted a second visit. The samples were brought back to the lab for verification and identification using a variety of sources (Mosses: Crum and Anderson, 1981; Ireland, 1982; Sharp *et al.*, 1994;

Liverworts: Schuster, 1966, 1969, 1974, 1980, 1992a, 1992b; Hicks, 1992). The nomenclature used follows the most recent checklists and literature (Mosses: Anderson *et al.*, 1990; Anderson, 1990; Liverworts: Stotler and Crandall-Stotler, 1977; Hicks, 1992). Samples representing each reported taxa were prepared and stored as per the guidelines of the University of Tennessee Herbarium (TENN, 2002). A database of the included specimens was also appended to the current database in order to facilitate future searches.

CHAPTER V

COLLECTIONS

The field collection portion of this study took place over 16 months from May of 2001 to September 2002 resulting in a total of 28 days in the field. During these forays a total of 590 collections were made which resulted in 708 individual collection packages due to replicates, or separation of individual species in order to make higher quality herbarium specimens. A total of 1408 identifications were made, most to species level or lower, though several were identifiable only to genus (See Appendix, Table A.1 for complete database of collections). The 1408 identifications resulted in a list of 228 bryophyte taxa, which includes a single species of hornwort, 80 taxa of liverworts, and 147 taxa of mosses (See Appendix, Table A.2 for complete taxa list including synonymy).

The different species that were collected can be artificially divided into categories of abundance and distribution based on the number of collections of the species, as well as the number of locations from which it was collected. This is an artificial construct because it is not based on direct distribution and abundance data, which were not part of the focus of this study, but may be gathered through a more direct ecological study. The categories include rare, limited, common, abundant, and widespread and abundant. The rare category includes species that are known from a single collection or were collected from a single location. The species with limited distribution and abundance are those species that were collected from two–five different locations. Those species that are included in the common category are known from collections made in six–10 different locations. The abundant category includes species that were collected from 11–20

different locations in the park. The final category is widespread and abundant, which includes species that were collected from more than 20 different locations in the park.

Species included in the rare category based on their limited distribution may represent species that were not readily observed and therefore not collected more often or they may represent taxa that are indeed locally rare. Although the majority of the species that were collected in Fall Creek Falls State Park fall into categories with multiple collection locations, 47 taxa were collected only once and 15 were collected at least twice from the same location. These 62 taxa constitute the rare category (Table 5.1). In cases of multiple collections from a single location, they most often represent presence as minor elements mixed with more dominant constituents of the collections. Also, taxa of special interest due to rarity or uncertainty of initial identification were collected multiple times from the same locality. Liverworts required fresh material for oil body characters to aid in certain identification. For example, the unnamed *Plagiochila* was collected 5 different times from the same location in order to aid its identification.

Taxa in the category of limited distribution include nearly half of the species collected with 109 different taxa falling into this grouping, 22 of which were collected more than five times (Table 5.1). Due to the scattered distribution of bryophytes and their habitat requirements, it is expected that many taxa would be sporadically distributed across the large heterogenous environment of Fall Creek Falls State Park.

The common category includes a total of 44 taxa, 24 of which were collected greater than 10 times (Table 5.1). Reasons for multiple collections are the same as those described in the instance of the rare species, though the majority of these are due to their presence as minor elements associated with other bryophytes.

Table 5.1. The abundance and distribution categories for the bryophytes of Fall Creek Falls State Park based on the number of collections and number of locations from which they were collected (the abbreviation aff. means an affinity to).

TAXON	# of Coll.	# of Loc.	TAXON	# of Coll.	# of Loc.
RARE TAXA					
<i>Amblystegium serpens</i>	1	1	<i>Mannia triandra</i>	2	1
<i>Amblystegium serpens</i> var. <i>juratzkanum</i>	1	1	<i>Marsupella emarginata</i>	1	1
<i>Amblystegium varium</i>	1	1	<i>Metzgeria leptoneura</i>	1	1
<i>Anthoceros punctatus</i>	2	1	<i>Mnium marginatum</i>	1	1
<i>Atrichum altecristatum</i>	1	1	<i>Neckera complanata</i>	2	1
<i>Barbula indica</i>	1	1	<i>Neckera pennata</i>	1	1
<i>Blepharostoma trichophyllum</i>	1	1	<i>Orthotrichum pusillum</i>	1	1
<i>Brachythecium acuminatum</i>	1	1	<i>Orthotrichum stellatum</i>	1	1
<i>Bryum</i> aff. <i>lisae</i> var. <i>cuspidatum</i>	1	1	<i>Orthotrichum strangulatum</i>	3	1
<i>Bryum argenteum</i>	1	1	<i>Oxystegus tenuirostris</i>	3	1
<i>Cephalozia catenulata</i>	3	1	<i>Philonotis fontana</i> var. <i>caespitosa</i>	1	1
<i>Cephaloziella rubella</i>	1	1	<i>Philonotis</i> aff. <i>glaucescens</i>	1	1
<i>Ceratodon purpureus</i>	1	1	<i>Plagiochila</i> (fcf unknown)	5	1
<i>Cololejeunea minutissima</i>	1	1	<i>Plagiochila austini</i>	4	1
<i>Cololejeunea ornata</i>	1	1	<i>Plagiochila ludoviciana</i>	2	1
<i>Dicranum condensatum</i>	1	1	<i>Plagiochila sullivantii</i>	1	1
<i>Dicranum flagellare</i>	1	1	<i>Plagiochila undata</i>	3	1
<i>Dicranum fuscescens</i>	1	1	<i>Plagiomnium ellipticum</i>	2	1
<i>Didymodon fallax</i>	1	1	<i>Plagiothecium laetum</i>	1	1
<i>Didymodon tophaceus</i>	1	1	<i>Platyhypnidium riparioides</i>	1	1
<i>Drummondia prorepens</i>	1	1	<i>Pleurochaete squarrosa</i>	1	1
<i>Entodon sullivantii</i>	2	1	<i>Polytrichum juniperinum</i>	1	1
<i>Eurhynchium hians</i>	1	1	<i>Ptychomitrium incurvum</i>	1	1
<i>Fabronia ciliaris</i>	1	1	<i>Racomitrium aciculare</i>	1	1
<i>Fissidens asplenioides</i>	1	1	<i>Radula sullivantii</i>	1	1
<i>Frullania appalachiana</i>	1	1	<i>Rectolejeunea maxonii</i>	1	1
<i>Frullania kunzei</i>	1	1	<i>Rhytidiadelphus squarrosus</i>	1	1
<i>Herbertus aduncus</i>	1	1	<i>Riccardia jugata</i>	1	1
<i>Lejeunea sharpii</i>	1	1	<i>Solenostoma gracillimum</i>	1	1
<i>Loeskeobryum brevirostre</i>	3	1	<i>Solenostoma</i> aff. <i>obscurum</i>	1	1
<i>Lophocolea</i> aff. <i>bidentata</i>	1	1	<i>Telaranea nematodes</i>	3	1
<i>Lophozia bicrenata</i>	1	1	<i>Tuerckheimia angustifolia</i>	2	1
			<i>Zygodon viridissimus</i> var. <i>rupestris</i>	1	1
LIMITED TAXA					
<i>Amblystegium serpens</i>	2	2	<i>Barbula unguiculata</i>	2	2
<i>Amphidium mougeotii</i>	4	4	<i>Bartramia pomiformis</i>	2	2
<i>Anacamptodon splachnoides</i>	2	2	<i>Brachythecium oxycladon</i>	4	3
<i>Andreaea rothii</i>	3	2	<i>Brachythecium plumosum</i>	2	2
<i>Atrichum angustatum</i>	6	5	<i>Brachythecium rivulare</i>	4	3
<i>Atrichum oerstedianum</i>	4	4	<i>Brotherella recurvans</i>	3	3
<i>Atrichum undulatum</i>	4	4	<i>Bryhnia graminicolor</i>	3	3
<i>Aulacomnium heterostichum</i>	6	5	<i>Bryum capillare</i>	4	4
<i>Aulacomnium palustre</i>	2	2	<i>Calypogeia fissa</i>	2	2

Table 5.1. Continued.

TAXON	# of Coll.	# of Loc.	TAXON	# of Coll.	# of Loc.
LIMITED TAXA (continued)					
<i>Calypogeia mulleriana</i>	6	5	<i>Metzgeria crasipilis</i>	4	2
<i>Calypogeia sullivanii</i>	8	5	<i>Metzgeria myriopoda</i>	5	3
<i>Clasmatodon parvulus</i>	4	4	<i>Mnium stellare</i>	2	2
<i>Climacium americanum</i>	6	5	<i>Myurella sibirica</i>	7	3
<i>Ctenidium malacodes</i>	4	3	<i>Nardia lescurii</i>	5	2
<i>Cyrto-hypnum pygmaeum</i>	5	4	<i>Odontoschisma denudatum</i>	6	3
<i>Dicranella heteromalla</i>	2	2	<i>Pallavicinia lyellii</i>	4	4
<i>Dicranum fulvum</i>	6	5	<i>Philonotis fontana</i>	5	5
<i>Dicranum montanum</i>	5	5	<i>Physcomitrium pyriforme</i>	2	2
<i>Diphysium foliosum</i>	5	4	<i>Plagiomnium rostratum</i>	3	3
<i>Ditrichum lineare</i>	2	2	<i>Plagiothecium denticulatum</i>	2	2
<i>Ditrichum pallidum</i>	4	4	<i>Platydictya confervoides</i>	4	2
<i>Ditrichum pusillum</i>	4	4	<i>Pogonatum pensilvanicum</i>	2	2
<i>Ditrichum rhynchostegium</i>	4	3	<i>Polytrichum commune</i>	5	5
<i>Dumortiera hirsuta</i>	2	2	<i>Polytrichum ohioense</i>	6	5
<i>Entodon cladorrhizans</i>	3	2	<i>Porella platyphylla</i>	2	2
<i>Entodon seductrix</i>	4	4	<i>Porella platyphylloidea</i>	5	5
<i>Eucladium verticillatum</i>	3	2	<i>Pseudotaxiphyllum elegans</i>	2	2
<i>Fissidens adianthoides</i>	2	2	<i>Pylaisiadelphina tenuirostris</i>	4	4
<i>Fissidens bushii</i>	4	3	<i>Radula mollis</i>	6	4
<i>Fissidens grandifrons</i>	6	3	<i>Radula tenax</i>	3	3
<i>Fissidens osmundioides</i>	2	2	<i>Radula voluta</i>	12	5
<i>Forsstroemia trichomitria</i>	4	4	<i>Reboulia hemisphaerica</i>	4	4
<i>Frullania brittoniae</i>	5	2	<i>Rhabdoweisia crispata</i>	2	2
<i>Frullania ericoides</i>	4	2	<i>Rhizomnium punctatum</i>	8	5
<i>Frullania plana</i>	2	2	<i>Rhodobryum roseum</i>	4	4
<i>Frullania riparia</i>	4	2	<i>Riccardia palmata</i>	2	2
<i>Harpalejeunea ovata</i>	5	4	<i>Scapania undulata</i>	6	5
<i>Homalotheciella subcapillata</i>	5	4	<i>Schistidium apocarpum</i>	6	4
<i>Hookeria acutifolia</i>	3	3	<i>Sematophyllum adnatum</i>	3	3
<i>Hymenostylium recurvirostre</i>	2	2	<i>Sematophyllum marylandicum</i>	7	4
<i>Hyophila involuta</i>	2	2	<i>Solenostoma crenuliformis</i>	2	2
<i>Hypnum fertile</i>	3	3	<i>Solenostoma hyalinum</i>	3	2
<i>Hypnum imponens</i>	3	3	<i>Solenostoma pumilum</i>	3	2
<i>Hypnum lindbergii</i>	3	3	<i>Sphagnum affine</i>	6	5
<i>Isopterigium tenerum</i>	2	2	<i>Sphagnum subsecundum</i>	6	5
<i>Isopterygiopsis muelleriana</i>	6	3	<i>Stereocleus serrulatus</i>	3	3
<i>Jubula pennsylvanica</i>	4	3	<i>Taxiphyllum deplanatum</i>	3	3
<i>Kurzia sylvatica</i>	13	4	<i>Taxiphyllum taxirameum</i>	3	3
<i>Lejeunea blomquistii</i>	4	3	<i>Tetraphis pellucida</i>	2	2
<i>Lejeunea cavifolia</i>	5	4	<i>Thamnobryum alleghaniense</i>	5	4
<i>Leucobryum glaucum</i>	4	3	<i>Thelia hirtella</i>	5	4
<i>Leucodon brachypus</i>	3	2	<i>Trichocolea tomentella</i>	5	3
<i>Leucodon julaceus</i>	4	3	<i>Ulota crispa</i>	4	4
<i>Leucolejeunea conchifolia</i>	4	4	<i>Weissia controversa</i>	5	4
<i>Leucolejeunea unciloba</i>	6	4			

Table 5.1. Continued.

TAXON	# of Coll.	# of Loc.	TAXON	# of Coll.	# of Loc.
COMMON TAXA					
<i>Bazzania trilobata</i>	14	9	<i>Lejeunea laetevirens</i>	13	7
<i>Brachythecium salebrosum</i>	12	10	<i>Lejeunea lamacerina</i> subsp. <i>gemminata</i>	9	6
<i>Bryhnia novae-angliae</i>	8	7	<i>Lejeunea ruthii</i>	13	9
<i>Bryoandersonia illecebra</i>	9	6	<i>Lejeunea ulicina</i>	13	10
<i>Campylium hispidulum</i>	6	6	<i>Leucobryum albidum</i>	7	6
<i>Cephalozia bicuspidata</i>	12	7	<i>Metzgeria conjugata</i>	11	8
<i>Cephalozia lunulifolia</i>	22	9	<i>Metzgeria furcata</i>	16	7
<i>Chiloscyphus cuspidatus</i>	22	8	<i>Nowellia curvifolia</i>	11	8
<i>Chiloscyphus profundus</i>	11	8	<i>Odontoschisma prostratum</i>	14	7
<i>Cololejeunea biddlecomiae</i>	16	8	<i>Pellia epiphylla</i>	13	10
<i>Conocephalum conicum</i>	10	6	<i>Plagiochila asplenioides</i> subsp. <i>porelloides</i>	16	8
<i>Dicranum scoparium</i>	10	8	<i>Plagiochila virginica</i>	6	6
<i>Diplophyllum apiculatum</i>	17	9	<i>Plagiomnium cuspidatum</i>	12	9
<i>Entodon macropodus</i>	10	6	<i>Platygyrium repens</i>	20	10
<i>Fissidens bryoides</i>	8	7	<i>Porella pinnata</i>	8	8
<i>Fissidens subbasilaris</i>	9	7	<i>Radula complanata</i>	14	9
<i>Fissidens taxifolius</i>	13	8	<i>Radula obconica</i>	15	9
<i>Fontinalis novae-angliae</i>	7	6	<i>Schistidium rivulare</i>	10	8
<i>Frullania eboracensis</i>	10	10	<i>Schwetschkeopsis fabronia</i>	9	7
<i>Gymnostomum aeruginosum</i>	9	6	<i>Sematophyllum demissum</i>	10	8
<i>Haplohymenium triste</i>	11	7	<i>Sphagnum lescurrei</i>	9	7
<i>Hedwigia ciliata</i>	7	6			
<i>Hygroamblystegium tenax</i>	14	9			
ABUNDANT TAXA					
<i>Anomodon rostratus</i>	23	15	<i>Mnium hornum</i>	18	12
<i>Campylium chrysophyllum</i>	34	14	<i>Plagiomnium ciliare</i>	15	11
<i>Fissidens dubius</i>	19	11	<i>Scapania nemorosa</i>	16	11
<i>Frullania asagrayana</i>	20	13	<i>Tortella humilis</i>	13	11
<i>Hypnum curvifolium</i>	11	11			
ABUNDANT AND WIDESPREAD TAXA					
<i>Anomodon attenuatus</i>	58	20	<i>Thuidium delicatulum</i>	56	25
<i>Leucolejeunea clypeata</i>	41	18			

Taxa that are considered abundant numbered nine, two-thirds of which were collected more than 15 times (Table 5.1). Their abundance reflects a widespread presence across the landscape and is not specific to any habitat and or substrate. Generally, bryophytes are not considered abundant in most habitats, with notable exceptions such as swamps, bogs, and other wetland habitats.

The final category, widespread and abundant, includes only three taxa: *Leucolejeunea clypeata*, *Anomodon attenuatus*, and *Thuidium delicatulum* (Table 5.1). All of these species were collected from greater than 15 different locations.

CHAPTER VI
SPECIES DISTRIBUTION

Due to immense size of the park and the diversity of habitat sites that are found throughout the park, the landscape has been divided into four [4] major landscape domains:

- | | |
|-------------------|------------------------|
| 1. Plateau forest | 3. Riparian/Gorge zone |
| 2. Slope forest | 4. Ruderal zones |

These major domains have been further divided into 18 restricted landscape domains:

- | | |
|----------------------------|-------------------------|
| 1. Riparian | 10. Waterfalls |
| 2. Inundation zone | 11. Caves |
| 3. Flood zone | 12. Seeps |
| 4. Zone beyond flood level | 13. Sinks |
| 5. Outcrops | 14. Fields |
| 6. Boulder fields | 15. Road-sides |
| 7. Woodland habitats | 16. Trail-sides |
| 8. Streams | 17. Man-made structures |
| 9. Swamps | 18. Miscellaneous sites |

Due to the importance of substrate, these sites were further divided into six [6] by substrate types:

- | | |
|------------------------|---------|
| 1. Calcareous rock | 5. Soil |
| 2. Non-calcareous rock | 6. Wood |
| 3. Hardwood bark | |
| 4. Coniferous bark | |

These different substrates were then used to categorize the bryophytes into four [4] traditionally utilized categories:

1. Saxicolous bryophytes
2. Lignicolous bryophytes
3. Corticolous bryophytes
4. Terricolous bryophyte

Major Landscape Domains

The park was divided into four major domains, based mainly on physiography, but also on land use and management. These four major domains are plateau forest, slope forest, gorge/riparian zone, and finally ruderal habitats.

The plateau forests are easily defined as the non-developed portion of the park found on the plateau surface. This domain is forested and is the main part of the park, observed as one travels the scenic roads of the park. Fleming (2003) described the predominant community type of this domain as Oak-Hickory-Pine-Red Maple (Figure 6.1). He also noted that several other community types are distributed throughout, including three forest communities; Shortleaf Pine-White Oak, Virginia Pine, Chestnut Oak, as well as the Riparian and the artificial Plateau Lake communities. The Riparian communities are a very important component of the overall domain. These communities have a canopy dominated by *Tsuga canadensis* (Eastern Hemlock), with *Betula nigra* (River Birch) and *Rhododendron maximum* (Great Rhododendron) important components of the subcanopy.

As one follows Highway 30 toward Spencer into Cane Creek Annex or descends into the gorges on one of the many hiking trails in the park, he or she will be surrounded by what has been denoted as slope forest. The slope forest is perhaps the most diverse in

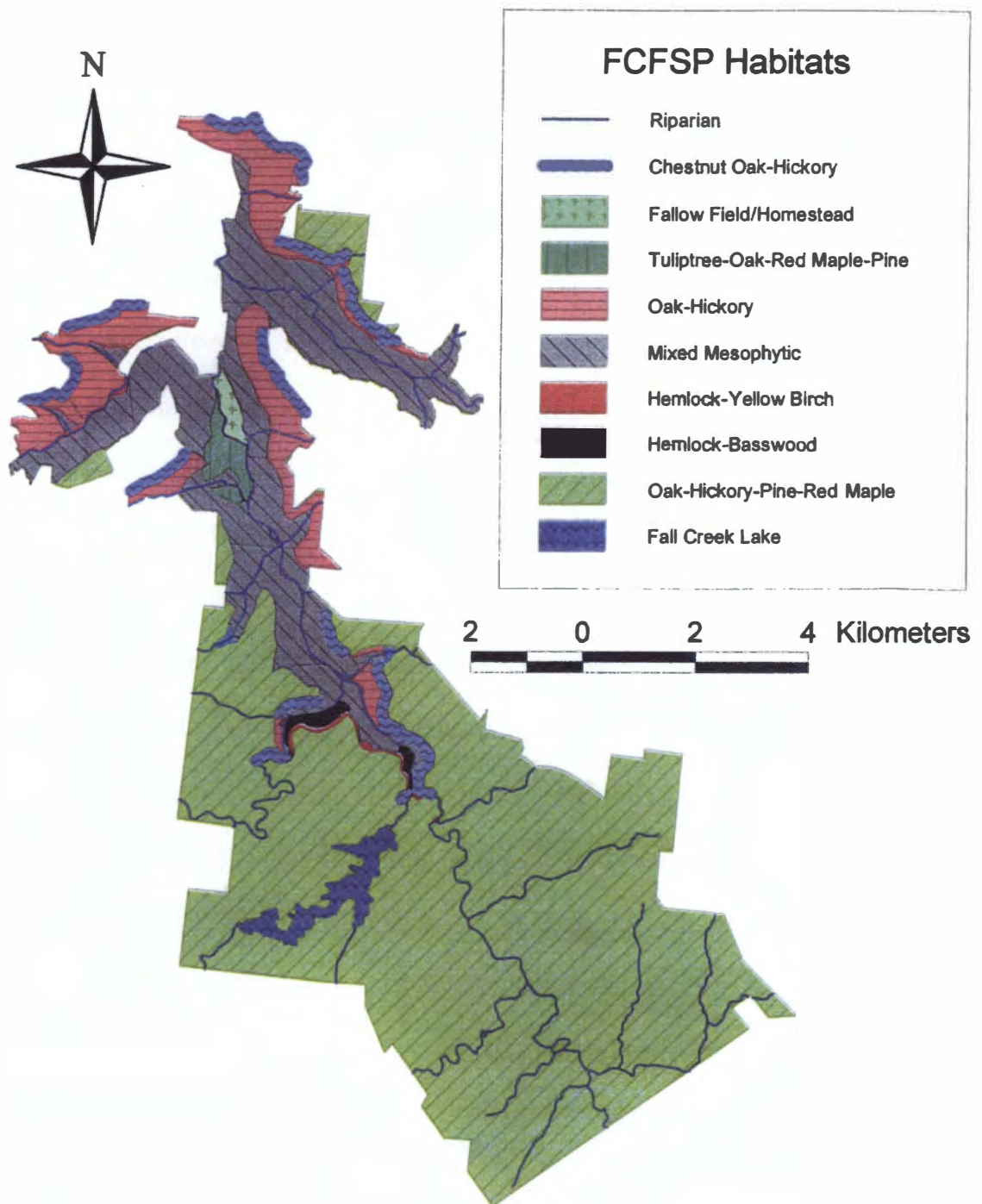


Figure 6.1. The major habitat types of Fall Creek Falls State Park and their distribution within the park (Fleming, 2003).

habitat since it includes the karst sites, including the caves and sinks. The forest is also less disturbed and more continuous owing to the difficulty of removing the timber. Fleming (2003) described the gorge areas as having a variety of different community types; the most extensive is Mixed Mesophytic Forest. Oak-Hickory and Chestnut Oak-Hickory are less extensive in their distribution, but still important components of the overall slope forest. With far more limited coverage are the Hemlock-Basswood, Hemlock-Yellow Birch, and Tulip tree-Oak-Red Maple-Pine communities (Figure 6.1).

The gorge/riparian zone is separated from the slope forests as a unique habitat type. It includes the immediate zone on both sides of the rivers located in the bottoms of the gorges, generally to the base of the slopes or to the edge of the effects of high water, though sometimes in steep walled gorges, even beyond the flood zone. Fleming (2003) included the description of the vegetation community of this domain under the Riparian community of the gorges. He listed the dominant canopy species as *Tsuga canadensis* and *Betula alleghaniensis* (Yellow Birch) with a mixture of other woody taxa.

The ruderal domain is not continuous as the other three domains are and therefore may be located in any of the other domains. It represents habitats that are not natural and therefore have been created and are being maintained through human intervention, such as mowing or some other type of human construct. They do not have a describable vegetation type, since that is dependent on the type of disturbance that is responsible for the formation of the site.

Not all of the major landscape domains located within the boundaries of the park exhibit a similar level of species richness. The slope forest domain contained the highest diversity of bryophyte species, with a total of 154 taxa (99 moss and 55 liverwort taxa)

that were identified with certainty as being distinct. The riparian/gorge domain had the second greatest taxonomic diversity with 58 liverwort and 73 moss taxa for a total species richness of 131. It is interesting to note that although the overall richness is greater in the slope forest domain, the liverwort richness is greater in the riparian/gorge zone. The third richest of the landscape domains was the plateau forest, from which 123 taxa were collected including 51 liverwort and 72 moss taxa. Finally, the ruderal domain was least rich of all the domains with only 61 total taxa collected, only 10 of which were liverworts and 51 mosses (Table 6.1).

Each of the different major domains had taxa that were specific only to that landscape type. This specificity may be due to the habitat requirements of those taxa being limited a particular major domain. It may also be due to limitations to fully collecting the representative species in each of the domain types as a result of the immense size of the park, such as overlooked pockets of diversity. The discussion will rely on the assumption that the habitat requirements of a taxon were only met in the domain from which it was reported.

Although the plateau forest contains a variety of restricted domains, there are only two unique types, the drier forest sites and the swampy upland depression. The dry forest is not expected to be particularly rich in bryophytes. These two restricted domain types only account for five of the 25 species (11 moss and 14 liverwort taxa) collected only from the plateau forest landscape domain (Table 6.1). Four more species were collected from rock outcrops and the remainder can be accounted for by upland riparian areas in a variety of moisture zones and trail-side collections. These results are unexpected, based on observations these sites do not vary greatly from the same restricted domains within

Table 6.1. Alphabetical list of the bryophytes collected in Fall Creek Falls State Park, the major landscape domains they were collected from and the associated restricted domains; riparian zone (Ri), inundation zone (I), flood zone (Fl), beyond flood level (B), outcrops (O), boulder fields (Bf), woodland (W), stream (St), swamp (Sw), waterfall (Wf), cave (C), seep (Sp), sink (S), field (F), roadside (R), trailside (T), man-made (Mm), and miscellaneous (M). ► - species collected in all four domains, ○ - collected only in gorge/riparian domain, Δ - collected only in plateau forest domain, □ - collected only in slope forest domain, ◇ - collected only in ruderal domain.

Taxa	PF	SF	G/R	Rd
HORNWORT TAXA				
<i>Anthoceros punctatus</i>	St(I)	T	Wf	
LIVERWORT TAXA				
<i>Bazzania trilobata</i>	O,T,Ri(O-Fl)	T,W(O),Ri(I)	I,Fl	
○ <i>Blepharostoma trichophyllum</i>			O-I	
Δ <i>Calypogeia fissa</i>	T,Ri(Fl)			
<i>Calypogeia mulleriana</i>	O,T,Sp		T	R
<i>Calypogeia sullivantii</i>	W,T,Sw,St(I), Ri(I)	T		
<i>Cephalozia bicuspidata</i>	Sw,St(I), Ri(I,O-B,Fl)	C	Fl	
Δ <i>Cephalozia catenulata</i>	T			
<i>Cephalozia lunulifolia</i>	T,Sw,Ri(I,O- Fl,B)	C	O-Fl	
<i>Cephaloziella rubella</i>	T			
<i>Chiloscyphus cuspidatus</i>	Sw,Ri(Fl)	T,S,O,C	I,Fl,O-Fl	
<i>Chiloscyphus profundus</i>	T,Sw	T,O,C,Wf, Ri(Fl)	Fl	
► <i>Cololejeunea biddlecomiae</i>	T,Sw,Ri(B)	S,O,C	Fl	R
○ <i>Cololejeunea minutissima</i>			O-B	
○ <i>Cololejeunea ornata</i>			Fl,B	
<i>Conocephalum conicum</i>		S,C,Wf,Ri(I)	Wf,O-B	
► <i>Diplophyllum apiculatum</i>	T,O,Ri(O-Fl, O-B)	T,O,C	T,Wf(O)	R
<i>Dumortiera hirsuta</i>		S	Fl	
Δ <i>Frullania appalachiana</i>	Ri(B)			
► <i>Frullania asagrayana</i>	T,Sw,St(I), Ri(B)	T,Ri(B)	B	T,R
<i>Frullania brittoniae</i>	T	T		
► <i>Frullania eboracensis</i>	T,Sw,W, Ri(B)	C	B	F,R
Δ <i>Frullania ericoides</i>	T,Ri(B)			
Δ <i>Frullania kunzei</i>	O			
<i>Frullania plana</i>	Sw	T		
○ <i>Frullania riparia</i>			O-Fl,O-B	
<i>Harpalejeunea ovata</i>	Ri(B,O-B,O-Fl)	O	Fl	
□ <i>Herbertus aduncus</i> subsp. <i>tenuis</i>		O		
<i>Jubula pennsylvanica</i>	Sp(O),Ri(O-Fl)		Fl	
Δ <i>Kurzia sylvatica</i>	T,O,Ri(I,Fl, O-Fl)			
<i>Lejeunea blomquistii</i>	Sp(O)	O	Fl	

Table 6.1. Continued.

Taxa	PF	SF	G/R	Rd
LIVERWORT TAXA (continued)				
<i>Lejeunea cavifolia</i>		R,O,C	O-B	
<i>Lejeunea laetevirens</i>	O,Ri(O-Fl)	S,S(Bf),O,C	O-B	
<i>Lejeunea lamacerina</i> subsp. <i>gemminata</i>	Ri(O-Fl)	S,O	Wf,I,O-B	
▶ <i>Lejeunea ruthii</i>	T,Ri(I,O-Fl,B)	T,C	Fl	T
○ <i>Lejeunea sharpii</i>			O-Fl	
<i>Lejeunea</i> sp.			I	
<i>Lejeunea ulicina</i>	T,Sw,W, Ri(B,O-Fl)	O	St(I),I,B	
▶ <i>Leucolejeunea chlypeata</i>	T,Sw,O,St(I), Ri(I,O-Fl,B)	T,S,S(Bf),O, C,Wf,Ri(B)	Wf,Fl,B	T,R
<i>Leucolejeunea conchifolia</i>	T	T	Fl	
<i>Leucolejeunea unciloba</i>	T,Ri(B)		St(I),B	
Δ <i>Lophocolea</i> aff. <i>bidentata</i>	Sw			
Δ <i>Lophozia bicrenata</i>	T			
□ <i>Mannia triandra</i>		C		
Δ <i>Marsupella emarginata</i>	Ri(I)			
<i>Metzgeria conjugata</i>		S,O,C	Fl,O-Fl,B	R
<i>Metzgeria crassipilis</i>		C	Fl,B	
<i>Metzgeria furcata</i>	Ri(I,B,O-Fl),O	S,S(Bf),Ri(B)	Fl	
○ <i>Metzgeria leptoneura</i>			Fl	
<i>Metzgeria myriopoda</i>	Sw,Ri(O-Fl)			T
Δ <i>Nardia lescurii</i>	Sw,Ri(Fl)			
<i>Nowellia curvifolia</i>	T,Sw,W(Bf)	T	I,Fl	
<i>Odontoschisma denudatum</i>	T,Sw	C		
<i>Odontoschisma prostratum</i>	T,Sw,Ri(I, O- Fl,Fl,O-B)	T	T,Wf(O)	
<i>Pallavicinia lyellii</i>	T,Sw,Ri(Fl)		Wf	
<i>Pellia epiphylla</i>	St(I), Ri(I,Fl, O- B)	S	Wf,I,Fl,O-Fl	
□ <i>Plagiochila</i> (fcf unknown)		O		
<i>Plagiochila asplenioides</i> subsp. <i>porelloides</i>	Sp(O)	S,C,Ri(I)	I,Fl,O-B	
□ <i>Plagiochila austini</i>		S		
□ <i>Plagiochila ludoviciana</i>		S		
<i>Plagiochila</i> sp.	Ri(O-B)			
<i>Plagiochila</i> sp.		O		
□ <i>Plagiochila sullivanii</i>		O		
□ <i>Plagiochila undata</i>		S		
<i>Plagiochila virginica</i>		S,O,Wf	Wf(O),Fl, O-B	
<i>Porella pinnata</i>	T,O	C,Wf	Wf,I,O-I,Fl,B	
<i>Porella platyphylla</i>		O	O-B	
▶ <i>Porella platyphylloidea</i>	W	T	O-B	R
<i>Radula complanata</i>	T,Sw,Ri(B)	S,S(Bf),O,C	O-B	
<i>Radula mollis</i>		S,O,Wf	O-B	
<i>Radula obconica</i>	St(I),Ri(I,B)	S,O,C	Wf,Fl	
○ <i>Radula sullivanii</i>			O-Fl	

Table 6.1. Continued.

Taxa	PF	SF	G/R	Rd
LIVERWORT TAXA (continued)				
<i>Radula tenax</i>		S,C	Fl	
<i>Radula voluta</i>		S,O,C,Ri(B)	T,O-B	
<i>Reboulia hemisphaerica</i>		O	Wf,O-B	
△ <i>Rectolejeunea maxonii</i>	T			
○ <i>Riccardia jugata</i>			Wf	
<i>Riccardia palmata</i>		C	Fl	
<i>Scapania nemorosa</i>	T(O),Ri(I,Fl, O-Fl,Fl)	T,C,Wf	T,I,Fl,O-Fl	
<i>Scapania undulata</i>	Sw,Ri(Fl)	Ri(Fl)	Wf,I	
△ <i>Solenostoma crenuliformis</i>	Ri(I,Fl)			
□ <i>Solenostoma gracillimum</i>		Wf		
<i>Solenostoma hyalinum</i>		Ri(Fl)	O-Fl	
○ <i>Solenostoma aff. obscurum</i>			I	
○ <i>Solenostoma pumilum</i>			Wf,I,Fl	
△ <i>Telaranea nematodes</i>	Sw			
<i>Trichocolea tomentella</i>		S,C	I,Fl	
MOSS TAXA				
△ <i>Amblystegium serpens</i>	T			
□ <i>Amblystegium serpens var. juratzkanum</i>		S		
◇ <i>Amblystegium varium</i>				T
<i>Amphidium mougeotii</i>	O,Ri(O-B)		Wf(O) Fl,B	
○ <i>Anacamptodon splachnoides</i>				
△ <i>Andreaea rothii</i>	Ri(O-Fl,O-B)			
▶ <i>Anomodon attenuatus</i>	R,T	T,S,O,C,Wf	Fl,O-Fl,O-B	R
▶ <i>Anomodon rostratus</i>	T,Sw	T,S,O,C,Wf	O-B	R,O
△ <i>Atrichum altecristatum</i>	Ri(I)			
<i>Atrichum angustatum</i>	Sw,Ri(I)	T		T,R
<i>Atrichum oerstedianum</i>	Ri(I)		Fl,O-B	
<i>Atrichum undulatum</i>		Ri(I,Fl)	Wf	
▶ <i>Aulacomnium heterostichum</i>	Sw	O	Wf,O-B	R
<i>Aulacomnium palustre</i>	Sw			F
◇ <i>Barbula indica</i>				R
<i>Barbula sp.</i>		T		
△ <i>Barbula unguiculata</i>	Mm,Ri(Fl)			
<i>Bartramia pomiformis</i>			O-B	T
□ <i>Brachythecium acuminatum</i>		S		
<i>Brachythecium oxycladon</i>		T	Wf,Fl	
<i>Brachythecium plumosum</i>		C	Wf	
□ <i>Brachythecium rivulare</i>		S,S(Wf),C, Ri(I)		
<i>Brachythecium salebrosum</i>		R,T,S,O	Fl,O-B	R,O
<i>Brachythecium sp.</i>			Wf,Fl	
<i>Brachythecium sp.</i>		T,S,O,C,Wf		
<i>Brotherella recurvans</i>	Ri(I)	T,Ri(I)		
<i>Bryhnia graminicolor</i>	W(Bf)	T,Wf		
<i>Bryhnia novae-angliae</i>		S,O,C,Wf, Ri(I)	Wf,O-B	

Table 6.1. Continued.

Taxa	PF	SF	G/R	Rd
MOSS TAXA (continued)				
▶ <i>Bryoandersonia illecebra</i>	St(I)	T	Fl,O-B	R
◊ <i>Bryum argenteum</i>				Mm
<i>Bryum capillare</i>	Mm,O,Ri(Fl)	C	Fl	
□ <i>Bryum</i> aff. <i>lisae</i> var. <i>cuspidatum</i>		Ri(T)		
<i>Bryum</i> sp.	Ri(O-B)			
<i>Bryum</i> sp.			Wf	
<i>Bryum</i> sp.		Ri(I)		
▶ <i>Campylium chrysophyllum</i>	T,W	T,S,O,C,Wf, Ri(I)	O-B	R
▶ <i>Campylium hispidulum</i>	T,W(Fl)	T	O-Fl	T
◊ <i>Ceratodon purpureus</i>				Mm
<i>Clasmatodon parvulus</i>	Sw	T,O		
<i>Climacium americanum</i>		S,C,Ri(I)	O-Fl	
<i>Ctenidium malacodes</i>		Ri(Fl)	I,O-B	
□ <i>Cyrto-hypnum pygmaeum</i>		T,S,O,Wf		
<i>Dicranella heteromalla</i>	O	T		
△ <i>Dicranum condensatum</i>	W			
□ <i>Dicranum flagellare</i>		C		
<i>Dicranum fulvum</i>	W(Bf)	T,O,Ri(I)		
□ <i>Dicranum fuscescens</i>		T		
▶ <i>Dicranum montanum</i>	T	T,S	Fl	R
<i>Dicranum scoparium</i>	R,T,Sw		Fl	T,R,F
<i>Dicranum</i> sp.	T			
<i>Dicranum</i> sp.		Ri(I)		
○ <i>Didymodon fallax</i>			O-B	
□ <i>Didymodon tophaceus</i>		C		
<i>Diphysium foliosum</i>	O,Ri(I)	T		R
<i>Ditrichum lineare</i>			T	R
<i>Ditrichum pallidum</i>	T	Wf		T,F
<i>Ditrichum pusillum</i>	T,Sw,Ri(I)	T		T
<i>Ditrichum rhynchostegium</i>	T			R
<i>Ditrichum</i> sp.		T		
◊ <i>Drummondia prorepens</i>				F
<i>Entodon cladorrhizans</i>		S,S(Bf)	O-B	
<i>Entodon macropodus</i>		T,S,C,Ri(B)	O-B	
<i>Entodon seductrix</i>		T,Wf		R,Mm
□ <i>Entodon sullivantii</i>		Wf		
□ <i>Eucladium verticillatum</i>		S,Wf		
◊ <i>Eurhynchium hians</i>				F
□ <i>Fabronia ciliaris</i> var. <i>polycarpa</i>		C		
□ <i>Fissidens adianthoides</i>		S,Wf		
△ <i>Fissidens asplenioides</i>	Ri(I)			
<i>Fissidens bryoides</i>		S,O,C,Wf	I,O-Fl	
<i>Fissidens bushii</i>		T,Ri(Fl)	Wf,I	
▶ <i>Fissidens dubius</i>	T	O,C,Wf	I,Fl,O-B	R
□ <i>Fissidens grandifrons</i>		S,S(Wf),Wf, Ri(I)		

Table 6.1. Continued.

Taxa	PF	SF	G/R	Rd
MOSS TAXA (continued)				
<i>Fissidens osmundioides</i>		Ri(I)	O-I	
<i>Fissidens subbasilaris</i>	T,W,W(Fl), Ri(B)		O-B	R,O
<i>Fissidens taxifolius</i>		T,S,C,Wf, Ri(I)	Wf,I,O-B	
<i>Fontinalis novae-angliae</i>	T,Sw,St(I), Ri(I)		Wf,O-I	
▶ <i>Forsstroemia trichomitria</i>	T	T	B	R
<i>Gymnostomum aeruginosum</i>		S,S(Wf),Wf, Ri(I)	Wf,B	
<i>Haplohymenium triste</i>	T,W,Ri(B)	T		R
▶ <i>Hedwigia ciliata</i>	T	T	Fl	R
<i>Homalotheciella subcapillata</i>	T,S	T		F
○ <i>Hookeria acutifolia</i>			Wf,O-I,O-Fl	
<i>Hygroamblystegium tenax</i>		S,O,C,Wf, Ri(I)	Wf,I,O-B	M,Ri(I)
<i>Hymenostylium recurvirostre</i>		C	O-I	
□ <i>Hyophila involuta</i>		Wf		
▶ <i>Hypnum curvifolium</i>	T,S,Ri(Fl)	S,C,Ri(I)	Fl,O-B	F
<i>Hypnum fertile</i>	T	T		
<i>Hypnum imponens</i>	T,O		Fl	
<i>Hypnum lindbergii</i>			I,Fl	R,M,Ri(I)
<i>Hypnum</i> sp.	T			
<i>Hypnum</i> sp.				T
<i>Hypnum</i> sp.		Ri(I)		
<i>Isopterygium tenerum</i>	Ri(O-Fl)		W(Bf)	
<i>Isopterygiopsis muelleriana</i>	Ri(O-Fl)		Fl	
<i>Leucobryum albidum</i>	T,Sw,O,St(I)	T		
△ <i>Leucobryum glaucum</i>	W,Ri(FL)	Ri(I)		
<i>Leucobryum</i> sp.		T,W(O)		
<i>Leucodon brachypus</i>	T			M
<i>Leucodon julaceus</i>	W	T		R
□ <i>Loeskeobryum brevirostre</i>		C		
<i>Mnium hornum</i>	Ri(Fl,O-Fl,O-B)	T,C,Wf	O-Fl,O-B	
○ <i>Mnium marginatum</i>			O-Fl	
<i>Mnium</i> sp.			F,O-Fl	
<i>Mnium</i> sp.		O		
<i>Mnium stellare</i>		O	Fl	
<i>Myurella sibirica</i>		C	O-B	
□ <i>Neckera complanata</i>		T,O		
□ <i>Neckera pennata</i>		C		
□ <i>Orthotrichum pusillum</i>		T		
□ <i>Orthotrichum stellatum</i>		T		
○ <i>Orthotrichum strangulatum</i>			O-B	
○ <i>Oxystegus tenuirostris</i>			O-Fl,O-B	
<i>Philonotis fontana</i>	Sp(O)	S,S(Wf)	W(Bf),O-B	
△ <i>Philonotis fontana</i> var. <i>caespitosa</i>	Ri(I)			
◇ <i>Philonotis</i> aff. <i>glaucescens</i>				R

Table 6.1. Continued.

Taxa	PF	SF	G/R	Rd
MOSS TAXA (continued)				
◇ <i>Physcomitrium pyriforme</i>				F
<i>Plagiomnium ciliare</i>		T,S,O,C	I,Fl	R,F
<i>Plagiomnium cuspidatum</i>		T,O,C,Ri(Fl)	Wf,Fl,O-B	R,F
□ <i>Plagiomnium ellipticum</i>		S		
<i>Plagiomnium rostratum</i>		S,C	O-B	
<i>Plagiothecium denticulatum</i>	W(Bf)	T		
□ <i>Plagiothecium laetum</i>		W(O)		
<i>Platydictya confervoides</i>		C	I	
▶ <i>Platygyrium repens</i>	T,Sw,W	T,Ri(Fl)	I,Fl	R
○ <i>Platyhypnidium riparioides</i>			Fl	
◇ <i>Pleurochaete squarrosa</i>				F
<i>Pogonatum pensilvanicum</i>	T	T		
<i>Polytrichum commune</i>	Sw	T		F
△ <i>Polytrichum juniperinum</i>	O			
<i>Polytrichum ohioense</i>	T,Sw	T,W		
<i>Pseudotaxiphyllum elegans</i>		Ri(I)		T
△ <i>Ptychomitrium incurvum</i>	O			
<i>Pylaisiadelphina tenuirostris</i>	Ri(O-B)	T,C	Fl	
△ <i>Racomitrium aciculare</i>	Ri(Fl)			
<i>Rhabdoweisia crispata</i>	Ri(O-B)	W(O)		
<i>Rhizomnium punctatum</i>	Ri(I,O-B)	C,Wf	Fl,O-Fl	
<i>Rhodobryum roseum</i>		T,C	O-B	R
□ <i>Rhytidiadelphus squarrosus</i>		C		
▶ <i>Schistidium apocarpum</i>	T	S	Fl	R
▶ <i>Schistidium rivulare</i>	Mm,Ri(I)	T,S,C,Wf	O-B	Mm
<i>Schwetschkeopsis fabronia</i>		T,S,O,Wf	Fl	
<i>Sematophyllum adnatum</i>	T		Fl	
<i>Sematophyllum demissum</i>	T,W(Bf)St(I), Ri(I,O-Fl)		I,Fl	R
<i>Sematophyllum marylandicum</i>	Sp(O)	Ri(I)		
<i>Sphagnum affine</i>	Sw,Ri(Fl)		T,Fl	
▶ <i>Sphagnum lescurrei</i>	W(I),Sw, Sp(O)	T	Wf,O-Fl	M,Ri(I)
<i>Sphagnum subsecundum</i>	Sw,Ri(I)	T	Fl	
<i>Steerecleus serrulatus</i>	T,W	O		
<i>Taxiphyllum deplanatum</i>		Wf	O-Fl,O-B	
□ <i>Taxiphyllum taxirameum</i>		T,S,Wf		
<i>Tetraphis pellucida</i>	T		Fl	
<i>Thamnobryum alleghaniense</i>		T,C,Ri(I)	Fl,O-B	
<i>Thelia hirtella</i>	Sw	T,S	O-B	
▶ <i>Thuidium delicatulum</i>	T,Sw,Sp(O), Ri(I,Fl,O-Fl,B)	T,S,O,C,Wf, Ri(I,B)	Wf,I,Fl,B, O-B	F,O
▶ <i>Tortella humilis</i>	T,W(Fl)	T,C	O-B	T,R,O,Mm
○ <i>Tuerckheimia angustifolia</i>			O-B	
<i>Ulota crispa</i>	T,Sw	T,C		
◇ <i>Weissia controversa</i>				R,F
□ <i>Zygodon viridissimus</i> var. <i>rupestris</i>		C		

the other major domains. This difference in species composition may be due to environmental differences such as different temperature and light regimes, since the other two major domains are located within the gorges and are more protected. Generally, protection is favorable for many bryophyte species and therefore may account for the number of unique taxa found within these gorge domains.

The slope forest domain contained the most taxa that were collected only from within its area, with 24 moss taxa and 8 liverworts (Table 6.1). The fact that this domain has the greatest number of unique taxa is not a surprise because it does contain several unique restricted domains, such as caves, waterfalls, and sinks, and also is protected by the surrounding plateau. That there are not more unique taxa is unexplained, especially in the case of liverworts, which would be expected to thrive in the more protected domain. Many of the taxa that were unique to the slope forests were collected multiple times within the domain often from multiple restricted domain types. Those restricted domains that are unique to the slope forest accounted for 23 of the 32 taxa, though 4 of these taxa were also collected outside of these special sites (outcrops, trail-sides, and riparian). Five of the remaining taxa were collected from outcrops, 3 from trail-sides, and a single species was collected in the riparian zone. Due to the majority of the unique taxa being found in the unique site types, it is most likely the result of the specific habitat requirements that these species possess.

The riparian/gorge domain is fairly limited in the variety of different restricted domains since they are dependent mostly on the proximity to the river and therefore how frequently the different zones are inundated. However, due to the importance of a ready source of water in the life of bryophytes it is not surprising that there were several unique

taxa collected in this domain. There were eight unique moss and 10 unique liverwort species collected (Table 6.1). Twelve of these 18 species were collected from a single zone, while the other 6 were found within multiple zones. Eleven of the taxa were collected from outcrops within at least one of the three zones (inundation, flood, and beyond flood). Two of these unique taxa were collected near the bases of waterfalls. And the other five species were collected from sites other than outcrops, but still within one of the three zones.

The ruderal domain had the fewest unique taxa with only 10 species of moss and no liverworts (Table 6.1). It was unexpected to find so many unique taxa in the ruderal sites. It is assumed that the species growing within ruderal sites would possess characteristics of “weedy” species, such as the capability of wide dispersal of propagules, rapid growth, and short life cycles, and therefore be found in many naturally disturbed areas of the park. Of these 10 species eight were collected only a single time. Of these there are probably two categories, those that are rare due to rarity of substrates and have really only been brought in by accident through human influence, and those that were only collected a single time due to chance or inaccessibility. The first category can be represented by examples, such as *Bryum argenteum*, which was collected off of concrete steps and *Pleurochaete squarrosa*, which was collected from the lawn in front of the nature center. The second category can best be represented by the specimen of *Drummondia prorepens*, which was collected from a single branch that had fallen from a tree in a mowed powerline right-of-way. It may not only grow out of reach on the trunks and in the canopy of trees. There were two species that were collected multiple times, though each time in a site considered ruderal. Fields and roadsides represent the majority

of sites from which these species were collected, though others were only collected from trail-sides and man-made structures.

There exists a great deal of overlap in species between the different major landscape domains. Much of this overlap is due to an overlap in the specific site types and substrate types between the different major domains. This can more easily be seen in an examination of the types of restricted domains in which the individual species were collected. Many of the species are found in at least two of the major landscape domains, however, there are only 24 species (17 moss and seven liverwort taxa) that are found in all four of the domains (Table 6.1). One reason for overlap is the limited specificity of certain species, which can be found in a variety of site types and on a variety of substrates. These cosmopolitan and weedy species will be discussed further under the heading of phytogeography in Chapter 7. It is important to note that the data from this study is based only on the collections that were made. Species that are common were not collected in all locations in which they were found and species that were particularly rare may have been overlooked.

Restricted Landscape Domains

The restricted domains further divide the four major landscape domains into smaller, more specific habitat types. The same restricted domains can be and are found within different major domain types. In total there have been 18 different restricted domains assigned. This includes a miscellaneous category, which includes those that did not fit other categories and had a limited occurrence. The riparian zone (Ri) was used to describe river habitats located within all the major domains with exception of the

Gorge/Riparian domain, which already included this designation. To further describe the riparian zone three descriptors/restricted domains were defined: the inundation zone (I), which includes the aquatic and submerged habitats, as well as those habitats that are subject to frequent submersion of splashing; the flood zone (Fl), which includes those habitats that may only be submerged at particular times of year in high water/flood conditions; and finally, the area beyond the flood level (B). This last zone is located furthest from the rivers and may extend into the lower portions of the upland slopes. It is typically much drier, but can be affected during major flood events every few years and during rain storms. Rock outcrops (O) is another restricted zone that may be found along the riparian zone, though is more commonly referred to in woodland or open settings. It is defined as a fairly extensive exposure of underlying rock or large boulders, but is separated from the more common boulder fields (Bf) found in the park, which have been included in a category of that name. A boulder field is generally found in woodland habitats (W) and is usually a slope strewn with boulders. The woodland category can be used to describe more open habitats as well as those with a fairly dense canopy. It is usually accompanied by some other restricted domain as a qualifier. Other restrictions were made to include those streams (St) that generally dry down early in the season and only flow during and following storm events. The same qualifiers that can be used for the riparian zone may also be applied in the case of a stream. In the plateau forest an upland swampy depression (Sw) was discovered, but due to its large importance to many of the species that were only found within its boundaries it has been given status as a restricted domain of its own. Perhaps the richest categories of restricted domains include four [4] that are found in the slope forest domain: waterfalls (Wf); caves (C); seeps (Sp),

mostly outcrops with a high moisture level including free-flowing water; and sinks (S), basins that are the result of the underlying karst topography and have been formed through the erosion of the soft calcareous underlying rocks and the collapse of the upper cap rock. The final four restricted domains are those that are influenced greatly by human actions: fields (F), which are open and usually grass with herbaceous-dominated areas formed through mowing or burning; roadsides (R), often impacted by mowing; trail-sides (T), impacted mostly by foot traffic; and man-made structures (Mm) that have come to support bryophytes, including stairs, buildings, etc. Finally, a miscellaneous (M) category was included to encompass the sites that did not fit into the other categories.

Most of the restricted domains are very limited in distribution or rather only found within a single major landscape domain so comparison of species lists is not useful. However, the riparian zone, which was a very rich zone, spans three of the most extensive major domains (Plateau Forest, Slope Forest and Riparian/Gorge). These characteristics make it important to examine the different restricted domains (I, Fl, and B, including outcrops in their specific zone). The total number of species collected in each of the zones varied, with 65 species in the inundation zone, 91 in the flood zone, and 78 in the zone beyond flood level. One hundred and fifty-two [152] confidently identified taxa were collected within these three zones. The amount of overlap, including all possible combinations, between species composition in each of the riparian zones ranged from 15% in the zone beyond the flood level to 26% in the flood zone. The inundation zone had an 19% overlap.

Within the inundation zone 12 of the 65 species were found in at least two different major domains. Half of the overlap can be accounted for by the similarity

between the riparian/gorge and the slope forest domains. This accounts for 21% of the taxa collected in the riparian/gorge and 30% of those collected in the slope forest domain. A single species, *Thuidium delicatulum*, collected in the inundation zone of all three major landscape domains, is included in these values. The degree of similarity between the riparian/gorge and plateau forest was just slightly less. Combined, these two pairings represent 10 of the 12 species that were found in the inundation zones of multiple major domains. Based on proximity, it would have been expected that the major domains nearest each other would have the greatest similarity, which was observed by the riparian/gorge having the greatest similarity, but not in the rest of the results for the inundation zone. This expected pattern does not hold in either the flood zone or the zone beyond flood level.

There were a total of 24 species that were found within the riparian flood zones of multiple major domains, in which a total of 91 species were collected. No species was found within all three of the major domain flood zones. Most of the similarity in the flood zone was found to be between the species composition of the riparian/gorge and the plateau forest domains, with nearly 80% (19 of 24) of the total similarity accounted for by this pair. This overlap represents 28% of the plants collected in this zone in the riparian/gorge domain and 50% of those collected in the plateau forest domain. The riparian/gorge and slope forest had the second greatest similarity with only 4 taxa that were found in each, which is only 6% of those collected in the riparian/gorge domain; but it represents 50% of those collected within the slope forest domain. The overall similarity between the plateau riparian zones and those in the gorges may be due to a similarity in composition, but it seems that the majority of riparian collections were made

in these two zones and that the slope forest riparian zone is somewhat depauperate in comparison to the other domains.

Finally, in the zone beyond the flood level, there were 12 species that were found in multiple major domain types. Three of these species were found in the three major domains; *Thuidium delicatulum*, *Leucolejeunea clypeata* and *Frullania asagrayana*. The greatest level of similarity was again represented by the overlap between the riparian/gorge and the plateau forest domains. This overlap consisted of nine of the 12 total species representing 75% of the total species overlap. These nine species make up 15% of the riparian/gorge species and 32% of the plateau forest species. The overlap between the riparian/gorge and slope forest made up less than half of the total overlap and the slope forest, plateau forest overlap was only a third of the total overlap. Again it is interesting to see that there is less of a similarity in those domains that are in close proximity to one another than there is between the domains that are disjunct.

The last comparison that is made is done by combining all of the species collected from each of the domains for each of the riparian zones and then assessing the amount of overlap between each of the riparian zones. It is found that there is at least some overlap between the zones for over 40% of the 152 taxa collected or 63 taxa. Nineteen of these species are found in all three of the riparian zones. The greatest amount of overlap is between the flood zone and the zone that lies beyond the flood level with 41 species, representing greater than 65% of the total similarity observed. The next is the similarity between the inundation zone and the flood zone, which share 35 taxa, 16 of which are uniquely shared between these two zones. Finally, the least amount of similarity is between the inundation zone and the zone beyond the flood level, with 25 taxa, only six

of which are uniquely shared. The greater level of similarity in the zones that are adjacent to one another would be expected since it is not always easy to discern the boundary line, especially since it can move. The low level of similarity between the inundation zone and the zone beyond the flood level is to be expected since each of these zones offers very different environmental conditions and they are discontinuous, so that there is less chance of overlapping the boundaries of the two zones.

Substrate Affinities

The four categories (saxicolous, terricolous, corticolous, and lignicolous) to which the individual species of bryophytes have been assigned is based on the substrate or substrates from which that species was collected. The definitions for these different categories have been taken and adapted from a thesis written by Mescall (1979), though these categories have been used for a long time in the study of bryophytes. Saxicolous bryophytes are defined as those species found growing on rock, which can be further narrowed to either calcareous or non-calcareous, though in this study pH was not taken during the collection process so this distinction will not be made in this report. The terricolous bryophytes are defined as those species collected from soil, including the soil that has accumulated over boulders. There were two major soil categories found in Fall Creek Falls State Park, well drained sandy soils and the richer humic soils, with high organic content and ability to hold moisture better. The corticolous bryophytes were defined as those bryophytes that were found growing on the bark of standing trees and woody shrubs (living or not), including exposed roots, the base of the trunk, and aerial portions, such as branches and the trunk. Also included in this category are those

bryophytes found growing on recently fallen trees, since it is assumed that within a relatively short period of time there is minimal successional changes in the bryophyte flora and therefore those species growing on the fallen log still represent those species that were inhabiting the bark of that tree while it was still alive and standing. Finally, the lignicolous bryophytes were defined as those bryophytes found growing on fallen trees and branches that were in an advanced state of decay, usually denoted by being decorticated or showing a major change in the nature of the wood.

The saxicolous category of bryophytes contained the highest diversity with 160 taxa of bryophytes, including 99 moss species and 61 liverwort species (Table 6.2). This high diversity was to be expected since rock substrate was found in each of the major landscape domains and in nearly all of the more restricted domains. This substrate was found along a wide spectrum of habitats, from moist and protected to dry and exposed. This substrate category, by far, contained the greatest number of taxa unique to it, based on the collections made for this study. Of the 160 species collected from rock substrate, 62 were only collected from rock. Twenty-three of these were liverwort species, with the remaining 39 mosses.

The terricolous class of bryophytes was the only group to contain representatives from all three divisions of bryophytes; mosses, liverworts and hornworts. This category was the second most rich with 123 species, comprised of 85 species of mosses, 37 species of liverworts and a single species of hornwort, which was the only hornwort found in the park (Table 6.3). Besides being the second richest category, it also contained the second highest number of unique taxa with 24 mosses and 10 liverworts and the single species of hornwort. This high diversity is probably due to the wide range of distribution of this

Table 6.2. The saxicolous bryophytes collected in Fall Creek Falls State Park, those that are in bold are taxa unique to this category.

LIVERWORT TAXA	
<i>Bazzania trilobata</i> <i>Blepharostoma trichophyllum</i> <i>Calypogeia mulleriana</i> <i>Cephalozia lunulifolia</i> <i>Chiloscyphus cuspidatus</i> <i>Chiloscyphus profundus</i> <i>Cololejeunea biddlecomiae</i> <i>Cololejeunea minutissima</i> <i>Cololejeunea ornata</i> <i>Conocephalum conicum</i> <i>Diplophyllum apiculatum</i> <i>Dumortiera hirsuta</i> <i>Frullania asagrayana</i> <i>Frullania plana</i> <i>Frullania riparia</i> <i>Harpalejeunea ovata</i> <i>Herbertus aduncus</i> <i>Jubula pennsylvanica</i> <i>Kurzia sylvatica</i> <i>Lejeunea blomquistii</i> <i>Lejeunea cavifolia</i> <i>Lejeunea laetevirens</i> <i>Lejeunea lamacerina</i> subsp. <i>geminata</i> <i>Lejeunea ruthii</i> <i>Lejeunea sharpii</i> <i>Lejeunea ulicina</i> <i>Leucolejeunea clypeata</i> <i>Leucolejeunea conchifolia</i> <i>Mannia triandra</i> <i>Scapania undulata</i> <i>Solenostoma</i> att. <i>obscurum</i>	<i>Marsupella emarginata</i> <i>Metzgeria conjugata</i> <i>Metzgeria crassipilis</i> <i>Metzgeria furcata</i> <i>Metzgeria leptoneura</i> <i>Metzgeria myriopoda</i> <i>Nowellia curvifolia</i> <i>Odontoschisma prostratum</i> <i>Pallavicinia lyellii</i> <i>Pellia epiphylla</i> <i>Plagiochila</i> (fcl unnamed) <i>Plagiochila asplenioides</i> subsp. <i>porelloides</i> <i>Plagiochila austini</i> <i>Plagiochila ludoviciana</i> <i>Plagiochila sullivantii</i> <i>Plagiochila undata</i> <i>Plagiochila virginica</i> <i>Porella pinnata</i> <i>Porella platyphylla</i> <i>Porella platyphylloidea</i> <i>Radula complanata</i> <i>Radula mollis</i> <i>Radula obconica</i> <i>Radula sullivantii</i> <i>Radula tenax</i> <i>Radula voluta</i> <i>Reboulia hemisphaerica</i> <i>Scapania nemorosa</i> <i>Solenostoma pumilum</i> <i>Trichocolea tomentella</i>
MOSS TAXA	
<i>Amblystegium serpens</i> var. <i>juratzkanum</i> <i>Amblystegium varium</i> <i>Amphidium mougeotii</i> <i>Andreaea rothii</i> <i>Anomodon attenuatus</i> <i>Anomodon rostratus</i> <i>Atrichum oerstedianum</i> <i>Atrichum undulatum</i> <i>Aulacomnium heterostichum</i> <i>Barbula unguiculata</i> <i>Bartramia pomiformis</i> <i>Brachythecium acuminatum</i> <i>Brachythecium oxycladon</i> <i>Brachythecium plumosum</i>	<i>Brachythecium rivulare</i> <i>Brachythecium salebrosum</i> <i>Bryhnia novae-angliae</i> <i>Bryoandersonia illecebra</i> <i>Bryum argenteum</i> <i>Bryum capillare</i> <i>Campylium chrysophyllum</i> <i>Clasmatodon parvulus</i> <i>Climacium americanum</i> <i>Ctenidium malacodes</i> <i>Cyrto-hypnum pygmaeum</i> <i>Dicranella heteromalla</i> <i>Dicranum fulvum</i> <i>Dicranum montanum</i> <i>Didymodon fallax</i>

Table 6.2. Continued.

MOSS TAXA (continued)	
<i>Didymodon tophaceus</i>	<i>Orthotrichum strangulatum</i>
<i>Diphysium foliosum</i>	<i>Oxystegus tenuirostris</i>
<i>Entodon cladorrhizans</i>	<i>Philonotis fontana</i>
<i>Entodon macropodus</i>	<i>Philonotis fontana</i> var. <i>caespitosa</i>
<i>Entodon seductrix</i>	<i>Plagiomnium ciliare</i>
<i>Entodon sullivantii</i>	<i>Plagiomnium cuspidatum</i>
<i>Eucladium verticillatum</i>	<i>Plagiomnium ellipticum</i>
<i>Fissidens adianthoides</i>	<i>Plagiomnium rostratum</i>
<i>Fissidens asplenioides</i>	<i>Plagiothecium denticulatum</i>
<i>Fissidens bryoides</i>	<i>Plagiothecium laetum</i>
<i>Fissidens bushii</i>	<i>Platydictya confervoides</i>
<i>Fissidens dubius</i>	<i>Platygyrium repens</i>
<i>Fissidens grandifrons</i>	<i>Pseudotaxiphyllum elegans</i>
<i>Fissidens osmundioides</i>	<i>Ptychomitrium incurvum</i>
<i>Fissidens subbasilaris</i>	<i>Pylaisiadelphina tenuirostris</i>
<i>Fissidens taxifolius</i>	<i>Racomitrium aciculare</i>
<i>Fontinalis novae-angliae</i>	<i>Rhabdoweisia crispata</i>
<i>Forsstroemia trichomitria</i>	<i>Rhizomnium punctatum</i>
<i>Gymnostomum aeruginosum</i>	<i>Rhodobryum roseum</i>
<i>Hedwigia ciliata</i>	<i>Rhytidiadelphus squarrosus</i>
<i>Hookeria acutifolia</i>	<i>Schistidium apocarpum</i>
<i>Hygroamblystegium tenax</i>	<i>Schistidium rivulare</i>
<i>Hymenostylium recurvirostre</i>	<i>Schwetschkeopsis fabronia</i>
<i>Hyophila involuta</i>	<i>Sematophyllum adnatum</i>
<i>Hypnum curvifolium</i>	<i>Sematophyllum demissum</i>
<i>Hypnum imponens</i>	<i>Sematophyllum marylandicum</i>
<i>Isopterigium tenerum</i>	<i>Sphagnum lescurrei</i>
<i>Isopterygiopsis muelleriana</i>	<i>Taxiphyllum deplanatum</i>
<i>Leucobryum albidum</i>	<i>Taxiphyllum taxirameum</i>
<i>Leucobryum glaucum</i>	<i>Thamnobryum alleghaniense</i>
<i>Loeskeobryum brevirostre</i>	<i>Thelia hirtella</i>
<i>Mnium hornum</i>	<i>Thuidium delicatulum</i>
<i>Mnium stellare</i>	<i>Tortella humilis</i>
<i>Myurella sibirica</i>	<i>Tuerckheimia angustifolia</i>
<i>Neckera complanata</i>	<i>Zygodon viridissimus</i> var. <i>rupestris</i>

Table 6.3. The terricolous bryophytes collected in Fall Creek Falls State Park, those that are in bold are taxa unique to this category.

HORNWORT TAXA	
<i>Anthoceros punctatus</i>	
LIVERWORT TAXA	
<i>Bazzania trilobata</i> Calypogeia fissa <i>Calypogeia mulleriana</i> <i>Calypogeia sullivantii</i> <i>Cephalozia bicuspidata</i> <i>Cephalozia lunulifolia</i> Cephaloziella rubella Chiloscyphus aff. bidentata <i>Chiloscyphus cuspidatus</i> <i>Chiloscyphus profundus</i> <i>Conocephalum conicum</i> <i>Dumortiera hirsuta</i> Frullania kunzei <i>Kurzia sylvatica</i> <i>Lejeunea laetevirens</i> <i>Leucolejeunea clypeata</i> <i>Leucolejeunea conchifolia</i> Lophozia bicrenata <i>Metzgeria furcata</i>	<i>Nardia lescurii</i> <i>Odontoschisma prostratum</i> <i>Pallavicinia lyellii</i> <i>Pellia epiphylla</i> <i>Plagiochila asplenioides</i> subsp. <i>porelloides</i> <i>Plagiochila virginica</i> <i>Porella pinnata</i> <i>Radula mollis</i> <i>Radula voluta</i> <i>Reboulia hemisphaerica</i> <i>Scapania nemorosa</i> <i>Scapania undulata</i> Solenostoma crenuliformis Solenostoma gracillimum Solenostoma hyalinum Telaranea nematodes <i>Trichocolea tomentella</i>
MOSS TAXA	
<i>Anomodon rostratus</i> Atrichum altecristatum Atrichum angustatum <i>Atrichum oerstedianum</i> <i>Atrichum undulatum</i> <i>Aulacomnium heterostichum</i> <i>Aulacomnium palustre</i> Barbula indica <i>Barbula sp.</i> <i>Barbula unguiculata</i> <i>Bartramia pomiformis</i> <i>Brachythecium rivulare</i> <i>Brachythecium salebrosum</i> <i>Brachythecium sp.</i> <i>Brotherella recurvans</i> Bryhnia graminicolor <i>Bryhnia novae-angliae</i> <i>Bryoandersonia illecebra</i> Bryum aff. lisae var. cuspidatum <i>Bryum capillare</i> <i>Bryum sp.</i> <i>Campylium chrysophyllum</i> <i>Campylium hispidulum</i> Ceratodon purpureus <i>Climacium americanum</i>	Dicranum condensatum <i>Dicranum scoparium</i> <i>Diphysium foliosum</i> <i>Diplophyllum apiculatum</i> Ditrichum lineare Ditrichum pallidum Ditrichum pusillum Ditrichum rhynchostegium <i>Ditrichum sp.</i> <i>Eucladium verticillatum</i> Eurhynchium hians <i>Fissidens bryoides</i> <i>Fissidens bushii</i> <i>Fissidens dubius</i> <i>Fissidens subbasilaris</i> <i>Fissidens taxifolius</i> <i>Fontinalis novae-angliae</i> <i>Gymnostomum aeruginosum</i> <i>Hookeria acutifolia</i> <i>Hygroamblystegium tenax</i> <i>Hypnum curvifolium</i> <i>Hypnum fertile</i> <i>Hypnum lindbergii</i> <i>Hypnum sp.</i> <i>Leucobryum albidum</i>

Table 6.3. Continued.

MOSS TAXA (continued)	
<i>Leucobryum glaucum</i>	<i>Polytrichum juniperinum</i>
<i>Mnium hornum</i>	<i>Polytrichum ohioense</i>
<i>Mnium marginatum</i>	<i>Rhizomnium punctatum</i>
<i>Mnium</i> sp.	<i>Schistidium rivulare</i>
<i>Myurella sibirica</i>	<i>Schwetschkeopsis fabronia</i>
<i>Oxystegus tenuirostris</i>	<i>Sematophyllum demissum</i>
<i>Philonotis</i> aff. <i>glaucescens</i>	<i>Sematophyllum marylandicum</i>
<i>Physcomitrium pyriforme</i>	<i>Sphagnum affine</i>
<i>Plagiomnium ellipticum</i>	<i>Sphagnum lescurrii</i>
<i>Plagiomnium ciliare</i>	<i>Sphagnum subsecundum</i>
<i>Plagiomnium cuspidatum</i>	<i>Steerecleus serrulatus</i>
<i>Plagiomnium rostratum</i>	<i>Taxiphyllum deplanatum</i>
<i>Plagiothecium denticulatum</i>	<i>Taxiphyllum taxirameum</i>
<i>Platydictya confervoides</i>	<i>Thuidium delicatulum</i>
<i>Platyhypnidium riparioides</i>	<i>Tortella humilis</i>
<i>Pleurochaete squarrosa</i>	<i>Weissia controversa</i>
<i>Pogonatum pensilvanicum</i>	

very common substrate. Soil substrates are found throughout the park, and have a variety of compositions and moisture levels depending on parent materials and location.

The least rich of the categories is the corticolous bryophytes, which only represented 50 total species, 27 moss species and 23 liverwort species (Table 6.4). Nearly twenty percent (9) of the taxa included in this category were only collected from the bark of trees. This is the only category of bryophytes in which the unique liverwort taxa (5) out-numbered the unique moss taxa (4). The low diversity found in this category is not unexpected considering the limited collecting carried out on the bark of trees. The bark of trees is an important substrate in some very humid environments, but in drier locales tends not to support a high diversity of bryophyte species. While collecting an attempt to collect all possible material in an area that may have represented an addition to the list of species for the park was made. However, not every tree in an area was examined, nor, was sampling carried out at all heights for those trees that were included.

There were 36 species of mosses and 22 species of liverworts that were classified as lignicolous (Table 6.5) in Fall Creek Falls State Park. This substrate class had a total of 10 species (6 mosses and 4 liverworts) that were found to be unique to this category. This represents only one more unique species than the corticolous bryophytes. These taxa were collected from a variety of sites, whether from a water saturated log at the base of a waterfall or a semi-decorticated log in the dry plateau forests; but all were collected from wood at a relatively advanced state of decay.

When comparing Tables 6.2 through 6.5, it is possible to find many examples of species that have been placed into multiple categories. This is due to the nature of bryophytes. Though many bryophytes are highly specific to substrates, others have little

Table 6.4. The corticolous bryophytes collected in Fall Creek Falls State Park, those that are in bold are taxa unique to this category.

LIVERWORT TAXA	
<i>Bazzania trilobata</i> <i>Cephalozia lunulifolia</i> <i>Cololejeunea biddlecomiae</i> <i>Frullania appalachiana</i> <i>Frullania asagrayana</i> <i>Frullania brittoniae</i> <i>Frullania eboracensis</i> <i>Frullania ericoides</i> <i>Frullania plana</i> <i>Kurzia sylvatica</i> <i>Lejeunea ruthii</i> <i>Lejeunea ulicina</i>	<i>Leucolejeunea chypeata</i> <i>Leucolejeunea conchifolia</i> <i>Leucolejeunea unciloba</i> <i>Metzgeria conjugata</i> <i>Metzgeria crassipilis</i> <i>Metzgeria furcata</i> <i>Metzgeria myriopoda</i> <i>Porella platyphylloidea</i> <i>Radula complanata</i> <i>Radula obconica</i> <i>Rectolejeunea maxonii</i>
MOSS TAXA	
<i>Anacamptodon splachnoides</i> <i>Anomodon attenuatus</i> <i>Anomodon rostratus</i> <i>Aulacomnium heterostichum</i> <i>Campylium chrysophyllum</i> <i>Clasmatodon parvulus</i> <i>Dicranum fuscescens</i> <i>Dicranum montanum</i> <i>Entodon macropodus</i> <i>Fissidens subbasilaris</i> <i>Forsstroemia trichomitria</i> <i>Haplomenium triste</i> <i>Homalotheciella subcapillata</i> <i>Leucobryum</i> sp.	<i>Leucodon brachypus</i> <i>Leucodon julaceus</i> <i>Neckera complanata</i> <i>Neckera pennata</i> <i>Orthotrichum stellatum</i> <i>Platygyrium repens</i> <i>Pylaisiadelphina tenuirostris</i> <i>Schwetschkeopsis fabronia</i> <i>Stereocleus serrulatus</i> <i>Thelia hirtella</i> <i>Thuidium delicatulum</i> <i>Tortella humilis</i> <i>Ulota crispa</i>

Table 6.5. The lignicolous bryophytes collected in Fall Creek Falls State Park, those that are in bold are taxa unique to this category.

LIVERWORT TAXA	
<i>Bazzania trilobata</i>	<i>Lejeunea ulicina</i>
<i>Cephalozia bicuspidata</i>	<i>Leucolejeunea clypeata</i>
<i>Cephalozia catenulata</i>	<i>Nowellia curvifolia</i>
<i>Cephalozia lunulifolia</i>	<i>Odontoschisma denudatum</i>
<i>Chiloscyphus cuspidatus</i>	<i>Odontoschisma prostratum</i>
<i>Chiloscyphus profundus</i>	<i>Pallavicinia lyellii</i>
<i>Cololejeunea biddlecomiae</i>	<i>Radula obconica</i>
<i>Diplophyllum apiculatum</i>	<i>Riccardia jugata</i>
<i>Frullania asagrayana</i>	<i>Riccardia palmata</i>
<i>Frullania eboracensis</i>	<i>Scapania nemorosa</i>
<i>Jubula pennsylvanica</i>	<i>Trichocolea tomentella</i>
MOSS TAXA	
<i>Amblystegium serpens</i>	<i>Hypnum imponens</i>
<i>Anomodon attenuatus</i>	<i>Leucodon brachypus</i>
<i>Brotherella recurvans</i>	<i>Leucodon julaceus</i>
<i>Campylium hispidulum</i>	<i>Loeskeobryum brevirostre</i>
<i>Ctenidium malacodes</i>	<i>Mnium hornum</i>
<i>Dicranum flagellare</i>	<i>Orthotrichum pusillum</i>
<i>Dicranum scoparium</i>	<i>Plagiomnium ciliare</i>
<i>Drummondia prorepens</i>	<i>Plagiomnium cuspidatum</i>
<i>Entodon macropodus</i>	<i>Platygyrium repens</i>
<i>Entodon seductrix</i>	<i>Pylaisiadelphina tenuirostris</i>
<i>Fabronia ciliaris</i> var. <i>polycarpa</i>	<i>Rhizomnium punctatum</i>
<i>Fissidens dubius</i>	<i>Sematophyllum adnatum</i>
<i>Fissidens subbasilaris</i>	<i>Sphagnum subsecundum</i>
<i>Fontinalis novae-angliae</i>	<i>Stereocleus serrulatus</i>
<i>Haplohymenium triste</i>	<i>Tetraphis pellucida</i>
<i>Homalotheciella subcapillata</i>	<i>Thuidium delicatulum</i>
<i>Hypnum curvifolium</i>	<i>Tortella humilis</i>
<i>Hypnum fertile</i>	<i>Ulota crispa</i>

or no real preference at all. Those species that are found in three or four of the categories would be species that one might expect to be widespread. There are only six taxa that can be included in all four categories: *Bazzania trilobata*, *Cephalozia lunulifolia* and *Leucolejeunea clypeata* (liverworts) and *Fissidens subbassilaris*, *Thuidium delicatulum*, and *Tortella humilis* (mosses). None of these species would necessarily be considered weedy, though both *B. trilobata* and *T. delicatulum* often form extensive mats in a variety of conditions.

Diversity and Taxonomic Index

Species diversity is often denoted as the total number of species found in a given area. With a group of organisms such as bryophytes, which are highly dependent on substrate and habitat, the species diversity can be further broken down and used as an indicator for the diversity of substrates and habitats found in a particular area. The Taxonomic Ratio (# of Moss species / # of Liverwort species) is an index that has been used as an indicator of diversity and habitat richness (Smith and Davison, 2001). Clebsch (1947a) used a simpler form of this to compare the lower Cumberland River Valley with east Tennessee. More recently Smith and Davison (2001) specifically used the taxonomic ratio as stated above as an indicator of area diversity. The value of this index can be used to assess the quality of habitats because it uses the specificity of bryophytes to approximate the combined effects of moisture and substrate. The results of several previous studies have shown that in the southern Appalachian Mountains this index ranges between 1.5 and 2.5, with 2.0 being the dividing point between the rich (<2.0) and the poor (>2.0) sites. The richer sites will tend to have higher species richness, which is

the result of a better habitat including protection, shade and a greater diversity of substrates, because with more substrates there is a greater chance of more species. On the other hand, the poorer sites will tend to have lower species richness and will probably offer less protection, be exposed to more direct sunlight and have fewer substrate types.

The overall taxonomic index for Fall Creek Falls is 1.84, calculated using 147 moss and 80 liverwort taxa. This denotes a rich site, which was to be expected based on a preliminary examination of soil and topographic maps. The taxonomic ratio was also calculated for each of the major landscape domain types found in the park.

The plateau forest in the park had a taxonomic index of 1.41 and a species richness of 124 species, the third richest domain. It was unexpected to find that the plateau forest had such a low value, since it was generally composed of dry forest. However, upon further reflection, the plateau forest domain contained a variety of habitats including outcrops, the upland swamp and many riparian zones. These specific sites provide habitat for a high number of liverworts, which are the most important component of the index, due largely to their specificity for better sites (moisture and substrate).

The slope forest in the park had a taxonomic index of 1.85. The number approaching 2.0 suggests that this domain is only average in its sites and richness. However, this domain contained the greatest species richness (154). Based on habitat diversity alone, it was also expected that the slope forest might have the lowest value for the taxonomic ratio since it contains several rich habitats including the karst areas, waterfalls, forests with a variety of substrate types, all of which would be expected to contribute to a greater richness. The majority of the extent of this domain is woodland

habitat. The effect from the minor portion that is made up of the rich restricted sites is masked by the somewhat average richness of the woodland areas.

The gorge/riparian area had the smallest taxonomic index of only 1.30 and the second greatest species richness with a total of 130 species. The gorge/riparian domain contained generally shaded and often well protected habitats that had a high level of moisture during most of the year, as well as a variety of different substrates including sandstone, limestone, soil, wood, and bark. All of these factors would be expected to contribute to the small taxonomic ratio and the high species richness.

The ruderal sites had the highest taxonomic index of 5.10 and the lowest species richness with only 61 species collected. This low diversity of species and habitats was to be expected. By definition the ruderal sites are sites that are temporary and often human induced through some kind of disturbance, such as mowing. These disturbance events expose habitats to environmental conditions that are unfavorable to the establishment and long term survival of most bryophyte taxa. The total area that was collected in this domain type was the least extensive of all the domains. Liverworts are rarely found in unstable habitats and are therefore very limited in the ruderal domain. The limited number of liverworts has a great effect on the overall taxonomic richness as represented by the taxonomic index.

CHAPTER VII

PHYTOGEOGRAPHIC NOTES

A phytogeographic examination of the bryophytes found in Fall Creek Falls State Park can take a variety of forms, varying from a study that looks at very specific phytogeographic regions here in North America to one that is concerned with large scale distribution of the species around the world. The former was chosen due to limited number of detailed studies both in North America and elsewhere in the world. It is also important to note that phytogeographical studies can vary greatly depending on the sources used. For example, in 1989 Sharp included *Entodon macropodus* as a species that was “indigenous to the Coastal Plain and the Mississippi Embayment as well as Tennessee.” However, only five years later in *The Moss Flora of Mexico* this same species is reported to have a range that includes East Asia, Mexico, Central to South America as well as the Greater Antilles. Despite the limited number of phytogeographic references, there is considerable information that can be mined from several major bryophyte floristic sources. The distributional data for this phytogeographic study are derived from a variety sources including Crum and Anderson (1981), Ireland (1982), and Sharp *et al.* (1994) for the mosses, and Schuster (1969) and Hicks (1992) for the liverworts and hornwort.

After an investigation into the world-wide distribution of the species found in Fall Creek Falls State Park, the results of which are reported in Table 7.1, six categories of North American and global distribution were adopted for this investigation of the phytogeography of the bryophyte flora Fall Creek Falls State Park. The first three categories include those species that have a widespread distribution. These categories are

Table 7.1. The world-wide distribution of the taxa collected in Fall Creek Falls State Park. ♦ - cosmopolitan, * - widespread in the given category, AU – Australia, C – Central, CA – Central America, (CP) – Coastal Plains, d – global disjunct, E – Eastern, H – Himalayas, J – Japan, MX – Mexico, N – Northern (n in Cosmopolitan category means widespread in the northern hemisphere), NZ – New Zealand, S – Southern, SA – South America, W – Western, ww – world wide distribution (though not cosmopolitan), X – denotes presence within the particular region. Lower case of the above symbols signify a limited distribution or a report. Oceania includes Australia, New Zealand, Tasmania, and Polynesia.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
HORNWORT TAXA												
<i>Anthoceros punctatus</i>		E									*	MX
LIVERWORT TAXA												
<i>Bazzania trilobata</i>	n	E,w			*	E		X				
<i>Blepharostoma trichophyllum</i>	n	*			X	X		X			*	
<i>Calypogeia fissa</i>		E			X							
<i>Calypogeia muelleriana</i>		E			X							
<i>Calypogeia sullivantii</i>		E							X			
<i>Cephalozia bicuspidata</i>	♦	*			X	X	N	X				mx,ca,sa
<i>Cephalozia catenulata</i>	n	N,E			X	X					X	
<i>Cephalozia lunulifolia</i>	n	*			X	X		X			X	
<i>Cephaloziella rubella</i>	n	*			X	X		X			X	
<i>Chiloscyphus cuspidatus</i>	♦	e,W			X	X	x		x			mx,sa
<i>Chiloscyphus profundus</i>	♦	*			X	X	N	X				
<i>Cololejeunea biddlecomiae</i>		E										
<i>Cololejeunea minutissima</i>		SE			W		X	X				
<i>Cololejeunea ornata</i>	d	se				J						
<i>Conocephalum conicum</i>	♦	*			*	X	N	X				
<i>Diplophyllum apiculatum</i>		E										
<i>Dumortiera hirsuta</i>		E							X			SA,CA
<i>Frullania appalachiana</i>		e		X								
<i>Frullania asagrayana</i>		E										
<i>Frullania brittoniae</i>		e	X									
<i>Frullania eboracensis</i>		E			x	E						
<i>Frullania ericoides</i>	♦	E,w			X	X	X			*		*
<i>Frullania kunzei</i>		SE,(CP)							X			SA
<i>Frullania plana</i>		e	X									
<i>Frullania riparia</i>		E			W			X				MX
<i>Harpalejeunea ovata</i> subsp. <i>integra</i>		SE										
<i>Herbertus aduncus</i> subsp. <i>tenuis</i>		e	X									

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
LIVERWORT TAXA (continued)												
<i>Jubula pennsylvanica</i>		e	X									
<i>Kurzia sylvatica</i>	d	E			W							
<i>Lejeunea blomquistii</i>		e		X								
<i>Lejeunea cavifolia</i>	n	E			X	X		X				
<i>Lejeunea laetevirens</i>		SE							X			MX,CA,SA
<i>Lejeunea lamacerina</i> subsp. <i>gemminata</i>		e	X									
<i>Lejeunea ruthii</i>		e		X								
<i>Lejeunea sharpii</i>		e										
<i>Lejeunea ulicina</i>		E			X				X			
<i>Leucolejeunea clypeata</i>		E										
<i>Leucolejeunea conchifolia</i>		SE										
<i>Leucolejeunea uncioloba</i>		E					s					MX,SA
<i>Lophocolea</i> (aff.) <i>bidentata</i>	♦	E			X	x	N	X				
<i>Lophozia bicrenata</i>	n	E,w			X	X						
<i>Mannia triandra</i>		E			*	J						
<i>Marsupella emerginata</i>	n	*			X	X		X				
<i>Metzgeria conjugata</i>	♦	*			X	X	X			NZ		CA,SA
<i>Metzgeria crassipilis</i>	d	E				J						MX,SA
<i>Metzgeria furcata</i>	♦	*			X	X	N	X		X		
<i>Metzgeria leptoneura</i>	♦	e,w			x	*	*	X	X	X		MX,CA,SA
<i>Metzgeria myriopoda</i>		SE										SA
<i>Nardia lescurii</i>		e	X									
<i>Nowellia curvifolia</i>	♦	E			*	*	s	X				MX,CA
<i>Odontoschisma denudatum</i>	♦	E			X	X		X	X			CA,SA
<i>Odontoschisma prostratum</i>		E							X			
<i>Pallavicinia lyellii</i>	♦	E			X	J	X		X	X		SA
<i>Pellia epiphylla</i>	n	E,w			X	J						
<i>Plagiochila asplenioides</i> subsp. <i>porelloides</i>		*			*							
<i>Plagiochila austini</i>		e	X									
<i>Plagiochila ludoviviana</i>		E,(CP)							X			CA
<i>Plagiochila sullivantii</i>		e	X									
<i>Plagiochila undata</i>		SE (CP)										
<i>Plagiochila virginica</i>		e		X								
<i>Porella pinnata</i>	d	E			W				X			x
<i>Porella platyphylla</i>	♦	E,W			X	X	N	X				
<i>Porella platyphylloidea</i>	d	E,W			x							mx

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
LIVERWORT TAXA (continued)												
<i>Radula complanata</i>	♦	*			X	X	N	X				MX
<i>Radula mollis</i>		SE							X			MX,CA,SA
<i>Radula obconica</i>		E										
<i>Radula sullivanii</i>		e		X								
<i>Radula tenax</i>		e	X									
<i>Radula voluta</i>	d	e			W							sa
<i>Reboulia hemisphaerica</i>	♦	*			X	X	N	X	X	X		MX,CA
<i>Rectolejeunea maxonii</i>		SE,(CP)							X			
<i>Riccardia jugata</i>		e	X									
<i>Riccardia palmata</i>	♦	E,w			X	X		X	X			MX
<i>Scapania nemorosa</i>	n	E			X	X		X				
<i>Scapania undulata</i>	♦	E,w			X	X	N	X				
<i>Solenostoma crenuliformis</i>		E										
<i>Solenostoma gracillimum</i>	♦	E			*	X	X					
<i>Solenostoma hyalinum</i>	ww	*			X		N	X				MX
<i>Solenostoma (aff.) obscurum</i>		e	X									
<i>Solenostoma pumilum</i>	n	E,W			*	*		X				
<i>Telaranea nematodes</i>	ww	SE			X		X	X	X			CA,SA
<i>Trichocolea tomentella</i>	♦	E			X	X	N					
MOSS TAXA												
<i>Amblystegium serpens</i>	♦	*			*	X	N	x				MX,SA
<i>Amblystegium serpens</i> var. <i>juratzkanum</i>	♦	*			*	X	N	x				MX,SA
<i>Amblystegium varium</i>	♦	E,w			*	x	n	x	X			MX,CA
<i>Amphidium mougeotii</i>	n	E,w			X	x		x				
<i>Anacamptodon splachnoides</i>	d	E			E							
<i>Andreaea rothii</i>	d	E,w			X							
<i>Anomodon attenuatus</i>		*			X	x			X			MX,CA
<i>Anomodon rostratus</i>		E,w			X				X			MX,CA
<i>Atrichum altecristatum</i>		E,w										
<i>Atrichum angustatum</i>	d	E			X							
<i>Atrichum oerstedianum</i>		E,w										MX,CA
<i>Atrichum undulatum</i>	♦	*			X	x	X	X				MX,CA
<i>Aulacomnium heterostichum</i>	d	E				J						
<i>Aulacomnium palustre</i>	♦	*			X	X			X	x		sa
<i>Barbula indica</i> var. <i>indica</i>	d	E,w				SE						mx
<i>Barbula unguiculata</i>	♦	E,W			X	X	N	X				
<i>Bartramia pomiformis</i>	♦	E,W			X	X	n	x		x		

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
MOSS TAXA (continued)												
<i>Brachythecium acuminatum</i>		E,w										
<i>Brachythecium oxycladon</i>		E,w										
<i>Brachythecium plumosum</i>	♦	*			X	X	n	x	X	X		MX,CA,sa
<i>Brachythecium rivulare</i>	♦	E,W			X	X	x	X		au	X	sa
<i>Brachythecium salebrosum</i>	♦	E,W			X	X	x	x		au,NZ		MX
<i>Brotherella recurvans</i>	d	E				J					X	
<i>Brhynia graminicolor</i>		E,w										
<i>Bryhnia novae-angliae</i>	d	E,w			x	J					X	
<i>Bryoandersonia illecebra</i>		E										
<i>Bryum argenteum</i>	♦	*										MX
<i>Bryum capillare</i>	♦	E,W			*	X	X					MX,SA
<i>Bryum (aff.) lisae</i> var. <i>cuspidatum</i>	♦	*			*	X				au,nz		
<i>Campylium chrysophyllum</i>	♦	E,W			X	J	n					MX,CA,sa
<i>Campylium hispidulum</i>	♦	E,w			X	x						MX,sa
<i>Ceratodon purpureus</i>	♦	E,W			X	X						MX,sa
<i>Clasmatodon parvulus</i>		E,w			x				X			
<i>Climacium americanum</i>	d	E,w				x						
<i>Ctenidium malacodes</i>	♦	E,W			X	n	n	X	X			MX,sa
<i>Cyrto-hypnum pygmaeum</i>	d	E,w				SE						
<i>Dicranella heteromalla</i>		E,W			X	X	X	x				CA,sa
<i>Dicranum flagellare</i>	♦	E,W			*	X			X			MX,CA
<i>Dicranum fulvum</i>		E			X	x						
<i>Dicranum fuscescens</i>	♦	*			X	X						sa
<i>Dicranum montanum</i>	n	E,W			X	x						
<i>Dicranum scoparium</i>	♦	*			X	X	X	X		AU,nz	X	MX,CA,SA
<i>Didymodon fallax</i>	ww	E,w			*		n	x				
<i>Didymodon tophaceus</i>	♦	E,W			X	X	n	x		nz		MX,CA
<i>Diphyscium foliosum</i>	♦	E,w			X	J		x	x			MX,CA
<i>Ditrichum lineare</i>	d	E			x							
<i>Ditrichum pallidum</i>	♦	E			X	J	X	X				
<i>Ditrichum pusillum</i>	n	E,w			X	x	n					
<i>Ditrichum rhynchostegium</i>		E										
<i>Drummondia prorepens</i>		E,w										
<i>Entodon cladorrhizans</i>		E,w										
<i>Entodon macropodus</i>	d	E,w				X						MX,CA,sa

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
MOSS TAXA (continued)												
<i>Entodon seductrix</i>		E,w										
<i>Entodon sullivantii</i>	d	SE,w				J						
<i>Eucladium verticillatum</i>	n	E,W			X	j	n	x				MX
<i>Eurhynchium hians</i>	n	E,w			X	e			X			MX
<i>Fabronia ciliaris</i> var. <i>polycarpa</i>		E										
<i>Fissidens adianthoides</i>	n	E,W			X	j	n	x				
<i>Fissidens asplenioides</i>	♦	SE				SE		X	X	NZ		MX,CA, SA
<i>Fissidens bryoides</i>	♦	*			*	X	X		x			CA,sa
<i>Fissidens bushii</i>	n	E,W			X	x						
<i>Fissidens dubius</i>	♦	E,w			X	X	X	X	X	x		MX
<i>Fissidens grandifrons</i>	♦	E,W			X	X						MX,CA
<i>Fissidens osmundioides</i>	n	*			X	x					X	
<i>Fissidens subbasilaris</i>		E,w										mx
<i>Fissidens taxifolius</i>	n	E,W			*	J		x	x			
<i>Fontinalis novae-angliae</i>		E,w										
<i>Forststroemia trichomitria</i>	d	E,w				E						mx
<i>Gymnostomum aeruginosum</i>	♦	E,W			*	X		x				MX,CA
<i>Haplohymenium triste</i>	♦	E			S	X				X		MX,CA, SA
<i>Hedwigia ciliata</i>	♦	E,W			X	X	x	X	X	AU, NZ		MX,CA, sa
<i>Homalotheciella subcapillata</i>		E,w										
<i>Hookeria acutifolia</i>	ww	E,w				X			X	x		MX,CA, sa
<i>Hygroamblystegium tenax</i>	♦	E,W			X	X	n	X				MX
<i>Hymenostylium recurvirostre</i>	♦	E,W			*	X	n		X	X		MX,CA
<i>Hyophila involuta</i>	d	E,w				X			X	X		MX,CA, sa
<i>Hypnum curvifolium</i>		E										
<i>Hypnum fertile</i>	n	E			X	X					X	
<i>Hypnum imponens</i>	n	E,w			X	E	x	X				
<i>Hypnum lindbergii</i>	n	E,W			X	X					X	
<i>Isopterygiopsis muelleriana</i>	n	E,w			X	X					X	mx
<i>Isopterygium tenerum</i>		E,w (CP)							X			MX,CA, sa
<i>Leucobryum albidum</i>		E							X			MX,CA
<i>Leucobryum glaucum</i>	n	E			X	J	x	x	X			
<i>Leucodon brachypus</i>		E,w										
<i>Leucodon julaceus</i>		E,w							x			mx

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
MOSS TAXA (continued)												
<i>Loeskeobryum brevirostre</i>	♦	E			*	X	n		x		X	mx,ca
<i>Mnium hornum</i>	n	E			X	j	n	x				
<i>Mnium marginatum</i>	♦	E,W			C	X						MX,CA
<i>Mnium stellare</i>	n	E,w			X	X					X	
<i>Myurella sibirica</i>	n	E,w			X	X					X	
<i>Neckera companata</i>	n	E			*	X	X	X			X	
<i>Neckera pennata</i>	♦	E,W			X	X	S	X		AU, NZ	X	sa
<i>Orthotrichum pusillum</i>		E,w										
<i>Orthotrichum stellatum</i>	d	E,w			x							
<i>Orthotrichum strangulatum</i>		E,w										
<i>Oxystegus tenuirostris</i>	♦	E,W			X	X	x			X		MX,CA, sa
<i>Philonotis fontana</i>	♦	*			X	X	x	x				MX
<i>Philonotis fontana</i> var. <i>caespitosa</i>	n	E,w			X	X						
<i>Philonotis fontana</i> var. <i>pumila</i>		E,W			x	x					X	
<i>Philonotis</i> (aff.) <i>glaucescens</i>		SE							X	nz		MX,CA, sa
<i>Physcomitrium pyriforme</i>	♦	E,W			*	x	n	x				mx
<i>Plagiomnium ciliare</i>		E,w										
<i>Plagiomnium cuspidatum</i>	n	E,W			*	X					X	
<i>Plagiomnium ellipticum</i>	n	E,W			*	X					X	sa
<i>Plagiomnium rostratum</i>	♦	E,W			X	X			X	X		MX,CA, sa
<i>Plagiothecium denticulatum</i>	♦	E,W			X	X	S			X		MX,ca,sa
<i>Plagiothecium laetum</i>	♦	E,W			X	x				NZ		
<i>Platydictya confervoides</i>	n	E,w			X	x						
<i>Platygyrium repens</i>	♦	E,W			X	X	N					
<i>Platyhypnidium riparioides</i>	♦	E,w			X	X	n	x	X			MX,CA, sa
<i>Pleurochaete squarrosa</i>	♦	E,W			X	x	X	x	X			MX,CA, SA
<i>Pogonatum pensilvanicum</i>		E,w							X			MX,sa
<i>Polytrichum commune</i>	♦	*			X	X	X	x		AU, NZ		MX,sa
<i>Polytrichum juniperinum</i>	♦	*			X	X	n	x	X	AU, NZ		MX,SA
<i>Polytrichum ohioense</i>	n	E,w			X	x						
<i>Pseudotaxiphyllum elegans</i>	♦	E,W			X	x	x			X	X	

Table 7.1. Continued.

Taxon	Cosmopolitan	North America	Appalachian Endemic	Southern Appalachian Endemic	Europe	Asia	Africa	Macaronesia	Caribbean	Oceania	North/Montane Affinity	South/Tropical Affinity
MOSS TAXA (continued)												
<i>Ptychomitrium incurvum</i>		E,w										
<i>Pylaisiadelpha tenuirostris</i>		E,w										
<i>Racomitrium aciculare</i>	♦	E,W			X	x	x	x				
<i>Rhabdoweisia crispata</i>	♦	E,w			X	X				x		sa
<i>Rhizomnium punctatum</i>	n	E,w			X	X						
<i>Rhodobryum roseum</i>	♦	E,W			X	X	x					MX
<i>Rhytidiadelphus squarrosus</i>	♦	E,W			X	X		x		nz	X	
<i>Schistidium apocarpum</i>	♦	E,W			X	X	X	x		AU, NZ		MX,CA, SA
<i>Schistidium rivulare</i>	♦	*			X	X	X			AU		MX,sa
<i>Schwetschkeopsis fabronia</i>	d	E				X						
<i>Sematophyllum adnatum</i>		E,w							X			MX,sa
<i>Sematophyllum demissum</i>	♦	E,w			X	X	x					
<i>Sematophyllum marylandicum</i>		E										MX
<i>Sphagnum affine</i>	♦	E,W			X	X			x			sa
<i>Sphagnum lescurrei</i>	♦	E,w			X	x	n					MX,CA
<i>Sphagnum subsecundum</i>	n	E,W			X	X						
<i>Steelecleus serrulatus</i>		E,w										MX,CA, SA
<i>Taxiphyllum deplanatum</i>		*										MX,CA
<i>Taxiphyllum taxirameum</i>	ww	E,w				X			X			MX,CA, sa
<i>Tetraphis pellucida</i>	n	*			*	X					X	
<i>Thamnobryum alleghaniense</i>	d	E,w				x						
<i>Thelia hirtella</i>		E,w										MX
<i>Thuidium delicatulum</i>	♦	E,W			*	X			X			MX,CA, sa
<i>Tortella humilis</i>	♦	E,w			X	X	X		X	X		MX,CA, SA
<i>Tuerckheimia angustifolia</i>	d	SE				J						
<i>Ulota crispa</i>	♦	E			X	X	n	x				
<i>Weissia controversa</i>	♦	*			X	X	x	X	X	X		MX,CA, sa
<i>Zygodon viridissimus</i> var. <i>rupestris</i>	n	e,W			*	J						MX

cosmopolitan, globally widespread, and widespread northern hemisphere taxa. A fourth category includes a fair number of representative taxa that are globally disjunct in their distribution. These first four categories were assigned based on the information gathered by the author and supported by the definitions of each of the above categories, below. Additionally, because the park is located within the continent of North America a greater emphasis has been given to this region. Two categories have been defined that encompass those plants that have a distribution limited to the North American continent, widespread North American species and Eastern North American endemics.

The term cosmopolitan has been used in a variety of ways when referring to the distribution of plants. Sharp (1989) described cosmopolitan species as “those widely distributed over the Earth.” In this study the term cosmopolitan will be used to refer to those species that have a widespread distribution that includes a significant presence on three northern continents (North America, Europe, and Asia) and also some presence on a southern continent (South America, Africa, and Australia) or on island systems of the southern hemisphere. Some examples from the literature include *Bryum argenteum*, *B. capillare* and *Diphyscium foliosum* (Sharp, 1989). These three species are included in the 79 taxa that were included in the cosmopolitan category based on the information used to develop Table 7.1. This represents 35% of the total taxa collected in the park (Table 7.1). Of these 79 taxa, only 19 are liverworts, which represent only about 23% of all the liverworts collected while the mosses represent over 40% of the total moss taxa collected. The cosmopolitan bryophytes are spread among the different abundance and distribution categories of Fall Creek Falls (Table 5.1, pg. 27), with representatives in each of the five categories. The majority of these representatives are in the three least abundant

categories; rare (23), limited (32), and common (20). The proportions of the total taxa included in each of the abundance categories that these figures represent range from 29% in the limited distribution category to 46% in the common species category. The cosmopolitan representatives of the abundant, and abundant and widespread categories account for one-third of the total species in each of those categories.

There were several species that were designated as widespread world-wide. Although they do not meet the requirements to be considered cosmopolitan they are widespread and can be noted. These species have a northern and southern hemisphere presence, but usually lack a presence on one of the northern continents. This phytogeographic category only contains five taxa, two of which are liverworts (Table 7.1). The mosses include *Didymodon fallax* [rare], *Hookeria acutifolia*, *Taxiphyllum taxirameum* and *Telaranea nematodes* [rare] and *Solenostoma hyalinum* represent the liverworts. *Hookeria acutifolia*, *Telaranea nematodes*, and *Taxiphyllum taxirameum* all appear to have a more southern distribution that extend northward, while the other two species would qualify as cosmopolitan if they were found on the continent of Asia. These five taxa all belong to the two most limited abundance categories (Table 5.1, pg. 27) for Fall Creek Falls State Park; rare (2) and limited (3).

The category of widespread northern hemisphere taxa contains those species without a southern distribution and therefore not cosmopolitan. This category is the second largest with a total of 38 taxa representing almost 17% of the total species collected (Table 7.1). Eleven of these were liverwort species which is only about 13% of the liverworts. The widespread northern hemisphere taxa include species from four of the five abundance category (Table 5.1, pg. 27). Only widespread and abundant is not

represented. Most of the taxa fall into the limited abundance category (21). The rare category (10) contains the next greatest number followed by the common taxa (5) and finally the abundant taxa (2). Though they comprise the greatest number of representatives of the widespread northern hemisphere taxa, the representatives make up less than 20% of the total taxa of the limited (19%), rare (16%) and common (11%) categories. Only the representatives in the abundant category comprise more than 20% of the total taxa in that category.

The species that have been noted as global disjuncts have a large amount of geographic discontinuity between the regions where they are found. The local distribution is usually limited. Sharp (1972) stated that possible reasons for disjunctions include past separation of populations therefore they represent the remnant of a much more extensive range that once existed. Also, disjunct populations may represent the “end” of past migration routes. It is beyond the scope of this study to ascertain the reasons for the disjunctions that were found. This phytogeographic group consists of 24 different species, which represent just over 10% of the total taxa collected (Table 7.1). Eighteen [18] taxa are mosses, the remaining 6 liverworts. All of the global disjunct taxa are included in the three lowest abundance categories (Table 5.1, pg. 27) for Fall Creek Falls State Park; rare (5), limited (15) and common (4). This pattern is expected based on the definition above.

It is often difficult to categorize species of isolated occurrence. As an example, in 1989 Sharp (1972) reported *Schwetschkeopsis fabronia* as a Southern Appalachian endemic, even though 17 years before he had described it as a global disjunct. In this

study it has been given the designation of a global disjunct because according to Crum and Anderson (1981), its range includes several regions of Asia.

The first of the North American categories contains species that are widespread or at least widespread in either the west or east, but with a presence in both parts of the region. There are 20 different taxa representing this classification, all of which are mosses (Table 7.1). The majority of these species are far more common in Eastern North America than in the west. Within the park, the majority of the widespread North American species have a limited distribution and abundance based on number and location of collections (Table 5.1, pg. 27). No taxa are both widespread and abundant. A single taxon is included in the abundant category. Two taxa are considered common in the park. Eleven species had only a limited distribution and six taxa are in the locally rare category. Overall those species represented in the park with a wide distribution in the west appear to be far more widespread globally.

The final category, Eastern North American endemics, is the most limited in its range. The species that are included in this category are only found within Eastern North America and are therefore important due to their limited range. About 14% of the total taxa collected in this study, 32 species were found to be endemic to Eastern North America (Table 7.1). This is the only category in which the liverworts (26) out-number the mosses (6). The Eastern North American endemics have representatives in each of the five abundance and distribution categories (Table 5.1, pg. 27). The rare (11) and limited (11) categories contain the greatest number of representatives, followed by the common (7) category. The abundant (2) and widespread and abundant (1) categories have only a small number of representatives, though due to the small number of total taxa

these categories, the representatives comprise a large portion of these categories. Eastern North America includes a smaller physiographic province, the Appalachian Mountains, which is represented by 50% of the Eastern North American endemic species (16), all of which are liverworts. The Appalachian Mountains run from the southeastern United States to Canada, which means that they can be further divided into the Northern and Southern Appalachian Mountains – the latter being home to nearly a third of the Appalachian endemics (5). *Radula sullivantii* is the only species that Sharp (1989) reported as being endemic to the Southern Appalachians that has retained its designation. Another species, *Lejeunea sharpii*, is included within the Eastern North American endemics category, due to the limited information found in the literature concerning its distribution.

Besides the overall distribution in North America and world-wide it is important to note specific affinities, such as southern and northern, which are of particular interest in East Tennessee because of the diversity microclimates produced by its favorable latitude. These sorts of affinities are not always easy to ascertain based on the detail of the information that was used to categorize the bryophytes in this study. There were many taxa that were found to have a distinctly southern distribution, though due to the resolution of the data it is important to note that even a species that has been collected in South America may have a truly northern/montane affinity due to the existence of very high elevation mountain ranges. Therefore, species with a southern affinity are not specifically denoted in Table 7.1. Sharp (1939) noted several prime examples of species with tropical/subtropical affinities including *Cololejeunea minutissima*, *Leucobryum albidum*, *Plagiochila undata*, *Rectolejeunea maxonii*, and *Sematophyllum adnatum*.

From the information available, *C. minutissima* is the only taxon which might be disputed, due to its presence in Western Europe, though the extent of that range is not known. The other three taxa have a definite western hemisphere range and a Caribbean, Mexico-Central American-South American distribution. Later in 1989, Sharp stated that *Eucladium verticillatum*, *Hookeria acutifolia*, and *Pogonatum pensilvanicum* were representatives of species that have a subtropical/tropical affinity. Interestingly, based on its distribution *E. verticillatum* is actually assigned to the category of widespread distribution in the northern hemisphere, although it does not reflect a strictly northern affinity. Overall there were 24 taxa that were noted as having a northern/montane affinity. Again the majority are mosses (19). Only one of these species was mentioned by Sharp (1939), *Mnium hornum*, which was described as a northern coastal plain species.

Though often attributed to climate, the range of a bryophyte may be more dependent on substrate availability, especially when it is a species that is dependent on a very narrow range of substrate types. The distribution of *Eucladium verticillatum* may be due largely to its affinity to a wet calcareous substrate. Another species that is more limited by substrate than perhaps other factors is *Pleurochaete squarrosa*, which is discussed by Sharp (1939) as being dependent on the presence of drier limestone.

CHAPTER VIII

ADDITIONS TO THE COUNTY FLORAS

This study has produced new information concerning the floras of both Bledsoe and Van Buren Counties. The bryophyte floras of these two counties had not been extensively studied prior to this study. Historical bryological work carried out in these two counties that is based on data obtained from Sharp (1939) and the TENN database shows that Van Buren County was, by far, the most collected of the two counties. In his 1939 paper Sharp reported a total of 23 taxa of bryophytes in these two counties combined with no overlap between the two. Only four of the 23 were liverworts. Van Buren County had a total of 17 reported taxa including all of the liverworts, while Bledsoe County had reports for only six moss taxa. Over sixty years later the extent of the collections within these two counties had not changed dramatically, Van Buren County had the most reports with 58 moss and 24 liverwort taxa while the list of species for Bledsoe County tallied only 19 moss and six liverwort taxa.

The current study has done much to remedy the historically limited inspection of these two counties, though Van Buren is also the main focus of this study. The flora of Van Buren County has expanded to include 164 additions to the bryophyte flora (Table 8.1), which includes a total of 104 moss taxa and 59 liverwort taxa and a single species of hornwort. This study only resulted in 16 additions to the bryoflora of Bledsoe County (Table 8.2) which includes a total of nine moss taxa and seven liverwort taxa. These additions have brought the known bryoflora of Van Buren County to 247 taxa and for Bledsoe County 41 taxa (See Appendix, Table A.3 and A.4 for complete county taxa lists, including synonymy).

Table 8.1. The additions, based on the collections for this study, to the bryoflora of Van Buren County, Tennessee.

Taxa	Synonyms
HORNWORT TAXA	
<i>Anthoceros punctatus</i> L.	
LIVERWORT TAXA	
<i>Blepharostoma trichophyllum</i> (L.) Dum.	
<i>Calypogeia fissa</i> (L.) Raddi	
<i>Calypogeia muelleriana</i> (Schiffn.) K. Müll.	
<i>Calypogeia sullivantii</i> Aust.	
<i>Cephalozia bicuspidata</i> (L.) Dum.	
<i>Cephalozia catemulata</i> (Hüb.) Lindb.	
<i>Cephaloziella rubella</i> (Nees) Warnst.	
<i>Chiloscyphus cuspidatus</i> (Nees) Eng. & Schust.	<i>Lophocolea cuspidata</i> (Nees) Limpr.
<i>Cololejeunea biddlecomiae</i> (Aust.) Evans	
<i>Cololejeunea minutissima</i> (Smith) Schiffn.	
<i>Cololejeunea ornata</i> Evans	
<i>Conocephalum conicum</i> (L.) Lindb.	
<i>Frullania appalachiana</i> Schust.	
<i>Frullania brittoniae</i> Evans	
<i>Frullania ericoides</i> (Nees) Mont.	<i>Frullania squarrosa</i> (Reinw. et al.) Dum.
<i>Frullania plana</i> Sull.	
<i>Frullania riparia</i> Hampe	
<i>Harpalejeunea ovata</i> (Hook.) Schiffn.	
<i>Herbertus aduncus</i> subsp. <i>tenuis</i> (Evans) Miller & Scott	
<i>Lejeunea blomquistii</i> Schust.	
<i>Lejeunea cavifolia</i> (Ehrh.) Lindb.	
<i>Lejeunea laetevirens</i> Nees & Mont.	<i>Microlejeunea laetivirens</i>
<i>Lejeunea lamacerina</i> (Steph.) Schiffn.	
subsp. <i>gemminata</i> Schust.	
<i>Lejeunea ruthii</i> (Evans) Schust.	
<i>Lejeunea sharpii</i> (Schust.) Schust.	
<i>Lejeunea ulicina</i> (Tayl.) Gott.	<i>Microlejeunea ulicina</i> , <i>Microlejeunea bullata</i> Tayl.
<i>Leucolejeunea conchifolia</i> (Evans) Evans	
<i>Leucolejeunea uncioloba</i> (Lindenb.) Evans	
<i>Lophocolea bidentata</i> (L.) Dum.	
<i>Lophozia bicrenata</i> (Schmid.) Dum.	
<i>Mannia triandra</i> (Scop.) Grolle	<i>Mannia rupestris</i> Frye & Clark
<i>Marsupella emarginata</i> (Ehrh.) Dum.	
<i>Metzgeria crassipilis</i> (Lindb.) Evans	
<i>Metzgeria leptoneura</i> Spruce	<i>Metzgeria hamata</i> Lindb.
<i>Metzgeria myriopoda</i> Lindb.	
<i>Odontoschisma denudatum</i> (Nees ex Mart.) Dum.	
<i>Pellia epiphylla</i> (L.) Lindb.	
<i>Plagiochila</i> (fcf unknown)	
<i>Plagiochila asplenoides</i> subsp. <i>porelloides</i> (Torr. ex Ness) Schust.	<i>Plagiochila porelloides</i>
<i>Plagiochila austini</i> Evans	

Table 8.1. Continued.

Taxa	Synonyms
LIVERWORT TAXA (continued)	
<p><i>Plagiochila ludoviciana</i> Sull. <i>Plagiochila sullivantii</i> Gott. ex Evans <i>Plagiochila virginica</i> Evans <i>Porella platyphylla</i> (L.) Pfeiff. <i>Porella platyphylloidea</i> (Schwein.) Lindb. <i>Radula complanata</i> (L.) Dum. <i>Radula mollis</i> Lindenb. & Gott. <i>Radula obconica</i> Sull. <i>Radula tenax</i> Lindb. <i>Radula voluta</i> Tayl. <i>Riccardia jugata</i> Schust. <i>Riccardia palmata</i> (Hedw.) Carruth. <i>Scapania undulata</i> (L.) Dum. <i>Solenostoma</i> aff. <i>obscurum</i> (Evans) Schust. <i>Solenostoma crenuliformis</i> (Aust.) Steph. <i>Solenostoma hyalinum</i> (Lyell) Mitt. <i>Solenostoma pumilum</i> (With.) K. Müll. <i>Teleranea nematodes</i> (Gott. ex Aust.) M. A. Howe <i>Trichocolea tomentella</i> (Ehrh.) Dum.</p>	<p><i>Radula andicola</i> Steph.</p> <p><i>Jungermannia evansii</i> <i>Jungermannia crenuliformis</i> Aust. <i>Jungermannia hyalina</i> <i>Jungermannia pumila</i> With.</p>
MOSS TAXA	
<p><i>Amblystegium serpens</i> (Hedw.) Schimp. in B.S.G. <i>Amblystegium serpens</i> var. <i>juratzkanum</i> (Schimp.) Rau. & Herv. <i>Amblystegium varium</i> (Hedw.) Lindb. <i>Anacamptodon splachnoides</i> (Frol. ex Brid.) Brid. <i>Anomodon attenuatus</i> (Hedw.) Hüb. <i>Anomodon rostratus</i> (Hedw.) Schimp. <i>Atrichum altecristatum</i> (Ren. & Card.) Smyth & Smyth <i>Atrichum angustatum</i> (Brid.) Bruch & Schimp. in B.S.G. <i>Atrichum oerstidianum</i> (C. Müll.) Mitt. <i>Atrichum undulatum</i> (Hedw.) P. Beauv. <i>Aulocomnium palustre</i> (Hedw.) Schwaegr. <i>Barbula indica</i> (Hook.) Spreng. in Steud. <i>Barbula unguiculata</i> Hedw. <i>Brachythecium acuminatum</i> (Hedw.) Aust. <i>Brachythecium oxycladon</i> (Brid.) Jaeg. <i>Brachythecium plumosum</i> (Hedw.) Schimp. in B.S.G. <i>Brachythecium rivulare</i> Schimp. in B.S.G. <i>Brachythecium salebrosum</i> (Web. & Mohr) Schimp. in B.S.G. <i>Bryhnia graminicolor</i> (Brid.) Grout <i>Bryhnia novae-angliae</i> (Sull. & Lesq. ex Sull.) Grout <i>Bryoandersonia illecebra</i> (Hedw.) Robins.</p>	<p><i>Amblystegium juratzkanum</i> Schimp.</p> <p><i>Atrichum undulatum</i> var. <i>altecristatum</i> Ren. & Card.</p> <p><i>Atrichum undulatum</i> var. <i>oerstidianum</i> (C. Müll.) Crum</p> <p><i>Barbula cancellata</i> C. Müll.</p> <p><i>Cirriphyllum boscii</i> (Schwaegr.) Grout</p>

Table 8.1. Continued.

Taxa	Synonyms
MOSS TAXA (continued)	
<i>Bryum</i> aff. <i>lisae</i> De Not. var. <i>cuspidatum</i> (Bruch & Schimp. in B.S.G.) Marg.	
<i>Bryum argenteum</i> Hedw.	
<i>Clasmatodon parvulus</i> (Hampe) Hook. & Wils. ex Sull.	
<i>Climacium americanum</i> Brid.	
<i>Ctenidium malacodes</i> Mitt.	<i>Ctenidium molluscum</i> (Hedw.) Mitt.
<i>Cyrto-hypnum pygmaeum</i> (Schimp. in B.S.G.) Buck & Crum	<i>Thuidium pygmaeum</i> Schimp. in B.S.G.
<i>Dicranella heteromalla</i> (Hedw.) Schimp.	
<i>Dicranum condensatum</i> Hedw.	
<i>Dicranum flagellare</i> Hedw.	<i>Orthodicranum flagellare</i> (Hedw.) Loeske
<i>Dicranum fuscescens</i> Turn.	
<i>Dicranum montanum</i> Hedw.	<i>Orthodicranum montanum</i> (Hedw.) Loeske
<i>Didymodon tophaceus</i> (Brid.) Lisa	
<i>Ditrichum pallidum</i> (Hedw.) Hampe	
<i>Ditrichum pusillum</i> (Hedw.) Hampe	
<i>Ditrichum rhynchostegium</i> Kindb.	
<i>Drummondia prorepens</i> (Hedw.) Britt.	
<i>Entodon cladorrhizans</i> (Hedw.) C. Müll.	
<i>Entodon macropodus</i> (Hedw.) C. Müll.	<i>Entodon drummondii</i> (Sull.) Jaeg.
<i>Entodon sullivanii</i> (C. M.) Lindb.	
<i>Eurhynchium hians</i> (Hedw.) Sande Lac.	
<i>Fabronia ciliaris</i> (Brid.) Brid. var. <i>polycarpa</i> (Hook.) Buck	<i>Fabronia ravenelii</i> Sull.
<i>Fissidens adianthoides</i> Hedw.	
<i>Fissidens asplenioides</i> Hedw.	
<i>Fissidens bryoides</i> Hedw.	<i>Fissidens exiguus</i> Sull., <i>Fissidens minutulus</i> Sull., <i>Fissidens pusillus</i> (Wils.) Milde, <i>Fissidens viridulus</i> (Sw.) Wahlenb.
<i>Fissidens bushii</i> (Card. & Ther.) Card. & Ther.	
<i>Fissidens dubius</i> P. Beauv.	<i>Fissidens cristatus</i> Wils. ex Mitt.
<i>Fissidens grandifrons</i> Brid.	
<i>Forsstroemia trichomitria</i> (Hedw.) Lindb.	
<i>Homalotheciella subcapillata</i> (Hedw.) Broth.	
<i>Hygroamblystegium tenax</i> (Hedw.) Jenn.	
<i>Hymenostylium recurvirostre</i> (Hedw.) Dix.	<i>Gymnostomum recurvirostre</i> Hedw.
<i>Hyophila involuta</i> (Hook.) Jaeg. & Sauerb.	
<i>Hypnum fertile</i> Sendtn.	
<i>Hypnum imponens</i> Hedw.	
<i>Hypnum lindbergii</i> Mitt.	
<i>Isopterygiopsis muelleriana</i> (Schimp.) Iwats.	
<i>Isopterygium tenerum</i> (Sw.) Mitt.	<i>Isopterygium micans</i> (Sw.) Kindb.
<i>Leucobryum glaucum</i> (Hedw.) Ångstr. in Fries	
<i>Leucodon brachypus</i> Brid.	
<i>Mnium marginatum</i> (With.) Brid. ex P. Beauv.	
<i>Mnium stellare</i> Hedw.	

Table 8.1. Continued.

Taxa	Synonyms
MOSS TAXA (continued)	
<i>Myurella sibirica</i> (C. Mull.) Reim.	<i>Myurella careyana</i> Sull. in Sull. & Lesq., <i>Myurella gracilis</i> Lindb.
<i>Neckera complanata</i> (Hedw.) Hub.	
<i>Neckera pennata</i> Hedw.	
<i>Orthotrichum pusillum</i> Mitt.	
<i>Orthotrichum stellatum</i> Brid.	
<i>Orthotrichum strangulatum</i> P. Beauv.	
<i>Oxystegus tenuirostris</i> (Hook. & Taylor) A. J. E. Smith	<i>Trichostomum tenuirostre</i> (Hook. & Taylor) Lindb., <i>Trichostomum cylindricum</i> (Bruch ex Brid.) C. Mull
<i>Philonotis fontana</i> (Hedw.) Brid. var. <i>caespitosa</i> (Jur.) Schimp.	<i>Philonotis caespitosa</i> Jur.
<i>Philonotis</i> aff. <i>glaucescens</i> (Hornsch.) Broth.	
<i>Physcomitrium pyriforme</i> (Hedw.) Hampe	
<i>Plagiomnium ciliare</i> (C. Müll.) T. Kop.	<i>Mnium affine</i> var. <i>ciliare</i> C. Mull., <i>Mnium ciliare</i> (C. Muell.) Schimp.
<i>Plagiomnium cuspidatum</i> (Hedw.) T. Kop.	<i>Mnium cuspidatum</i> Hedw.
<i>Plagiomnium ellipticum</i> (Brid.) T. Kop.	<i>Mnium affine</i> (aff.) var. <i>rugicum</i> (Laur.) Bruch & Schimp. in B.S.G.
<i>Plagiomnium rostratum</i> (Schrad.) T. Kop.	<i>Mnium rostratum</i> Schrad., <i>Mnium longirostre</i> Brid.
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp. in B.S.G.	
<i>Plagiothecium laetum</i> Schimp. in B.S.G.	
<i>Platygyrium repens</i> (Brid.) Schimp. in B.S.G.	
<i>Platyhypnidium riparioides</i> (Hedw.) Dix.	<i>Eurhynchium riparioides</i> (Hedw.) Rich.
<i>Pleurochaete squarrosa</i> (Brid.) Lindb.	
<i>Pogonatum pensilvanicum</i> (Hedw.) P. Beauv.	
<i>Polytrichum commune</i> Hedw.	
<i>Polytrichum juniperinum</i> Hedw.	
<i>Polytrichum ohioense</i> Ren. & Card.	
<i>Pylaisiadelphus tenuirostris</i> (Bruch & Schimp. ex Sull.) Buck	<i>Brotherella tenuirostris</i> (Bruch & Schimp. ex Sull.) Fleisch.
<i>Racomitrium aciculare</i> (Hedw.) Brid.	<i>Rhacomitrium aciculare</i> (Hedw.) Brid.
<i>Rhytidadelphus squarrosus</i> (Hedw.) Warnst.	<i>Rhytidadelphus subpinnatus</i> (Lindb.) T. Kop.
<i>Schistidium agassizii</i> Sull. & Lesq. in Sull.	<i>Grimmia alpicola</i> Sw. ex Hedw.
<i>Schistidium rivulare</i> (Brid.) Podp.	<i>Grimmia alpicola</i> Sw. ex Hedw.; <i>Grimmia alpicola</i> Hedw. var. <i>rivularis</i> (Brid.) Wahlenb.
<i>Schwetschkeopsis fabronia</i> (Schwaegr.) Broth.	<i>Schwetschkeopsis denticulata</i> (Sull.) Broth.
<i>Sematophyllum adnatum</i> (Michx.) Britt.	
<i>Sphagnum lescurii</i> Sull. in Gray	<i>Sphagnum subsecundum</i> var. <i>rufescens</i> (Nees & Hornsch.) Huep.
<i>Sphagnum subsecundum</i> Nees in Sturm	

Table 8.1. Continued.

Taxa	Synonyms
MOSS TAXA (continued)	
<i>Steerecleus serrulatus</i> (Hedw.) Robins.	<i>Rhynchostegium serrulatum</i> (Hedw.) Jaeg. & Sauerb., <i>Eurhynchium serrulatum</i> (Hedw.) Kindb.
<i>Taxiphyllum deplanatum</i> (Bruch. & Schimp. ex Schimp.) Fleisch	<i>Plagiothecium deplanatum</i> (Bruch & Schimp. ex Sull.) Spruce
<i>Taxiphyllum taxirameum</i> (Mitt.) Fleisch	<i>Plagiothecium geophilum</i> (Aust.) Grout
<i>Tetraphis pellucida</i> Hedw.	
<i>Thelia hirtella</i> (Hedw.) Sull. in Sull. & Lesq.	
<i>Thuidium delicatulum</i> (Hedw.) Schimp in B.S.G.	
<i>Tuerckheimia augustifolia</i> (Saito) Zand.	<i>Gymnostomum augustifolium</i> Saito
<i>Ulota crista</i> (Hedw.) Brid.	
<i>Zygodon viridissimus</i> (Dicks.) Brid. var. <i>rupestris</i> Lindb. ex Hartm.	

Table 8.2. The additions, based on the collections for this study, to the bryoflora of Bledsoe County, Tennessee.

Taxa	Synonyms
LIVERWORT TAXA	
<i>Bazzania trilobata</i> (L.) S. F. Gray	
<i>Frullania asagrayana</i> Mont.	<i>Frullania tamarisci</i> subsp. <i>asagrayana</i> (Mont.) Hatt.
<i>Frullania eboracensis</i> Gott.	
<i>Leucolejeunea clypeata</i> (Schwein.) Evs.	
<i>Marsupella emarginata</i> (Ehrh.) Dum.	
<i>Pellia epiphylla</i> (L.) Lindb.	
<i>Radula obconica</i> Sull.	
MOSS TAXA	
<i>Atrichum oerstidianum</i> (C. Müll.) Mitt.	<i>Atrichum undulatum</i> var. <i>oerstidianum</i> (C. Müll.) Crum
<i>Ditrichum pusillum</i> (Hedw.) Hampe	
<i>Platygyrium repens</i> (Brid.) Schimp. in B.S.G.	
<i>Pogonatum pensilvanicum</i> (Hedw.) P. Beauv.	
<i>Polytrichum ohioense</i> Ren. & Card.	
<i>Schistidium rivulare</i> (Brid.) Podp.	<i>Grimmia alpicola</i> Sw. ex Hedw.; <i>Grimmia alpicola</i> Hedw. var. <i>rivularis</i> (Brid.) Wahlenb.
<i>Sematophyllum demissum</i> (Wils.) Mitt.	<i>Sematophyllum carolinianum</i> (C. Müll.) Britt., <i>Raphidostegium carolinianum</i>
<i>Sematophyllum marylandicum</i> (C. Müll.) Britt.	<i>Raphidostegium marylandicum</i>
<i>Thuidium delicatulum</i> (Hedw.) Schimp in B.S.G.	

The disparity in the number of additions to each county is probably more a result of area and the collection methods used than to differing diversity or amount of collecting by previous botanists, since that has already been demonstrated to have been quite limited in extent. The collections that were made for this study were centered mostly in Van Buren County, which is where the main land area of the park is located and includes the richest areas, such as the gorges and the karst sites. Bledsoe County contains only a small corner of the park and collections were made along a single trail.

CHAPTER IX

SPECIES OF SPECIAL CONCERN

There are four species that were collected during this study that represent organisms of special interest for conservation purposes. One of these species, *Lejeunea sharpii*, is listed as endangered non-vascular plant by the Tennessee Division of Natural Heritage (TDEC, 2001). *Cololejeunea ornata* has been listed as threatened. *Lejeunea blomquistii*, and *Radula voluta* have all been acknowledged as species of special concern based on either their limited distribution in Tennessee or their habitat requirements, which are either unique or highly specific. Table 9.1 shows the status and rank of these five species at state, national and global levels. There was also a species of *Plagiochila* that requires further study as it may prove to be new to science and if not new to science it is at least not known from this part of the world and therefore is important as an extension of its range.

Lejeunea sharpii is a small liverwort that was named by R. M. Schuster based on material collected by A. J. Sharp for which Schuster only mentions three collection sites. There are only two collections, a 1991 collection from Anderson County and a 1998 collection from Coffey County, reported in the TENN database (2002). TDEC (2001) reports it as being found in two physiographic provinces, the Eastern Highland Rim and the Central Basin, which agrees with where it was collected within the Park, since the gorges are considered part of the Eastern Highland Rim. It is known to grow on calcareous bluffs, rocks, and logs in wet sinks, which is also consistent with the habitat in which it was found within Fall Creek Falls State Park (Table 9.2).

Table 9.1. The status and rank of the five taxa of bryophytes (four liverworts) collected in Fall Creek Falls State Park that are considered to be rare by the Tennessee Natural Heritage Program (TDEC, 2001).

Species	Tennessee Status	Tennessee Rank	National Rank	Global Rank
<i>Cololejeunea ornata</i> Evans	T	S1	N?	G2G4
<i>Lejeunea blomquistii</i> Schust.	S	S1	N1N2	G1G2
<i>Lejeunea sharpii</i> (Schust.) Schust.	E	S1	N1N2	G1G2
<i>Radula voluta</i> Tayl.	S	S1	N1	G3

Explanation of status and rank codes:

State status

E – Endangered Species. Any species or subspecies of plant whose continued existence as a viable component of Tennessee’s flora is in jeopardy.

T – Threatened Species. Any species or subspecies of plant which appears likely, within the foreseeable future, to become endangered throughout all or a significant portion of its range in Tennessee.

S – Special Concern Species. Any species or subspecies of plant that is uncommon in Tennessee, or has unique or highly specific habitat requirements and therefore requires careful monitoring of its status.

State Rank

S1 – State rank indicating that a species is extremely rare in the state with five or fewer populations. This rank is also assigned if there are very few remaining individuals or due to special circumstances the species is particularly vulnerable to extirpation from Tennessee.

National Rank

N1 – Extremely rare and critically imperiled, generally with five or fewer occurrences in the nation, or very few remaining individuals, or because of some special condition the species is particularly vulnerable to extirpation from the United States.

N2 – Very rare and imperiled, generally with six to twenty occurrences and less than 3000 individuals nationally, or because of some factor(s) vulnerable to extirpation.

N? – Inexact numeric rank.

Global Rank

G1 – Extremely rare and critically imperiled, generally with five or fewer occurrences in the world, or very few remaining individuals, or because of some special condition the species is particularly vulnerable to extinction.

G2 – Very rare and imperiled, generally with six to twenty occurrences and less than 3000 individuals, or because of some factor(s), vulnerable to extinction.

G3 – Very rare and local throughout its range or found locally in a restricted range, or, because of other factors, vulnerable to extinction throughout its range. Generally between 21 and 100 occurrences and fewer than 10,000 individuals.

G4 – Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery. Thus, the plant is of long-term concern.

Table 9.2. The site and substrate descriptions for each of the four taxa of conservation concern in the state of Tennessee, including locations.

Species	Site Location	Latitude/ Longitude	Site Description	Substrate
<i>Cololejeunea ornata</i> Evans	Falls Creek below falls at the confluence with Cane Creek	035°10'6.07"N 085°21'16.13"W	Forested river's edge (North side of Falls Creek)	Mesic/moist sandstone boulder (large angular boulder)
<i>Lejeunea blomquistii</i> Schust.	Above Piney Falls, South side of river, side ravine	035°40'21.04"N 085°23'6.11"W	Forested seep	Moist/wet boulder
	Falls Creek Falls, along river	035°40'2.19"N 085°21'19.77"W	Forested river's edge	Moist sandstone boulder
	Falls Creek Falls, trail to base	035°40'2.19"N 085°21'19.77"W	Cool shaded rock face	Moist sandstone
<i>Lejeunea sharpii</i> (Schust.) Schust.	Camp's Gulf, limestone outcrop at first river crossing	035°44'41.22"N 085°22'25.11"W	Cool air vent in gully	Moist sandstone boulder
<i>Radula voluta</i> Tayl.	Camp's Gulf	035°44'23.63"N 085°21'59.09"W	Cool cave entrance	Moist limestone boulder
	Camp's Gulf	035°45'15.50"N 085°23'23.03"W	Quarry	Moist soil on boulder and dry/mesic sandstone boulder
	Cane Creek Annex, Quarry road	035°45'15.50"N 085°23'23.03"W	River resurgence	Mesic/moist limestone vert. rock face, mesic/moist humus covering limestone, and Mesic/moist soil over root

Cololejeunea ornata is another small liverwort for which there have been only a few collections made. TDEC (2001) reports that it is known from the Central Basin. Though TDEC only mentions the Central Basin, there are three collections listed in the TENN database (2002), as being made over 25 years ago, two of which were made in the Ridge and Valley geographic province and the other in the Cumberland Plateau, north of the park in Morgan County, TN. This species is listed as growing on calcareous substrate, though one of the reports in the TENN database states that it was collected from decaying bark. In Fall Creek Falls State Park it was found growing among a variety of other bryophytes in a wet gorge at the confluence of two rivers on a large sandstone boulder (Table 9.2). The report of this species here does not agree with either of the reported substrate affinities, unless of course it was basic sandstone, which was not determined in this study.

Lejeunea blomquistii is yet another small liverwort species, though it is not recorded in the TENN database (2002). The author was present when it was collected by Dr. Paul Davison, of the University of Northern Alabama, a bryologist who specializes in liverworts. TDEC reports it from the Cumberland Mountains and the Cumberland Plateau (2001). This agrees partially with the locations from which it is found in Fall Creek Falls, however, since it is found along the floor of a gorge (Table 9.2) it has now technically been collected from the Eastern Highland Rim physiographic province. According to Davison this species is fairly common, though often overlooked, because of its small size and the difficulty in collecting it due to its ability to tightly affix to its substrates, most commonly rock, though it can be found growing on bark (P. Davison,

personal communication, 2001). Other encounters by the author concur with Dr. Davison's assessment of the species.

Finally, *Radula voluta*, a relatively large leafy liverwort, represents the last of the species of special concern. Mescall (1979) reported this species in the bryophyte flora of Savage Gulf, Grundy County, only two counties distant and in the same physiographic province. The TENN database (2002) does not show any collections. However, there are several specimens stored in the herbarium, including those collected by Mescall (1979). TDEC (2001) cites that this species is found in four physiographic provinces; the Ridge and Valley, the Cumberland Plateau, the Eastern Highland Rim and the Blue Ridge. The sites from which it was collected in Fall Creek Falls State Park would most likely be considered Cumberland Plateau, though based on the major landscape domains this species is found in the slope forest and only in the moist calcareous sites, such as caves and limestone outcrops (Table 9.2), which coincides with limited habitat information given by TDEC (2001).

CHAPTER X

CONCLUSIONS

Fall Creek Falls State Park has a rich bryophyte flora. A measure of this diversity is the large number of different taxa and the geographical diversity that these taxa represent. This diversity is the result of favorable temperate latitudinal position as well as diversity in habitat types combined with such gradients as elevation, exposure intensity and direction, moisture, and soil types.

Several of the taxa deserve consideration in conservation initiatives that the park may implement. There were 61 species that were only collected from a single location in the park, all of which could possibly represent locally rare taxa and may require monitoring and possibly further ecological study. Included in these 61 species is a putatively unnamed species of *Plagiochila*, which appears to be new to science and currently known only from Fall Creek Falls. Additional study of this taxon is required to understand its systematic identity. Also, *Cololejeunea ornata*, *Lejeunea sharpii*, *L. blomquistii*, and *Radula voluta* are state listed species due to their limited abundance and distribution in the state of Tennessee. Both *C. ornata* and *L. sharpii* were only collected from only a single location within the park.

This study has increased the number of bryophytes known from Van Buren and Bledsoe Counties from 82 to 246 and 25 to 41, respectively. Previous and new information reflected by this study is an example of the condition of knowledge elsewhere in the state, and can be generalized to acknowledge the need for future floristic studies in other states, regions, and larger geographical domains. There is a need for floristic inventories in many places in the world, and it is critical that effort be devoted to

such investigations. One contribution of this type of study is the development of a baseline understanding of the environments that currently exist. As has been indicated by other studies, understanding the presence and role of bryophytes may be a window to what the vegetation and environments may become or what they once were (Sharp, 1939; Schofield, 1985). It is important to note that though field botanists capable of carrying out such floristic studies have over the years lost favor with the current scientific community, they continue to have a place in modern biology and ecology. The value may be even more important with the destruction of native habitats through human activities, whether intentional or accidental. This destruction can or often results in the elimination or displacement of native flora and fauna. The degradation of natural ecosystems is exacerbated by the introduction of exotic species that have great competitive abilities in their new environments.

Though many of the species of bryophytes collected in this study are wide-ranging in their distribution they still require special and/or certain conditions of habitat for their survival. Those with more limited range are more vulnerable, at greater risk, and can be quickly lost through destruction of their habitat types.

The strategy to efficiently and effectively sample the park was a major constraint of the study. Whereas the division of the park into different domains may be argued as superficial, it was adopted as a reasonable approach to cope with the large size and diversity of the landscape and gain some advantage in the organization of the information gathered about the flora.

This study has been limited by the fact that in each of the different zones a complete collection was not carried out, though that was not the focus of this study.

Future studies should adjust the design of the collecting protocol to more fully sample each of the parkland domains. These changes in design might result in greater insight into the ecology of the different species as well as their distribution in the study area.

The main objectives of this study were met. The bryophytes in Fall Creek Falls State Park were catalogued thoroughly, though due to their small size and scattered distribution it is almost certain that this study has not discovered every taxon growing within the boundaries of the park. The bryophyte floras of both Van Buren and Bledsoe Counties have been augmented greatly, with the list of taxa for Van Buren expanded considerably due to the extent of the parkland in this county.

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APPENDIX

Table A.1. Collection information for all collections made in Fall Creek Falls State Park including collection number, location, substrate, light regime, and the major and restricted domains in which the site was included (see end notes of table p.161).

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Amblystegium serpens</i>	00436d	VB	Paw Paw Trail	For. trail edge	Mo. bark of a rotten log	PS	PF	T
<i>Amblystegium serpens</i> var. <i>juratzkanum</i>	00382c	VB	CCA, Sink with waterfall	Bottom of sink	Mo./wet ss bldr	PS	SF	S
<i>Amblystegium varium</i>	00530	VB	Bike trail around lake	For. trail	Me. ss	PS	RU	T
<i>Amphidium mougeotii</i>	00141	VB	Above PF, So. side of river	Rockface/cliff	Me. Mo. ss	PS	PF	RI,O,B
	00528	VB	Gorge Overlook Trail	Cane Creek Falls overlook	Me. ss	PS	PF	O
	00179a	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00580b	VB	Base of FCF, Falls side	ss wall	Me. ss	PS	R	WF,O
<i>Anacamptodon splachnoides</i>	00074	VB	Overnight trail, suspension bridge	For. river's edge	Me./Mo. Carpinus bark		R	B
	00087	VB	CG, trail to big cave	Dry stream bed under forest canopy	Mo. Sweet gum bark		R	FL
<i>Andreaea rothii</i>	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O,FL
	00140a	VB	Above PF, So. side of river	Rock outcrops above falls	Mo. ss wert. rockface	PS	PF	RI,O,B
	00140c	VB	Above PF, So. side of river	Rock outcrops above falls	Mo. ss wert. rockface	PS	PF	RI,O,B
<i>Anomodon attenuatus</i>	00004	VB	CCA, Quarry road	For. roadside	Me. ls bldr	PS	RU	R
	00013	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr		RU	R
	00014	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr	PS	RU	R
	00016	VB	CCA, Quarry road	For. roadside	Me./Mo. bark of sugar maple		RU	R
	00018	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr		R	O,B
	00019	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr		R	O,B
	00041	VB	Piney Mtn. Bike Trail, trail to plateau point	For. site	Me. bark of Chestnut oak		PF	R
	00117	VB	PF' bridge	For. trail's edge	Mo. bark of <i>Quercus rubra</i>	PS	PF	T
	00154	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
00157	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Anomodon attenuatus</i> (cont.)	00239	VB	CG	For. trail's edge	Mo. wood	PS	SF	T
	00240	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00241	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00243	VB	CG	For. trail's edge	Mo. ss	PS	SF	T
	00245	VB	CG	ls hole	Me./Mo. ls	PS	R	O,FL
	00269	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. ss bldr	PS	SF	WF
	00277	VB	Wheeler Place, Woodland stream and cascade	For. stream	Me./Mo. ss bldr	PS	SF	WF
	00303	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00304	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00305	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00306	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00326	VB	Old farm trail, beyond CC	For. trail's edge	Me./Mo. ss wall	PS	SF	T
	00355	VB	CCA, Sink	For. slope	Mo. bark of tulip poplar	PS	SF	S
	00356	VB	CCA, Sink	For. slope	Me./Mo. ss bldr	PS	SF	S
	00360	VB	CCA, Sink	For. slope	Me./Mo. crevice in ss wall	PS	SF	S
	00369	VB	CCA, Sink	For. slope	Me. protected ss bldr	PS	SF	S
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00371	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00372	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00378	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00396	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
	00431	VB	Paw Paw Trail	For. trail along dry stream bed	Mo. rotten stump	PS	PF	T
	00520	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
	00527	VB	Trail to FCF before split	For. trail above Cane Creek Cascades	Me. exposed root	PS	PF	T
	00547	VB	CCA, Sink	For. slope	Dry/Me. ss rocks	PS	SF	S

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.	
<i>Anomodon attenuatus</i> (cont.)	00547	VB	CCA, Sink	For. slope	Dry/Me. ss rocks	PS	SF	S	
	00558	VB	Wheeler place, waterfall	ss wall	Wet ss rocks	PS	SF	WF	
	00065a	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL	
	00065e	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL	
	00079e	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B	
	00081b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B	
	00083a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B	
	00089a	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C	
	00102e	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C	
	00102f	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C	
	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL	
	00152c	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL	
	00152d	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL	
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL	
	00164a	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C	
	00313a	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O	
	00313b	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O	
	00316c	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T	
	00316d	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T	
	00389a	VB	CCA, Sink	Below waterfall	Me./Mo. ss bldr	PS	SF	S	
	00392a	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF	
	00555b	VB	Wheeler place, waterfall	ss wall	Dry/Me. ss	PS	SF	WF	
	<i>Anomodon rostratus</i>	00002	VB	CCA, Quarry road	For. roadside	Mo. ss		RU	R
		00008	VB	CCA, Quarry road	For. roadside slope	Me./Mo. ss bldr	PS	RU	R
		00017	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr	PS	R	O,B
		00086	VB	CG, ls outcrop	ls outcrops, vertical rockface	Mo. ls	PS	R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Anomodon rostratus</i> (cont.)	00185	VB	FCF, trail to base	Vertical rock face, near cold air vent, 8" above the ground	Mo. ss	PS/FS	SF	O
	00240	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00256	VB	CCA, Quarry road	Quarry	Dry ss bldr	PS	RU	O
	00287	VB	CCA, Sink	For. slope	Mo./wet vert. ss wall	PS	SF	S
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00310	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00326	VB	Old farm trail, beyond CC	For. trail's edge	Me./Mo. ss wall	PS	SF	T
	00359	VB	CCA, Sink	For. slope	Me. ss vert. wall	PS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
	00051d	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00107a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00313a	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00313b	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00313c	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00316c	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00428b	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
	00550b	VB	Wheeler place, waterfall	For. slope	Me. soil covering ss bldrs	PS	SF	WF
	00560d	VB	Wheeler place, cave above sink	Outside cave entrance	Mo. ss bldr	PS	SF	C
	<i>Anthoceros punctatus</i>	00421	VB	FCF, trail to base	Trails edge at base of rock wall	Mo. soil	PS	SF
00423		VB	FCF, base of falls	Wet path	Mo./wet sand and rock	PS	R	WF
<i>Atrichum altecristatum</i>	00124	VB	Above PF, So. side of river	For. river's edge	Mo. sandy soil	PS	PF	RI,I
<i>Atrichum angustatum</i>	00139	VB	Above PF, So. side of river	For. river's edge	Mo. soil		PF	RI,I
	00251	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00252	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Atrichum angustatum</i> (cont.)	00537	VB	Bike trail around lake	For. trail bank	Me./Mo. soil	O/ PS	RU	T
	00052b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me./Mo. rich sandy soil		PF	SW
	00461a	VB	Trail to base of FCF	Trail's edge	Me./Mo. soil	PS	SF	T
<i>Atrichum oerstidianum</i>	00072	VB	Camp at base of gorge near suspension bridge	For. river bank	Mo. sandy soil	PS	R	FL
	00441	B	Chinquapin Mtn. Bike Trail	For. stream bank	Mo. soil	PS	PF	RI,I
	00450	B	Chinquapin Mtn. Bike Trail	Stream bed	Mo. sandy soil over rocks	PS	PF	RI,I
	00081c	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
<i>Atrichum undulatum</i>	00189	VB	FCF, trail to base	Fall's base	Wet ss bldr		R	WF
	00510	VB	CCG, Buzzard's Roost Trail	Cascades of stream	Wet/submerged ss	PS	SF	RI,I
	00070a	VB	Gorge trail/Youth Camp 2	For. stream edge	Mo. sandy soil		SF	RI,FL
	00213a	VB	Base of CC Falls	Base of falls	Mo. sandy soil		R	WF
<i>Aulacomnium heterostichum</i>	00054	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. base of red maple		PF	SW
	00251	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00252	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00310	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00422	VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
	00079b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
<i>Aulacomnium palustre</i>	00036	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet humus at base of tree		PF	SW
	00546	VB	Fishing lot 1 before dam	Roadside slope	Wet soil	PS	RU	F
<i>Barbula indica</i>	00332	VB	Farm access road	Middle of road	Me./Mo. sand/clay	PS	RU	R
<i>Barbula</i> sp.	00574	VB	Trail to base of FCF	For. heavy use trail	Me. sandy soil on slope	PS	SF	T
<i>Barbula unguiculata</i>	00503	VB	Swimming hole	Water's edge	Dry/Me. concrete bench	O/ PS	PF	MM
	00545	VB	Below bridge at FCF Lake	Overflow stream bed	Me./Mo. sandy soil along stream bank	O	PF	RI,FL
<i>Bartramia pomiformis</i>	00535	VB	Bike trail around lake	Trail bank	Me./Mo. soil	O/ PS	RU	T
	00079a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Bazzania trilobata</i>	00207	VB	Rockhouse Creek	For. stream bank	Me. ss rock face		PF	RI,O,FL
	00447	B	Chinquapin Mtn. Bike Trail	For. stream bank	Me./Mo. sandy soil	PS	PF	RI,FL
	00465	VB	Trail to base of FCF	Trail's edge	Me./Mo. base of hemlock	PS	SF	T
	00468	VB	Above PF before bridge	Under rhododendrons	Mo. soil/humus	PS	PF	T
	00496	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log with <i>Pallavicinia</i>	PS	PF	T
	00507	VB	CCG, Buzzard's Roost Trail	For. slope	Mo./wet ss bldr	PS	SF	T
	00513	VB	CCG, Buzzard's Roost Trail	Near base of falls	Mo. ss rocks	PS	SF	RI,I
	00576	VB	Trail to base of FCF	For. heavy use trail	Me. ss	PS	SF	T
	00582	VB	Falls loop, below drainage before Caplenor Point	For. slope	Me. ss wall	PS	SF	O,W
	00148a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00152y	VB	FCF, river below falls	For. river's edge	Mo. sandy soil		R	FL,I
	00179a	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00179b	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00179c	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
<i>Blepharostoma trichophyllum</i>	00568b	VB	CCG below the falls	River's edge	Mo. ss wall	PS	R	O,I
<i>Brachythecium acuminatum</i>	00361	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
<i>Brachythecium oxycladon</i>	00240	VB	CG	Dry river bank	Mo. ss bldr	PS	R	FL
	00241	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00504	VB	FCF, base of falls	Trail's edge	Mo./wet ss (pendulus)	PS	R	WF
	00520	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
<i>Brachythecium plumosum</i>	00106	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00585	VB	PF basin	Base of falls	Me. ss wall	PS	R	WF
<i>Brachythecium rivulare</i>	00027	VB	Wheeler Place, Woodland stream and cascade	For. stream	Wet sand	PS	SF	RI,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Brachythecium rivulare</i> (cont.)	00386	VB	CCA, Sink with waterfall	Waterfall	Wet ss	PS	SF	S,WF
	00391	VB	CCA, Sink	Below waterfall		PS	SF	S
	00562	VB	Wheeler place, lower cave		Mo./wet ss bldr	PS	SF	C
<i>Brachythecium salebrosum</i>	00008	VB	CCA, Quarry road	For. roadside slope	Me./Mo. ss bldr	PS	RU	R
	00046	VB	Waterfall trail/Backpack trail/Piney Mtn. Bike Trail	For. trail's edge	Me. dark sandy soil	PS	SF	T
	00255	VB	CCA, Quarry road	Quarry	Dry ls bldr	O	RU	O
	00261	VB	CCA, Quarry road		Me. ss bldr	PS	SF	R
	00303	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00304	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00359	VB	CCA, Sink	For. slope	Me. ss vert. wall	PS	SF	S
	00478	VB	Village	Lawn of roadside bank	Me./Mo. soil	PS	RU	R
	00065a	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00083a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls vert. surface	PS	R	O,B
	00389a	VB	CCA, Sink	Below waterfall	Me./Mo. ss bldr	PS	SF	S
	00405a	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. humus over ls	PS	R	O,B
	<i>Brachythecium</i> sp.	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF
<i>Brachythecium</i> sp.	00309	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
<i>Brachythecium</i> sp.	00326	VB	Old farm trail, beyond CC	For. trail's edge	Me./Mo. ss wall	PS	SF	T
<i>Brachythecium</i> sp.	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
<i>Brachythecium</i> sp.	00372	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
<i>Brachythecium</i> sp.	00553	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS/ O	SF	WF
<i>Brachythecium</i> sp.	00556	VB	Wheeler place, waterfall	ss wall	Mo./wet ss wall	PS	SF	WF
<i>Brachythecium</i> sp.	00102f	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
<i>Brachythecium</i> sp.	00152d	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
<i>Brachythecium</i> sp.	00554b	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
<i>Brachythecium</i> sp.	00580b	VB	Base of FCF, Falls side	ss wall	Me. ss	PS	R	WF

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Brotherella recurvans</i>	00116	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. soil		PF	RI,I
	00508	VB	CCG, Buzzard's Roost Trail	Near small cascades	Mo./wet soil	PS	SF	RI,I
	00066b	VB	Gorge trail/Youth Camp 2	For. slope	Me./Mo. decorticated log		SF	T
<i>Bryhnia graminicolor</i>	00295	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. sandy soil mound	PS	SF	T
	00120a	VB	Above PF, So. side of river	Boulder field on For. river's edge	Mo. protected pocket on a ss bldr		PF	W,BF
	00550b	VB	Wheeler place, waterfall	For. slope	Me. soil covering ss bldrs	PS	SF	WF
<i>Bryhnia novae-angliae</i>	00094	VB	CG, big cave	Cool cave entrance	Mo. soil	PS	SF	C
	00292	VB	CCA, Sink	For. slope	Mo. soil	PS	SF	S
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00393	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00422	VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
	00559	VB	Wheeler place, sink (Indian Rockhouse)	Stream above sink	Submerge ss	PS	SF	RI,I
	00079d	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
	00102f	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
<i>Bryoandersonia illecebra</i>	00003	VB	CCA, Quarry road	For. roadside	Me. ss bldr		RU	R
	00019	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr		R	O,B
	00024	VB	CCA, Quarry road, outlet	River outlet	Mo. soil on bldr		R	O,B
	00072	VB	Camp at base of gorge near suspension bridge	For. river bank	Mo. sandy soil	PS	R	FL
	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
	00064a	VB	Gorge trail/Youth Camp 2	For. trail	Me. midslope ss ledge	PS	SF	T
	00079e	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
	00439b	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
<i>Bryum aff. lisae var. cuspidatum</i>	00286	VB	CCA, Trail to sinks	For. trail's/stream's edge	Wet humus	PS	SF	RI,T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Bryum argenteum</i>	00413	VB	Nature center	Stairs to restrooms	Me. concrete	PS/O	RU	MM
<i>Bryum capillare</i>	00502	VB	Beyond swimming hole		Me./Mo. upper surface of ss	PS/O	PF	O
	00503	VB	Swimming hole	Water's edge	Dry/Me. concrete bench	O/PS	PF	MM
	00545	VB	Below bridge at FCF Lake	Overflow stream bed	Me./Mo. sandy soil along stream bank	O	PF	RI,FL
	00065b	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
<i>Bryum aff. capillare</i>	00100b	VB	CG, big cave	Cool cave entrance	Wet ss bldr under drip	PS	SF	C
<i>Bryum</i> sp.	00029	VB	Wheeler Place, Woodland stream and cascade	Under rock overhang in stream	Wet silt	PS	SF	RI,I
<i>Bryum</i> sp.	00187	VB	FCF, base of falls	Falls' base	Wet ss	PS	R	WF
<i>Bryum</i> sp.	00427	VB	Above CC Falls; below bridge near Nature Center	River bed subject to inundation	Wet rocks	O/PS	PF	RI,I
<i>Bryum</i> sp.	00140c	VB	Above PF, So. side of river	Rock outcrops above falls	Mo. ss wert. rockface	PS	PF	RI,O,B
<i>Calypogeia fissa</i>	00123a	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00183b	VB	FCF gorge overlook trail	For. sloped trail's edge	Mo. sandy soil		PF	T
<i>Calypogeia muelleriana</i>	00170	VB	FCF gorge overlook trail	Eroded clay bank near bridge	Mo. clay soil		PF	T
	00196	VB	FCF woodland trail, stairs to bridge	For. trail's edge	Me./Mo. sandy soil in root pockets		PF	T
	00251	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00252	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00462	VB	Base of FCF	Trail bank	Me./Mo. sandy soil	PS	R	T
	00133a	VB	Above PF, So. side of river	For. seep	Mo. ss wall		PF	O,SP
<i>Calypogeia sullivantii</i>	00128	VB	Above PF, So. side of river	For. river's edge	Wet sand		PF	RI,I
	00334	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. sand on stream bank	PS	PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Calypogeia sullivanii</i> (cont.)	00335	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus, stream	PS	PF	SW
	00336	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet humic soil, stream	PS	PF	SW
	00349	VB	Piney Mtn. Bike Trail	Just beyond For. upland swamp in trail	Mo. clay soil	PS	PF	T
	00419	VB	FCF, bridge above falls	For. stream bank	Mo. humus	PS	PF	W
	00460	VB	Trail to base of FCF	Trail's edge	Me./Mo. sand	PS	SF	T
	00439a	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
<i>Campylium chrysophyllum</i>	00011	VB	CCA, Quarry road	For. roadside	Me. ss bldr		RU	R
	00086	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
	00093	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00264	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00296	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss bldr	PS	SF	O
	00305	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00309	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00318	VB	Old farm trail, beyond CC	For. trail's edge	Me. soil	PS	SF	T
	00360	VB	CCA, Sink	For. slope	Me./Mo. crevice in ss wall	PS	SF	S
	00361	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00364	VB	CCA, Sink	Protected base of vert. wall	Me. ss bldr	PS	SF	S
	00368	VB	CCA, Sink	For. slope	Me. protected ss	P/ FS	SF	S
	00369	VB	CCA, Sink	For. slope	Me. protected ss bldr	PS	SF	S
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
	00400	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
	00410	VB	CCA, Quarry road; outlet	Boulders	Me./Mo. ls bldr	PS	R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Campylium chrysophyllum</i> (cont.)	00470	VB	Village	Wooded area	Me./Mo. humus at base of white oak	PS	PF	W
	00475	VB	Village	Wooded area surrounding village	Me. large standing dead tree (oak?)	PS	PF	W
	00527	VB	Trail to FCF before split	For. trail above Cane Creek Cascades	Me. exposed root	PS	PF	T
	00079e	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
	00083a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
	00102c	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102e	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00385a	VB	CCA, Sink with waterfall		Mo. ss bldr	PS	SF	WF
	00399d	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00461a	VB	Trail to base of FCF	Trail's edge	Me./Mo. soil	PS	SF	T
	00554a	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
	00554b	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
	00555b	VB	Wheeler place, waterfall	ss wall	Dry/Me. ss	PS	SF	WF
	00560d	VB	Wheeler place, cave above sink	Outside cave entrance	Mo. ss bldr	PS	SF	C
	00563a	VB	Wheeler farm, waterfall	For. stream side	Mo. ss bldr beside a stream	PS	SF	RI,B
<i>Campylium hispidulum</i>	00239	VB	CG	For. trail	Mo. wood	PS	SF	T
	00431	VB	Paw Paw Trail	For. trail along dry stream bed	Mo. rotten stump	PS	PF	T
	00434	VB	Paw Paw Trail	For. trail	Me. rotten wood	PS	PF	T
	00531	VB	Bike trail around lake	For. trail	Me./Mo. sandy soil	PS	RU	T
	00539	VB	Pond along road near inn	For. pond's edge	Mo. soil at base of a tree	PS/O	PF	W,FL
	00401a	VB	CCA, Quarry road; outlet	River outlet	Mo. soil in pocket formed by bldrs	P/FS	R	O,FL
<i>Cephalozia bicuspidata</i>	00124	VB	Above PF, So. side of river	For. river's edge	Mo. sandy soil	PS	PF	RI,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Cephalozia bicuspidata</i> (cont.)	00126	VB	Above PF, So. side of river near bridge	Below shrub canopy on an island in the river	Wet soil		PF	RI,FL
	00155	VB	FCF, river below falls	For. river's edge	Mo. decorticated log	PS	R	FL
	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00336	VB	Piney Mtn. Bike Trail	For. upland swamp, along stream	Wet humic soil	PS	PF	SW
	00419	VB	FCF, bridge above falls	For. stream bank	Mo. humus	PS	PF	RI,FL
	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00210b	VB	Rockhouse Creek	For. stream bank	Mo. soil on upper surface of ss wall		PF	RI,O,B
	00439a	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
	00561c	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
<i>Cephalozia catenulata</i>	00496	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log with <i>Pallavacinia</i>	PS	PF	T
	00494b	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T
	00494c	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T
<i>Cephalozia lunulifolia</i>	00170	VB	FCF gorge overlook trail	Eroded clay bank near bridge	Mo. clay soil		PF	T
	00196	VB	FCF woodland trail, stairs to bridge	For. trail's edge	Me./Mo. sandy soil in root pockets		PF	T
	00199	VB	Rockhouse Creek	For. stream's edge	Me./Mo. exposed roots of a rhododendron		PF	RI,B
	00202	VB	Rockhouse Creek	For. stream bank	Me./Mo. soil		PF	RI,I
	00334	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. sand on stream bank	PS	PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Cephalozia lunulifolia</i> (cont.)	00335	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus along stream	PS	PF	SW
	00344	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rotten log	PS	PF	SW
	00346	VB	Piney Mtn. Bike Trail	For. upland swamp	Me./Mo. raised humus	PS	PF	SW
	00488	VB	Above Rockhouse falls	Shaded bank along trail	Me./Mo. sandy humus	PS	PF	T
	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00056b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil		PF	SW
	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00095a	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095c	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095d	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00123a	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00137a	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O,FL
	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O,FL
	00200c	VB	Rockhouse Creek	Moist, For. stream bank	Mo. stream bank		PF	RI,FL
<i>Cephaloziella rubella</i>	00112	VB	PF trail to bridge	Shrubby opening	Mo. soil		PF	T
<i>Ceratodon purpureus</i>	00529	VB	Village	Edge of parking lot	Me./Mo. soil/humus	O/ PS	RU	MM
<i>Chiloscyphus cuspidatus</i>	00155	VB	FCF, river below falls	For. river's edge	Mo. decorticated log	PS	R	FL
	00157	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Chiloscyphus cuspidatus</i> (cont.)	00163	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00229	VB	CG	River bed	Mo. standing decorticated tree trunk	PS	R	FL
	00230	VB	CG	Dry river bed	Mo. decorticated trunk	PS	R	I
	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF	O
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00301	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00302	VB	Old farm trail, beyond CC	Indian Rockhouse	Dry/Me. rotten branch	PS	SF	O
	00310	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00312	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. rotten log	PS	SF	T
	00058b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rich soil		PF	SW
	00107b	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152d	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00389a	VB	CCA, Sink	Below waterfall	Me./Mo. ss bldr	PS	SF	S
	00401a	VB	CCA, Quarry road; outlet	River outlet	Mo. soil in pocket formed by bldrs	PS/ FS	R	O,FL
	00561b	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
	<i>Chiloscyphus profundus</i>	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R
00248		VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
00280		VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. rotting wood	PS	SF	RI,FL
00300		VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. rotten branch on ground	PS	SF	T
00310		VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
00311		VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Chiloscyphus profundus</i> (cont.)	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00065b	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00225b	VB	Stable road, overnight trail	For. trail	Me./Mo. decorticated virginia pine		PF	T
	00385a	VB	CCA, Sink with waterfall		Mo. ss bldr	PS	SF	WF
<i>Clasmatodon parvulus</i>	00050	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. red maple bark		PF	SW
	00085a	VB	CG, between outcrop and cave	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00313c	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00316a	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
<i>Climacium americanum</i>	00021	VB	CCA, Quarry road, outlet	River outlet	Mo. sandy soil		R	O,FL
	00090	VB	CG, big cave	Cool cave entrance	Mo. soil		SF	C
	00293	VB	CCA, Sink	For. slope	Mo. ss bldr	PS	SF	S
	00518	VB	CCG, Buzzard's Roost Trail	For. stream	Wet/submerged rocks	PS	SF	RI,I
	00565	VB	CCG below the falls	River's edge	Mo. upper surface of ss ledge	PS	R	O,FL
	00164a	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
	00093	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
<i>Cololejeunea biddlecomiae</i>	00119	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. bark of black gum	PS	PF	RI,B
	00249	VB	CCA, Quarry road	For. roadside	Me. ss bldr	PS	RU	R
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00309	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00355	VB	CCA, Sink	For. slope	Mo. bark of tulip poplar	PS	SF	S
	00431	VB	Paw Paw Trail	For. trail along dry stream bed	Mo. rotten stump	PS	PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Cololejeunea biddlecomiae</i> (cont.)	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00091b	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	00102a	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102b	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102f	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00107c	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00152c	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00164a	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
	00428b	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
<i>Cololejeunea minutissima</i>	00166	VB	CG, ls outcrop	Beside dry stream bed under forest canopy	Me. ls		R	O,B
<i>Cololejeunea ornata</i>	00161a	VB	FCF, CC confluence	For. river's edge	Me./Mo. box shaped ss bldr		R	FL,B
<i>Conocephalum conicum</i>	00028	VB	Wheeler Place, Woodland stream and cascade	For. slope, under overhang	Wet sandy silt		SF	RI,I
	00094	VB	CG, big cave	Cool cave entrance	Mo. soil	PS	SF	C
	00103	VB	CG, big cave	Cool cave entrance	Mo. soil		SF	C
	00289	VB	CCA, Sink	For. slope	Wet rock	PS	SF	S
	00291	VB	CCA, Sink	For. slope	Wet ss bldr	PS	SF	S
	00292	VB	CCA, Sink	For. slope	Mo. soil	PS	SF	S
	00393	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00410	VB	CCA, Quarry road; outlet	Boulders	Me./Mo. ls bldr	PS	R	O,B
	00424	VB	FCF, base of falls		Me./Mo. soil	PS	R	WF
00101a	VB	CG, big cave	Cool cave entrance; Inside	Wet clay		SF	C	
<i>Ctenidium malacodes</i>	00519	VB	CCG, Buzzard's Roost Trail	For. stream's edge	Me./Mo. rotten branch	PS	SF	RI,FL
	00590	VB	Piney Creek Gorge outside boulder wall	Island in creek bed	Me. sand over ss bldr	PS	R	I
	00081b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
	00083b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
<i>Cyrto-hypnum pygmaeum</i>	00242	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Cyrto-hypnum pygmaeum</i> (cont.)	00301	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00367	VB	CCA, Sink	Protected on a For. slope	Me. ss bldr	PS	SF	S
	00377	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00552	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
<i>Dicranella heteromalla</i>	00506	VB	CCG, Buzzard's Roost Trail	For. slope	Mo./wet ss bldr	PS	SF	T
	00179c	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
<i>Dicranum condensatum</i>	00040	VB	Piney Mtn. Bike Trail, Plateau point	For. point	Me. soil		PF	W
<i>Dicranum flagellare</i>	00095c	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
<i>Dicranum fulvum</i>	00327	VB	Old farm trail, beyond CC	For. trail's edge	Mo. ss bldr	PS	SF	T
	00464	VB	FCF, trail to base	Shaded trail's edge	Me. ss bldr	PS	SF	O
	00513	VB	CCG, Buzzard's Roost Trail	Near base of falls	Mo. ss rocks	PS	SF	RI,I
	00515	VB	CCG, Buzzard's Roost Trail	Near base of falls	Mo. ss rocks	PS	SF	RI,I
	00061a	VB	Gorge trail/Youth Camp 2	For. trail's edge	Me. ss bldr		SF	T
	00120b	VB	Above PF, So. side of river	Boulder field on For. river's edge	Mo. ss bldr		PF	W,BF
<i>Dicranum fuscescens</i>	00062	VB	Gorge trail/Youth Camp 2	For. trail	Me. trunk of chestnut oak on slope	PS	SF	T
<i>Dicranum montanum</i>	00234	VB	CG	Dry river bank	Mo. ss bldr	PS	R	FL
	00250	VB	CCA, Quarry road	For. roadside	Dry/Me. ss bldr	PS	RU	R
	00061b	VB	Gorge trail/Youth Camp 2	For. trail's edge	Me. ss bldr		SF	T
	00224a	VB	Stable road, overnight trail	For. trail	Me. fallen pine log		PF	T
	00376a	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
<i>Dicranum scoparium</i>	00001	VB	CCA, Quarry road	For. roadside	Sandy soil		RU	R
	00034	VB	Roadside to Youth Camp 2	For. roadside	Me. pine humus on rotting wood		RU	R
	00340	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. decorticated log	PS	PF	SW
	00342	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus	PS	PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Dicranum scoparium</i> (cont.)	00352	VB	Piney Mtn. Bike Trail	For. roadside, beyond Sw. Up. Dep.	Me. humus	PS	PF	R
	00415	VB	FCF gorge overlook trail	For. trail	Me./dry humus	PS	PF	T
	00467	VB	Above PF, near suspension bridge	Under rhododendrons	Me./Mo. humus	PS	PF	T
	00471	VB	Village		Mo./Me. soil	PS	RU	F
	00536	VB	Bike trail around lake	Trail bank	Me./Mo. soil	O/PS	RU	T
	00571	VB	CCG below the falls	River's edge	Mo. decorticated log	PS	R	FL
<i>Dicranum</i> sp.	00496	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log with <i>Pallavacinia</i>	PS	PF	T
<i>Dicranum</i> sp.	00514	VB	CCG, Buzzard's Roost Trail	For. stream	Mo. ss rocks in stream near base of falls	PS	SF	RI,I
<i>Didymodon fallax</i>	00022	VB	CCA, Quarry road, outlet	River outlet	ls bldr	PS	R	O,B
<i>Didymodon tophaceus</i>	00099c	VB	CG, big cave	Cool cave entrance	Mo. (ls?) bldr	PS	SF	C
<i>Diphyscium foliosum</i>	00139	VB	Above PF, So. side of river	For. river's edge	Mo. soil		PF	RI,I
	00254	VB	CG	Roadside bank	Dry/Me. ss	PS	RU	R
	00491	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00500	VB	Beyond swimming hole	Under overhang in stream	Mo./wet soil	FS	PF	RI,I
	00461b	VB	Trail to base of FCF	Trail's edge	Me./Mo. soil	PS	SF	T
<i>Diplophyllum apiculatum</i>	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O,FL
	00247	VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
	00252	VB	CCA, Quarry road	For. road side bank	Dry/Me. sand	PS	RU	R
	00254	VB	CG	Roadside bank	Dry/Me. ss	PS	RU	R
	00460	VB	Trail to base of FCF	Trail's edge	Me./Mo. sand	PS	SF	T
	00462	VB	Base of FCF	Trail bank	Me./Mo. sandy soil	PS	R	T
	00506	VB	CCG, Buzzard's Roost Trail	For. slope	Mo./wet ss bldr	PS	SF	T
	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O,FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Diplophyllum apiculatum</i> (cont.)	00140c	VB	Above PF, So. side of river	Rock outcrops above falls	Mo. ss wert. rockface	PS	PF	RI,O,B
	00179a	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00179c	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00183b	VB	FCF gorge overlook trail	For. sloped trail's edge	Mo. sandy soil		PF	T
	00204a	VB	Rockhouse Creek	For. stream bank	Wet ss		PF	RI,O, FL
	00204b	VB	Rockhouse Creek	For. stream bank	Wet ss		PF	RI,O, FL
	00461b	VB	Trail to base of FCF	Trail's edge	Me./Mo. soil	PS	SF	T
	00575c	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
	00580a	VB	Base of FCF, Falls side	ss wall	Me. ss	PS	R	WF,O
<i>Ditrichum lineare</i>	00462	VB	Base of FCF	Trail bank	Me./Mo. sandy soil	PS	R	T
<i>Ditrichum aff. lineare</i>	00331	VB	Old farm trail, beyond CC	Roadside bank	Me./Mo. sand	O/ PS	RU	R
<i>Ditrichum pallidum</i>	00060	VB	Wheeler Place, Woodland stream and cascade	Shallow overhang in stream	Wet silty sand	PS	SF	WF
	00438	VB	Paw Paw Trail	For. trail	Me. soil or an old tip-up mound	PS	PF	T
	00532	VB	Bike trail around lake	For. trail	Me./Mo. soil, up thru pine duff	PS	RU	T
	00543	VB	Along road before FCF turn off	Mowed grassy area	Me./Mo. soil	O	RU	F
<i>Ditrichum pusillum</i>	00124	VB	Above PF, So. side of river	For. river's edge	Mo. sandy soil	PS	PF	RI,I
	00220	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Mo. sandy soil in soil pockets		RU	T
	00442	B	Chinquapin Mtn. Bike Trail	For. trail	Me. soil	PS	PF	T
	00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW

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Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Ditrichum aff. pusillum</i>	00295	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. sandy soil mound	PS	SF	T
<i>Ditrichum rhynchostegium</i>	00005	VB	CCA, Quarry road	For. roadside bank	Mo. disturbed sandy soil	PS	RU	R
	00006	VB	CCA, Quarry road	For. roadside bank	Mo. disturbed sandy soil	PS	RU	R
	00042	VB	Piney Mtn. Bike Trail	For. trail	Me./Mo. sand on upturned tree root	PS	PF	T
	00059	VB	Piney Mtn. Bike Trail	For. trail	Me. sand on upturned tree root	PS	PF	T
<i>Ditrichum aff. rhynchostegium</i>	00417	VB	FCF gorge overlook trail, Rocky Point overlook	For. trail	Dry/Me. sandy soil	O/PS	PF	T
<i>Ditrichum sp.</i>	00574	VB	Trail to base of FCF	For. heavy use trail	Me. sandy soil on slope	PS	SF	T
<i>Drummondia prorepens</i>	00540	VB	Powerline right-of-way leading to Youth Camp 2 road	For.-managed area interface	Dry/Me. fallen branch	PS	RU	F
<i>Dumortiera hirsuta</i>	00325	VB	Old farm trail, beyond CC	For. river's edge in overflow area	Mo. soil	PS	R	FL
	00384	VB	CCA, Sink with waterfall	Vertical stonewall	Wet ss	PS	SF	S
<i>Entodon cladorrhizans</i>	00362	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00374	VB	CCA, Sink	Boulder strewn slope	Me. upper surface of ss bldr	PS	SF	S,BF
	00400	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
<i>Entodon macropodus</i>	00047	VB	Waterfall trail/Backpack trail/Piney Mtn. Bike Trail	For. trail	Me. lower trunk of a tree	PS	SF	T
	00241	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00265	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00356	VB	CCA, Sink	For. slope	Me./Mo. ss bldr	PS	SF	S
	00372	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00378	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00547	VB	CCA, Sink	For. slope	Dry/Me. ss rocks	PS	SF	S
	00547	VB	CCA, Sink	For. slope	Dry/Me. ss rocks	PS	SF	S
	00561a	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Entodon macropodus</i> (cont.)	00563b	VB	Wheeler farm, waterfall	For. stream side	Mo. ss bldr beside a stream	PS	SF	RI,B
<i>Entodon seductrix</i>	00388	VB	CCA, Sink with waterfall	Below falls	Me./Mo. fallen log	PS	SF	WF
	00459	VB	FCF overlook near parking lot	Along sidewalk	Me. ss bldr	PS	RU	R
	00480	VB	Village	Parking lot	Me. blacktop	PS	RU	MM
	00066c	VB	Gorge trail/Youth Camp 2	For. slope	Me./Mo. decorticated log		SF	T
<i>Entodon sullivanii</i>	00278	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. ss bldr	PS	SF	WF
	00279	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. ss bldr	PS	SF	WF
<i>Eucladium verticillatum</i>	00281	VB	Wheeler Place, Woodland stream and cascade	Rockhouse	Me./Mo. vert. ss rock face	PS	SF	WF
	00282	VB	Wheeler Place, Woodland stream and cascade	Rockhouse	Me./Mo. ss vert. rockface	PS	SF	WF
	00395	VB	CCA, Sink	Base of stone wall	Mo. tuffa	PS	SF	S
<i>Eurhynchium hians</i>	00031	VB	CCA, Wheeler homestead	Abandoned field	Me. soil under canopy of grasses	PS	RU	F
<i>Fabronia ciliaris</i> var. <i>polycarpa</i>	00561d	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
<i>Fissidens adianthoides</i>	00285	VB	Wheeler Place, Woodland stream and cascade	For. base of falls	Mo. ss bldr	PS	SF	WF
	00382a	VB	CCA, Sink with waterfall	Bottom of sink	Mo./wet ss bldr	PS	SF	S
<i>Fissidens asplenioides</i>	00427	VB	Above CC Falls; below bridge near Nature Center	River bed subject to inundation	Wet rocks	O/ PS	PF	RI,I
<i>Fissidens bryoides</i>	00160	VB	FCF, river below falls	For. river's edge	Mo. ss rocks, subject to inundation	PS	R	I
	00244	VB	CG	ls hole	Me. ls bldr	PS	R	O,FL
	00296	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss bldr	PS	SF	O
	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF	O
	00367	VB	CCA, Sink	Protected on a For. slope	Me. ss bldr	PS	SF	S

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Fissidens bryoides</i> (cont.)	00390	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00553	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS/O	SF	WF
	00101c	VB	CG, big cave	Cool cave entrance; Inside	Wet clay		SF	C
<i>Fissidens bushii</i>	00422	VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
	00070c	VB	Gorge trail/Youth Camp 2	For. stream edge	Mo. sandy soil		SF	RI,FL
	00080a	VB	CG, ls outcrop	Under overhang	Me./Mo. calcareous clay soil	PS	R	I
<i>Fissidens aff. bushii</i>	00064a	VB	Gorge trail/Youth Camp 2	For. trail	Me. midslope ss ledge	PS	SF	T
<i>Fissidens dubius</i>	00004	VB	CCA, Quarry road	For. roadside	Me. ls bldr	PS	RU	R
	00017	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr	PS	R	O,B
	00093	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00180	VB	FCF gorge overlook trail	For. trail near second bridge	Mo. sandy soil	PS	PF	T
	00181	VB	FCF gorge overlook trail after 2nd bridge	For. trail's edge	Mo. ss bldr		PF	T
	00232	VB	CG	For. river's edge	Mo. sand on river bank	PS	R	FL,I
	00264	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00265	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00396	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00431	VB	Paw Paw Trail	For. trail along dry stream bed	Mo. rotten stump	PS	PF	T
	00566	VB	CCA, Quarry road, 3rd gorge near Stuart's land	Stonewall	Mo./wet calcareous clay	PS	SF	O
	00083b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
	00102a	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102e	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL	
00313b	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Fissidens dubius</i> (cont.)	00385a	VB	CCA, Sink with waterfall		Mo. ss bldr	PS	SF	WF
	00560d	VB	Wheeler place, cave above sink	Outside cave entrance	Mo. ss bldr	PS	SF	C
<i>Fissidens grandifrons</i>	00026	VB	Wheeler Place, Woodland stream and cascade	For. stream	Submerged ss wall	PS	SF	RI,I
	00383	VB	CCA, Sink with waterfall	Vertical stonewall to top of falls within stream	Wet stone	PS	SF	S
	00557	VB	Wheeler place, waterfall	Base of falls	Wet wert. ss face	PS	SF	WF
	00559	VB	Wheeler place, sink (Indian Rockhouse)	Stream above sink	Submerge ss	PS	SF	RI,I
	00382b	VB	CCA, Sink with waterfall	Bottom of sink	Mo./wet ss bldr	PS	SF	S
	00387b	VB	CCA, Sink #2	Waterfall	Wet ss	PS	SF	S,WF
<i>Fissidens osmundioides</i>	00577	VB	Base of FCF, behind falls	ss wall	Mo. ss	PS	R	O,I
<i>Fissidens aff. osmundioides</i>	00517	VB	CCG, Buzzard's Roost Trail	For. stream	Wet rocks in stream	PS	SF	RI,I
<i>Fissidens subbasilaris</i>	00014	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr	PS	RU	R
	00117	VB	PF' bridge	For. trail's edge	Mo. bark of Quercus rubra	PS	PF	T
	00119	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. bark of black gum	PS	PF	RI,B
	00256	VB	CCA, Quarry road	Quarry	Dry ss bldr	PS	RU	O
	00475	VB	Village	Wooded area surrounding village	Me. large standing dead tree (oak?)	PS	PF	W
	00539	VB	Pond along road near inn	For. pond's edge	Mo. soil at base of a tree	PS/O	PF	W,FL
	00399a	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00399d	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00436b	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T
<i>Fissidens taxifolius</i>	00029	VB	Wheeler Place, Woodland stream and cascade	Under rock overhang in stream	Wet silt	PS	SF	RI,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Fissidens taxifolius</i> (cont.)	00215	VB	Base of CC Falls	Behind the falls	Mo. ss (rockhouse)	P/FS	R	WF
	00288	VB	CCA, Sink	Large For. depression	Wet rock	PS	SF	S
	00294	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. sandy soil mound	PS	SF	T
	00295	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. sandy soil mound	PS	SF	T
	00323	VB	Old farm trail, beyond CC	Riverbed	Mo. sand	PS	R	I
	00358	VB	CCA, Sink	For. slope	Me./Mo. ss bldr	PS	SF	S
	00395	VB	CCA, Sink	Base of stone wall	Mo. tuffa	PS	SF	S
	00511	VB	CCG, Buzzard's Roost Trail	Cascades	Wet/submerged ss	PS	SF	RI,I
	00081a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
	00392b	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00549a	VB	Wheeler place, waterfall	Stream	Mo./wet rocks	PS	SF	WF
00560b	VB	Wheeler place, cave above sink	Inside cave	Wet sand	PS	SF	C	
<i>Fontinalis novae-angliae</i>	00203	VB	Rockhouse Creek	For. stream bank	Submerged on ss		PF	RI,I
	00339	VB	Piney Mtn. Bike Trail	For. upland swamp	Submerged on decorticated log	PS	PF	SW
	00429	VB	Paw Paw Trail	For. trail crossing dry stream	Mo. rocks and wood	PS	PF	T
	00433	VB	Paw Paw Trail	Dry stream bed	Mo. soil	PS	PF	ST,I
	00445	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Wet rocks subject to inundation	PS	PF	ST,I
	00567	VB	CCG below the falls	River's edge	Me. ss wall subject to inundation	PS	R	O,I
	00589	VB	PF basin	Base of falls	Rocks and bldrs subject to inundation	PS	R	WF
<i>Forsstroemia trichomitria</i>	00015	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr		RU	R
	00073	VB	Overnight trail, suspension bridge	For. river's edge	Me. bark		R	RI,B
	00316d	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Forsstroemia trichomitria</i>	00428b	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
<i>Frullania appalachiana</i>	00209	VB	Rockhouse Creek	For. slope at bend	Me./Mo. holly bark		PF	RI,B
<i>Frullania asagrayana</i>	00111	VB	PF trail to bridge	For. trail's edge	Me. ss rock face		PF	T
	00121	VB	Above PF, So. side of river	For. river's edge	Me. bark		PF	RI,B
	00176	VB	FCF gorge overlook trail	For. trail's edge	Me. bark of oak		PF	T
	00197	VB	Rockhouse Creek	For. stream's edge	Me. bark of rhododendron		PF	RI,B
	00221	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Dry/Me. ss bldr		RU	T
	00345	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark of red maple	PS	PF	SW
	00449	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. bark of <i>Kalmia</i>	PS	PF	ST,I
	00451	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. fallen log	PS	PF	ST,I
	00469	VB	PF, juncture of susp. bridge trail and overnight trail	For. trail	Me./Mo. trunk of maple	PS	PF	T
	00483	VB	Trail to FCF from Nature Center before fork	For. trail's edge on slope	Me. ss rock	PS	PF	T
	00573	VB	CCG below the falls	River's edge	Me. bark of birch trunk	PS	R	B
	00051b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00053a	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark of red maple		PF	SW
	00067a	VB	Gorge trail/Youth Camp 2	For. stream edge	Me. bldr		SF	RI,B
	00118b	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00174a	VB	FCF gorge overlook trail	For. trail's edge	Me. Mo. bark of sugar maple		PF	T
	00178b	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
	00222a	VB	Overnight trail at Caney Fork Bridge	For. trail's edge	Me. bark of red maple		SF	T
	00458a	VB	Road to fisherman's cabins	Wooded roadside	Me./Mo. bark of oak near base	PS	RU	R

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Frullania brittoniae</i>	00115	VB	PF above suspension bridge	For. trail's edge	Me. bark of white oak		PF	T
	00316a	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00316c	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00316d	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00316e	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
<i>Frullania eboracensis</i>	00108	VB	PF trail to bridge	For. trail's edge	Me. red maple bark		PF	T
	00119	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. bark of black gum	PS	PF	RI,B
	00233	VB	CG	River bank	Me./Mo. bark of beech	PS	R	B
	00333	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. decaying wood	PS	PF	SW
	00444	B	Chinquapin Mtn. Bike Trail	For. trail's edge	Me. decaying log	PS	PF	T
	00476	VB	Village	Wooded area surrounding village	Me. Cornus bark laying on ground	PS	PF	W
	00540	VB	Powerline right-of-way leading to Youth Camp 2 road	For.-managed area interface	Dry/Me. fallen branch	PS	RU	F
	00089b	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00436a	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T
00458b	VB	Road to fisherman's cabins	Wooded roadside	Me./Mo. bark of oak at breast height	PS	RU	R	
<i>Frullania ericoides</i>	00114a	VB	Above PF, So. side of river	For. river's edge	Me. bark of white oak snag		PF	RI,B
	00114b	VB	Above PF, So. side of river	For. river's edge	Me. bark of white oak snag		PF	RI,B
	00171b	VB	FCF gorge overlook trail	For. trail's edge	Me. bark of Aesculus?		PF	T
	00174b	VB	FCF gorge overlook trail	For. trail's edge	Me. Mo. bark of sugar maple		PF	T
<i>Frullania kunzei</i>	00493	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Frullania plana</i>	00055	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. red maple bark		PF	SW
	00523	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
<i>Frullania riparia</i>	00245	VB	CG	ls hole	Me./Mo. ls	PS	R	O,FL
	00270	VB	CCA, Quarry road; outlet	River outlet	Dry ls bldr	PS	R	O,B
	00397	VB	CCA, Quarry road; outlet	Boulders	Me. ls bldr	PS	R	O,B
	00398	VB	CCA, Quarry road; outlet	Boulders	Me. ls bldr	PS	R	O,B
<i>Gymnostomum aeruginosum</i>	00029	VB	Wheeler Place, Woodland stream and cascade	Under rock overhang in stream	Wet silt	PS	SF	RI,I
	00214	VB	Base of CC Falls	Behind the falls	Mo./wet ss rock face		R	WF
	00290	VB	CCA, Sink		Wet bldr	PS	SF	S
	00365	VB	CCA, Sink	Base of vertical rock face	Me./Mo. ss	PS	SF	S
	00396	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00422	VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
	00387b	VB	CCA, Sink #2	Waterfall	Wet ss	PS	SF	S,WF
	00405b	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. humus over ls	PS	R	O,B
	00555c	VB	Wheeler place, waterfall	ss wall	Dry/Me. ss	PS	SF	WF
	<i>Haplohymenium triste</i>	00209	VB	Rockhouse Creek	For. slope at bend	Me./Mo. holly bark		PF
00435		VB	Paw Paw Trail	For. trail	Me. bark of standing dead <i>Cornus</i>	PS	PF	T
00456		VB	Road to fisherman's cabins	Wooded roadside	Me. base of oak sapling	PS	RU	R
00476		VB	Village	Wooded area surrounding village	Me. <i>Cornus</i> bark laying on ground	PS	PF	W
00114b		VB	Above PF, So. side of river	For. river's edge	Me. bark of white oak snag		PF	RI,B
00172b		VB	FCF gorge overlook trail	For. trail's edge	Mo. bark of fallen decaying log		PF	T
00316e		VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
00428a		VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
00428b	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T	
<i>Homalotheciella subcapillata</i>	00316a	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Haplohymenium triste</i> (cont.)	00436b	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T
	00436c	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T
<i>Harpalejeunea ovata</i>	00136	VB	Above PF, So. side of river	For. river's edge	Mo. ss vert. rockface		PF	RI,B
	00138	VB	Above PF, So. side of river	For. river's edge	Mo. ss vert. rockface		PF	RI,O,B
	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O,FL
	00575c	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
<i>Hedwigia ciliata</i>	00007	VB	CCA, Quarry road	For. roadside	Mo. ss bldr		RU	R
	00071	VB	Overnight trail, suspension bridge	For. river bank	Me. ss bldr		R	FL
	00110	VB	PF above suspension bridge	Low canopy trail's edge	Mo. ss bldr		PF	T
	00249	VB	CCA, Quarry road	For. roadside	Me. ss bldr	PS	RU	R
	00523	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
	00065b	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00497b	VB	Beyond swimming hole	For. trail's edge	Dry/Me. ss bldr	PS	PF	T
<i>Herbertus aduncus</i> subsp. <i>tenuis</i>	00575c	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
<i>Homalotheciella subcapillata</i>	00115	VB	PF above suspension bridge	For. trail's edge	Me. bark of white oak		PF	T
	00540	VB	Powerline right-of-way leading to Youth Camp 2 road	For.-managed area interface	Dry/Me. fallen branch	PS	RU	F
	00541	VB	Powerline right-of-way leading to Youth Camp 2 road	For.-managed area interface	Dry/Me. trunk of a dogwood (2m)	PS	RU	F
	00051c	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Hookeria acutifolia</i>	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00213b	VB	Base of CC Falls	Base of falls	Mo. sandy soil		R	WF
	00568a	VB	CCG below the falls	River's edge	Mo. ss wall	PS	R	O,I
<i>Hygroamblystegium tenax</i>	00027	VB	Wheeler Place, Woodland stream and cascade	For. stream	Wet sand	PS	SF	RI,I
	00030	VB	Wheeler Place, Woodland stream and cascade	For. slope	Wet ss bldr		SF	RI,I
	00106	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00145	VB	FCF, trail to base	N facing rock face	Wet ss		SF	O
	00381	VB	CCA, Sink	Base of waterfall	Mo. sand	PS	SF	S
	00481	VB	Village	Drainage ditch	Wet/submerged on ss rocks	PS	RU	M,I
	00564	VB	Cave near Stuart's property		Me./Mo. ss wall	PS	SF	C
	00578	VB	Base of FCF	Behind falls	Mo. ss wall	PS	R	WF
	00079c	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls	PS	R	O,B
	00080c	VB	CG, ls outcrop	Under overhang	Me./Mo. calcareous clay soil	PS	R	I
	00099a	VB	CG, big cave	Cool cave entrance	Mo. (ls?) bldr	PS	SF	C
	00389b	VB	CCA, Sink	Below waterfall	Me./Mo. ss bldr	PS	SF	S
	00549b	VB	Wheeler place, waterfall	Stream	Mo./wet rocks	PS	SF	WF
	00554b	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
	<i>Hymenostylium recurvirostre</i>	00579	VB	Base of FCF, behind falls	ss wall	Mo. ss	PS	R
00100c		VB	CG, big cave	Cool cave entrance	Wet ss bldr under drip	PS	SF	C
<i>Hyophila involuta</i>	00268	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. ss bldr	PS	SF	WF
	00385b	VB	CCA, Sink with waterfall		Mo. ss bldr	PS	SF	WF
<i>Hypnum curvifolium</i>	00025	VB	Wheeler Place, Woodland stream and cascade	For. slope	Wet ss		SF	RI,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Hypnum curvifolium</i> (cont.)	00077	VB	CG, ls outcrop	Beside dry stream bed under forest canopy	Me. rotten log		R	O,B
	00229	VB	CG	River bed	Mo. standing decorticated tree trunk	PS	R	FL
	00321	VB	Old farm trail, beyond CC	River's edge	Me./Mo. ss bldr	PS	R	FL
	00347	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rotten log	PS	PF	SW
	00354	VB	Youth Camp 2	Field near swimming hole	Dry/Me. sand	O/ PS	RU	F
	00357	VB	CCA, Sink	For. slope	Mo. rotten log	PS	SF	S
	00432	VB	Paw Paw Trail	For. stream crossing trail	Mo. humus	PS	PF	RI,FL
	00482	VB	Village		Me./Mo. soil	PS	RU	F
	00484	VB	Trail to FCF from Nature Center before fork	On slope beside For. trail	Me./Mo. decorticated log	PS	PF	T
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
<i>Hypnum fertile</i>	00237	VB	CG, trail's end	For. trail's edge	Mo. decaying branch	PS	SF	T
	00066a	VB	Gorge trail/Youth Camp 2	For. slope	Me./Mo. decorticated log		SF	T
	00183a	VB	FCF gorge overlook trail	For. sloped trail's edge	Mo. sandy soil		PF	T
<i>Hypnum imponens</i>	00487	VB	Above Rockhouse falls	Trail's edge	Me./Mo. upper surface ss rock outcrop	PS	PF	O
	00495	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T
	00572	VB	CCG below the falls	River's edge	Me. ss bldr	PS	R	FL
<i>Hypnum lindbergii</i>	00324	VB	Old farm trail, beyond CC	For. river's edge	Mo./wet sand	PS	R	FL,I
	00473	VB	Village	Lawn of roadside bank	Me./Mo. sandy soil	PS	RU	R
	00534a	VB	Lake shore along bike trail	Draw down zone	Wet sandy soil	O/ PS	RU	M,I
<i>Hypnum</i> sp.	00467	VB	Above PF, near suspension bridge	Under rhododendrons	Me./Mo. humus	PS	PF	T
<i>Hypnum</i> sp.	00514	VB	CCG, Buzzard's Roost Trail	For. stream	Mo. ss rocks in stream near base of falls	PS	SF	RI,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Hypnum</i> sp.	00535	VB	Bike trail around lake	Trail bank	Me./Mo. soil	O/ PS	RU	T
<i>Isopterygiopsis muelleriana</i>	00076	VB	Overnight trail, suspension bridge	Flood zone along river	Me./Mo. ss bldr	PS	R	FL
	00065c	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00065f	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
<i>Isopterygium tenerum</i>	00207	VB	Rockhouse Creek	For. stream bank	Me. ss rock face		PF	RI,O,F L
	00569	VB	CCG below the falls	Boulder strewn gorge	Mo. ss wall	PS	R	W,BF
<i>Jubula pennsylvanica</i>	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00133b	VB	Above PF, So. side of river	For. seep	Mo. ss wall		PF	O,SP
	00137a	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
<i>Kurzia sylvatica</i>	00170	VB	FCF gorge overlook trail	Eroded clay bank near bridge	Mo. clay soil		PF	T
	00199	VB	Rockhouse Creek	For. stream's edge	Me./Mo. exposed roots of a rhododendron		PF	RI,FL
	00202	VB	Rockhouse Creek	For. stream bank	Me./Mo. soil		PF	RI,I
	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O, FL
	00468	VB	Above PF before bridge	Under rhododendrons	Mo. soil/humus	PS	PF	T
	00488	VB	Above Rockhouse falls	Shaded bank along trail	Me./Mo. sandy humus	PS	PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Kurzia sylvatica</i> (cont.)	00123a	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00179a	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00179c	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00200c	VB	Rockhouse Creek	Moist, For. stream bank	Mo. stream bank		PF	RI,FL
	00204a	VB	Rockhouse Creek	For. stream bank	Wet ss		PF	RI,O,FL
	00204b	VB	Rockhouse Creek	For. stream bank	Wet ss		PF	RI,O,FL
<i>Lejeunea blomquistii</i>	00130	VB	Above PF, So. side of river, side ravine	For. seep	Mo./wet bldr		PF	O,SP
	00142	VB	FCF, trail to base	Cool shaded rock face	Mo. ss		SF	O
	00151	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00148a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
<i>Lejeunea cavifolia</i>	00261	VB	CCA, Quarry road		Me. ss bldr	PS	SF	R
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00399d	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00560c	VB	Wheeler place, cave above sink	Outside cave entrance	Mo. ss bldr	PS	SF	C
<i>Lejeunea aff. cavifolia</i>	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
<i>Lejeunea laetevirens</i>	00185	VB	FCF, trail to base	Vertical rock face, near cold air vent, 8" above the ground	Mo. ss	PS/FS	SF	O
	00205	VB	Rockhouse Creek	For. stream bank	Me. Mo. ss		PF	RI,O,FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Lejeunea laetevirens</i> (cont.)	00265	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00306	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00315	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	O	SF	O
	00364	VB	CCA, Sink	Protected base of vert. wall	Me. ss bldr	PS	SF	S
	00368	VB	CCA, Sink	For. slope	Me. protected ss	PS/ FS	SF	S
	00369	VB	CCA, Sink	For. slope	Me. protected ss bldr	PS	SF	S
	00374	VB	CCA, Sink	Boulder strewn slope	Me. upper surface of ss bldr	PS	SF	S,BF
	00489	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00164a	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
	00164b	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
	00169a	VB	FCF, trail to base	N facing rock face near cold air vent	Mo. ss		SF	O
<i>Lejeunea lamacerina</i> subsp. <i>gemminata</i>	00205	VB	Rockhouse Creek	For. stream bank	Me. Mo. ss		PF	RI,O, FL
	00207	VB	Rockhouse Creek	For. stream bank	Me. ss rock face		PF	RI,O, FL
	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O, FL
	00218	VB	Base of CC Falls	Behind falls near river's edge	Mo./wet ss bldr		R	WF
	00236	VB	CG	Dry river bed	Mo. ss bldr	PS	R	I
	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00363	VB	CCA, Sink	Base of stone wall	Protected Me. ss bldr	PS	SF	S
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
00313c	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O	
<i>Lejeunea ruthii</i>	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Lejeunea ruthii</i> (cont.)	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O, FL
	00219	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Me. bark of sweetgum at base of trail		RU	T
	00523	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
	00526	VB	CG, big cave	Cool cave entrance	Me./Mo. ss bldr	PS	SF	C
	00065a	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00089a	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00089b	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00118a	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00118b	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00129a	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. rocks	PS	PF	RI,I
	00178a	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
00178b	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T	
<i>Lejeunea sharpii</i>	00167	VB	CG, ls outcrop	Cool air vent in gully	Mo. ss bldr		R	O,FL
<i>Lejeunea</i> sp.	00235	VB	CG	Dry river bed	Mo. ss bldr	PS	R	I
<i>Lejeunea ulicina</i>	00087	VB	CG, trail to big cave	Dry stream bed under forest canopy	Mo. Sweet gum bark		R	ST,I
	00121	VB	Above PF, So. side of river	For. river's edge	Me. bark		PF	RI,B
	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00207	VB	Rockhouse Creek	For. stream bank	Me. ss rock face		PF	RI,O, FL
	00476	VB	Village	Wooded area surrounding village	Me. Comus bark laying on ground	PS	PF	W

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Lejeunea ulicina</i> (cont.)	00573	VB	CCG below the falls	River's edge	Me. bark of birch trunk	PS	R	B
	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00148b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00172a	VB	FCF gorge overlook trail	For. trail's edge	Mo. bark of fallen decaying log		PF	T
	00178a	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
	00428a	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
	00575c	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
<i>Leucobryum albidum</i>	00346	VB	Piney Mtn. Bike Trail	For. upland swamp	Me./Mo. raised humus	PS	PF	SW
	00414	VB	FCF gorge overlook trail	For. trail	Me./dry humus	PS	PF	T
	00416	VB	FCF gorge overlook trail	For. trail	Me./dry sandy soil	PS	PF	T
	00507	VB	CCG, Buzzard's Roost Trail	For. slope	Mo./wet ss bldr	PS	SF	T
	00179b	VB	FCF gorge overlook trail; Rocky Point Overlook	Steep outcrop	Me./Mo. ss wall	PS	PF	O
	00439b	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
<i>Leucobryum glaucum</i>	00039	VB	Piney Mtn. Bike Trail	For. plateau site	Me. soil		PF	W
	00512	VB	CCG, Buzzard's Roost Trail	Stream below falls	Wet ss	PS	SF	RI,I
	00200a	VB	Rockhouse Creek	Moist, For. stream bank	Mo. stream bank		PF	RI,FL
<i>Leucobryum</i> sp.	00460	VB	Trail to base of FCF	Trail's edge	Me./Mo. sand	PS	SF	T
<i>Leucobryum</i> sp.	00465	VB	Trail to base of FCF	Trail's edge	Me./Mo. base of hemlock	PS	SF	T
<i>Leucobryum</i> sp.	00584	VB	Falls loop, below drainage before Caplenor Point	For. slope	Me. ss wall	PS	SF	O,W
<i>Leucobryum</i> sp.	00137a	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL
<i>Leucobryum</i> sp.	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Leucodon brachypus</i>	00486	VB	Nature Center	Covering trunk of large Platanus	Dry/Me. bark of Platanus tree	PS	RU	M
	00428a	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
	00436a	VB	Paw Paw Trail	For. trail edge	Mo. bark (remenant) of a rotten log	PS	PF	T
<i>Leucodon julaceus</i>	00455	VB	Road to fisherman's cabins	Wooded roadside	Me./Mo. base of oak	PS	RU	R
	00457	VB	Road to fisherman's cabins	Wooded roadside	Me./Mo. bark of large oak (common into canopy)	PS	RU	R
	00475	VB	Village	Wooded area surrounding village	Me. large standing dead tree (oak?)	PS	PF	W
	00525	VB	CCG, Buzzard's Roost Trail	For. slope	Me./Mo. rotten branch	PS	SF	T
<i>Leucolejeunea clypeata</i>	00010	VB	CCA, Quarry road	For. roadside	Me. ss bldr		RU	R
	00062	VB	Gorge trail/Youth Camp 2	For. trail	Me. trunk of chestnut oak on slope	PS	SF	T
	00069	VB	Overnight trail, suspension bridge	For. river's edge	Me. bark of Magnolia macrocarpa		R	B
	00071	VB	Overnight trail, suspension bridge	For. river bank	Me. ss bldr		R	FL
	00173	VB	FCF gorge overlook trail above CC overlook	For. trail's edge	Mo. decaying log		PF	T
	00175	VB	FCF gorge overlook trail above CC overlook	For. trail's edge	Me. bark of Aesculus?		PF	T
	00186	VB	FCF, trail to base	For. trail's edge	Me. ss bldr		SF	T
	00197	VB	Rockhouse Creek	For. stream's edge	Me. bark of rhododendron		PF	RI,B
	00209	VB	Rockhouse Creek	For. slope at bend	Me./Mo. holly bark		PF	RI,B
	00217	VB	CC Falls, Cable trail	Behind falls near river's edge	Mo./wet ss bldr		R	WF
	00219	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Me. bark of sweetgum at base of trail		RU	T
00221	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Dry/Me. ss bldr		RU	T	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Leucolejeunea clypeata</i> (cont.)	00233	VB	CG	River bank	Me./Mo. bark of beech tree	PS	R	B
	00234	VB	CG	Dry river bank	Mo. ss bldr	PS	R	FL
	00250	VB	CCA, Quarry road	For. roadside	Dry/Me. ss bldr	PS	RU	R
	00269	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. ss bldr	PS	SF	WF
	00374	VB	CCA, Sink	Boulder strewn slope	Me. upper surface of ss bldr	PS	SF	S,BF
	00375	VB	CCA, Sink	Shaded slope	Me. upper surface of ss bldr	PS	SF	S
	00449	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. bark of Kalmia	PS	PF	ST,I
	00451	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. fallen log	PS	PF	ST,I
	00464	VB	FCF, trail to base	Shaded trail's edge	Me. ss bldr	PS	SF	O
	00491	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00493	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00051a	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00053c	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark of red maple		PF	SW
	00067b	VB	Gorge trail/Youth Camp 2	For. stream edge	Me. bldr		SF	RI,B
	00070b	VB	Gorge trail/Youth Camp 2	For. stream edge	Me. bark		SF	RI,B
	00118a	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00118b	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00129a	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. rocks	PS	PF	RI,I
	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL
00171a	VB	FCF gorge overlook trail	For. trail's edge	Me. bark of Aesculus?		PF	T	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Leucolejeunea clypeata</i> (cont.)	00172a	VB	FCF gorge overlook trail	For. trail's edge	Mo. bark of fallen decaying log		PF	T
	00178a	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
	00178b	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
	00376b	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00428a	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
	00458a	VB	Road to fisherman's cabins	Wooded roadside	Me./Mo. bark, base of oak	PS	RU	R
	00551b	VB	Wheeler place, waterfall		Me. ss bldr	PS	SF	WF
	00561c	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
<i>Leucolejeunea conchifolia</i>	00109	VB	PF trail to bridge	For. trail's edge	Me./Mo. red maple bark		PF	T
	00176	VB	FCF gorge overlook trail	For. trail's edge	Me. bark of oak		PF	T
	00321	VB	Old farm trail, beyond CC	River's edge	Me./Mo. ss bldr	PS	R	FL
	00222b	VB	Overnight trail at Caney Fork Bridge	For. trail's edge	Me. bark of red maple		SF	T
<i>Leucolejeunea unciloba</i>	00087	VB	CG, trail to big cave	Dry stream bed under forest canopy	Mo. Sweet gum bark		R	ST,I
	00115	VB	PF above suspension bridge	For. trail's edge	Me. bark of white oak		PF	T
	00119	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. bark of black gum	PS	PF	RI,B
	00121	VB	Above PF, So. side of river	For. river's edge	Me. bark		PF	RI,B
	00573	VB	CCG below the falls	River's edge	Me. bark of birch trunk	PS	R	B
	00113a	VB	PF' bridge	For. trail's edge	Me. red oak bark		PF	T
<i>Loeskeobryum brevirostre</i>	00088	VB	CG, big cave	Cool cave entrance	Mo. rotten log		SF	C
	00091a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	00092c	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
<i>Lophocolea aff. bidentata</i>	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Lophozia bicrenata</i>	00112	VB	PF trail to bridge	Shrubby opening	Mo. soil		PF	T
<i>Mannia triandra</i>	00165	VB	CG, big cave	Cool shaded cave entrance	Mo. ss bldr		SF	C
	00100a	VB	CG, big cave	Cool cave entrance	Wet ss bldr under drip	PS	SF	C
<i>Marsupella emarginata</i>	00446	B	Chinquapin Mtn. Bike Trail	Stream bed	Wet/subject to inundation rocks	PS	PF	RI,I
<i>Metzgeria conjugata</i>	00010	VB	CCA, Quarry road	For. roadside	Me. ss bldr		RU	R
	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	RI,B
	00163	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	RI,B
	00306	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00311	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00372	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
	00570	VB	CCG below the falls	River's edge	Me./Mo. ss ledge (lower surface)	PS	R	O,FL
	00089a	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00161b	VB	FCF, CC confluence	For. river's edge	Me./Mo. box shaped ss bldr		R	FL,B
	00575b	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
<i>Metzgeria crassipilis</i>	00065a	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	B
	00065d	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00089b	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00107d	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
<i>Metzgeria furcata</i>	00207	VB	Rockhouse Creek	For. stream bank	Me. ss rock face		PF	RI,O,FL
	00209	VB	Rockhouse Creek	For. slope at bend	Me./Mo. holly bark		PF	RI,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Metzgeria furcata</i> (cont.)	00374	VB	CCA, Sink	Boulder strewn slope	Me. upper surface of ss bldr	PS	SF	S,BF
	00375	VB	CCA, Sink	Shaded slope	Me. upper surface of ss bldr	PS	SF	S
	00491	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00065e	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00065g	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00067b	VB	Gorge trail/Youth Camp 2	For. stream edge	Me. bldr		SF	RI,B
	00118a	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00118b	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00129a	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. rocks	PS	PF	RI,I
	00129b	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. twig on the ground	PS	PF	RI,B
	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152c	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152d	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	<i>Metzgeria leptoneura</i>	00154	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R
<i>Metzgeria myriopoda</i>	00205	VB	Rockhouse Creek	For. stream bank	Me. Mo. ss		PF	RI,O,FL
	00221	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Dry/Me. ss bldr		RU	T
	00051a	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
<i>Mnium hornum</i>	00022	VB	CCA, Quarry road, outlet	River outlet	ls bldr	PS	R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Mnium hornum</i> (cont.)	00194	VB	FCF woodland trail	For. stream bank above bridge	Mo. sandy soil		PF	RI,FL
	00201	VB	Rockhouse Creek	Moist, For. stream bank	Mo. ss		PF	RI,O,FL
	00326	VB	Old farm trail, beyond CC	For. trail's edge	Me./Mo. ss wall	PS	SF	T
	00388	VB	CCA, Sink with waterfall	Below falls	Me./Mo. fallen log	PS	SF	WF
	00393	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00418	VB	FCF, bridge above falls	For. stream bank	Mo. humus	PS	PF	RI,FL
	00556	VB	Wheeler place, waterfall	ss wall	Mo./wet ss wall	PS	SF	WF
	00586	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00081a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
	00083b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
	00083d	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
	00101d	VB	CG, big cave	Cool cave entrance; Inside	Wet clay		SF	C
	00107a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00210a	VB	Rockhouse Creek	For. stream bank	Mo. soil on upper surface of ss wall		PF	RI,O,B
	00392b	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00554a	VB	Wheeler place, waterfall	For. slope	Me. ss bldr	PS	SF	WF
<i>Mnium marginatum</i>	00401b	VB	CCA, Quarry road; outlet	River outlet	Mo. soil in pocket formed by bldrs	PS/FS	R	O,FL
<i>Mnium</i> sp.	00310	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
<i>Mnium</i> sp.	00325	VB	Old farm trail, beyond CC	For. river's edge in overflow area	Mo. soil	PS	R	FL
<i>Mnium</i> sp.	00401a	VB	CCA, Quarry road; outlet	River outlet	Mo. soil in pocket formed by bldrs	PS/FS	R	O,FL
<i>Mnium stellare</i>	00144	VB	FCF, trail to base	Cool shaded rock face	Mo. ss		SF	O
	00156	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
<i>Myurella sibirica</i>	00020	VB	CCA, Quarry road, outlet	River outlet	Me. ls bldr		R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Myurella sibirica</i> (cont.)	00086	VB	CG, ls outcrop	ls outcrops, vertical rockface	Mo. ls	PS	R	O,B
	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
	00078a	VB	CG, ls outcrop	Shaded ls outcrop	Mo./wet ls soil	PS	R	O,B
	00081a	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
	00101b	VB	CG, big cave	Cool cave entrance; Inside	Wet clay		SF	C
	00107a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
<i>Nardia lescurii</i>	00126	VB	Above PF, So. side of river near bridge	Below shrub canopy on an island in the river	Wet soil		PF	RI,FL
	00334	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. sand on stream bank	PS	PF	SW
	00335	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus along stream	PS	PF	SW
	00057a	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
<i>Neckera complanata</i>	00143	VB	FCF, trail to base	N facing rock face	Me./Mo. ss		SF	O
	00426	VB	FCF trail to base of falls	For. trail along slope	Me. trunk of basswood	PS	SF	T
<i>Neckera pennata</i>	00089a	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
<i>Nowellia curvifolia</i>	00068	VB	Overnight trail, suspension bridge	For. river's edge	Mo. decorticated log		R	FL
	00155	VB	FCF, river below falls	For. river's edge	Mo. decorticated log	PS	R	FL
	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00230	VB	CG	Dry river bed	Mo. decorticated trunk	PS	R	I
	00300	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. rotten branch on ground	PS	SF	T
	00341	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. decorticated log	PS	PF	SW
	00344	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rotten log	PS	PF	SW
	00066b	VB	Gorge trail/Youth Camp 2	For. slope	Me./Mo. decorticated log		SF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Nowellia curvifolia</i> (cont.)	00120b	VB	Above PF, So. side of river	Boulder field on For. river's edge	Mo. ss bldr		PF	W,BF
	00225a	VB	Stable road, overnight trail	For. trail	Me./Mo. decorticated virginia pine		PF	T
	00225b	VB	Stable road, overnight trail	For. trail	Me./Mo. decorticated virginia pine		PF	T
<i>Odontoschisma denudatum</i>	00341	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. decorticated log	PS	PF	SW
	00496	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log with <i>Pallavacinia</i>	PS	PF	T
	00095a	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095c	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095d	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
<i>Odontoschisma prostratum</i>	00124	VB	Above PF, So. side of river	For. river's edge	Mo. sandy soil	PS	PF	RI,I
	00135	VB	Above PF, So. side of river	For. river's edge	Mo. ss vert. rockface		PF	RI,O,B
	00228	VB	CG	For. trail through dry river bed	Mo. ss bldr	PS	R	T
	00335	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus along stream	PS	PF	SW
	00344	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rotten log	PS	PF	SW
	00346	VB	Piney Mtn. Bike Trail	For. upland swamp	Me./Mo. raised humux of humus	PS	PF	SW
	00468	VB	Above PF before bridge	Under rhododendrons	Mo. soil/humus	PS	PF	T
	00576	VB	Trail to base of FCF	For. heavy use trail	Me. ss	PS	SF	T
	00056b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil		PF	SW
	00057b	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Odontoschisma prostratum</i> (cont.)	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O,FL
	00580a	VB	Base of FCF, Falls side	ss wall	Me. ss	PS	R	WF,O
<i>Orthotrichum pusillum</i>	00525	VB	CCG, Buzzard's Roost Trail	For. slope	Me./Mo. rotten branch	PS	SF	T
<i>Orthotrichum stellatum</i>	00316b	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
<i>Orthotrichum strangulatum</i>	00023	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr	PS	R	O,B
	00411	VB	CCA, Quarry road; outlet	River outlet	Me. ls in small crevice	PS	R	O,B
	00399b	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
<i>Oxystegus tenuirostris</i>	00082	VB	CG, ls outcrop	Shaded ls outcrop	ls verticle face	PS	R	O,B
	00246	VB	CG	ls hole	Mo. vert. ss wall	PS	R	O,FL
	00078b	VB	CG, ls outcrop	Shaded ls outcrop	Mo./wet ls soil	PS	R	O,B
<i>Pallavicinia lyellii</i>	00191	VB	FCF, trail to base	Fall's base	Wet ss bldr		R	WF
	00419	VB	FCF, bridge above falls	For. stream bank	Mo. humus	PS	PF	RI,FL
	00058a	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rich soil		PF	SW
	00494b	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T
<i>Pellia epiphylla</i>	00158	VB	FCF, river below falls	For. river's edge	Mo. sandy soil		R	FL,I
	00192	VB	FCF, trail to base	Fall's base	Wet ss bldr		R	WF
	00287	VB	CCA, Sink	For. slope	Mo./wet vert. ss wall	PS	SF	S
	00324	VB	Old farm trail, beyond CC	For. river's edge	Mo./wet sand	PS	R	FL,I
	00418	VB	FCF, bridge above falls	For. stream bank	Mo. humus	PS	PF	RI,FL
	00424	VB	FCF, base of falls		Me./Mo. soil	PS	R	WF
	00440	B	Chinquapin Mtn. Bike Trail, bridge	Stream under bank	Mo. soil	PS	PF	RI,I
	00441	B	Chinquapin Mtn. Bike Trail	For. stream bank	Mo. soil	PS	PF	RI,I
	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00210a	VB	Rockhouse Creek	For. stream bank	Mo. soil on upper surface of ss wall		PF	RI,O,B
00213a	VB	Base of CC Falls	Base of falls	Mo. sandy soil		R	WF	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Pellia epiphylla</i> (cont.)	00439a	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
	00439b	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
<i>Philonotis fontana</i>	00291	VB	CCA, Sink	For. slope	Wet ss bldr	PS	SF	S
	00409	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls bldr near water	PS	R	O,B
	00569	VB	CCG below the falls	Boulder strewn gorge	Mo. ss wall	PS	R	W,BF
	00152x	VB	Above PF, So. side of river near bridge	For. seep	Wet ss		PF	O,SP
	00387a	VB	CCA, Sink #2	Waterfall	Wet ss	PS	SF	S,WF
<i>Philonotis fontana</i> var. <i>caespitosa</i>	00427	VB	Above CC Falls; below bridge near Nature Center	River bed subject to inundation	Wet rocks	O/PS	PF	RI,I
<i>Philonotis</i> aff. <i>glaucescens</i>	00332	VB	Farm access road	Middle of road	Me./Mo. sand/clay	PS	RU	R
<i>Physcomitrium pyriforme</i>	00031	VB	CCA, Wheeler homestead	Abandoned field	Me. soil under canopy of grasses	PS	RU	F
	00544	VB	Road to Inn	Roadside ditch	Wet sandy soil	O/PS	RU	F
<i>Plagiochila</i> (fcf unnamed)	00420	VB	FCF, trail to base	Cool protected corner of a rock wall	Mo. ss	PS/FS	SF	O
	00463	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
	00581	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
	00169b	VB	FCF, trail to base	N facing rock face near cold air vent	Mo. ss		SF	O
	00575a	VB	FCF, trail to base	Protected cool rock face	Me. ss	PS	SF	O
<i>Plagiochila asplenoides</i> subsp. <i>porelloides</i>	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00328	VB	Old farm trail, beyond CC	For. river's edge	Me./Mo. sand	PS	R	FL,I
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Plagiochila asplenoides</i> subsp. <i>porelloides</i> (cont.)	00410	VB	CCA, Quarry road; outlet	Boulders	Me./Mo. ls bldr	PS	R	O,B
	00514	VB	CCG, Buzzard's Roost Trail	For. stream	Mo. ss rocks in stream near base of falls	PS	SF	RI,I
	00562	VB	Wheeler place, lower cave		Mo./wet ss bldr	PS	SF	C
	00091b	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	00102a	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102e	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00107a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00133b	VB	Above PF, So. side of river	For. seep	Mo. ss wall		PF	O,SP
	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152c	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00164a	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
<i>Plagiochila austini</i>	00363	VB	CCA, Sink	Base of stone wall	Protected Me. ss bldr	PS	SF	S
	00364	VB	CCA, Sink	Protected base of vert. wall	Me. ss bldr	PS	SF	S
	00368	VB	CCA, Sink	For. slope	Me. protected ss	PS/ FS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
<i>Plagiochila ludoviciana</i>	00368	VB	CCA, Sink	For. slope	Me. protected ss	PS/ FS	SF	S
	00369	VB	CCA, Sink	For. slope	Me. protected ss bldr	PS	SF	S
<i>Plagiochila</i> sp.	00141	VB	Above PF, So. side of river	Rockface/cliff	Me. Mo. ss	PS	PF	RI,O,B
<i>Plagiochila</i> sp.	00310	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
<i>Plagiochila sullivantii</i>	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
<i>Plagiochila undata</i>	00371	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00372	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00375	VB	CCA, Sink	Shaded slope	Me. upper surface of ss bldr	PS	SF	S

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Plagiochila virginica</i>	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00403	VB	CCA, Quarry road; outlet	Boulder protected area	Me./Mo. ls bldr	PS/ FS	R	O,B
	00550a	VB	Wheeler place, waterfall	For. slope	Me. soil covering ss bldrs	PS	SF	WF
	00580a	VB	Base of FCF, Falls side	ss wall	Me. ss	PS	R	WF,O
<i>Plagiomnium ellipticum</i>	00389a	VB	CCA, Sink	Below waterfall	Me./Mo. ss bldr	PS	SF	S
<i>Plagiomnium aff. ellipticum</i>	00381	VB	CCA, Sink	Base of waterfall	Mo. sand	PS	SF	S
<i>Plagiomnium ciliare</i>	00033	VB	Roadside to Youth Camp 2	Mowed roadside bank	Mo. soil		RU	F
	00045	VB	Backpack trail near waterfall/Piney Mtn. Bike Trail	For. trail	Me./Mo. humus on ss bldr		SF	T
	00184	VB	FCF, trail to base	For. trail's edge	Mo. sandy soil		SF	T
	00223	VB	Main backroad to 284	Mowed roadside bank	Mo. sandy soil		RU	F
	00238	VB	CG, trail's end	For. trail's edge	Mo. ss bldr	PS	SF	T
	00248	VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
	00253	VB	CG	For. roadside	Dry/Me. sand	PS	RU	R
	00292	VB	CCA, Sink	For. slope	Mo. soil	PS	SF	S
	00293	VB	CCA, Sink	For. slope	Mo. ss bldr	PS	SF	S
	00306	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00328	VB	Old farm trail, beyond CC	For. river's edge	Me./Mo. sand	PS	R	FL,I
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00521	VB	CCG, Buzzard's Roost Trail	For. slope	Me. ss bldr	PS	SF	T
	00064a	VB	Gorge trail/Youth Camp 2	For. trail	Me. midslope ss ledge	PS	SF	T
	00091b	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	<i>Plagiomnium cuspidatum</i>	00012	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr		RU
00019		VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr		R	O,B
00086		VB	CG, ls outcrop	ls outcrops, vertical rockface	Mo. ls	PS	R	O,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Plagiomnium cuspidatum</i> (cont.)	00103	VB	CG, big cave	Cool cave entrance	Mo. soil		SF	C
	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00241	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00295	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. sandy soil mound	PS	SF	T
	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF	O
	00303	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00422	VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
	00472	VB	Village	Roadside open areas in lawn	Me. sandy soil	PS	RU	F
	00524	VB	CCG, Buzzard's Roost Trail	For. stream	Me./Mo. ss bldr	PS	SF	RI,FL
<i>Plagiomnium rostratum</i>	00094	VB	CG, big cave	Cool cave entrance	Mo. soil	PS	SF	C
	00360	VB	CCA, Sink	For. slope	Me./Mo. crevice in ss wall	PS	SF	S
	00409	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls bldr near water	PS	R	O,B
<i>Plagiothecium denticulatum</i>	00516	VB	CCG, Buzzard's Roost Trail	For. slope	Mo. ss bldr	PS	SF	T
	00120a	VB	Above PF, So. side of river	Boulder field on For. river's edge	Mo. protected pocket on a ss bldr		PF	W,BF
<i>Plagiothecium laetum</i>	00583	VB	Falls loop, below drainage before Caplenor Point	For. slope	Me. ss wall	PS	SF	O,W
<i>Platydictya confervoides</i>	00093	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00080b	VB	CG, ls outcrop	Under overhang	Me./Mo. calcareous clay soil	PS	R	I
	00102b	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00107d	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
<i>Platygyrium repens</i>	00173	VB	FCF gorge overlook trail above CC overlook	For. trail's edge	Mo. decaying log		PF	T
	00176	VB	FCF gorge overlook trail	For. trail's edge	Me. bark of oak		PF	T
	00229	VB	CG	Dry river bed	Mo. standing decorticated tree trunk	PS	R	I
	00231	VB	CG	River	Mo. decorticated trunk	PS	R	FL
	00249	VB	CCA, Quarry road	For. roadside	Me. ss bldr	PS	RU	R

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Platygyrium repens</i> (cont.)	00280	VB	Wheeler Place, Woodland stream and cascade	For. stream	Mo. rotting wood	PS	SF	RI,FL
	00302	VB	Old farm trail, beyond CC	Indian Rockhouse	Dry/Me. rotten branch	PS	SF	T
	00322	VB	Old farm trail, beyond CC	River's edge	Me./Mo. fallen pine log	PS	R	FL
	00333	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. decaying wood	PS	PF	SW
	00435	VB	Paw Paw Trail	For. trail	Me. bark of standing dead Cornus	PS	PF	T
	00444	B	Chinquapin Mtn. Bike Trail	For. trail's edge	Me. decaying log	PS	PF	T
	00476	VB	Village	Wooded area surrounding village	Me. Cornus bark laying on ground	PS	PF	W
	00051a	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00172a	VB	FCF gorge overlook trail	For. trail's edge	Mo. bark of fallen decaying log		PF	T
	00178a	VB	FCF gorge overlook trail	For. trail	Me. lower trunk of chestnut oak	PS	PF	T
	00224b	VB	Stable road, overnight trail	For. trail	Me. fallen pine log		PF	T
	00316c	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
00436d	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T	
<i>Platyhypnidium riparioides</i>	00325	VB	Old farm trail, beyond CC	For. river's edge in overflow area	Mo. soil	PS	R	FL
<i>Pleurochaete squarrosa</i>	00485	VB	Nature Center	Lawn	Me./Mo. soil	O	RU	F
<i>Pogonatum pensilvanicum</i>	00147	VB	FCF, trail to base	Trail's edge	Mo. clay soil		SF	T
	00443	B	Chinquapin Mtn. Bike Trail	For. trail	Me. sandy soil	PS	PF	T
<i>Polytrichum commune</i>	00223	VB	Main backroad to 284	Mowed roadside bank	Mo. sandy soil		RU	F
	00317	VB	Old farm trail, beyond CC	For. trail's edge	Me. soil	PS	SF	T
	00343	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. humus	PS	PF	SW

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Polytrichum commune</i> (cont.)	00353	VB	Youth Camp 2	Open field near swimming hole	Me. sand	O/PS	RU	F
	00474	VB	Village	Lawn-woods interface on roadside bank	Me./Mo. soil	PS	RU	F
<i>Polytrichum juniperinum</i>	00505	VB	Scenic drive first turnout on right (across from small falls)	ss outcrop	Dry/Me. thin soil	O	PF	O
<i>Polytrichum ohioense</i>	00032	VB	CCA	For. ledge	Mo. sandy soil		SF	W
	00046	VB	Waterfall trail/Backpack trail/Piney Mtn. Bike Trail	For. trail's edge	Me. dark sandy soil	PS	SF	T
	00195	VB	FCF woodland trail	For. trail's edge	Mo. sandy soil		PF	T
	00348	VB	Piney Mtn. Bike Trail	For. upland swamp, trail's edge	Me. humic soil	PS	PF	SW
	00442	B	Chinquapin Mtn. Bike Trail	For. trail	Me. soil	PS	PF	T
	00052a	VB	Piney Mtn. Bike Trail	For. upland swamp	Me./Mo. rich sandy soil		PF	SW
<i>Porella pinnata</i>	00075	VB	Overnight trail, suspension bridge	For. river's edge	Wet/submerged ss bldr		R	I
	00216	VB	Base of CC Falls	Base of falls near river's edge	Mo./wet ss bldr		R	WF
	00284	VB	Wheeler Place, Woodland stream and cascade	For. base of falls	Mo. ss bldr	PS	SF	WF
	00429	VB	Paw Paw Trail	For. trail crossing dry stream	Mo. rocks and wood	PS	PF	T
	00490	VB	Beyond swimming hole	ss wall	Dry sand in crevice	PS	PF	O
	00567	VB	CCG below the falls	River's edge	Me. ss wall subject to inundation	PS	R	O,I
	00161c	VB	FCF, CC confluence	For. river's edge	Me./Mo. box shaped ss bldr		R	FL,B
	00560a	VB	Wheeler place, cave above sink	Mouth of cave	Submerged on rock	PS	SF	C

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Porella platyphylla</i>	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00407	VB	CCA, Quarry road; outlet	Boulders	Me. upper surface of ls bldr	PS	R	O,B
<i>Porella platyphylloidea</i>	00009	VB	CCA, Quarry road	For. roadside	Me. bldr		RU	R
	00166	VB	CG, ls outcrop	Beside dry stream bed under forest canopy	Me. ls		R	O,B
	00270	VB	CCA, Quarry road; outlet	River outlet	Dry ls bldr	PS	R	O,B
	00475	VB	Village	Wooded area surrounding village	Me. large standing dead tree (oak?)	PS	PF	W
	00085b	VB	CG, between outcrop and cave	For. trail's edge	Me. bark of red cedar	PS	SF	T
<i>Pseudotaxiphyllum elegans</i>	00221	VB	CC Falls, Cable trail	Sparsely For. eroding trail	Dry/Me. ss bldr		RU	T
	00512	VB	CCG, Buzzard's Roost Trail	Stream below falls	Wet ss	PS	SF	RI,I
<i>Ptychomitrium incurvum</i>	00492	VB	Swimming hole	Rockface	Me./dry ss	O/ PS	PF	O
<i>Pylaisiadelpha tenuirostris</i>	00155	VB	FCF, river below falls	For. river's edge	Mo. decorticated log	PS	R	FL
	00208	VB	Rockhouse Creek	For. stream bank	Me. ss		PF	RI,O,B
	00466	VB	Trail to base of FCF	Trail's edge, near base	Mo./Me. exposed hemlock root	PS	SF	T
	00561c	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
<i>Racomitrium aciculare</i>	00125	VB	Above PF, So. side of river	Exposed boulder in river	Wet bldr		PF	RI,FL
<i>Radula complanata</i>	00050	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. red maple bark		PF	SW
	00115	VB	PF above suspension bridge	For. trail's edge	Me. bark of white oak		PF	T
	00119	VB	Above PF, So. side of river near bridge	For. river's edge	Mo. bark of black gum	PS	PF	RI,B
	00374	VB	CCA, Sink	Boulder strewn slope	Me. upper surface of ss bldr	PS	SF	S,BF
	00375	VB	CCA, Sink	Shaded slope	Me. upper surface of ss bldr	PS	SF	S

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Radula complanata</i> (cont.)	00435	VB	Paw Paw Trail	For. trail	Me. bark of standing dead Cornus	PS	PF	T
	00051b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00051e	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark		PF	SW
	00081b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls		R	O,B
	00089a	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00089b	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00114a	VB	Above PF, So. side of river	For. river's edge	Me. bark of white oak snag		PF	RI,B
	00313a	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00428a	VB	Paw Paw Trail	For. trail	Me. bark of elm	PS	PF	T
<i>Radula mollis</i>	00263	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00370	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
	00550a	VB	Wheeler place, waterfall	For. slope	Me. soil covering ss bldrs	PS	SF	WF
	00550b	VB	Wheeler place, waterfall	For. slope	Me. soil covering ss bldrs	PS	SF	WF
<i>Radula obconica</i>	00143	VB	FCF, trail to base	N facing rock face	Me./Mo. ss		SF	O
	00163	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00309	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
	00373	VB	CCA, Sink	Protective pocket of boulders	Me. ss bldr	PS	SF	S
	00451	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. fallen log	PS	PF	ST,I
	00585	VB	PF basin	Base of falls	Me. ss wall	PS	R	WF
	00129a	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. rocks	PS	PF	RI,I
	00129b	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. twig on the ground	PS	PF	RI,B

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Radula obconica</i> (cont.)	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152c	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152d	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00561b	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
<i>Radula sullivantii</i>	00570	VB	CCG below the falls	River's edge	Me./Mo. ss ledge (lower surface)	PS	R	O,FL
<i>Radula tenax</i>	00093	VB	CG, big cave	Cool cave entrance	Mo. ss bldr	PS	SF	C
	00153	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00368	VB	CCA, Sink	For. slope	Me. protected ss	PS/ FS	SF	S
<i>Radula voluta</i>	00024	VB	CCA, Quarry road, outlet	River outlet	Mo. soil on bldr		R	O,B
	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00306	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	O
	00371	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00402	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. soil over root	PS	R	T
	00404	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. ls vert. rock face	PS	R	O,B
	00092a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	00102a	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00102b	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00164b	VB	CG, big cave	Cool cave entrance	Mo. ls bldr	PS	SF	C
	00405a	VB	CCA, Quarry road; outlet	River outlet	Me./Mo. humus over ls	PS	R	O,B
	00563a	VB	Wheeler farm, waterfall	For. stream side	Mo. ss bldr beside a stream	PS	SF	RI,B
	<i>Reboulia hemisphaerica</i>	00022	VB	CCA, Quarry road, outlet	River outlet	ls bldr	PS	R
00144		VB	FCF, trail to base	Cool shaded rock face	Mo. ss		SF	O
00310		VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss wall	PS	SF	O
00422		VB	FCF, base of falls	Base of rock wall	Mo. soil	PS	R	WF
<i>Rectolejeunea maxonii</i>	00113b	VB	PF' bridge	For. trail's edge	Me. red oak bark		PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Rhabdoweisia crispata</i>	00584	VB	Falls loop, below drainage before Caplenor Point	For. slope	Me. ss wall	PS	SF	O,W
	00140b	VB	Above PF, So. side of river	Rock outcrops above falls	Mo. ss wert. rockface	PS	PF	RI,O,B
<i>Rhizomnium punctatum</i>	00149	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00206	VB	Rockhouse Creek	For. stream bank	Me./Mo. sandy soil		PF	RI,I
	00247	VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
	00248	VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
	00394	VB	CCA, Sink	Below falls	Mo. ss bldr	PS	SF	WF
	00586	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00210a	VB	Rockhouse Creek	For. stream bank	Mo. soil on upper surface of ss wall		PF	RI,O,B
<i>Rhodobryum roseum</i>	00013	VB	CCA, Quarry road	For. roadside	Me./Mo. ss bldr		RU	R
	00084	VB	CG, ls outcrop	Shaded ls outcrop	Me./Mo. base of ls wall	PS	R	O,B
	00243	VB	CG	For. trail's edge	Mo. ss	PS	SF	T
	00091a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
<i>Rhytidadelphus squarrosus</i>	00092b	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
<i>Riccardia jugata</i>	00588	VB	PF basin	Base of falls	Wet decorticated log	O/ PS	R	WF
<i>Riccardia palmata</i>	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00095d	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
<i>Scapania nemorosa</i>	00060	VB	Wheeler Place, Woodland stream and cascade	Shallow overhang in stream	Wet silty sand	PS	SF	WF
	00126	VB	Above PF, So. side of river near bridge	Below shrub canopy on an island in the river	Wet soil		PF	RI,FL
	00138	VB	Above PF, So. side of river	For. river's edge	Mo. ss vert. rockface		PF	RI,B
	00157	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00177	VB	FCF gorge overlook trail side trail to unmarked overlook	For. trail's edge, fissured stone wall	Me. ss		PF	T,O

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Scapania nemorosa</i> (cont.)	00212	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O,FL
	00228	VB	CG	For. trail through dry river bed	Mo. ss bldr	PS	R	T
	00248	VB	CG, big cave	Cool cave entrance	Mo. rotten log	PS	SF	C
	00318	VB	Old farm trail, beyond CC	For. trail's edge	Me. soil	PS	SF	T
	00499	VB	Beyond swimming hole	Stream bank	Mo./wet soil	PS	PF	RI,I
	00586	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00590	VB	Piney Creek Gorge outside boulder wall	Island in creek bed	Me. sand over ss bldr	PS	R	I
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00095c	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
	00152b	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
<i>Scapania undulata</i>	00127	VB	Above PF, So. side of river	For. river's edge	Wet bldr in river		PF	RI,FL
	00150	VB	FCF, river below falls	Riverbed below falls in gorge	Mo. rocks subject to inundation	PS	R	I
	00193	VB	FCF, trail to base	Fall's base	Wet ss bldr		R	WF
	00425	VB	FCF, base of falls		Mo. soil over rocks	PS	R	WF
	00056a	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil		PF	SW
	00070c	VB	Gorge trail/Youth Camp 2	For. stream edge	Mo. sandy soil		SF	RI,FL
	00007	VB	CCA, Quarry road	For. roadside	Mo. ss bldr		RU	R
<i>Schistidium apocarpum</i>	00063	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr		R	FL
	00071	VB	Overnight trail, suspension bridge	For. river bank	Me. ss bldr		R	FL
	00250	VB	CCA, Quarry road	For. roadside	Dry/Me. ss bldr	PS	RU	R
	00376b	VB	CCA, Sink	For. slope	Me. ss bldr	PS	SF	S
	00497a	VB	Beyond swimming hole	For. trail's edge	Dry/Me. ss bldr	PS	PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Schistidium rivulare</i>	00260	VB	CCA, Quarry road	Quarry	Dry exposed upper surface of ls	PS	RU	O
	00366	VB	CCA, Sink	Vertical stonewall	Me. ss	PS	SF	S
	00452	B	Chinquapin Mtn. Bike Trail	For. stream	Mo. ss rocks	PS	PF	RI,I
	00479	VB	Village	Parking lot	Thin Me. soil over blacktop	PS	RU	MM
	00503	VB	Swimming hole	Water's edge	Dry/Me. concrete bench	O/ PS	PF	MM
	00064b	VB	Gorge trail/Youth Camp 2	For. trail	Me. midslope ss ledge	PS	SF	T
	00099b	VB	CG, big cave	Cool cave entrance	Mo. (ls?) bldr	PS	SF	C
	00102d	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
	00399d	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B
	00555b	VB	Wheeler place, waterfall	ss wall	Dry/Me. ss	PS	SF	WF
<i>Schwetschkeopsis fabronia</i>	00163	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00298	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00355	VB	CCA, Sink	For. slope	Mo. bark of tulip poplar	PS	SF	S
	00375	VB	CCA, Sink	Shaded slope	Me. upper surface of ss bldr	PS	SF	S
	00523	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T
	00065e	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00065g	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr	PS	R	FL
	00316b	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
	00551a	VB	Wheeler place, waterfall		Me. sand on ss bldr	PS	SF	WF
<i>Sematophyllum adnatum</i>	00063	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr		R	FL
	00173	VB	FCF gorge overlook trail above CC overlook	For. trail's edge	Mo. decaying log		PF	T
	00434	VB	Paw Paw Trail	For. trail	Me. rotten wood	PS	PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Sematophyllum demissum</i>	00151	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00198	VB	Rockhouse Creek	For. stream's edge	Me./Mo. ss		PF	RI,O, FL
	00211	VB	Rockhouse Creek	For. stream bank	Me./Mo. ss rock face		PF	RI,O, FL
	00235	VB	CG	Dry river bed	Mo. ss bldr	PS	R	I
	00257	VB	CCA, Quarry road	For. road side bank	Dry/Me. sandy soil	PS	RU	R
	00430	VB	Paw Paw Trail	Dry stream bed	Mo. ss rocks	PS	PF	ST,I
	00437	VB	Paw Paw Trail	For. trail	Me. ss rock on tip-up mound	PS	PF	T
	00452	B	Chinquapin Mtn. Bike Trail	For. stream	Mo. ss rocks	PS	PF	RI,I
	00120b	VB	Above PF, So. side of river	Boulder field on For. river's edge	Mo. ss bldr		PF	W,BF
00137b	VB	Above PF, So. side of river	For. river's edge	Mo. ss		PF	RI,O, FL	
<i>Sematophyllum marylandicum</i>	00134	VB	Above PF, So. side of river	For. seep	Wet rocks		PF	O,SP
	00448	B	Chinquapin Mtn. Bike Trail	For. stream bank	Me./Mo. sandy soil	PS	PF	RI,I
	00499	VB	Beyond swimming hole	Stream bank	Mo./wet soil	PS	PF	RI,I
	00500	VB	Beyond swimming hole	Stream	Submerged covering rocks	PS	PF	RI,I
	00500	VB	Beyond swimming hole	Under overhang in stream	Mo./wet soil	FS	PF	RI,I
	00509	VB	CCG, Buzzard's Roost Trail	Cascades of stream	Wet/submerged ss	PS	SF	RI,I
	00510	VB	CCG, Buzzard's Roost Trail	Cascades of stream	Wet/submerged ss	PS	SF	RI,I
<i>Solenostoma crenuliformis</i>	00500	VB	Beyond swimming hole	Under overhang in stream	Mo./wet soil	FS	PF	RI,I
	00200b	VB	Rockhouse Creek	Moist, For. stream bank	Mo. stream bank		PF	RI,FL
<i>Solenostoma gracillimum</i>	00060	VB	Wheeler Place, Woodland stream and cascade	Shallow overhang in stream	Wet silty sand	PS	SF	WF
<i>Solenostoma hyalinum</i>	00586	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00587	VB	PF basin	Cracks in rocks	Me. fern rhizomes	PS	R	O,FL
	00070c	VB	Gorge trail/Youth Camp 2	For. stream edge	Mo. sandy soil		SF	RI,FL

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Solenostoma aff. obscurum</i>	00150	VB	FCF, river below falls	Riverbed below falls in gorge	Mo. rocks subject to inundation	PS	R	I
<i>Solenostoma pumilum</i>	00150	VB	FCF, river below falls	Riverbed below falls in gorge	Mo. rocks subject to inundation	PS	R	I
	00160	VB	FCF, river below falls	For. river's edge	Mo. ss rocks, subject to inundation	PS	R	FL,I
	00188	VB	FCF, base of falls	Fall's base	Wet ss bldr		R	WF
<i>Sphagnum affine</i>	00035	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo. humus off trail	PS	PF	SW
	00038	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil	PS	PF	SW
	00048	VB	Piney Mtn. Bike Trail	For. stream at base of tree near small bridge	Mo. sand	PS	PF	RI,FL
	00330	VB	Old farm trail, beyond CC	Abandoned trail parallel to a river	Mo./wet soil	PS	R	FL,T
	00432	VB	Paw Paw Trail	For. stream crossing trail	Mo. humus	PS	PF	RI,FL
	00453	B	Chinquapin Mtn. Bike Trail	For. stream bank	Me./Mo. soil and humus	PS	PF	RI,FL
<i>Sphagnum lescurii</i>	00049	VB	Piney Mtn. Bike Trail	For. upland swamp in high water zone	Wet sandy soil	PS	PF	SW
	00131	VB	Above PF, So. side of river	For. seep	Wet ss wall	PS	PF	O,SP
	00190	VB	FCF, base of falls	Mist filled falls basin	Wet sand on ss bldr	PS	R	WF
	00227	VB	Stable trail, overnight trail	Open For. wetland	Wet soil, no standing water	PS	PF	W,I
	00227	VB	Stable trail, overnight trail	Open For. wetland	Wet soil, no standing water	PS	PF	W,I
	00318	VB	Old farm trail, beyond CC	For. trail's edge	Me. soil	PS	SF	T
	00586	VB	PF basin	Cracks in rocks	Me. fem rhizomes	PS	R	O,FL
	00587	VB	PF basin	Cracks in rocks	Me. fem rhizomes	PS	R	O,FL
	00534b	VB	Lake shore along bike trail	Draw down zone	Wet sandy soil	O/ PS	RU	M,I

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Sphagnum subsecundum</i>	00037	VB	Piney Mtn. Bike Trail	For. upland swamp	Submerged	PS	PF	SW
	00072	VB	Overnight trail, suspension bridge; campsite at base	For. river bank	Mo. sandy soil	PS	R	FL
	00329	VB	Old farm trail, beyond CC	For. trail	Mo./wet soil on abandoned trail	PS	SF	T
	00335	VB	Piney Mtn. Bike Trail	For. upland swamp	Mo./wet humus along stream	PS	PF	SW
	00344	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet rotten log	PS	PF	SW
	00498	VB	Beyond swimming hole	For. stream bank	Mo./wet soil	PS	PF	RI,I
<i>Stereocleus serrulatus</i>	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF	O
	00477	VB	Village	Wooded area surrounding village	Me. base of small fallen tree	PS	PF	W
	00436d	VB	Paw Paw Trail	For. trail edge	Mo. bark (remanent) of a rotten log	PS	PF	T
<i>Taxiphyllum deplanatum</i>	00556	VB	Wheeler place, waterfall	ss wall	Mo./wet ss wall	PS	SF	WF
	00078c	VB	CG, ls outcrop	Shaded ls outcrop	Mo./wet ls soil	PS	R	O,B
	00401a	VB	CCA, Quarry road; outlet	River outlet	Mo. soil in pocket formed by bldrs	PS/ FS	R	O,FL
<i>Taxiphyllum taxirameum</i>	00242	VB	CG	For. trail's edge	Mo. ss bldr	PS	SF	T
	00283	VB	Wheeler Place, Woodland stream and cascade	Rockhouse, protected pocket	Me./Mo. vert. ss rockface	PS	SF	WF
	00379	VB	CCA, Sink	Base of stone wall	Me./Mo. soil	PS	SF	S
<i>Telaranea nematodes</i>	00336	VB	Piney Mtn. Bike Trail	For. upland swamp, along stream	Wet humic soil	PS	PF	SW
	00057a	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
	00057c	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil on stream bank	PS	PF	SW
<i>Tetraphis pellucida</i>	00162	VB	FCF, CC confluence	For. river's edge	Wet rotten stump		R	FL
	00494a	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Thamnobryum alleghaniense</i>	00146	VB	FCF, river below falls	For. river's edge	Mo. ss		R	O,B
	00154	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00326	VB	Old farm trail, beyond CC	For. trail's edge	Me./Mo. ss wall	PS	SF	T
	00380	VB	CCA, Sink with waterfall	Near falls	Me./Mo. ss bldr	PS	SF	RI,I
	00562	VB	Wheeler place, lower cave		Mo./wet ss bldr	PS	SF	C
<i>Thelia hirtella</i>	00023	VB	CCA, Quarry road, outlet	River outlet	Mo. ls bldr	PS	R	O,B
	00055	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. red maple bark		PF	SW
	00355	VB	CCA, Sink	For. slope	Mo. bark of tulip poplar	PS	SF	S
	00412	VB	CCA, Quarry road; outlet	Boulders	Me./Mo. ls bldr	PS	R	O,B
	00316d	VB	Old farm trail, beyond CC	For. trail's edge	Me. bark of red cedar	PS	SF	T
<i>Thuidium delicatulum</i>	00038	VB	Piney Mtn. Bike Trail	For. upland swamp	Wet sandy soil	PS	PF	SW
	00044	VB	Waterfall trail/Backpack trail/Piney Mtn. Bike Trail	For. trail	Me. humus on ss bldr		SF	T
	00063	VB	Overnight trail, suspension bridge	For. river's edge	Me. ss bldr		R	FL
	00072	VB	Camp at base of gorge near suspension bridge	For. river bank	Mo. sandy soil	PS	R	FL
	00084	VB	CG, ls outcrop	Shaded ls outcrop	Me./Mo. base of ls wall	PS	R	O,B
	00138	VB	Above PF, So. side of river	For. river's edge	Mo. ss vert. rockface		PF	RI,B
	00149	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00155	VB	FCF, river below falls	For. river's edge	Mo. decorticated log	PS	R	FL
	00159	VB	FCF, river below falls	For. river's edge	Mo. decaying pine log	PS	R	FL
	00201	VB	Rockhouse Creek	For. stream bank	Mo. ss		PF	RI,O, FL
	00205	VB	Rockhouse Creek	For. stream bank	Me. Mo. ss		PF	RI,O, FL
	00206	VB	Rockhouse Creek	For. stream bank	Me./Mo. sandy soil		PF	RI,I
	00230	VB	CG	Dry river bed	Mo. decorticated trunk	PS	R	I
	00237	VB	CG, trail's end	For. trail's edge	Mo. decaying branch	PS	SF	T
00243	VB	CG	For. trail's edge	Mo. ss	PS	SF	T	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Thuidium delicatulum</i> (cont.)	00258	VB	CCA, Quarry road	Quarry	Dry/Me. exposed upper surface of ls	PS	RU	O
	00262	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00297	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. soil over ss bldr	PS	SF	O
	00299	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. near vert. ss wall	PS	SF	O
	00300	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. rotten branch on ground	PS	SF	T
	00303	VB	Old farm trail, beyond CC	Indian Rockhouse	Mo. ss	PS	SF	O
	00305	VB	Old farm trail, beyond CC	Indian Rockhouse	Me./Mo. ss	PS	SF	T
	00318	VB	Old farm trail, beyond CC	For. trail's edge	Me. soil	PS	SF	T
	00324	VB	Old farm trail, beyond CC	For. river's edge	Mo./wet sand	PS	R	FL,I
	00327	VB	Old farm trail, beyond CC	For. trail's edge	Mo. ss bldr	PS	SF	T
	00328	VB	Old farm trail, beyond CC	For. river's edge	Me./Mo. sand	PS	R	FL,I
	00355	VB	CCA, Sink	For. slope	Mo. bark of tulip poplar	PS	SF	S
	00357	VB	CCA, Sink	For. slope	Mo. rotten log	PS	SF	S
	00393	VB	CCA, Sink with waterfall	Below falls	Mo. ss bldr	PS	SF	WF
	00394	VB	CCA, Sink	Below falls	Mo. ss bldr	PS	SF	WF
	00406	VB	CCA, Quarry road; outlet	Boulders	Me. soil on upper surface of ls bldr	PS	R	O,B
	00408	VB	CCA, Quarry road; outlet	Boulders	Me. upper surface of ls bldr	PS	R	O,B
	00451	B	Chinquapin Mtn. Bike Trail	Dry stream bed	Me./Mo. fallen log	PS	PF	ST,I
	00471	VB	Village		Mo./Me. soil	PS	RU	F
	00472	VB	Village	Roadside open areas in lawn	Me. sandy soil	PS	RU	F
	00474	VB	Village	Lawn-woods interface on roadside bank	Me./Mo. soil	PS	RU	F
00504	VB	FCF, base of falls	Trail's edge	Mo./wet ss (pendulus)	PS	R	WF	
00518	VB	CCG, Buzzard's Roost Trail	For. stream	Wet/submerged rocks	PS	SF	RI,I	
00520	VB	CCG, Buzzard's Roost Trail	For. slope	Dry/Me. ss bldr	PS	SF	T	

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Thuidium delicatulum</i> (cont.)	00527	VB	Trail to FCF before split	For. trail above Cane Creek Cascades	Me. exposed root	PS	PF	T
	00562	VB	Wheeler place, lower cave		Mo./wet ss bldr	PS	SF	C
	00572	VB	CCG below the falls	River's edge	Me. ss bldr	PS	R	B
	00066a	VB	Gorge trail/Youth Camp 2	For. slope	Me./Mo. decorticated log		SF	T
	00118a	VB	Above PF, So. side of river near bridge	For. river's edge	Me./Mo. bark of chestnut oak		PF	RI,B
	00123a	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00123b	VB	Above PF, So. side of river	For. river's edge under Rhododendrons	Mo. sandy soil		PF	RI,FL
	00129a	VB	Above PF, So. side of river, side ravine	For. river's edge	Me./Mo. rocks	PS	PF	RI,I
	00133a	VB	Above PF, So. side of river	For. seep	Mo. ss wall		PF	O,SP
	00133b	VB	Above PF, So. side of river	For. seep	Mo. ss wall		PF	O,SP
	00148a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
	00152a	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00152e	VB	FCF, river below falls	For. river's edge	Mo. ss bldr	PS	R	FL
	00439b	VB	Paw Paw Trail	Dry stream bed beside small bridge	Mo. sandy soil	PS	PF	ST,I
	00494a	VB	Beyond swimming hole	For. trail's edge	Mo. rotten log	PS	PF	T
	00561b	VB	Wheeler place, lower cave	Cool cave entrance	Mo. fallen log	PS	SF	C
	00563a	VB	Wheeler farm, waterfall	For. stream side	Mo. ss bldr beside a stream	PS	SF	RI,B
<i>Thuidium</i> sp.	00163	VB	FCF, river below falls	For. river's edge	Mo. ss bldr		R	FL
<i>Thuidium</i> sp.	00431	VB	Paw Paw Trail	For. trail along dry stream bed	Mo. rotten stump	PS	PF	T
<i>Tortella humilis</i>	00002	VB	CCA, Quarry road	For. roadside	Mo. ss		RU	R
	00043	VB	Waterfall trail/Backpack trail/Piney Mtn. Bike Trail	For. trail	Me./Mo. rotten log		SF	T

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM.	RES. DOM.
<i>Tortella humilis</i> (cont.)	00182	VB	FCF gorge overlook trail	For. trail's edge	Me. ss		PF	T
	00259	VB	CCA, Quarry road	Quarry	Dry uppersurface of exposed ls	PS	RU	O
	00264	VB	CCA, Quarry road; outlet	River outlet	Dry/Me. ss bldr	PS	R	O,B
	00413	VB	Nature center	Stairs to restrooms	Me. concrete	PS/O	RU	MM
	00434	VB	Paw Paw Trail	For. trail	Me. rotten wood	PS	PF	T
	00470	VB	Village	Wooded area	Me./Mo. humus at base of white oak	PS	PF	W
	00527	VB	Trail to FCF before split	For. trail above Cane Creek Cascades	Me. exposed root	PS	PF	T
	00530	VB	Bike trail around lake	For. trail	Me. ss	PS	RU	T
	00538	VB	Pond along road near inn	For. pond edge	Mo. soil at base of a tree	O/PS	PF	W,FL
	00102e	VB	CG, big cave	Cool cave entrance	ls (?) bldr	PS	SF	C
00399c	VB	CCA, Quarry road; outlet	River outlet	Me. ls bldr	PS	R	O,B	
<i>Trichocolea tomentella</i>	00292	VB	CCA, Sink	For. slope	Mo. soil	PS	SF	S
	00293	VB	CCA, Sink	For. slope	Mo. ss bldr	PS	SF	S
	00328	VB	Old farm trail, beyond CC	For. river's edge	Me./Mo. sand	PS	R	FL,I
	00091a	VB	CG, big cave	Cool cave entrance	Mo. ss bldr		SF	C
	00095b	VB	CG, big cave	Cool cave entrance	Mo. rotting stump		SF	C
<i>Tuerckheimia augustifolia</i>	00083b	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
	00083c	VB	CG, ls outcrop	Shaded ls outcrop	Mo. ls wert. surface	PS	R	O,B
<i>Ulota crispa</i>	00226	VB	Stable road, overnight trail	For. trail	Me. branch of a fallen log		PF	T
	00053b	VB	Piney Mtn. Bike Trail	For. upland swamp	Me. bark of red maple		PF	SW
	00089b	VB	CG, big cave	Cool cave entrance	Mo. basswood bark		SF	C
	00222c	VB	Overnight trail at Caney Fork Bridge	For. trail's edge	Me. bark of red maple		SF	T
<i>Weissia controversa</i>	00005	VB	CCA, Quarry road	For. roadside bank	Mo. disturbed sandy soil	PS	RU	R
	00006	VB	CCA, Quarry road	For. roadside bank	Mo. disturbed sandy soil	PS	RU	R

Table A.1. Continued.

TAXON	COLL. #	CO	SITE	HABITAT	SUBSTRATE	LT	MAJ. DOM	RES. DOM.
<i>Weissia controversa</i> (cont.)	00031	VB	CCA, Wheeler homestead	Abandoned field	Me. soil under canopy of grasses	PS	RU	F
	00454	VB	Road to fisherman's cabins	Roadside bank	Me. sandy soil	PS	RU	F
	00542	VB	Road to Inn	Roadside	Me./Mo. soil near base of tree	O	RU	R
<i>Zygodon viridissimus</i> var. <i>rupestris</i>	00526	VB	CG, big cave	Cool cave entrance	Me./Mo. ss bldr	PS	SF	C

Sites

CC - Cane Creek
 CCA - Cane Creek Annex
 CG - Camp's Gulf
 FCF - Falls Creek Falls
 PF - Piney Falls

Light Regime

FS - Full Shade
 O - Open/Full Sun
 PS - Partial Shade

Moisture

Me - Mesic
 Mo - Moist

Major Domains

PF - Plateau Surface Forest
 R - Riparian/Gorge
 RU - Ruderal Habitats
 SF - Slope Forest

Restricted Domains

B - Zone beyond flood zone
 BF - Boulder Field
 C - Cave
 F - Field
 FL - Flood zone
 I - Inundation zone
 M - Miscellaneous

Restricted Domains

MM - Man-made structures
 O - Outcrop
 R - Roadside
 RI - Riparian zone
 S - Sink
 SP - Seep
 ST - Stream
 SW - Swamp
 T - Trailside
 W - Woodland
 WF - Waterfall

Table A.2. Taxonomic list for Fall Creek Falls State Park including synonyms, arranged by families.

TAXA	SYNONYMS
HORNWORT TAXA	
Anthocerotaceae	
<i>Anthoceros punctatus</i> L.	
LIVERWORT TAXA	
Aneuraceae	
<i>Riccardia jugata</i> Schust.	
<i>Riccardia palmata</i> (Hedw.) Carruth.	
Aytoniaceae	
<i>Mannia triandra</i> (Scop.) Grolle	<i>Mannia rupestris</i> Frye & Clark
<i>Reboulia hemisphaerica</i> (L.) Raddi	
Blepharostomaceae	
<i>Blepharostoma trichophyllum</i> (L.) Dum.	
Clypogeiaceae	
<i>Calypogeia fissa</i> (L.) Raddi	
<i>Calypogeia muelleriana</i> (Schiffn.) K. Müll.	
<i>Calypogeia sullivanii</i> Aust.	
Cephaloziaceae	
<i>Cephalozia bicuspidata</i> (L.) Dum.	
<i>Cephalozia catenulata</i> (Hüb.) Lindb.	
<i>Cephalozia lunulifolia</i> (Dum.) Dum.	<i>Cephalozia media</i> Lindb.
<i>Nowellia curvifolia</i> (Dicks.) Mitt.	<i>Cephalozia curvifolia</i> Dum.
<i>Odontoschisma denudatum</i> (Nees ex Mart.) Dum.	
<i>Odontoschisma prostratum</i> (Sw.) Trev.	
Cephaloziellaceae	
<i>Cephaloziella rubella</i> (Nees) Warnst.	
Conocephalaceae	
<i>Conocephalum conicum</i> (L.) Lindb.	

Table A.2. Continued.

TAXA	SYNONYMS
LIVERWORT TAXA (continued)	
Geocalyceaceae	
<i>Chiloscyphus cuspidatus</i> (Nees) Eng. & Schust.	<i>Lophocolea cuspidata</i> (Nees) Limpr.
<i>Chiloscyphus profundus</i> (Nees) Eng. & Schust.	<i>Lophocolea heterophylla</i> (Schrad.) Dum.
<i>Lophocolea bidentata</i> (L.) Dum.	
Gymnomitriaceae	
<i>Marsupella emarginata</i> (Ehrh.) Dum.	
Herbertaceae	
<i>Herbertus aduncus</i> subsp. <i>tenuis</i> (Evans) Miller & Scott	
Jubulaceae	
<i>Frullania appalachiana</i> Schust.	
<i>Frullania asagrayana</i> Mont.	<i>Frullania tamarisci</i> subsp. <i>asagrayana</i> (Mont.) Hatt.
<i>Frullania brittoniae</i> Evans	
<i>Frullania eboracensis</i> Gott.	
<i>Frullania ericoides</i> (Nees) Mont.	<i>Frullania squarrosa</i> (Reinw. et al.) Dum.
<i>Frullania plana</i> Sull.	
<i>Frullania riparia</i> Hampe	
<i>Jubula pennsylvanica</i> (Steph.) Evs.	
Jungermanniaceae	
<i>Nardia lescurii</i> (Aust.) Underw.	
<i>Solenostoma</i> aff. <i>obscurum</i> (Evans) Schust.	<i>Jungermannia evansii</i>
<i>Solenostoma crenuliformis</i> (Aust.) Steph.	<i>Jungermannia crenuliformis</i> Aust.
<i>Solenostoma gracillimum</i> (Sm.) Schust.	
<i>Solenostoma hyalinum</i> (Lyell) Mitt.	<i>Jungermannia hyalina</i>
<i>Solenostoma pumilum</i> (With.) K. Müll.	<i>Jungermannia pumila</i> With.
Lejeuneaceae	
<i>Cololejeunea biddlecomiae</i> (Aust.) Evans	
<i>Cololejeunea minutissima</i> (Smith) Schiffn.	
<i>Cololejeunea ornata</i> Evans	
<i>Harpalejeunea ovata</i> (Hook.) Schiffn.	

Table A.2. Continued.

TAXA	SYNONYMS
LIVERWORT TAXA (continued)	
Lejeuneaceae (continued)	
<i>Lejeunea blomquistii</i> Schust.	
<i>Lejeunea cavifolia</i> (Ehrh.) Lindb.	
<i>Lejeunea laetevirens</i> Nees & Mont.	<i>Microlejeunea laetevirens</i>
<i>Lejeunea lamacerina</i> (Steph.) Schiffn. subsp. <i>gemminata</i> Schust.	
<i>Lejeunea ruthii</i> (Evans) Schust.	
<i>Lejeunea sharpii</i> (Schust.) Schust.	
<i>Lejeunea ulicina</i> (Tayl.) Gott.	<i>Microlejeunea ulicina</i> , <i>Microlejeunea bullata</i> Tayl.
<i>Leucolejeunea clypeata</i> (Schwein.) Evs.	
<i>Leucolejeunea conchifolia</i> (Evans) Evans	
<i>Leucolejeunea unciloba</i> (Lindenb.) Evans	
<i>Rectolejeunea maxonii</i> Evans	
Lepidoziaceae	
<i>Bazzania trilobata</i> (L.) S. F. Gray	
<i>Kurzia sylvatica</i> (Evans) Grolle	<i>Microlepidozia sylvatica</i> (Evans) Joerg., <i>Lepidozia sylvatica</i> Evans
<i>Telaranea nematodes</i> (Gott. ex Aust.) M. A. Howe	
Lophoziaceae	
<i>Lophozia bicrenata</i> (Schmid.) Dum.	
Marchantiaceae	
<i>Dumortiera hirsuta</i> (Sw.) Nees	
Metzgeriaceae	
<i>Metzgeria conjugata</i> Lindb.	
<i>Metzgeria crassipilis</i> (Lindb.) Evans	
<i>Metzgeria furcata</i> (L.) Dum.	
<i>Metzgeria leptoneura</i> Spruce	<i>Metzgeria hamata</i> Lindb.
<i>Metzgeria myriopoda</i> Lindb.	
Pallaviciniaceae	
<i>Pallavicinia lyellii</i> (Hook.) Gray	

Table A.2. Continued.

TAXA	SYNONYMS
LIVERWORT TAXA (continued)	
Pelliaceae	
<i>Pellia epiphylla</i> (L.) Lindb.	
Plagichilaceae	
<i>Plagiochila</i> (cf unnamed)	
<i>Plagiochila asplenioides</i> subsp. <i>porelloides</i> (Torr. ex Ness) Schust.	<i>Plagiochila porelloides</i>
<i>Plagiochila austini</i> Evans	
<i>Plagiochila ludoviciana</i> Sull.	
<i>Plagiochila sullivantii</i> Gott. ex Evans	
<i>Plagiochila undata</i> Sull.	
<i>Plagiochila virginica</i> Evans	
Porellaceae	
<i>Porella pinnata</i> L.	
<i>Porella platyphylla</i> (L.) Pfeiff.	
<i>Porella platyphylloidea</i> (Schwein.) Lindb.	
Scapaniaceae	
<i>Diplophyllum apiculatum</i> (Evans) Steph.	
<i>Scapania nemorosa</i> (L.) Dum.	
<i>Scapania undulata</i> (L.) Dum.	
Trichocoleaceae	
<i>Trichocolea tomentella</i> (Ehrh.) Dum.	
Radulaceae	
<i>Radula complanata</i> (L.) Dum.	
<i>Radula mollis</i> Lindenb. & Gott.	<i>Radula andicola</i> Steph.
<i>Radula obconica</i> Sull.	
<i>Radula sullivantii</i> Aust.	
<i>Radula tenax</i> Lindb.	
<i>Radula voluta</i> Tayl.	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA	
Amblystegiaceae	
<i>Amblystegium serpens</i> (Hedw.) Schimp. in B.S.G.	
<i>Amblystegium serpens</i> var. <i>juratzkanum</i> (Schimp.) Rau. & Herv.	<i>Amblystegium juratzkanum</i> Schimp.
<i>Amblystegium varium</i> (Hedw.) Lindb.	
<i>Campylium chrysophyllum</i> (Brid.) J. Lange	
<i>Campylium hispidulum</i> (Brid.) Mitt.	
<i>Hygroamblystegium tenax</i> (Hedw.) Jenn.	
Andreaceae	
<i>Andreaea rothii</i> Web. & Mohr.	
Anomodontaceae	
<i>Anomodon attenuatus</i> (Hedw.) Hüb.	
<i>Anomodon rostratus</i> (Hedw.) Schimp.	
<i>Haplohymenium triste</i> (Ces. in De Not.) Kindb.	
Aulacomniaceae	
<i>Aulacomnium heterostichum</i> (Hedw.) Bruch & Schimp. in B.S.G.	
<i>Aulacomnium palustre</i> (Hedw.) Schwaegr.	
Bartramiaceae	
<i>Bartramia pomiformis</i> Hedw.	
<i>Philonotis</i> aff. <i>glaucescens</i> (Hornsch.) Broth.	
<i>Philonotis fontana</i> (Hedw.) Brid.	
<i>Philonotis fontana</i> (Hedw.) Brid. var. <i>caespitosa</i> (Jur.) Schimp.	<i>Philonotis caespitosa</i> Jur.
<i>Philonotis fontana</i> (Hedw.) Brid. var. <i>pumila</i> (Turn.) Brid.	
Bauxbaumiaceae	
<i>Diphyscium foliosum</i> (Hedw.) Mohr.	
Brachytheciaceae	
<i>Brachythecium acuminatum</i> (Hedw.) Aust.	
<i>Brachythecium oxycladon</i> (Brid.) Jaeg.	
<i>Brachythecium plumosum</i> (Hedw.) Schimp. in B.S.G.	
<i>Brachythecium rivulare</i> Schimp. in B.S.G.	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Brachytheciaceae (continued)	
<i>Brachythecium salebrosum</i> (Web. & Mohr) Schimp. in B.S.G.	
<i>Bryhnia novae-angliae</i> (Sull. & Lesq. ex Sull.) Grout	
<i>Bryoandersonia illecebra</i> (Hedw.) Robins.	<i>Cirriphyllum boscii</i> (Schwaegr.) Grout
<i>Eurhynchium hians</i> (Hedw.) Sande Lac.	
<i>Homalotheciella subcapillata</i> (Hedw.) Broth.	
<i>Platyhypnidium riparioides</i> (Hedw.) Dix.	<i>Eurhynchium riparioides</i> (Hedw.) Rich.
<i>Steerecleus serrulatus</i> (Hedw.) Robins.	<i>Rhynchostegium serrulatum</i> (Hedw.) Jaeg. & Sauerb., <i>Eurhynchium serrulatum</i> (Hedw.) Kindb.
Bryaceae	
<i>Bryum</i> aff. <i>lisae</i> De Not. var. <i>cuspidatum</i> (Bruch & Schimp. in B.S.G.) Marg.	
<i>Bryum argenteum</i> Hedw.	
<i>Bryum capillare</i> Hedw.	
<i>Rhodobryum roseum</i> (Hedw.) Limpr.	
Climaciaceae	
<i>Climacium americanum</i> Brid.	
Dicranaceae	
<i>Dicranella heteromalla</i> (Hedw.) Schimp.	
<i>Dicranum condensatum</i> Hedw.	
<i>Dicranum flagellare</i> Hedw.	<i>Orthodicranum flagellare</i> (Hedw.) Loeske
<i>Dicranum fulvum</i> Hook.	<i>Orthodicranum fulvum</i>
<i>Dicranum fuscescens</i> Turn.	
<i>Dicranum montanum</i> Hedw.	<i>Orthodicranum montanum</i> (Hedw.) Loeske
<i>Dicranum scoparium</i> Hedw.	
<i>Rhabdoweisia crispata</i> (With.) Lindb.	<i>Rhabdoweisia denticulata</i> Brid.
Ditrichaceae	
<i>Ceratodon purpureus</i> (Hedw.) Brid.	
<i>Ditrichum lineare</i> (Sw.) Lindb.	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Ditrichaceae (continued)	
<i>Ditrichum pallidum</i> (Hedw.) Hampe	
<i>Ditrichum pusillum</i> (Hedw.) Hampe	
<i>Ditrichum rhynchostegium</i> Kindb.	
Entodontaceae	
<i>Entodon cladorrhizans</i> (Hedw.) C. Müll.	
<i>Entodon macropodus</i> (Hedw.) C. Müll.	<i>Entodon drummondii</i> (Sull.) Jaeg.
<i>Entodon seductrix</i> (Hedw.) C. Müll.	
<i>Entodon sullivantii</i> (C. M.) Lindb.	
Fabroniaceae	
<i>Anacamptodon splachnoides</i> (Frol. ex Brid.) Brid.	
<i>Clasmatodon parvulus</i> (Hampe) Hook. & Wils. ex Sull.	
<i>Fabronia ciliaris</i> (Brid.) Brid. var. <i>polycarpa</i> (Hook.) Buck	<i>Fabronia ravenelii</i> Sull.
Fissidentaceae	
<i>Fissidens adianthoides</i> Hedw.	
<i>Fissidens asplenioides</i> Hedw.	
<i>Fissidens bryoides</i> Hedw.	<i>Fissidens exiguus</i> Sull., <i>Fissidens minutulus</i> Sull., <i>Fissidens pusillus</i> (Wils.) Milde, <i>Fissidens viridulus</i> (Sw.) Wahlenb.
<i>Fissidens bushii</i> (Card. & Ther.) Card. & Ther.	
<i>Fissidens dubius</i> P. Beauv.	<i>Fissidens cristatus</i> Wils. ex Mitt.
<i>Fissidens grandifrons</i> Brid.	
<i>Fissidens osmundioides</i> Hedw.	
<i>Fissidens subbasilaris</i> Hedw.	
<i>Fissidens taxifolius</i> Hedw.	
Fontinalaceae	
<i>Fontinalis novae-angliae</i> Sull.	
Funariaceae	
<i>Physcomitrium pyriforme</i> (Hedw.) Hampe	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Grimmiaceae	
<i>Racomitrium aciculare</i> (Hedw.) Brid.	<i>Rhacomitrium aciculare</i> (Hedw.) Brid.
<i>Schistidium apocarpum</i> (Hedw.) Bruch & Schimp. in B.S.G.	<i>Grimmia apocarpa</i> Hedw., <i>Grimmia apocarpa</i> var. <i>gracilis</i> Web. & Mohr. ex Nees et al.
<i>Schistidium rivulare</i> (Brid.) Podp.	<i>Grimmia alpicola</i> Sw. ex Hedw.; <i>Grimmia alpicola</i> Hedw. var. <i>rivularis</i> (Brid.) Wahlenb.
Hedwigiaceae	
<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	
Hookeriaceae	
<i>Hookeria acutifolia</i> Hook. & Grev.	<i>Hookeria sullivantii</i> C. M. ex Lesq. & James
Hylocomniaceae	
<i>Loeskeobryum brevirostre</i> (Brid.) Fleisch. in Broth.	<i>Hylocomium brevirostre</i> (Brid.) Schimp. in B.S.G.
<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	<i>Rhytidiadelphus subpinnatus</i> (Lindb.) T. Kop.
Hypnaceae	
<i>Ctenidium malacodes</i> Mitt.	<i>Ctenidium molluscum</i> (Hedw.) Mitt.
<i>Hypnum curvifolium</i> Hedw.	
<i>Hypnum fertile</i> Sendtn.	
<i>Hypnum imponens</i> Hedw.	
<i>Hypnum lindbergii</i> Mitt.	
<i>Isopterygiopsis muelleriana</i> (Schimp.) Iwats.	
<i>Isopterygium tenerum</i> (Sw.) Mitt.	<i>Isopterygium micans</i> (Sw.) Kindb.
<i>Platydictya confervoides</i> (Brid.) Crum	<i>Amblystegiella confervoides</i>
<i>Platygyrium repens</i> (Brid.) Schimp. in B.S.G.	
<i>Pseudotaxiphylum elegans</i> (Brid.) Iwats.	<i>Isopterygium borrierianum</i> (C. Mull.) Lindb., <i>Plagiothecium elegans</i> (Brid.) Sull. in Gray, <i>Isopterygium elegans</i> (Brid.) Lindb.
<i>Taxiphylum deplanatum</i> (Bruch. & Schimp. ex Schimp.) Fleisch	<i>Plagiothecium deplanatum</i> (Bruch & Schimp. ex Sull.) Spruce
<i>Taxiphylum taxirameum</i> (Mitt.) Fleisch	<i>Plagiothecium geophilum</i> (Aust.) Grout
Leptodontaceae	
<i>Forsstroemia trichomitria</i> (Hedw.) Lindb.	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Leucobryaceae	
<i>Leucobryum albidum</i> (Brid. ex P. Beauv.) Lindb.	
<i>Leucobryum glaucum</i> (Hedw.) Ångstr. in Fries	
Leucodontaceae	
<i>Leucodon brachypus</i> Brid.	
<i>Leucodon julaceus</i> (Hedw.) Sull.	
Mniaceae	
<i>Mnium hornum</i> Hedw.	
<i>Mnium marginatum</i> (With.) Brid. ex P. Beauv.	
<i>Mnium stellare</i> Hedw.	
<i>Plagiomnium ellipticum</i> (Brid.) T. Kop.	<i>Mnium affine</i> (aff.) var. <i>rugicum</i> (Laur.) Bruch & Schimp. in B.S.G.
<i>Plagiomnium ciliare</i> (C. Müll.) T. Kop.	<i>Mnium affine</i> var. <i>ciliare</i> C. Mull., <i>Mnium ciliare</i> (C. Muell.) Schimp.
<i>Plagiomnium cuspidatum</i> (Hedw.) T. Kop.	<i>Mnium cuspidatum</i> Hedw.
<i>Plagiomnium rostratum</i> (Schrad.) T. Kop.	<i>Mnium rostratum</i> Schrad., <i>Mnium longirostre</i> Brid.
<i>Rhizomnium punctatum</i> (Hedw.) T. Kop.	<i>Mnium punctatum</i> Hedw.
Myriniaceae	
<i>Schwetschkeopsis fabronia</i> (Schwaegr.) Broth.	<i>Schwetschkeopsis denticulata</i> (Sull.) Broth.
Neckeraceae	
<i>Neckera complanata</i> (Hedw.) Hub.	
<i>Neckera pennata</i> Hedw.	
<i>Thamnobryum alleghaniense</i> (C. Müll.) Nieuwl.	<i>Porotrichum alleghaniense</i> (C. M.) Grout
Orthotrichaceae	
<i>Amphidium mougeotii</i> (Bruch & Schimp. in B.S.G.) Schimp.	
<i>Drummondia prorepens</i> (Hedw.) Britt.	
<i>Orthotrichum pusillum</i> Mitt.	
<i>Orthotrichum stellatum</i> Brid.	
<i>Orthotrichum strangulatum</i> P. Beauv.	
<i>Ulota crispa</i> (Hedw.) Brid.	

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Orthotrichaceae (continued)	
<i>Zygodon viridissimus</i> (Dicks.) Brid. var. <i>rupestris</i> Lindb. ex Hartm.	
Plagiotheciaceae	
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp. in B.S.G.	
<i>Plagiothecium laetum</i> Schimp. in B.S.G.	
Polytrichaceae	
<i>Atrichum altecristatum</i> (Ren. & Card.) Smyth & Smyth	<i>Atrichum undulatum</i> var. <i>altecristatum</i> Ren. & Card.
<i>Atrichum angustatum</i> (Brid.) Bruch & Schimp. in B.S.G.	
<i>Atrichum oerstidianum</i> (C. Müll.) Mitt.	<i>Atrichum undulatum</i> var. <i>oerstidianum</i> (C. Müll.) Crum
<i>Atrichum undulatum</i> (Hedw.) P. Beauv.	
Polytrichaceae (continued)	
<i>Pogonatum pensilvanicum</i> (Hedw.) P. Beauv.	
<i>Polytrichum commune</i> Hedw.	
<i>Polytrichum juniperinum</i> Hedw.	
<i>Polytrichum ohioense</i> Ren. & Card.	
Pottiaceae	
<i>Barbula indica</i> (Hook.) Spreng. in Steud.	<i>Barbula cancellata</i> C. Müll.
<i>Barbula unguiculata</i> Hedw.	
<i>Didymodon fallax</i> (Hedw.) Zand.	<i>Barbula fallax</i> Hedw.
<i>Didymodon tophaceus</i> (Brid.) Lisa	
<i>Eucladium verticillatum</i> (Brid.) Bruch & Schimp. in B.S.G.	
<i>Gymnostomum aeruginosum</i> Sm.	
<i>Hymenostylium recurvirostre</i> (Hedw.) Dix.	<i>Gymnostomum recurvirostre</i> Hedw.
<i>Hyophila involuta</i> (Hook.) Jaeg. & Sauerb.	
<i>Oxystegus tenuirostris</i> (Hook. & Taylor) A. J. E. Smith	<i>Trichostomum tenuirostre</i> (Hook. & Taylor) Lindb., <i>Trichostomum cylindricum</i> (Bruch ex Brid.) C. Mull
<i>Pleurochaete squarrosa</i> (Brid.) Lindb.	
<i>Tortella humilis</i> (Hedw.) Jenn.	<i>Tortella caespitosa</i> (Schwaegr.) Limpr.
<i>Tuerckheimia augustifolia</i> (Saito) Zand.	<i>Gymnostomum augustifolium</i> Saito

Table A.2. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
Pottiaceae (continued)	
<i>Weissia controversa</i> Hedw.	<i>Weissia viridula</i> Hedw. ex Brid.
Pterigynandraceae	
<i>Myurella sibirica</i> (C. Mull.) Reim.	<i>Myurella careyana</i> Sull. in Sull. & Lesq., <i>Myurella gracilis</i> Lindb.
Ptychomitriaceae	
<i>Ptychomitrium incurvum</i> (Schwaegr.) Spruce	
Sematophyllaceae	
<i>Brotherella recurvans</i> (Michx.) Fleisch.	<i>Brotherella deliculata</i> (James ex Sull.) Fl.
<i>Pylaisiadelpha tenuirostris</i> (Bruch & Schimp. ex Sull.) Buck	<i>Brotherella tenuirostris</i> (Bruch & Schimp. ex Sull.) Fleisch.
<i>Sematophyllum adnatum</i> (Michx.) Britt.	
<i>Sematophyllum demissum</i> (Wils.) Mitt.	<i>Sematophyllum carolinianum</i> (C. Müll.) Britt., <i>Raphidostegium carolinianum</i>
<i>Sematophyllum marylandicum</i> (C. Müll.) Britt.	<i>Raphidostegium marylandicum</i>
Sphagnaceae	
<i>Sphagnum affine</i> Ren. & Card.	<i>Sphagnum imbricatum</i> Hornsch. ex Russ.; <i>Sphagnum imbricatum</i> var. <i>affine</i> (Ren. & Card.) Flatb.
<i>Sphagnum lescurii</i> Sull. in Gray	<i>Sphagnum subsecundum</i> var. <i>rufescens</i> (Nees & Hornsch.) Huep.
<i>Sphagnum subsecundum</i> Nees in Sturm	
Tetraphidaceae	
<i>Tetraphis pellucida</i> Hedw.	
Theliaceae	
<i>Thelia hirtella</i> (Hedw.) Sull. in Sull. & Lesq.	
Thuidiaceae	
<i>Cyrto-hypnum pygmaeum</i> (Schimp. in B.S.G.) Buck & Crum	<i>Thuidium pygmaeum</i> Schimp. in B.S.G.
<i>Thuidium delicatulum</i> (Hedw.) Schimp in B.S.G.	

Table A.3. Taxonomic list of bryophytes for Van Buren County, TN based on information obtained from the TENN database (2002) and species added in the current study.

TAXA	SYNONYMS
HORNWORT TAXA	
<i>Anthoceros punctatus</i> L.	
LIVERWORT TAXA	
<i>Bazzania trilobata</i> (L.) S. F. Gray	
<i>Blepharostoma trichophyllum</i> (L.) Dum.	
<i>Calypogeia fissa</i> (L.) Raddi	
<i>Calypogeia muelleriana</i> (Schiffn.) K. Müll.	
<i>Calypogeia neesiana</i> (Mass. & Carest.) K. Müll. emend. Buch.	
<i>Calypogeia sullivantii</i> Aust.	
<i>Calypogeia trichomanis</i> (L.) Corda. emend. K. Müll.	
<i>Cephalozia bicuspidata</i> (L.) Dum.	
<i>Cephalozia catenulata</i> (Hüb.) Lindb.	
<i>Cephalozia lunulifolia</i> (Dum.) Dum.	<i>Cephalozia media</i> Lindb.
<i>Cephaloziella rubella</i> (Nees) Warnst.	
<i>Chiloscyphus cuspidatus</i> (Nees) Eng. & Schust.	<i>Lophocolea cuspidata</i> (Nees) Limpr.
<i>Chiloscyphus profundus</i> (Nees) Eng. & Schust.	<i>Lophocolea heterophylla</i> (Schrad.) Dum.
<i>Cololejeunea biddlecomiae</i> (Aust.) Evans	
<i>Cololejeunea minutissima</i> (Smith) Schiffn.	
<i>Cololejeunea ornata</i> Evans	
<i>Conocephalum conicum</i> (L.) Lindb.	
<i>Diplophyllum apiculatum</i> (Evans) Steph.	
<i>Dumortiera hirsuta</i> (Sw.) Nees	
<i>Frullania appalachiana</i> Schust.	
<i>Frullania asagrayana</i> Mont.	<i>Frullania tamarisci</i> subsp. <i>asagrayana</i> (Mont.) Hatt.
<i>Frullania brittoniae</i> Evans	
<i>Frullania eboracensis</i> Gott.	
<i>Frullania ericoides</i> (Nees) Mont.	<i>Frullania squarrosa</i> (Reinw. et al.) Dum.
<i>Frullania plana</i> Sull.	
<i>Frullania riparia</i> Hampe	
<i>Harpalejeunea ovata</i> (Hook.) Schiffn.	

Table A.3. Continued.

TAXA	SYNONYMS
LIVERWORT TAXA (continued)	
<i>Herbertus aduncus</i> subsp. <i>tenuis</i> (Evans) Miller & Scott	
<i>Jubula pennsylvanica</i> (Steph.) Evs.	
<i>Kurzia sylvatica</i> (Evans) Grolle	<i>Microlepidozia sylvatica</i> (Evans) Joerg., <i>Lepidozia sylvatica</i> Evans
<i>Lejeunea blomquistii</i> Schust.	
<i>Lejeunea cavifolia</i> (Ehrh.) Lindb.	
<i>Lejeunea laetevirens</i> Nees & Mont.	<i>Microlejeunea laetivirens</i>
<i>Lejeunea lamacerina</i> (Steph.) Schiffn. subsp. <i>gemminata</i> Schust.	
<i>Lejeunea ruthii</i> (Evans) Schust.	
<i>Lejeunea sharpii</i> (Schust.) Schust.	
<i>Lejeunea ulicina</i> (Tayl.) Gott.	<i>Microlejeunea ulicina</i> , <i>Microlejeunea bullata</i> Tayl.
<i>Leucolejeunea clypeata</i> (Schwein.) Evs.	
<i>Leucolejeunea conchifolia</i> (Evans) Evans	
<i>Leucolejeunea uncioloba</i> (Lindenb.) Evans	
<i>Lophocolea bidentata</i> (L.) Dum.	
<i>Lophozia bicrenata</i> (Schmid.) Dum.	
<i>Mannia triandra</i> (Scop.) Grolle	<i>Mannia rupestris</i> Frye & Clark
<i>Marsupella emarginata</i> (Ehrh.) Dum.	
<i>Marsupella sphacelata</i> (Gies.) Dum.	
<i>Metzgeria conjugata</i> Lindb.	
<i>Metzgeria crassipilis</i> (Lindb.) Evans	
<i>Metzgeria furcata</i> (L.) Dum.	
<i>Metzgeria leptoneura</i> Spruce	<i>Metzgeria hamata</i> Lindb.
<i>Metzgeria myriopoda</i> Lindb.	
<i>Nardia lescurii</i> (Aust.) Underw.	
<i>Nowellia curvifolia</i> (Dicks.) Mitt.	<i>Cephalozia curvifolia</i> Dum.
<i>Odontoschisma denudatum</i> (Nees ex Mart.) Dum.	
<i>Odontoschisma prostratum</i> (Sw.) Trev.	
<i>Pallavicinia lyellii</i> (Hook.) Gray	
<i>Pellia epiphylla</i> (L.) Lindb.	
<i>Plagiochila</i> (fcf unknown)	

Table A.3. Continued.

TAXA	SYNONYMS
LIVERWORT TAXA (continued)	
<i>Plagiochila asplenioides</i> subsp. <i>porelloides</i> (Torr. ex Ness) Schust.	<i>Plagiochila porelloides</i>
<i>Plagiochila austini</i> Evans	
<i>Plagiochila ludoviciana</i> Sull.	
<i>Plagiochila sullivantii</i> Gott. ex Evans	
<i>Plagiochila undata</i> Sull.	
<i>Plagiochila virginica</i> Evans	
<i>Porella pinnata</i> L.	
<i>Porella platyphylla</i> (L.) Pfeiff.	
<i>Porella platyphylloidea</i> (Schwein.) Lindb.	
<i>Radula complanata</i> (L.) Dum.	
<i>Radula mollis</i> Lindenb. & Gott.	<i>Radula andicola</i> Steph.
<i>Radula obconica</i> Sull.	
<i>Radula tenax</i> Lindb.	
<i>Radula voluta</i> Tayl.	
<i>Reboulia hemisphaerica</i> (L.) Raddi	
<i>Rectolejeunea maxonii</i> Evans	
<i>Riccardia jugata</i> Schust.	
<i>Riccardia palmata</i> (Hedw.) Carruth.	
<i>Scapania nemorosa</i> (L.) Dum.	
<i>Scapania undulata</i> (L.) Dum.	
<i>Solenostoma</i> aff. <i>obscurum</i> (Evans) Schust.	<i>Jungermannia evansii</i>
<i>Solenostoma crenuliformis</i> (Aust.) Steph.	<i>Jungermannia crenuliformis</i> Aust.
<i>Solenostoma hyalinum</i> (Lyell) Mitt.	<i>Jungermannia hyalina</i>
<i>Solenostoma pumilum</i> (With.) K. Müll.	<i>Jungermannia pumila</i> With.
<i>Telaranea nematodes</i> (Gott. ex Aust.) M. A. Howe	
<i>Trichocolea tomentella</i> (Ehrh.) Dum.	
MOSS TAXA	
<i>Amblystegium serpens</i> (Hedw.) Schimp. in B.S.G.	
<i>Amblystegium serpens</i> var. <i>juratzkanum</i> (Schimp.) Rau. & Herv.	<i>Amblystegium juratzkanum</i> Schimp.
<i>Amblystegium varium</i> (Hedw.) Lindb.	

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Amphidium mougeotii</i> (Bruch & Schimp. in B.S.G.) Schimp.	
<i>Anacamptodon splachnoides</i> (Frol. ex Brid.) Brid.	
<i>Andreaea rothii</i> Web. & Mohr.	
<i>Anomodon attenuatus</i> (Hedw.) Hüb.	
<i>Anomodon rostratus</i> (Hedw.) Schimp.	
<i>Atrichum altecristatum</i> (Ren. & Card.) Smyth & Smyth	<i>Atrichum undulatum</i> var. <i>altecristatum</i> Ren. & Card.
<i>Atrichum angustatum</i> (Brid.) Bruch & Schimp. in B.S.G.	
<i>Atrichum oerstidianum</i> (C. Müll.) Mitt.	<i>Atrichum undulatum</i> var. <i>oerstidianum</i> (C. Müll.) Crum
<i>Atrichum undulatum</i> (Hedw.) P. Beauv.	
<i>Aulacomnium heterostichum</i> (Hedw.) Bruch & Schimp. in B.S.G.	
<i>Aulacomnium palustre</i> (Hedw.) Schwaegr.	
<i>Barbula indica</i> (Hook.) Spreng. in Steud.	<i>Barbula cancellata</i> C. Müll.
<i>Barbula unguiculata</i> Hedw.	
<i>Bartramia pomiformis</i> Hedw.	
<i>Brachythecium acuminatum</i> (Hedw.) Aust.	
<i>Brachythecium oxycladon</i> (Brid.) Jaeg.	
<i>Brachythecium plumosum</i> (Hedw.) Schimp. in B.S.G.	
<i>Brachythecium rivulare</i> Schimp. in B.S.G.	
<i>Brachythecium salebrosum</i> (Web. & Mohr) Schimp. in B.S.G.	
<i>Brotherella recurvans</i> (Michx.) Fleisch.	<i>Brotherella deliculata</i> (James ex Sull.) Fl.
<i>Bryhnia graminicolor</i> (Brid.) Grout	
<i>Bryhnia novae-angliae</i> (Sull. & Lesq. ex Sull.) Grout	
<i>Bryoandersonia illecebra</i> (Hedw.) Robins.	<i>Cirriphyllum boscii</i> (Schwaegr.) Grout
<i>Bryum</i> aff. <i>lisae</i> De Not. var. <i>cuspidatum</i> (Bruch & Schimp. in B.S.G.) Marg.	
<i>Bryum argenteum</i> Hedw.	
<i>Bryum capillare</i> Hedw.	
<i>Campylium chrysophyllum</i> (Brid.) J. Lange	
<i>Campylium hispidulum</i> (Brid.) Mitt.	
<i>Campylopus pilifer</i> Brid.	<i>Campylopus introflexus</i> auct. Amer. non (Hedw.) Brid.

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Ceratodon purpureus</i> (Hedw.) Brid.	
<i>Clasmatodon parvulus</i> (Hampe) Hook. & Wils. ex Sull.	
<i>Climacium americanum</i> Brid.	
<i>Cryphaea glomerata</i> Bruch & Schimp ex Sull.	
<i>Ctenidium malacodes</i> Mitt.	<i>Ctenidium molluscum</i> (Hedw.) Mitt.
<i>Cyrto-hypnum minutulum</i> (Hedw.) Buck & Crum	<i>Thuidium minutulum</i> (Hedw.) Schimp. in B.S.G.
<i>Cyrto-hypnum pygmaeum</i> (Schimp. in B.S.G.) Buck & Crum	<i>Thuidium pygmaeum</i> Schimp. in B.S.G.
<i>Dicranella heteromalla</i> (Hedw.) Schimp.	
<i>Dicranodontium denudum</i> (Brid.) Britt. ex Williams	
<i>Dicranum condensatum</i> Hedw.	
<i>Dicranum flagellare</i> Hedw.	<i>Orthodicranum flagellare</i> (Hedw.) Loeske
<i>Dicranum fulvum</i> Hook.	<i>Orthodicranum fulvum</i>
<i>Dicranum fuscescens</i> Turn.	
<i>Dicranum montanum</i> Hedw.	<i>Orthodicranum montanum</i> (Hedw.) Loeske
<i>Dicranum scoparium</i> Hedw.	
<i>Dicranum spurium</i> Hedw.	
<i>Didymodon fallax</i> (Hedw.) Zand.	<i>Barbula fallax</i> Hedw.
<i>Didymodon tophaceus</i> (Brid.) Lisa	
<i>Diphyscium foliosum</i> (Hedw.) Mohr.	
<i>Ditrichum lineare</i> (Sw.) Lindb.	
<i>Ditrichum pallidum</i> (Hedw.) Hampe	
<i>Ditrichum pusillum</i> (Hedw.) Hampe	
<i>Ditrichum rhynchostegium</i> Kindb.	
<i>Drummondia prorepens</i> (Hedw.) Britt.	
<i>Entodon cladorrhizans</i> (Hedw.) C. Müll.	
<i>Entodon macropodus</i> (Hedw.) C. Müll.	<i>Entodon drummondii</i> (Sull.) Jaeg.
<i>Entodon seductrix</i> (Hedw.) C. Müll.	
<i>Entodon sullivantii</i> (C. M.) Lindb.	
<i>Eucladium verticillatum</i> (Brid.) Bruch & Schimp. in B.S.G.	
<i>Eurhynchium hians</i> (Hedw.) Sande Lac.	

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Fabronia ciliaris</i> (Brid.) Brid. var. <i>polycarpa</i> (Hook.) Buck	<i>Fabronia ravenelii</i> Sull.
<i>Fissidens adiantoides</i> Hedw.	
<i>Fissidens asplenoides</i> Hedw.	
<i>Fissidens bryoides</i> Hedw.	<i>Fissidens exiguus</i> Sull., <i>Fissidens minutulus</i> Sull., <i>Fissidens pusillus</i> (Wils.) Milde, <i>Fissidens viridulus</i> (Sw.) Wahlenb.
<i>Fissidens bushii</i> (Card. & Ther.) Card. & Ther.	
<i>Fissidens dubius</i> P. Beauv.	<i>Fissidens cristatus</i> Wils. ex Mitt.
<i>Fissidens grandifrons</i> Brid.	
<i>Fissidens osmundioides</i> Hedw.	
<i>Fissidens subbasilaris</i> Hedw.	
<i>Fissidens taxifolius</i> Hedw.	
<i>Fontinalis novae-angliae</i> Sull.	
<i>Forsstroemia trichomitria</i> (Hedw.) Lindb.	
<i>Grimmia laevigata</i> (Brid.) Brid.	
<i>Gymnostomum aeruginosum</i> Sm.	
<i>Haplohymenium triste</i> (Ces. in De Not.) Kindb.	
<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	
<i>Herzogiella striatella</i> (Brid.) Iwats.	<i>Dolichotheca striatella</i>
<i>Homalotheciella subcapillata</i> (Hedw.) Broth.	
<i>Hookeria acutifolia</i> Hook. & Grev.	<i>Hookeria sullivantii</i> C. M. ex Lesq. & James
<i>Hygroamblystegium tenax</i> (Hedw.) Jenn.	
<i>Hymenostylium recurvirostre</i> (Hedw.) Dix.	<i>Gymnostomum recurvirostre</i> Hedw.
<i>Hyophila involuta</i> (Hook.) Jaeg. & Sauerb.	
<i>Hypnum curvifolium</i> Hedw.	
<i>Hypnum fertile</i> Sendtn.	
<i>Hypnum imponens</i> Hedw.	
<i>Hypnum lindbergii</i> Mitt.	
<i>Isopterygiopsis muelleriana</i> (Schimp.) Iwats.	
<i>Isopterygium tenerum</i> (Sw.) Mitt.	<i>Isopterygium micans</i> (Sw.) Kindb.
<i>Leucobryum albidum</i> (Brid. ex P. Beauv.) Lindb.	

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Leucobryum glaucum</i> (Hedw.) Ångstr. in Fries	
<i>Leucodon brachypus</i> Brid.	
<i>Leucodon julaceus</i> (Hedw.) Sull.	
<i>Loeskeobryum brevirostre</i> (Brid.) Fleisch. in Broth.	<i>Hylacomium brevirostre</i> (Brid.) Schimp. in B.S.G.
<i>Mnium hornum</i> Hedw.	
<i>Mnium marginatum</i> (With.) Brid. ex P. Beauv.	
<i>Mnium stellare</i> Hedw.	
<i>Myurella sibirica</i> (C. Mull.) Reim.	<i>Myurella careyana</i> Sull. in Sull. & Lesq., <i>Myurella gracilis</i> Lindb.
<i>Neckera complanata</i> (Hedw.) Hub.	
<i>Neckera pennata</i> Hedw.	
<i>Orthotrichum ohioense</i> Sull. & Lesq. in Aust.	
<i>Orthotrichum pusillum</i> Mitt.	
<i>Orthotrichum stellatum</i> Brid.	
<i>Orthotrichum strangulatum</i> P. Beauv.	
<i>Oxystegus tenuirostris</i> (Hook. & Taylor) A. J. E. Smith	<i>Trichostomum tenuirostre</i> (Hook. & Taylor) Lindb., <i>Trichostomum cylindricum</i> (Bruch ex Brid.) C. Mull
<i>Philonotis</i> aff. <i>glaucescens</i> (Hornsch.) Broth.	
<i>Philonotis fontana</i> (Hedw.) Brid.	
<i>Philonotis fontana</i> (Hedw.) Brid. var. <i>caespitosa</i> (Jur.) Schimp.	<i>Philonotis caespitosa</i> Jur.
<i>Philonotis fontana</i> (Hedw.) Brid. var. <i>pumila</i> (Turn.) Brid.	
<i>Physcomitrium pyriforme</i> (Hedw.) Hampe	
<i>Plagiomnium ellipticum</i> (Brid.) T. Kop.	<i>Mnium affine</i> (aff.) var. <i>rugicum</i> (Laur.) Bruch & Schimp. in B.S.G.
<i>Plagiomnium ciliare</i> (C. Müll.) T. Kop.	<i>Mnium affine</i> var. <i>ciliare</i> C. Mull., <i>Mnium ciliare</i> (C. Muell.) Schimp.
<i>Plagiomnium cuspidatum</i> (Hedw.) T. Kop.	<i>Mnium cuspidatum</i> Hedw.
<i>Plagiomnium rostratum</i> (Schrad.) T. Kop.	<i>Mnium rostratum</i> Schrad., <i>Mnium longirostre</i> Brid.
<i>Plagiothecium cavifolium</i> (Brid.) Iwats.	<i>Plagiothecium roeseanum</i> Schimp. in B.S.G.
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp. in B.S.G.	
<i>Plagiothecium laetum</i> Schimp. in B.S.G.	
<i>Platydictya confervoides</i> (Brid.) Crum	<i>Amblystegiella confervoides</i>

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Platygyrium repens</i> (Brid.) Schimp. in B.S.G.	
<i>Platyhypnidium riparioides</i> (Hedw.) Dix.	<i>Eurhynchium riparioides</i> (Hedw.) Rich.
<i>Pleurochaete squarrosa</i> (Brid.) Lindb.	
<i>Pleurozium schreberi</i> (Brid.) Mitt.	<i>Calliergonella schreberi</i> (Brid.) Grout
<i>Pogonatum pensilvanicum</i> (Hedw.) P. Beauv.	
<i>Polytrichum commune</i> Hedw.	
<i>Polytrichum juniperinum</i> Hedw.	
<i>Polytrichum ohioense</i> Ren. & Card.	
<i>Pseudotaxiphyllum elegans</i> (Brid.) Iwats.	<i>Isopterygium borrierianum</i> (C. Mull.) Lindb., <i>Plagiothecium elegans</i> (Brid.) Sull. in Gray, <i>Isopterygium elegans</i> (Brid.) Lindb.
<i>Ptychomitrium incurvum</i> (Schwaegr.) Spruce	
<i>Pylaisiadelphus tenuirostris</i> (Bruch & Schimp. ex Sull.) Buck	<i>Brotherella tenuirostris</i> (Bruch & Schimp. ex Sull.) Fleisch.
<i>Racomitrium aciculare</i> (Hedw.) Brid.	<i>Rhacomitrium aciculare</i> (Hedw.) Brid.
<i>Rhabdoweisia crispata</i> (With.) Lindb.	<i>Rhabdoweisia denticulata</i> Brid.
<i>Rhizomnium punctatum</i> (Hedw.) T. Kop.	<i>Mnium punctatum</i> Hedw.
<i>Rhodobryum roseum</i> (Hedw.) Limpr.	
<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	<i>Rhytidiadelphus subpinnatus</i> (Lindb.) T. Kop.
<i>Schistidium agassizii</i> Sull. & Lesq. in Sull.	<i>Grimmia alpicola</i> Sw. ex Hedw.
<i>Schistidium apocarpum</i> (Hedw.) Bruch & Schimp. in B.S.G.	<i>Grimmia apocarpa</i> Hedw., <i>Grimmia apocarpa</i> var. <i>gracilis</i> Web. & Mohr. ex Nees et al.
<i>Schistidium rivulare</i> (Brid.) Podp.	<i>Grimmia alpicola</i> Sw. ex Hedw.; <i>Grimmia alpicola</i> Hedw. var. <i>rivularis</i> (Brid.) Wahlenb.
<i>Schwetschkeopsis fabronia</i> (Schwaegr.) Broth.	<i>Schwetschkeopsis denticulata</i> (Sull.) Broth.
<i>Sematophyllum adnatum</i> (Michx.) Britt.	
<i>Sematophyllum demissum</i> (Wils.) Mitt.	<i>Sematophyllum carolinianum</i> (C. Müll.) Britt., <i>Raphidostegium carolinianum</i>
<i>Sematophyllum marylandicum</i> (C. Müll.) Britt.	<i>Raphidostegium marylandicum</i>
<i>Sphagnum affine</i> Ren. & Card.	<i>Sphagnum imbricatum</i> Hornsch. ex Russ.; <i>Sphagnum imbricatum</i> var. <i>affine</i> (Ren. & Card.) Flatb.
<i>Sphagnum compactum</i> DC. in Lam. & DC.	

Table A.3. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Sphagnum lescurii</i> Sull. in Gray	<i>Sphagnum subsecundum</i> var. <i>rufescens</i> (Nees & Hornsch.) Huep.
<i>Sphagnum molle</i> Sull.	<i>Sphagnum tabulare</i> Sull.
<i>Sphagnum subsecundum</i> Nees in Sturm	
<i>Steerecleus serrulatus</i> (Hedw.) Robins.	<i>Rhynchostegium serrulatum</i> (Hedw.) Jaeg. & Sauerb., <i>Eurhynchium serrulatum</i> (Hedw.) Kindb.
<i>Syrrhopodon texanus</i> Sull.	
<i>Taxiphyllum deplanatum</i> (Bruch. & Schimp. ex Schimp.) Fleisch	<i>Plagiothecium deplanatum</i> (Bruch & Schimp. ex Sull.) Spruce
<i>Taxiphyllum taxirameum</i> (Mitt.) Fleisch	<i>Plagiothecium geophilum</i> (Aust.) Grout
<i>Tetraphis pellucida</i> Hedw.	
<i>Thamnobryum alleghaniense</i> (C. Müll.) Nieuwl.	<i>Porotrichum alleghaniense</i> (C. M.) Grout
<i>Thelia hirtella</i> (Hedw.) Sull. in Sull. & Lesq.	
<i>Thuidium delicatulum</i> (Hedw.) Schimp in B.S.G.	
<i>Tortella humilis</i> (Hedw.) Jenn.	<i>Tortella caespitosa</i> (Schwaegr.) Limpr.
<i>Tuerckheimia augustifolia</i> (Saito) Zand.	<i>Gymnostomum augustifolium</i> Saito
<i>Ulota crispa</i> (Hedw.) Brid.	
<i>Ulota hutchinsiae</i> (Sw.) Hamm.	<i>Ulota americana</i> (P. Beauv.) Limpr.
<i>Weissia controversa</i> Hedw.	<i>Weissia viridula</i> Hedw. ex Brid.
<i>Zygodon viridissimus</i> (Dick.) Brid.	
<i>Zygodon viridissimus</i> (Dicks.) Brid. var. <i>rupestris</i> Lindb. ex Hartm.	

Table A.4. Taxonomic list of bryophytes for Bledsoe County, TN based on information obtained from the TENN database (2002) and species added in the current study.

TAXA	SYNONYMS
LIVERWORT TAXA	
<i>Aneura sharpii</i> Inoue & Miller	
<i>Bazzania tricrenata</i> (Wahl.) Trev.	
<i>Bazzania trilobata</i> (L.) S. F. Gray	
<i>Cololejeunea biddlecomiae</i> (Aust.) Evans	
<i>Frullania asagrayana</i> Mont.	<i>Frullania tamarisci</i> subsp. <i>asagrayana</i> (Mont.) Hatt.
<i>Frullania eboracensis</i> Gott.	
<i>Gymnocollea inflata</i> (Huds.) Dum.	
<i>Leucolejeunea clypeata</i> (Schwein.) Evs.	
<i>Marsupella emarginata</i> (Ehrh.) Dum.	
<i>Marsupella sphacelata</i> (Gies.) Dum.	
<i>Odontoschisma prostratum</i> (Sw.) Trev.	
<i>Pellia epiphylla</i> (L.) Lindb.	
<i>Radula obconica</i> Sull.	
MOSS TAXA	
<i>Amblystegium varium</i> (Hedw.) Lindb.	
<i>Anomodon attenuatus</i> (Hedw.) Hüb.	
<i>Atrichum oerstidianum</i> (C. Müll.) Mitt.	<i>Atrichum undulatum</i> var. <i>oerstidianum</i> (C. Müll.) Crum
<i>Campylium chrysophyllum</i> (Brid.) J. Lange	
<i>Climacium americanum</i> Brid.	
<i>Cryphaea glomerata</i> Bruch & Schimp ex Sull.	
<i>Dicranum flagellare</i> Hedw.	<i>Orthodicranum flagellare</i> (Hedw.) Loeske
<i>Ditrichum pusillum</i> (Hedw.) Hampe	
<i>Fontinalis novae-angliae</i> Sull.	
<i>Funaria hygrometrica</i> Hedw.	
<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	
<i>Platygyrium repens</i> (Brid.) Schimp. in B.S.G.	
<i>Pogonatum pensilvanicum</i> (Hedw.) P. Beauv.	
<i>Polytrichum ohioense</i> Ren. & Card.	

Table A.4. Continued.

TAXA	SYNONYMS
MOSS TAXA (continued)	
<i>Pseudotaxiphyllum elegans</i> (Brid.) Iwats.	<i>Isopterygium borrierianum</i> (C. Mull.) Lindb., <i>Plagiothecium elegans</i> (Brid.) Sull. in Gray, <i>Isopterygium elegans</i> (Brid.) Lindb.
<i>Rhabdoweisia crispata</i> (With.) Lindb.	<i>Rhabdoweisia denticulata</i> Brid.
<i>Schistidium rivulare</i> (Brid.) Podp.	<i>Grimmia alpicola</i> Sw. ex Hedw.; <i>Grimmia alpicola</i> Hedw. var. <i>rivularis</i> (Brid.) Wahlenb.
<i>Sematophyllum adnatum</i> (Michx.) Britt.	
<i>Sematophyllum demissum</i> (Wils.) Mitt.	<i>Sematophyllum carolinianum</i> (C. Müll.) Britt., <i>Raphidostegium carolinianum</i>
<i>Sematophyllum marylandicum</i> (C. Müll.) Britt.	<i>Raphidostegium marylandicum</i>
<i>Sphagnum affine</i> Ren. & Card.	<i>Sphagnum imbricatum</i> Hornsch. ex Russ.; <i>Sphagnum imbricatum</i> var. <i>affine</i> (Ren. & Card.) Flatb.
<i>Sphagnum lescurii</i> Sull. in Gray	<i>Sphagnum subsecundum</i> var. <i>rufescens</i> (Nees & Hornsch.) Huep.
<i>Sphagnum macrophyllum</i> Brid.	
<i>Sphagnum subsecundum</i> Nees in Sturm	
<i>Thuidium allenii</i> Aust.	
<i>Thuidium delicatulum</i> (Hedw.) Schimp in B.S.G.	
<i>Weissia sharpii</i> Anders. & Lemmon	<i>Hymenostomum tortile</i> (Schwaegr. & Schkuhr.) B.S.G.
<i>Zygodon viridissimus</i> (Dick.) Brid.	

VITA

Keith Charles Bowman was born to Verlin B. and Sharon A. Bowman in Minneapolis, Minnesota on the 27th day of September in the year of our Lord nineteen hundred and seventy-six. He received both his primary and secondary education in North Branch, MN, graduating as the 1995 Valedictorian from North Branch Senior High School. He then attended Connecticut College in New London, CT, during which time he was accepted into the School for Field Studies' program for the study of sustainable development located in Atenas, Costa Rica. He completed this three month program in December of 1997, at which time he resumed his studies at Connecticut College. During the summer of 1998 he began his honors thesis study through the support of a Lawrence Scholarship. During that summer he was funded by the National Bryological Society to attend a class at the Humboldt Field Research Institute in Steuben, Maine. In May of 1999 he earned his Bachelor of Arts degree in Botany with a minor in Mathematics, graduating with honors as *Summa Cum Laude*. Following graduation, Keith worked with Dr. Manuel Lizarralde on a study in Venezuela of the ethnobotanical uses of palms among the Barí, an indigenous tribe in Venezuela and Colombia. Upon his return to the United States, he began a year long internship with the Connecticut College Arboretum. In August of 2000 he began his studies at the University of Tennessee in Knoxville, TN. He plans to attain his Master of Science degree in May of 2003.

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