Vegetation of geographically isolated montane non-alluvial wetlands of the southern Blue Ridge of North Carolina

by
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ABSTRACT

WICHMANN, BRENDA LYNN. Vegetation of geographically isolated montane non-alluvial wetlands of the southern Blue Ridge of North Carolina. (Under the direction of Thomas R. Wentworth.)

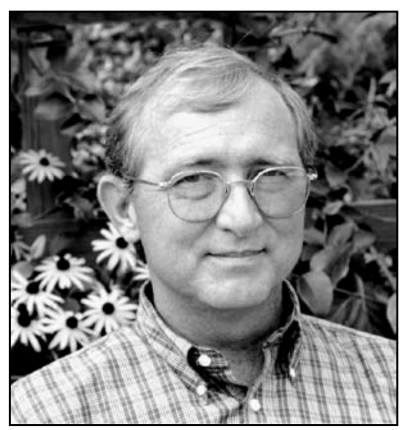
The ecological significance of montane non-alluvial wetlands in the southern Blue Ridge region of North Carolina is well known. However, there is relatively little quantitative documentation of these community types. In particular, our understanding of montane, peat-forming wetlands is based primarily on qualitative data, and there has been no previous comprehensive classification and description of these community types. In this study, species composition and vegetation-environment relationships are described for the geographically-isolated, non-alluvial wetlands of the southern Blue Ridge region of North Carolina. A hierarchical classification is presented for 12 community types within 2 broad vegetation classes based on 136 vegetation plots spanning the range of the southern Blue Ridge region of North Carolina. Hierarchical cluster analysis was used to delimit community types, and non-metric multidimensional scaling was subsequently used to help differentiate the community types identified by the cluster analysis. Although some of these community types fit well within currently recognized community concepts, others fit poorly within existing concepts, pointing to a need for definition of new types and/or significant refinement of types currently recognized. The 2 broad vegetation classes and 12 community types are discussed, each with a description of composition, related community concepts, and environmental context. Compositional variation among the types is most strongly associated with elevation, soil pH, soil nutrient availability, and soil cation exchange capacity.

DEDICATION

To my late Grandmother, **Virnette Colleen Herrmann**, whom, I believe, cultivated my passion for botany at a very early age. When I was as young as 4 years old, she explained to me why I should not pick the wild flowers…because they will not make seed for baby flowers to grow and one day all the flowers will be gone. Here's to all the wonderful moments spent with my grandmother, especially those at 'Endlich' (at last), which I cherish the most.

To the late **Robert Gardener**, a dear friend and mentor with whom I spent countless hours in the garden learning and chatting. My dear friend left this world, after a long fight, during the summer of 2006, while I was away collecting data for the research presented in this thesis. To Rob, an amazing person with good spirits, who always knew how to have fun, and who had exceptional talent in the garden. Good-bye my friend. I miss our Saturday mornings together and will always cherish the memories.

Virnette C. Herrmann
November 15, 1928 - December 11, 1993



Robert K. Gardner
May 6, 1949 – August 2006

BIOGRAPHY

I am western girl disjunct in the South. I was born and raised outside of Denver, Colorado (Westminster, 80021) and spent a lot of time in the Rocky Mountains. My parents are wonderful. My brother and sister are wonderful. I grew up in a supportive and loving family. My grandparents, aunts, cousins, sister, brother, mom and dad made my life enjoyable and exciting. Determination and excellence were encouraged, always with support. Adventure and fun were typical. We spent time together, outdoors and indoors. I have fond memories of the Rocky Mountains, camping, fishing, relaxing, and botanizing. I cherish the memories of my grandmother, whom I believe, along with my father, cultivated my passion for botany at a very young age. I've always been a dedicated and passionate person, reaching for the stars with all my might. I was a passionate and serious athlete and that taught me a lot. My youthful aspirations were to excel both academically and athletically. My parents encouraged and supported both academic and athletic excellence; success at both (and all) endeavors was expected to be possible with determination and hard work. My family is the reason that I am where I am today. I would have never made it here without them. My parents spent their life encouraging my dreams (along with those of my brother and sister), weekends were spent at the soccer field, and money was spent on my education and soccer career. So long as I can remember, I've wanted to be both an Olympic soccer player and a professional botanist. My parents never told me to expect anything less. I generally succeeded. I played soccer at the collegiate level (DI, Southern Conference, Wofford College) and I became a botanist. I only wish my family were not so far away. I am still passionate about athletics, soccer in particular. I will play soccer so as long as I can run. I understand the importance of athletics to society, accepting the environmental impacts that such activities have on the earth. I will always be a passionate botanist, no matter where my career might take me. I love adventure and discovery and hope only for more of both. I love my husband and our cats. I love my parents and my brother and my sister. I love my friends and my local community. My life is enjoyable. If I should discover, describe, and name a new plant taxon, I will have lived.

ACKNOWLEDGEMENTS

Accomplishments such as those represented in this thesis are rarely achieved without the support of many people and the achievements of those that have come before us. I would like to acknowledge all the explorers, naturalists, geologists, soil scientists, botanists, taxonomists, plant collectors, herbarium curators, phytosociologists, and ecologists that have ventured before me. I would especially like to acknowledge all the diligent plant collectors and plant taxonomists, for they have provided the foundation on which this body of work depends. Without them, even beginning to understand the compositional variation found within and among plant community assemblages would be impossible and the science of plant ecology would not be where it is today.

I owe special thanks to the gang of seven (GOS), especially the gang of only four (GOOF). Their mission and dreams developed the fundamentals behind this project and made it possible. Specifically, I thank Michael P. Schafale (Mike), Thomas R. Wentworth (Tom), and Robert K. Peet (Bob) for the countless hours spent together during ten years of pulse events. With them, I have seen the Carolinas, from the shell islands of South Carolina's coast to the cranberry bogs of North Carolina's high mountain valleys. Their patience with my personality and my numerous questions never waned. My experiences with these three great minds, both in the field and in conversations over dinner and during long drives, taught me more about ecology and the vegetation of the Southeast than can ever be learned in a formal educational setting. Finally, I thank CVS (a.k.a. GOS/GOOF) for seeing my potential, giving me a first chance at this project, and having the confidence that I would do a good job. I give special thanks to Tom and Bob for seeing my potential and taking me on as their student.

I thank my committee members for taking on this project and giving me encouragement and support. I especially thank Dr. Thomas R. Wentworth for serving as my committee chair, having confidence in me and providing positive encouragement while having patience with my nuances. I thank Dr. Robert K. Peet for providing financial support, for having patience with my nuances, and for letting me use his lab as a home away from home (Dr. Wentworth's lab). I thank Dr. Ted Shear for his patience with and support of this project.

I thank my two field assistants, Marj Boyer and Mike Turner. Especially Marj, who spent 13 weeks on the road sampling bogs with me while never voicing a complaint. Marj is a passionate botanist with a great spirit. She taught me many plants and, during those thirteen weeks, she reminded me that we were having fun when I was not having fun. Every day, even when we were crawling through a 'Rhodo hell' or stuck in muck, surrounded by thick shrubs over sharp beaver stumps that could kill a person with one wrong move, Marj recognized the joy in being outdoors and seeing unique places and plants. Mike Turner helped me get through three additional weeks of dreaded sampling. His enthusiasm for botany and love of field work, combined with his strong work ethic, was a needed and timely blessing.

I thank my lab mates, Wade A. Wall and Kristen M. Kostelnik, who have provided encouragement and support at times when I needed it most. I especially thank Wade for coming out in the field and sampling plots, for his patience and willingness to help me with data analysis each and every time I asked and when I asked. I would not have brought this project to completion without Wade's assistance.

I would like to thank the Plant Ecology Lab (PEL) at UNC-CH for providing a home away from home (Dr. Wentworth's lab), technical assistance, encouragement, and support. I especially thank M. Forbes Boyle, Liz Matthews, Jackie White, and Michael Lee. Forbes and Liz provided technical assistance with data compilation and data management. Jackie provided insightful conversation and invaluable support and encouragement. I thank Michael Lee for all the work he has done with the Carolina Vegetation Survey database over the past decade and for his kindness and willingness to help with anything needed.

I thank my friends who came out in the field to sample plots: Chris Liloia, Kirk Ross, and Misty F. Buchanan. I thank my dear friends Sally Heiney and Kirk Ross who always opened their door and listened to the woes of graduate school. I thank Kirk for all the good meals he fed me and all the good mid-western advice he offered. I thank Sally for being a best friend and doing for me what best friends do for each other.

I also thank my local community and fan club who continually supported and encouraged me during these past few years. I thank them for trying to understand why I missed so many good shows and basketball games (Tar Heels, of course), and why I spent more time with my computer than with them.

I thank the Botany Department (aka Department of Plant Biology) of North Carolina State University, especially the Graduate School Acceptance Committee, for taking a leap of faith and letting me into the program.

Lastly, I thank the people closest to me, my parents David A. and Dianne L. Wichmann, my sister, Beth A. Borland, my brother Jacob W. Wichmann, and my dear husband Kevin H. Dixon. Without the continued support of my parents, the motivation from Beth and Jacob, and the continual patience and encouragement from my husband, success in graduate school and completion of this thesis would not have been possible.

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INTRODUCTION

Vegetation description and classification, as well as the interpretation of vegetation-environment relationships, play key roles in scientific research, conservation, and natural resource management (Peet et al. 1998). Vegetation classification systems provide conceptual frameworks for understanding ecological and evolutionary relationships among species and environment from local to regional scales (Carr et al. *in press*). The information embedded in such systems is essential to scientists interested in a better understanding of how vegetation varies through time and with respect to local conditions (Peet et al. 1998). The same information informs professionals working to document patterns of biodiversity, to determine its current status, to predict its responses to global environmental change, and to identify the most effective approaches for *in situ* conservation and sustainable use (Gaston 2000).

Geographically isolated montane non-alluvial wetlands of the southern Blue Ridge region of North Carolina are endangered ecosystems (Noss et al. 2005) that support high biological diversity and numerous disjunct and regionally rare species (Richardson and Gibbons 1993). These are small wetlands, surrounded by terrestrial vegetation, occurring in localized areas where hydrology dominated by seepage, high water table, or paludification allows for the development of *Sphagnum* moss and the accumulation of peat or muck soils (Weakley and Schafale 1994, Schafale and Weakley 1990, and Moorhead et al. 2000). These wetlands occupy four principal landscape positions: headwater regions of small streams, stream valleys no longer subject to flooding, slopes intercepting the water table and subject to constant seepage from groundwater, and isolated locations over resistant rock strata

(Moorhead et al. 2000, Weakley and Schafale 1994, and Walbridge 1994). They span six degrees of latitude and are found across an elevation range of 1,800 m; each wetland has distinct geological, chemical, and physical characteristics (Moorehead and Rossell 1998), creating a situation fostering high floristic variation at both local and regional scales.

The soil chemistry and plant assemblages of these peat-accumulating wetlands resemble the bogs and fens found in the northern latitudes of North America and Europe, but their ontogeny is quite different and they were not influenced directly by continental glacial recession (Ingham 1996 in Franl et al. 2004, Warren et al. 2004, and Thompson et al. 2007).

The unique combination of climatoilogical and geological components typical of the southern Blue Ridge region of North Carolina help to explain the formation of peat-accumulating wetlands south of their general regional climatic limit (40° N. latitude). Cooler air and soil temperatures and increased precipitation, often leading to areas of precipitation exceeding evapotranpiration typical of high elevations (> 800m) of the southern Blue Ridge region, mimic northern climates (Francl et al. 2004 in Thompson et al. 2007); the typical acidic substrate and localized areas with high connectivity to groundwater encourage the formation of Sphagnum-dominated wetlands (Halsey et al. 2000).

Non-alluvial wetlands are rare in the southern Blue Ridge region, not only because of relatively recent loss through human modification of the landscape (~90% since European settlement) but also because the generally steep and topographically mature landscape typical of the region is not favorable for extensive wetland formation (Halsey et al. 2000 and Weakley and Schafale 1994). Nonetheless, these small, rare ecosystems support great biological diversity, are themselves highly varied in composition, provide critical habitat for several species of native plants and animals, some of which are rare in the Southeast (Thompson et al. 2007, Comer et al. 2005, Weakley and Schafale 1994, Richardson and Gibbons 1993, and Murdock 1994). The flora they support includes a high concentration of rare taxa, southern Appalachian endemics, and regionally disjunct taxa (Billings and Anderson 1966, Weakley and Schafale 1994).

Much of our understanding of the vegetation of montane non-alluvial wetlands of the southern and central Appalachian highlands is based on work conducted outside of the Blue Ridge region, in the Appalachian Plateau and Ridge and Valley regions of Virginia and West Virginia (e.g., Byers et al. 2007 and Francl at al. 2004). Relatively little work has been conducted on the wetlands in the southern Blue Ridge region. What we do know of these southern wetlands is based primarily on information from plant species lists that often focus primarily on rare or dominant taxa (e.g., Smith 1993, Boufford and Wood 1975, Gaddy 1981, Schafale and Weakley 1990, Weakley and Schafale 1994, Oakley 2000, and Weakley 1993), and from studies conducted in a few key research sites (Tucker 1967; Shafer 1984, 1986, and 1988; Mowbray and Schlesinger 1988; Stewart and Nilsen 1993; Pittillo 1994; Delcourt and Delcourt 1997; Almon 1998; Riggsbee 1999; Rossell and Wells 1999; Moorhead et al. 2000; Moorhead 2001; Warren et al. 2004; Warren et al. 2007; and Rossell et al. 2008). Cursory studies in the southern Blue Ridge region and more comprehensive studies in the Appalachian Plateau and Ridge and Valley regions have documented the distinctiveness of individual wetlands and the wide range of compositional variation found among wetland sites (Weakley and Schafale 1994, Francl et al. 2004, Fleming et al. 2006, and Byers et al. 2007). These same studies indicate that findings from the few carefully-studied sites represent only a small subset of the variation in vegetation and underlying environmental conditions found in montane non-alluvial wetlands spanning the southern Appalachian region. Moreover, the small pockets that these wetlands occupy are spatially isolated from one another (Weakley and Schafale 1994), with the consequence that chance events such as seed dispersal, habitat colonization, and survivorship have led to considerable compositional variation in vegetation. No previous work has provided quantitative documentation of the vegetation composition of the non-alluvial wetlands found throughout the southern Blue Ridge region at either local or regional scales.

The focus of this study is geographically isolated montane non-alluvial wetlands of the southern Blue Ridge region of North Carolina. In regional literature, these habitats are often referred to as 'bogs', (e.g., Schafale and Weakley 1990, Pittillo 1994, and Richardson and Gibbons 1993), though this usage is not consistent with more common, international use of the term to refer to more ombrotrophic peatlands. Schafale and Weakley (1990) divided the montane non-alluvial wetlands of North Carolina into six major types: 1) Swamp Forest-Bog Complex, 2) Southern Appalachian Bog, 3) Southern Appalachian Fen, 4) High Elevation Seep, 5) Spray Cliff, and 6) Upland Pool. Except for Spray Cliffs and Upland Pools, these wetland types are geographically isolated, have hydrology dominated by seepage, high water table, or paludification, and accumulate relatively large amounts of peat or muck under *Sphagnum* moss (Schafale and Weakley 1990 and Weakley and Schafale 1994). This study includes montane, non-alluvial wetlands within the scope of Schafale and Weakley's (1990) Swamp Forest-Bog Complex, Southern Appalachian Bog, Southern Appalachian Fen, and High Elevation Seep.

We present a quantitative classification and description of the vegetation of montane non-alluvial wetlands occurring throughout the southern Blue Ridge region of North Carolina. Our objective was to describe plant community types based on floristic assemblages alone, and then place the compositional variation in vegetation in an environmental and geographic context by examining underlying environmental gradients correlated with the observed differences in vegetation patterns. Community types are described by their dominant and diagnostic plant species, facilitating field identification.

We use the results of this study to develop proposals for revision or elaboration of the community types recognized in the U.S. National Vegetation Classification (NVC) and the North Carolina Natural Heritage Program (NCNHP). The resultant characterization and classification of the vegetation of the montane non-alluvial wetlands North Carolina will provide a better overall ecological understanding of these rare systems and should guide future preservation, conservation, management, and restoration decisions.

METHODS

Study Area

The study area spanned the southern Blue Ridge region of North Carolina (Figure 1). This region occupies the Southern section of the Blue Ridge Province, the easternmost belt of mountains in the Appalachian Highlands physiographic division of eastern North America (Fenneman 1928 and Guyot 1861). The Blue Ridge province is geologically and ecologically complex (Soltis et al. 2006) with remarkable physical structure and general altitude (Goyot 1861). It is characterized by mature mountains composed of crystalline rocks

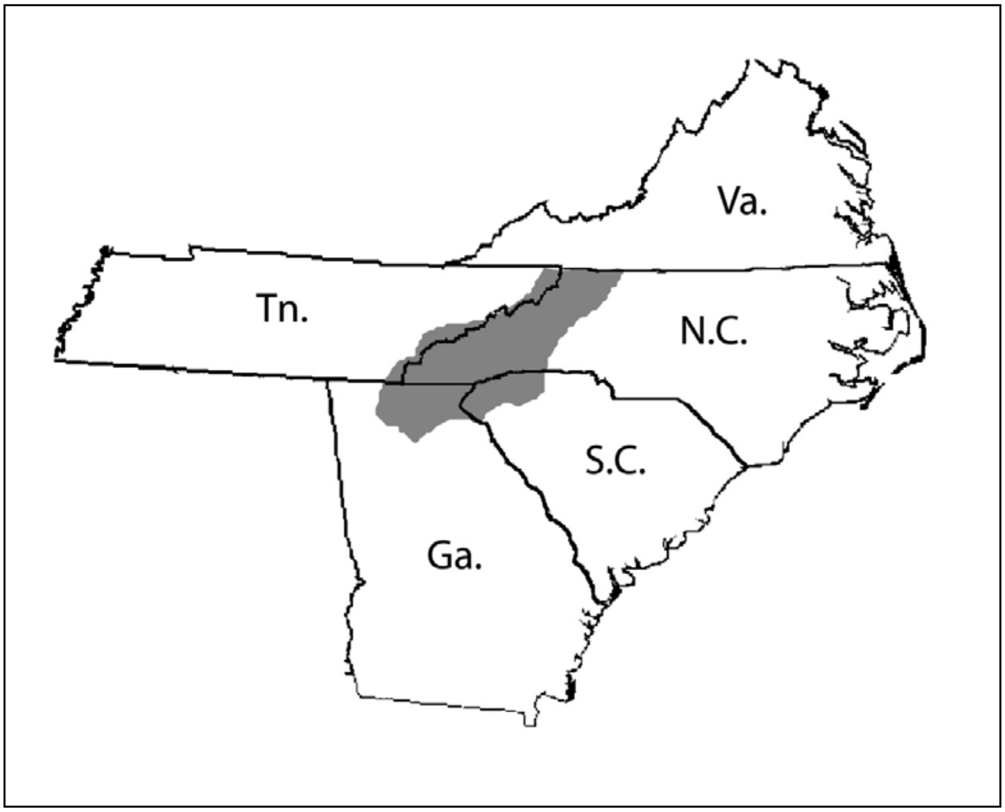

Figure 1. Map of southern Blue Ridge region (in gray) of North Carolina and contiguous states.

of pre-Cambrian to early Cambrian origin and defined as the broader portion south of the Roanoke River whose summits do not indicate a peneplain (Fenneman 1928). Within North Carolina, the Blue Ridge region extends about 350 km along a southwest to northeast axis and reaches a width of 130 km with a total area of around 22,000 km^2 (Guyot 1861, McNab and Avers 1996, and Peet et al. 2003). Elevations vary abruptly from around 300 m at the base of Blue Ridge Escarpment to 2000 m atop highest peaks (Peet et al. 2003).

The landscape of the southern Blue Ridge region of North Carolina is ancient, built by a series of collisional events in the Paleozoic and an extensional event in the Late Triassic (Matmon 2003). In this ancient landscape, active tectonics ceased long ago and there were no glaciations, thereby giving topography time to adjust to lithology (rock composition) and structure (Matmon 2003). Thus, the landscape is in a relative steady state (Matmon 2003), has well developed drainage systems (Halsey et al. 2000) with no natural lakes and few depression wetlands.

The soils of the region are largely derived from mica gneiss, similar felsic rocks, and acidic metasedimentary rock units (Peet et al. 2003). Ancient weathering and acidic substrate characteristic of the region are reflected in the soils, which are typically poor in phosphorus, calcium, and magnesium, and are acidic, generally with a pH less than 5.0 in all horizons (Peet et al. 2003). Exceptions are found in areas with soils derived from igneous bedrock containing high levels of mafic minerals (Peet et al. 2003).

The climate of the southern Blue Ridge region varies considerably with local topography and elevation (Newell 1998, McNab and Avers 1996), but is generally humid, and its average annual precipitation far exceeds evapotranspiration (Muller and Grymes III 1998). Precipitation averages 1000-1300 mm annually, although totals may be considerably higher along portions of the Blue Ridge escarpment (up to 2000 mm) and on the highest peaks (up to 2000 m) (McNab and Avers 1996). Precipitation is nearly equally distributed throughout the year and relatively little occurs as snow, which may cover only the highest elevations until spring (McNab and Avers 1996, Sankovski and Pridnia 1995). Mean monthly temperatures range from 3° C in January to 24° C in July (McNab and Avers 1996).

SITE SELECTION

The geographic and ecological scope of this study includes all geographically isolated non-alluvial wetlands within the southern Blue Ridge region of North Carolina. Sample sites were distributed across the region to capture the range of variation associated with both elevation and geography (Figure 2). Candidate sites were identified by various sources, including the North Carolina Natural Heritage Program (NHP) and regional natural resource professionals. Priority was given to sites with at least one NHP Natural Community Element Occurrence classified as "Southern Appalachian Bog" (Schafale and Weakley 1994) and ranked as excellent (A) or good (B). In a few cases, sites ranked as fair (C) were considered, specifically if a site had at least one known occurrence of a federally listed (LE or LT) or special concern (FSC) plant or animal. A site was defined as an individual area of wetland vegetation, geographically separated from additional areas of wetland vegetation by terrestrial vegetation. Determination of geographical separation was based on field observation and/or interpretation of Digital Orthophoto Quarter Quads (DOQQS) in a Geographic Information System (GIS). A site does not, necessarily, correspond to the spatial extent of a Significant Natural Heritage Area SNHA as defined by NHP. In total I recorded 90 plots from 49 sites distributed across 11 counties in North Carolina (Appendix 1). For the analysis I also included 53 plots from the Carolina Vegetation Survey (CVS) database (archived by the North Carolina Botanical Garden) that were classified as "Montane non-alluvial wetlands," increasing the sample size to 143 plots from 68 sites distributed across 12 counties in North Carolina (Appendix 1). Original plot data, including plot locations (with latitudes and longitudes), collected for this project are part of the Carolina Vegetation Survey database and are archived as such.

FIELD METHODS

Vegetation plots established for this project were $10m^2$ in size (10 x 10m or 5 x 20m) to correspond to the standard observation unit (i.e., quadrat or module) of the Carolina Vegetation Survey (CVS) protocol (Peet et al. 1998). In one instance (plot 73-09-007), a $1000m^2$ or 20 x 50 m plot configuration with multiple $100m^2$ subplots was used (Peet et al. 1998). At each site, at least one $100m^2$ (10 x 10m or 5 x 20 m) plot was established within

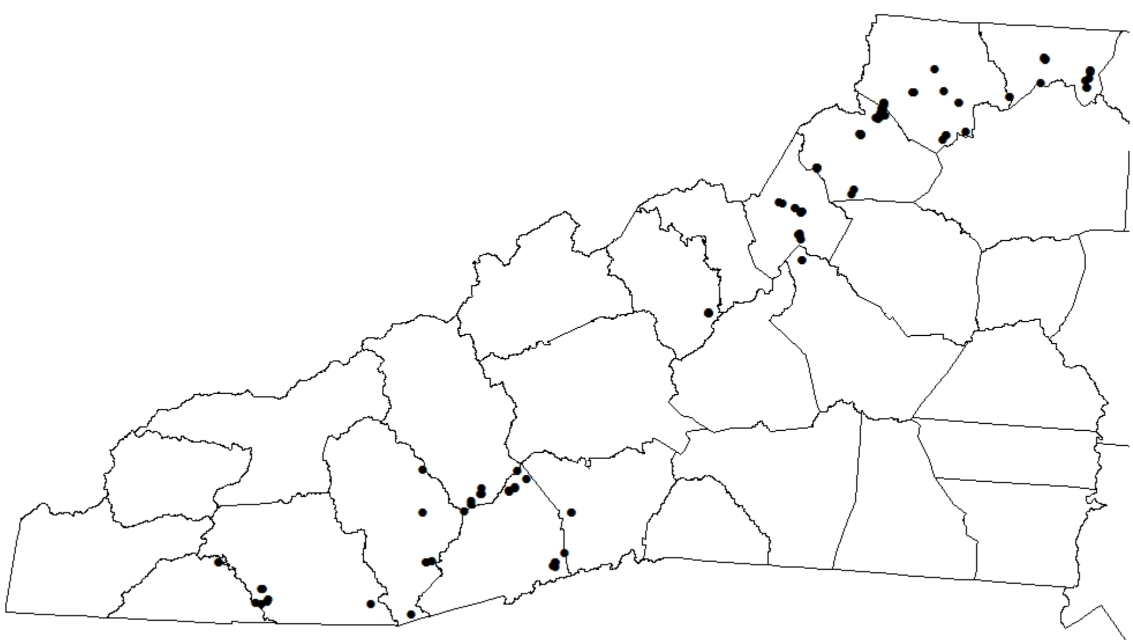

Figure 2. Distribution of sampling sites across the southern Blue Ridge region of North Carolina.

an area of relatively homogeneous vegetation. At compositionally diverse sites, more than one plot was typically established. However, the primary objective was to capture the range of variation found across the region with the consequence that the number of plots established in any one site was generally limited and not sufficient to capture the full range of vegetation variation found throughout the wetland area. Vegetation was recorded following the CVS protocol (Peet et al. 1998). Within each $10m^2$ plot, four nested subquadrats or "subplots" were inventoried: all vascular plant taxa were identified and given values indicating presence in different sized quadrats in a nest (presence, depth: 1-5) and abundance (cover class, scale: 1-10) (Peet et al. 1998). Aerial cover (as a measure of abundance) was estimated at the scale of the plot (depth: 1) using the CVS cover-class scale (1 = trace, 2 = <1%, 3 = 1-2%, 4= 2-5%, 5 = 5-10%, 6 = 10-25%, 7 = 25-50%, 8 = 50-75%, 9=75-95%, 10 = 95-100). The presence and abundance of *Sphagnum* spp. were recorded at the scale of the plot (depth: 1, $100m^2$). Percentage total covers (scale: 0 – 100%) of litter, decaying wood, bryophytes (including *Sphagnum* spp. and other mosses), visible surface water, and exposed muck were recorded at the scale of the plot (depth: 1, $100m^2$). Plots were inventoried during the late-vernal to aestival growing season (May-August) over a two-year period (2006-2007). Geographic coordinates (as estimated using a Garmin Extrex Legend H GPS Navigator Global Positioning System with an accuracy of $\leq$10m) and photographs were taken at one corner of each plot. Often a gnome (37 cm in height) was placed in the photograph for scale. The elevation of each plot was determined by from USGS digital elevation maps through use of a Geographic Information System.

Plant taxa were identified to the most finely resolved taxonomic level possible (i.e., specific, subspecific and/or varietal, where appropriate). Some taxa were treated with reduced taxonomic resolution because of problems with consistent field identification. Taxon concepts and authorities follow the Manual of the Vascular Flora of the Carolinas, Virginia, Georgia, and surrounding areas, working draft of 7 April 2008 (Weakley 2008). Voucher specimens of selected species of conservation value will be deposited at the North Carolina State University herbarium (NCSC).

A soil sample was collected from the top 10-20 cm of mineral or organic (peat or muck) soil found below the humic or bryophyte layer. When possible, a second soil sample was collected approximately 50 cm below ground surface. Soil depth was measured at the inner corner of each nested subquadrat (see Peet et al. 1998 for details). Soil samples were analyzed by Brookside Laboratories, Inc., New Knoxville, Ohio using the Mehlich III extraction technique. Total cation exchange capacity, percentage humic matter, pH, estimated nitrogen release (N ppm), easily extractable Phosphorus (P ppm), exchangeable cations (Ca, Mg, K, Na ppm), percentage base saturation, extractable micro-nutrients (Fe, Mn, B, Cu, Zn, Al ppm), soluble sulfur, and bulk density values were determined for each sample. Extractions were carried out using the Mehlich III method (Mehlich 1984) and percentage humic matter was determined by loss on ignition. Soil texture was determined and quantified as percentage sand (2 mm – 63 μm), silt (63– 2 μm) and clay (< 2 μm).

QUATITATIVE ANALYSIS

Standardization of Data

Analysis included 142 plots, 90 that I personally sampled during the summers of 2006 and 2007 and 52 sampled by the Carolina Vegetation Survey between 1993 and 1999 (Appendix A). Plots I sampled were all 100 m^2 except one plot (117-09-007), which was 1000 m^2 in size (Appendix A). Plots sampled by the Carolina Vegetation Survey ranged in size from 100 m^2 to 1000 m^2 (Appendix A). To accommodate for the variation in spatial extent and number of intensive modules sampled (i.e., quadrats with presence and abundance data recorded, see Peet et al. 1998), we determined the geometric mean percentage cover of each cover class for all intensive modules inventoried in a plot and calculated an average value across the entire plot. In most cases, plots were a single 100m^2 module in size and thus no such calculations were necessary. We similarly standardized soil values by determining a single value for each measured variable for each plot. In the case of multiple module plots, we averaged all soil values measured from intensive modules to obtain a single plot value for each measured variable. Prior to analysis, we used our field experience to assign each plot to one of three possible *a priori* classification groups: 1) bog or fen, 2) seep, or 3) forested bog. This provided a subjective clustering or grouping of vegetation which we then used to evaluate quantitative results as suggested by Gauch and Whittaker (1981).

Differences in botanical nomenclature due to sampling date and preference of data recorders were standardized to follow Weakley's Flora of the Carolinas, Virginia, Georgia, and surrounding areas, working draft of 7 April 2008 (Weakley 2008). In cases where nomenclatural relationships were not synonymous as a one to one relationship, a composite taxon was created to include all possible component taxa. Composite taxa, typically of broad taxonomy, were also created to accommodate vegetative specimens that could not be identified to the most finely resolved taxonomic level (e.g., the composite taxon '*Chelone* [*glabra* + *obliqua*]' accommodates indistinguishable vegetative specimens of the petiolate *Chelone* spp., while allowing precise recognition of vegetative specimens of the sessile species, *Chelone cuthbertii*).

Vegetation classification and characterization

Our approach to vegetation classification was to apply a combination of ordination and clustering techniques to partition samples into floristically similar groups. Once potential groups were identified, we calculated several summery statistics based on concepts of constancy and fidelity to evaluate the consistency and distinctiveness of each group and to aid in selecting nominal taxa. We also ranked taxa by prevalence (*sensu* Curtis 1959) and subsequently determined homoteneity (*sensu* Curtis 1959) for each vegetation class and community type to provide an indication of compositional variability among plots within a recognized group.

We calculated a dissimilarity matrix for the complete data set (142 plots x 493 taxa) representing inter-sample similarity in species abundances among plots Sørensen (Bray-Curtis) distance metric. We used a hierarchical, agglomerative Sørensen-based cluster analysis and the flexible-beta group linkage (Lance and Williams 1967) with a $\beta = -0.25$ to partition samples in a manner that minimized within group sum of squares relative to between group differences (McCune and Grace 2002). We used PC-ORD software, version 5.0 (McCune and Mefford 2006) to conduct these analyses.

An initial cluster analysis of the complete data set (142 plots x 493 taxa) revealed that the data were very heterogeneous. We, therefore, identified and removed outlier samples in the dataset and subsequently partitioned the data set into finer-scale data subsets. We identified plots that fell greater than 2.0 standard deviations above the mean for average Sørensen (Bray-Curtis) distance as outliers in the data set (142 plots x 493 taxa) and removed these plots prior to further analyses. Six plots were removed, bringing the dataset to 136 plots (Appendix A). We then performed cluster analysis on the new data set (136 plots x 477 taxa) to partition the data into finer-scale data subsets. We also used Nonmetric Multidimensional Scaling (NMS) ordination to summarize compositional similarity among the plots. We also manually adjusted group membership of individual plots during cluster analysis of the data set. Eight plots proved problematic, falling in clustered groups inconsistent with *a priori* classification. We ultimately re-assigned these plots (Appendix A) from their initial group to another group after evaluating the statistical interpretability of each affected group with and without the questionable plots, by examining the plots in ordination space, and by reviewing *a priori* classification. Finally, after examining the results of fine-tunedthe manually-adjusted cluster analysis and ordination, we chose to partition the dataset into two groups or data subsets, which we call "vegetation classes". Acceptance of two groups as vegetation classes provided recognizable and distinct floristic assemblages that were ecologically interpretable and provided a hierarchical framework comparable to existing classifications of montane non-alluvial wetlands.

Once the vegetation classes were determined, we treated data associated with each vegetation class as independent data sets and each was analyzed as such. Data set I contained 83 plots and 313 taxa. Data set II contained 53 plots and 385 taxa. For each data set we performed multiple hierarchical, agglomerative cluster analyses using various measures of distance. Ultimately, a Sørensen-based cluster analysis and the flexible-beta group linkage (Lance and Williams 1967) with a $\beta = -0.25$ provided the most interpretable groups for both data subsets.

Data set II proved problematic, not yielding groups that were easily recognizable and distinct. To mediate this problem, we deleted two taxa, *Acer rubrum* L. var. *rubrum* and the composite taxon *Betula* sp. (subgenus *Betulenta*; *Betula lenta* L. var. *lenta* + *B. alleghaniensis*). Because we were unable to confidently distinguish between *Betula lenta* L. var. *lenta* and *Betula alleghaniensis* Britton in the field, we felt that we may have been obscuring inter-plot similarities by lumping the two taxa. Hybridization and vegetative variability is common among birches (Järvinen 2004), and Weakley (2008) suggests that these taxa may occupy different elevation gradients. Similarly, we felt *Acer rubrum* L. var. *rubrum*, one of the most ubiquitous trees in North Carolina and one with weedy abilities (Weakley 2008), may have been obscuring inter-plot similarities because it was found in nearly every plot. Ultimately, removal of the taxon *Acer rubrum* L. var. *rubrum* and the composite taxon representing *Betula lenta* L. var. *lenta* and *B. alleghaniensis* resulted in groups that were easily recognizable and distinct. Once groups were accepted, both taxa were put back into the data set prior to calculation of summary statistics.

After examining the results of cluster analysis for each data set, we accepted the most ecologically interpretable dendrogram for each vegetation class, which presented recognizable and distinct floristic assemblages that we call “communities.” To evaluate the consistency and distinctiveness of each community we calculated summary statistics based on taxon-specific measures of constancy (*sensu* Curtis 1958), fidelity, and mean abundance. Constancy represents the percentage of plots in a community in which a taxon occurs. Fidelity represents the degree to which a taxon is confined in a community. We also identified diagnostic taxa (*sensu* Curtis 1958) by calculating taxon-specific indicator values. For each taxon in each community, two indicator values were calculated. The first, which we call Indicator Value (IV) represents taxa that are both constant and relatively confined to a community and does not consider abundance. The second, which we call Scaled Indicator Value (IVS), represents taxa that are both constant and relatively confined to a community and is adjusted by mean abundance so as to synthesize taxon-specific information of constancy, fidelity, and mean abundance (Fleming et al. 2006).

Relationship of vegetation to the environment

The relationship between species composition and major environmental gradients was explored using non-metric multidimensional scaling (NMS) ordination of our response matrices of Sørensen distance. Nonmetric multidimensional scaling (NMS; Kruskal 1964) was implemented in the program PC-ORD 5.0 using the slow and thorough autopilot approach followed by a final run using the manual approach (McCune and Medford 2006). The configuration file from the preliminary run and one real run was used for the final run. The final NMS run consisted of two dimensions with no step-down in dimensionality. The ordination was VARIMAX rotated to optimize axis placement such that axis 1 accounted for the majority of the solution.

RESULTS

We identified 12 communities within 2 vegetation classes based on analyses of 136 plots containing a total of 477 plant taxa. Within vegetation class I, we identified 4 communities based on 53 plots (Appendix B.1). Within vegetation class II we identified 8 communities and 83 plots (Appendix B.2). We identified vegetation classes from the manually adjusted Sørensen flexible-beta cluster solution that was ecologically interpretable, corresponded to the *a priori* classification, and displayed a stable, two-dimensional solution using Nonmetric Multidimentional Scaling (NMS) ordination.

Vegetation classes were identified to provide broad categories of non-alluvial wetlands that differ primarily in vegetation structure and are comparable to broad vegetation groups previously recognized by Schafale and Weakley (1990). Communities represent finer divisions of vegetation classes that are more compositionally homogeneous and reflect environmental gradients of elevation and properties of soil. Our classification is a first approximation of a geographically broad classification based on quantitative data. Our classification system of 12 communities in 2 vegetation classes provides a hierarchical framework comparable to classifications of montane non-alluvial wetlands by Schafale and Weakley (1990) and presents community types that are readily distinguishable by field practitioners.

Vegetation classes were named using existing terminology in plant community classification. We used a standard naming strategy for community types, largely consistent with usage in the U.S. National Vegetation Classification (NVC; NatureServe 2009). Community names include diagnostic taxa that characterize and distinguish individual communities and typically have both high constancy (> 40%) and consistently high cover ($\geq$4). Diagnostic taxa occurring in the same stratum (tree, shrub, herb, nonvascular) are separated by a hyphen (-), and those occurring in different strata are separated by a slash (/). Taxa occurring in the uppermost stratum are listed first, followed successively by those in the lower strata. The order of taxon names within the stratum generally reflects decreasing levels constancy and/or abundance. Names were selected at the author's discretion based on calculated indicator values, constancy, and existing NVC names (Appendix B.1 and Appendix B.2).

We describe the two vegetation classes and individual communities below in terms of community structure, species composition, and associated environmental variables. First we explain the difference between the two vegetation classes and how these compare to previously recognized vegetation groups. We then compare and contrast each community within each vegetation class based on environmental gradients of elevation and properties of soil. This is followed by detailed descriptions of each community within each vegetation class. Communities are described in terms of community structure and species composition. Community descriptions are presented in order of descending constancy for each of four recognized strata layers: Canopy, Shrub, Herbaceous, and Bryophyte.

VEGETATION CLASSES

We recognize two vegetation classes, 1) SATURATED FORESTS AND SEEPS and 2) BOGS AND FENS, which are differentiated primarily based on the presence or abundance of large canopy trees. SATURATED FORESTS AND SEEPS represent areas of saturated soils having an abundance of canopy trees growing within a complex of ridges and sloughs, or small (< 0.5 ha) areas of saturated soils that receive shading from overhanging canopy trees of adjacent forests. BOGS AND FENS, in contrast, represent relatively large (> 0.5 ha) areas of saturated soils, which are typically open, generally flat or slightly sloping, and lack shading from overhanging canopy trees of adjacent forest.

The SATURATED FORESTS AND SEEPS vegetation class we describe includes Schafale and Weakley's (1990) concepts of Swamp Forest-Bog Complexe and High Elevation Seep. The BOGS AND FENS vegetation class we describe included Schafale and Weakley's (1990) concepts of Southern Appalachian Bogs and Southern Appalachian Fen.

Vegetation class 1: SATURATED FORESTS AND SEEPS

The SATURATED FORESTS AND SEEPS vegetation class occurs throughout the southern Blue Ridge region of North Carolina at elevations ranging from 600 m to over 1735 m. This vegetation class represents a large, broad group of montane non-alluvial wetland community types, which are distinctive in having large canopy trees contributing to vegetation composition. Canopy trees may be rooted within the wetland or overhanging from more terrestrial zones on community edges. Communities recognized within this vegetation class occupy poorly drained bottomlands of small streams, relatively steep slopes of groundwater discharge (Weakley and Schafale 1994), and/or broad and gently sloping areas among stream headwaters. Soils may be permanently saturated to intermittently dry or seasonally to semipermanently saturated, a result of constant to regular seepage and high water table (Weakley and Schafale 1994).

We recognized 4 community types within the SATURATED FOREST AND SEEPS vegetation class based on results of cluster analysis and NMDS ordination (Figures 3 and 4). Compositional differences among the 4 vegetation classes are most strongly associated with variation in elevation (Elv), soil depth, soil cation exchange capacity (CEC), soil nutrients (represented by calcium (Ca), potassium (K) and zinc (Zn)), and exchangeable Calcium to Magnesium ratios (Ca/Mg) (Figure 4, Appendix C). The **Low Elevation Saturated Forest (1.4)** occupies lower-elevation areas of deeper soil characterized by lower nutrient availability, lower total cation exchange capacity, and lower exchangeable Calcium to Magnesium ratios (Ca/Mg) (Figure 4). In contrast, the **High Elevation Seep (1.1)** community occupies higher-elevation areas of relatively shallow soils that are characterized by higher nutrient availability, higher total cation exchange capacity, and higher exchangeable Calcium to Magnesium ratios (Ca/Mg) (Figure 4). The **High Elevation Saturated Forest (1.3)** and the **High Elevation Sedge Seep (1.2)** occupy intermediate to higher-elevation areas of relatively shallow soils that are characterized by intermediate to higher nutrient availability and total cation exchange capacity (CEC) (Figure 4). The **High Elevation Sedge Seep (1.2)** differs from the **High Elevation Saturated Forest (1.3) and the Low Elevation Saturated Forest (1.4)** by occupying areas of soils characterized by higher exchangeable Calcium to Magnesium ratios (Ca/Mg) (Figure 4).

1.1 High Elevation Seep (8 plots)

Betula spp. / *Viburnum cassinoides / Athyrium asplenioides*

The **High Elevation Seep** community occupies relatively small zones of seepage at high elevations (1115 – 1730 m) on slopes ranging from 3 – 33°. Examples occur primarily in the southern portion of the study area, in Macon, Haywood, Jackson, and Transylvania Counties. Two example occurs in the northern portion of the study area, in Avery and Watauga Counties.

Vegetation composition is highly variable. This community occupies wetland zones that are often small (< 0.01 ha) with the consequence that surrounding vegetation of more upland or forested areas isare often included in plots and thus contributes to community composition. The canopy is typically dominated by *Betula* spp. (*alleghaniensis*/*lenta*) in association with a variable composition of deciduous and evergreen trees such as *Fagus grandiflora*, *Aesculus flava*, *Abies fraseri*, *Acer rubrum*, *Acer saccharum*, *Picea rubens*, *Prunus pensylvanica*, *Magnolia acuminata* var. *acuminata*, *Quercus montana* and/or *Fraxinus* spp. Shrub composition may include *Rhododendron maximum*, *Rhododendron catawbiense, Rubus allegheniensis*, *Amelanchier* spp. (*arborea/laevis*), *Vaccinium erythrocarpum*, *Hamamelis virginiana* var. *virginiana*, and/or *Viburnum cassinoides*. The herbaceous layer typically includes *Athyrium asplenioides* in association with *Eurybia chlorolepis*, *Oclemena acuminata*, *Dennstaedtia punctilobula*, *Angelica triquinata*, *Prenanthes* sp., *Chelone* spp. (*oblique*/*glabra*), *Viola cucullata*, and/or *Arisaema triphyllum*. Additional less common herbaceous taxa may include *Carex ruthii, Agrostis altissima, Oxalis montana*, *Veratrum virginicum*, *Diphylleia cymosa*, *Carex flexuosa*, *Glyceria melicaria*, and/or *Solidago curtisii* (Appendix A). *Sphagnum* spp. are generally present as scattered patches.

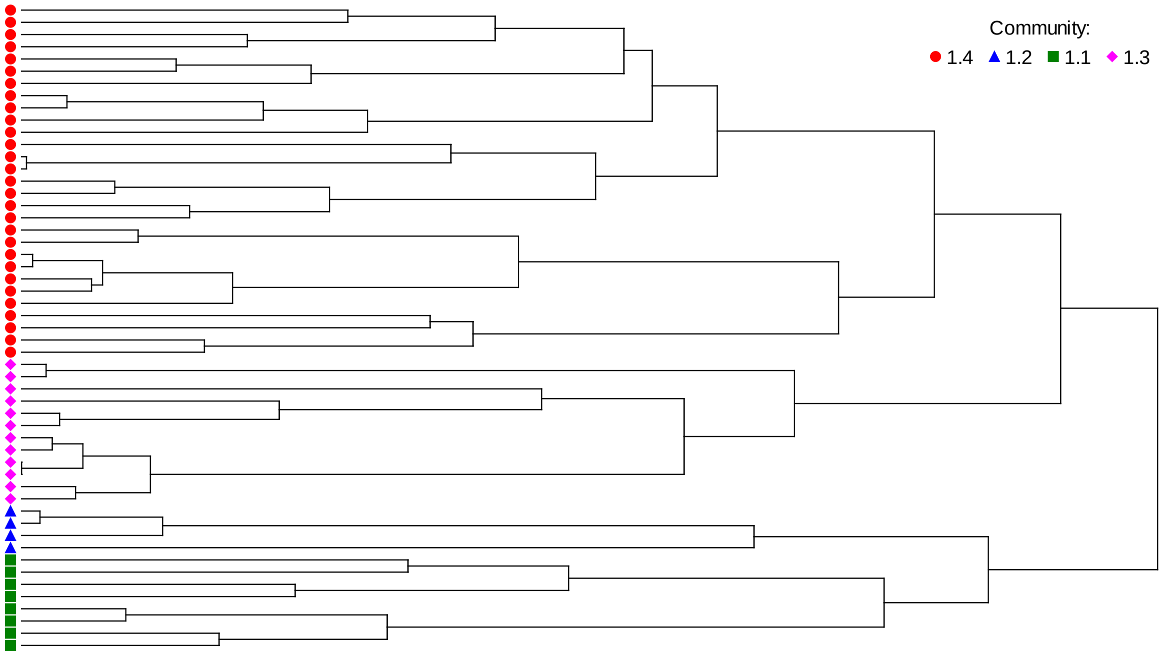

Figure 3. Hierarchical cluster solution of non-alluvial wetlands of the southern Blue Ridge region of North Carolina in the SATURATED FORESTS AND SEEPS vegetation class. The dendrogram shows divisions and final community grouping identified using Sørensen-based cluster analysis and the flexible-beta group linkage (Lance and Williams 1967) with a $\beta = -0.25$. Communities are represented by their numbers: 1.1 High Elevation Seep, 1.2 High Elevation Sedge Seep, 1.3 High Elevation Saturated Forest, 1.4 Low Elevation Saturated Forest.

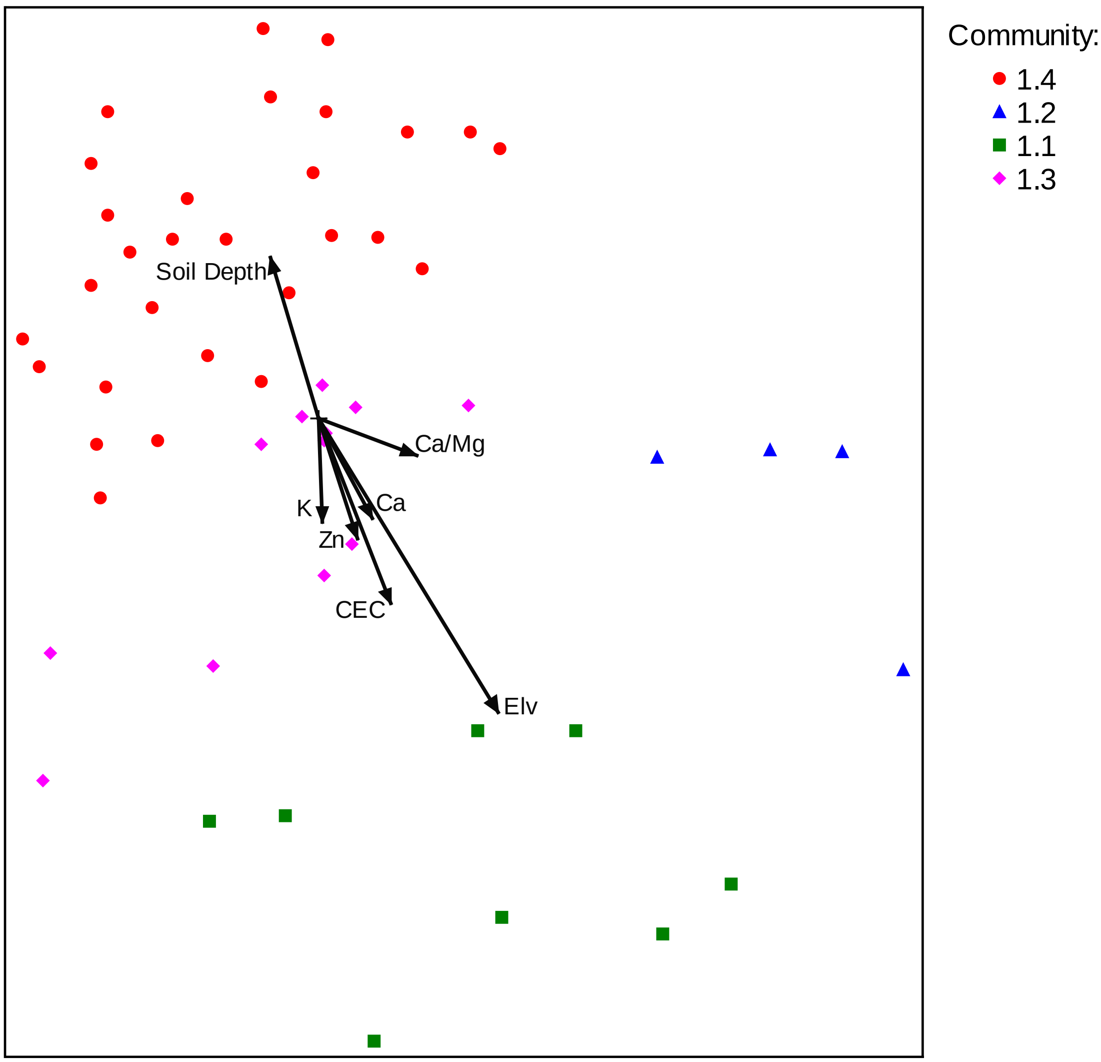

Figure 4. Two-dimensional NMDS ordination showing association between community types and environmental gradients in the SATURATED FORESTS AND SEEPS vegetation class. The direction of each vector indicates the direction of maximum correlation, and the length is the strength of the correlation. **CEC** indicates total cation exchange capacity (meg/100 g); **Soil Depth** indicates depth of soil (cm); **Elv** indicates Elevation (m); **Ca**, **K**, and **Zn** represent soil micronutrients (ppm); and **Ca/Mg** indicates the exchangeable Ca to Mg ratio.

Communities are represented by their numbers: 1.1 High Elevation Seep, 1.2 High Elevation Sedge Seep, 1.3 High Elevation Saturated Forest, 1.4 Low Elevation Saturated Forest.

The **High Elevation Seep** as described here fits within the broad concept of High Elevation Seep recognized by Schafale and Weakley (1990) (Appendix D). The **High Elevation Seep** as described here is a broad concept that includes the NVC associations CEGL004293 and CEGL004296 (NatureServe 2009) (Appendix D). The composition found among seepage zone of higher elevation areas of the southern Blue Ridge region of North Carolina is highly variable and more samples are needed to fully understand the compositional diversity found within and among sites. As described here, the **High Elevation Seep** community includes a broad range of compositional variation. As more data are collected it is likely that this community will be split into more than one community.

1.2 High Elevation Sedge Seep (4 plots)

Betula spp. / *Carex ruthii – Avenella flexuosa / Sphagnum* spp.

The **High Elevation Sedge Seep** is currently known only from two sites in Haywood County, North Carolina. Examples occur as relatively small zones of seepage on slopes ranging from 2 – 7°. The average elevation is 1,685 m.

Vegetation composition is generally graminoid-dominated but coverage from shrubs and trees is common, particularly around seep margins, due to the small nature of wetland zones. Canopy trees may include *Betula* (*alleghaniensis*/*lenta*), *Acer rubrum*, and/or *Sorbus americana*. Shrub composition is variable but typically includes *Hypericum densiflorum* and *Lyonia ligustrina* var. *ligustrina*, *Amelanchier* spp. (*arborea/laevis*), *Rhododendron maximum*, *Aronia melanocarpa*, *Rhododendron catawbiense*, and *Viburnum cassinoides*. The trailing sub-shrub, *Rubus canadensis*, is also common. *Carex ruthii* is the characteristic graminoid in association with *Avenella flexuosa*, *Carex crinita* s.l. (includes *C. mitchelliana* and *Carex gynandra*), *Carex flexuosa*, *Juncus* spp., *Oclemena acuminata*, *Osmunda cinnamomea* var. *cinnamomea*, *Scirpus* spp., *Calamagrostis cinnoides*, *Juncus gymnocarpus*, and *Solidago patula* var. *patula*. *Sphagnum* spp. are characteristic and typically abundant (Appendix D).

The **High Elevation Sedge Seep** as described here fits well within the concept of the NVC Association CEGL007697 (NatureServe 2009) and within Schafale and Weakley's (1990) broad concept of High Elevation Seep. The vegetation composition found among seepage zones of the higher elevation areas of the southern Blue Ridge region of North Carolina is highly variable and more sampling is needed to fully understand the compositional diversity found within and among site. There is potential that this community is more widespread and could occur in locations outside of Haywood County, North Carolina (Appendix D).

1.3 High Elevation Saturated Forest (12 plots)

Picea rubens / *Rhododendron maximum* / *Osmunda cinnamomea* var. *cinnamomea*.

The **High Elevation Saturated Forest** occurs scattered throughout the mountains of North Carolina at high elevations (1060 m to 1475 m). Examples occur in the northern and southern portion of the southern Blue Ridge region of North Carolina in Avery, Ashe, Jackson, Transylvania, and Watauga counties.

Vegetation composition is variable, dependent on canopy and shrub coverage. Widely scattered trees and thick patches of shrubs are typical, interspersed with relatively small patches of herbaceous and bryophyte-dominated zones. *Picea rubens* is a typical canopy tree in association with *Acer rubrum, Betula* spp. (*alleghaniensis*/*lenta*), *Tsuga canadensis*, *Sorbus americana*, and/or *Pinus rigida*. *Rhododendron maximum* and *Kalmia latifolia* are characteristically abundant in association with *Viburnum cassinoides*, *Ilex verticillata, Aronia melanocarpa*, and *Amelanchier* spp. (*arborea/laevis*). The trailing sub-shrub *Rubus hispidus* is typically present. Characteristic herbaceous components include *Maianthemum canadense*, *Osmunda cinnamomea* var. *cinnamomea*, *Arisaema triphyllum*, *Carex leptalea* var. *leptalea*, *Solidago patula* var. *patula*, *Mitchella repens*, and *Viola macloskeyi* var. *macloskeyi*. Additional herbaceous taxa may include *Trillium undulatum*, *Symphyotrichum puniceum* var. *puniceum, Impatiens* spp. (*capensis*/*pallida*), *Packera aurea*, *Galium* spp. (*tinctoria*/*triflora*), *Carex trisperma* var. *trisperma*, and *Platanthera clavellata* (Appendix D).

The **High Elevation Saturated Forest** as described here is broader than the concept of Swamp Forest-Bog Complex (Typic Subtype) recognized by Schafale and Weakley (1990) (Appendix D). The **High Elevation Saturated Forest** as described here is a broad concept that includes the NVC associations CEGL006277 and CEGL003667 (NatureServe 2009) (Appendix D). The composition found among saturated forests of lower elevations of the southern Blue Ridge region of North Carolina is highly variable and more sampling is needed to fully understand the compositional diversity found within and among sites. As described here, the **High Elevation Saturated Forest** community includes a broad range of compositional variation. As more data are collected it is likely that this community will be split into more than one community.

1.4 Low Elevation Saturated Forest (28 plots)

Acer rubrum / Viburnum cassinoides /Osmunda cinnamomea var. cinnamomea.

The **Low Elevation Saturated Forest** occurs throughout the southern Blue Ridge region at lower elevations, ranging from 630 to 1120 m. Examples occur in poorly drained bottomlands, generally with visible microtopography of ridges and sloughs or depressions (Schafale and Weakley 1990), or in gently sloping to relatively flat stream headwaters. Examples are located in the northern mountains in Ashe and Alleghany Counties and in the southern mountains in Transylvania, Henderson, and Jackson Counties. One example occurs in Yancy County.

Vegetation composition is typically tree and shrub-dominated, interspersed with relatively small patches of herbaceous and bryophyte-dominated zones. Canopy trees may occur widely scattered throughout wetlands or may be confined to edges of smaller wetland openings. Canopy composition is quite variable among sites but *Acer rubrum* is a characteristic dominant in association with *Nyssa sylvatica* and *Pinus strobus*. Additional canopy associates may include *Quercus alba*, *Quercus rubra* var. *rubra*, *Tsuga canadensis*, and *Liriodendron tulipifera* var. *tulipifera*. Vines such as *Smilax glauca* and/or *Smilax rotundifolia* are often present. Shrubs are typically present but composition is variable among sites. Typical shrubs may include *Kalmia latifolia*, *Viburnum cassinoides*, *Amelanchier* spp. (*arborea/laevis*), *Rhododendron maximum*, *Alnus serrulata*, *Ilex verticillata*, *Vaccinium corymbosum*, *Lyonia ligustrina* var. *ligustrina*, *Rhododendron* spp. (subgenus Hymenanthes), and *Prunus serotina* var. *serotina*. The trailing sub-shrub *Rubus* *hispidus* is often present. Herbaceous composition is highly variable among sites, dependent primarily upon geographic location and canopy coverage. Larger canopy openings often result in a relatively abundant herbaceous layer typically dominated by *Sphagnum* spp. and sedges such as *Carex folliculata* and/or *Carex intumescens*. Smaller canopy gaps or shaded zones of seepage areas support a less abundant herbaceous layer that typically includes small clumps of *Sphagnum* spp., sedges, and ferns such as *Osmunda cinnamomea* var. *cinnamomea* and/or *Thelypteris noveboracensis*. In areas with limited canopy gaps, low depressions, and zones of seepage, the herbaceous layer is less abundant and composition is highly variable. Additional herbaceous components may include *Galium* spp. (*tinctorum*/*triflorum*), *Impatiens* spp. (*capensis*/*pallida*), *Medeola virginiana*, *Symplocarpus foetidus*, *Galax urceolata*, *Lycopus virginicus*, and *Mitchella repens*. Occasionally this community supports the rare forbs *Dalibarda repens* and *Helonia bullata* or the carnivorous *Sarracenia purpurea* var. *montana*. (Appendix D).

The **Low Elevation Saturated Forest** as described here fits within the broad concept of Swamp Forest-Bog Complex (Typic Subtype) recognized by Schafale and Weakley (1990) (Appendix D). The **Low Elevation Saturated Forest** as described here is a broad concept that includes the NVC associations CEGL007565, CEGL003667, CEGL003918, CEGLE008438 (NatureServe 2009) (Appendix D). The composition found among saturated forests of lower elevations of the southern Blue Ridge region of North Carolina is highly variable and more samples are needed to fully understand the compositional diversity found within and among site. As described here, the **Low Elevation Saturated Forest** community includes a broad range of compositional variation. As more data is collected it is likely that this community will be split into more than one community.

Vegetation class 2: BOGS AND FENS

The BOGS AND FENS vegetation class occurs throughout the southern Blue Ridge region at elevations ranging from 620 m to 1,400 m. This vegetation class represents a large, broad group of montane non-alluvial wetland communities that are open areas dominated by shrubs and/or graminoids, lacking canopy trees of considerable abundance. Communities recognized within this vegetation class occupy the headwater regions of small streams, rounded and gently sloping mountain peaks, and broad valleys of small rivers and streams.

We recognize 8 community types within the BOGS AND FENS vegetation class based on results of cluster analysis and NMS ordination (Figures 5 and 6). Compositional differences among the 8 vegetation classes groups are most strongly associated with variation in elevation (Elv), soil depth, soil texture (represented by Clay and Sand), soil pH, soil nutrient availability (represented by magnesium (Mg), and base saturation (Figure 6). The **Disturbed Bog (2.1)** occupies lower-elevation areas of deeper soil characterized by higher clay content, lower nutrient availability, lower base saturation, and lower pH (Figure 6). In contrast, the **High Elevation Valley Fen (2.8)** occupies higher-elevation ares of shallow soils characterized by higher sand content, higher nutrient availability, higher base saturation, and higher pH (Figure 6). The **Shrub Bog (2.2)** and the **High Elevation Mosiac Bog (2.4)** are positioned along the left side of Axis 1 of the NMDS ordination and are not associated with variation in measured environmental variables (Figure 6). When compared to the **Disturbed Bog (2.3)**, the **Acidic Bog (2.3)** occupies areas of higher soil nutrient availability, higher base saturation, and higher soil pH. However, when compared to the **High Elevation Valley Fen (2.8)**, the **Acidic Bog (2.3)** occupies areas of lower soil nutrient availability, lower base saturation, and lower soil pH. **The Mosiac Bog (2.5)** is similar to the **High Elevation Valley Fen (2.8)** in that is occupies areas of relatively higher soil nutrient availability, higher base saturation, and higher soil pH when compared to all other communities except the **Mountaintop Fen (2.6)** which also occupies areas of relatively higher soil nutrient availability, higher base saturation, and higher soil pH. The difference between the **Mountaintop Fen (2.6)** and **High Elevation Valley Fen (2.8)** is not associated with variation in measured environmental variables as it is positioned on the right side of Axis 1 of the NMDS ordination (Figure 6). Similiarly, variation in measured environmental variables does not explain compositional differences of the **Low Elevation Bog (2.7)** which is positioned near the middle of Axis 2 and on the right side of Axis 1 of the NMDS ordination (Figure 6).

2.1 Disturbed Bog (13 plots)

Alnus serrulata / *Juncus effusus* – *Persicaria sagittata*

The **Disturbed Bog** community represents herbaceous bogs that are recovering from current to relatively recent disturbance activities, such as active pasturing, active beaver activity, recent impoundment, and tree/shrub removal. Examples occur throughout the southern Blue Ridge region and over a wide range of elevation (635 to 1,450 m).

Vegetation composition in the **Disturbed Bog** is highly variable. The herbaceous layer is typically the dominant stratum, but scattered shrubs, including *Alnus serrulata*, *Spiraea* *tomentosa*, and *Salix sericea* are occasional. The herbaceous layer is characteristically dominated by *Juncus* spp. (*effusus* ssp. *solutus*/*pylaei*) and *Persicaria sagittata* in association with *Galium* sp. (*tinctorum*/*triflorum*), *Impatiens* spp. (*capensis*/*pallida*), *Carex lurida*, *Carex* spp. (section *Ovales*), *Hypericum mutilum* var. *mutilum*, *Juncus* spp. (*acuminatus*/*canadensis*/*subcaudatus*), and *Eupatorium perfoliatum*. Additional herbaceous taxa may include *Scirpus* spp., *Carex echinata* ssp. *echinata*, *Viola macloskeyi* var. *pallens*, *Solidago patula* var. *patula*, *Symphyotrichum puniceum* var. *puniceum*, *Carex leptalea* var. *leptalea*, *Dichanthelium dichotomum*, *Lycopus uniflorus*, *Solidago* spp., *Carex atlantica*, *Carex crinita* s.l. (includes *C. gynandra* and *C. mitchelliana*), *Leersia virginica*, *Eleocharis tenuis* var. *tenuis*, *Glyceria striata* var. *striata*, *Rhynchospora capitellata*, *Agrostis perennans* s.l., *Mimulus ringens* var. *ringens*, *Leersia oryzoides*, and *Vernonia noveboracensis*. *Symplocarpus foetidus* may be present in the northern counties (i.e., Ashe, Alleghany Counties) of the southern Blue Ridge region of North Carolina (Appendix A).

The **Disturbed Bog** is comparable, but more broadly defined than the NVC associations CEGLE004112, CEGL004510, and CEGL008433 (NatureServe 2009) (Appendix D). The **Disturbed Bog** does not fit well within Schafale and Weakley (1990) community concepts (Appendix D).

2.2 Shrub Bog (14plots)

Viburnum cassinoides – Salix sericea / *Impatiens capensis* / *Sphagnum* spp.

The **Shrub Bog** occurs at higher elevations ranging from 980-1,250 m. Examples occur in the southern mountains, along the broad floodplain of the Nantahala River (Jackson and Clay Counties), and in the northern mountains in broad areas of stream headwaters and along tributaries to the Linville River (Avery County).

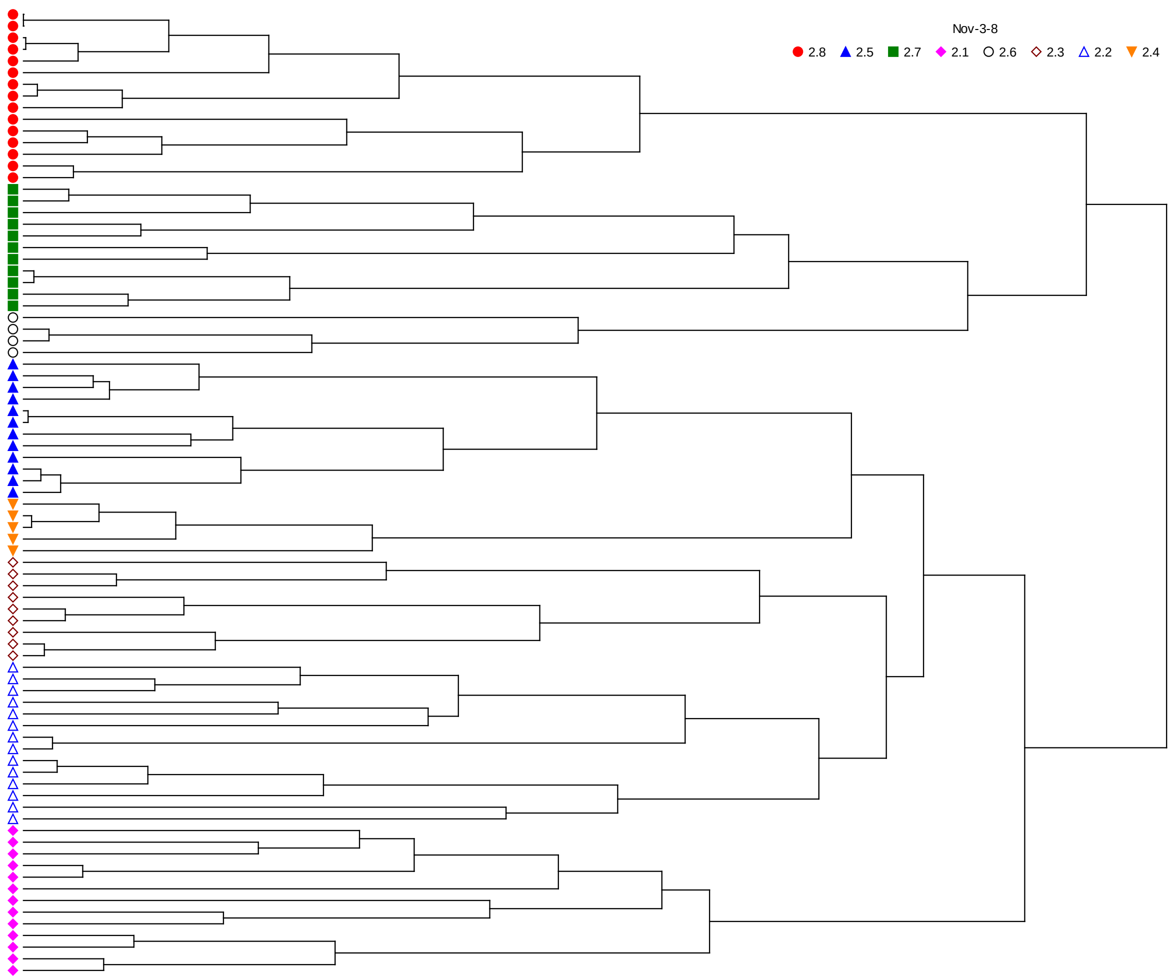

Figure 5. Hierarchical cluster solution for non-alluvial wetlands of the southern Blue Ridge region of North Carolina in the BOGS AND FENS vegetation class. The dendrogram shows divisions and final community grouping identified using Sørensen (Bray-Curtis) based cluster analysis and the flexible-beta group linkage (Lance and Williams 1967) with a β = -0.25. Communities are represented by their numbers: 2.1 Disturbed Bog, 2.2 Shrub Bog, 2.3 Acidic Bog, 2.4 High Elevation Mosiac Bog, 2.5 Mosiac Bog, 2.6 Bluff Mountain Fen, 2.7 Low Elevation Bog, and 2.8 High Elevation Valley Bog.

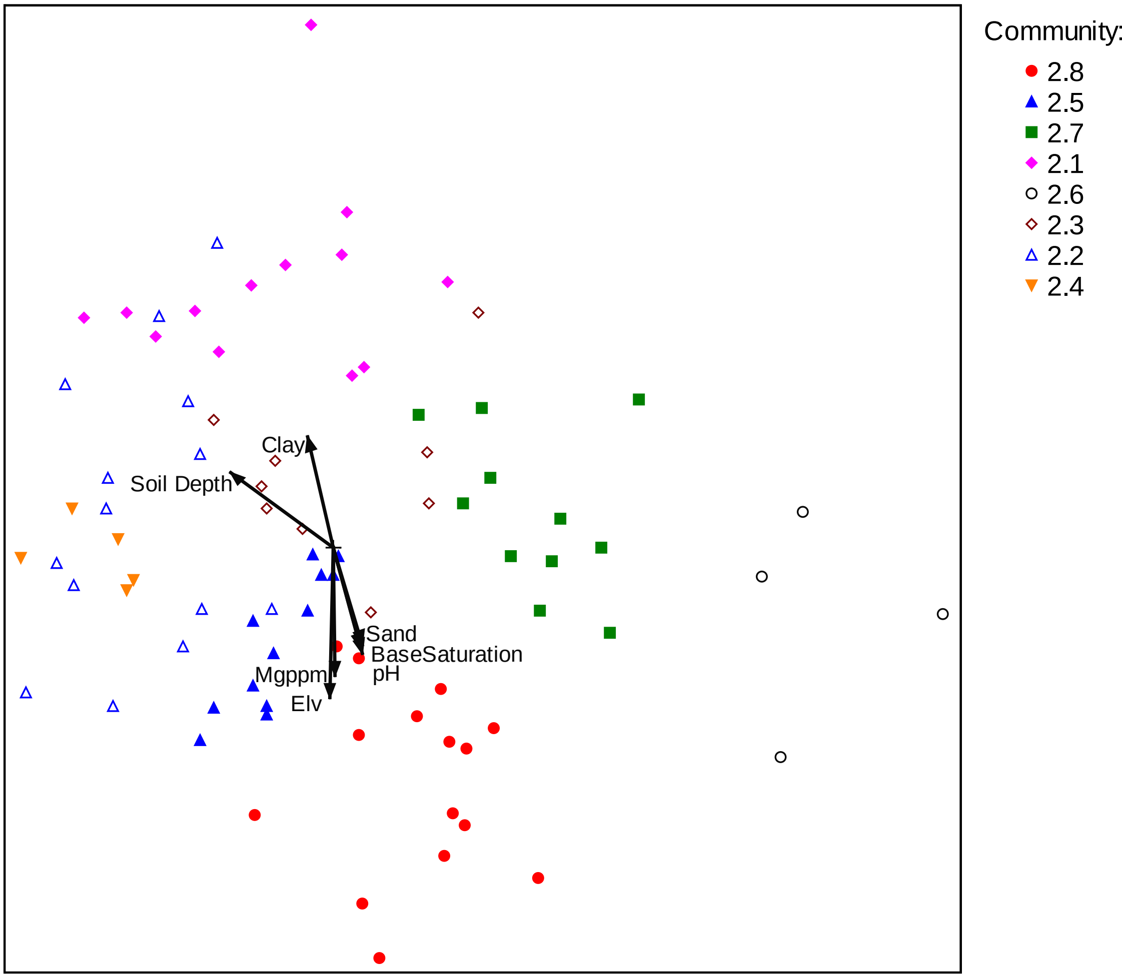

Figure 6. Two-dimensional non-metric multidimentional scaling (NMS) ordination showing association between community types and environmental gradients in the BOGS AND FENS vegetation class. The direction of each vector indicates the direction of maximum correlation, and the length is the strength of the correlation. **Elv** indicates Elevation (m), **Mgppm** represents soil micronutrients, **pH** representents soil pH, Clay and **Sand** indicate soil texture (%), **Soil Depth** indicates depth of soil (cm), and **BaseSaturation** indicates soil base sutration. Communities are represented by their numbers: 2.1 Disturbed Bog, 2.2 Shrub Bog, 2.3 Acidic Bog, 2.4 High Elevation Mosiac Bog, 2.5 Mosiac Bog, 2.6 Bluff Mountain Fen, 2.7 Low Elevation Bog, and 2.8 High Elevation Valley Bog.

Composition is highly variable in the **Shrub Bog**, which may be primarily shrub-dominated or may have patches of shrub and herb dominated zones. *Sphagnum* spp. are typically abundant. A canopy is largely lacking, although small trees and saplings of *Acer rubrum*, *Betula* sp. (*lenta*/*alleghaniensis*), and *Tsuga canadensis* may be present. Shrubs are common and may dominate large areas or occur in small patches. Typical shrubs include *Viburnum cassinoides*, *Salix sericea*, *Lyonia ligustrina* var. *ligustrina*, *Rosa palustris*, and *Ilex verticillata*. *Sambucus canadensis*, *Rhododendron maximum*, *Spiraea alba* and/or *Ilex verticillata* may also be present and occasionally locally dominant. Herbaceous composition is variable and is typically comprised of a mixture of forbs and sedges. The dwarf shrub *Rubus hispidus* and the fern *Osmunda cinnamomea* var. *cinnamomea* are often present. Characteristic forbs include *Arisaema triphyllum* var. *stewardsonii*, *Impatiens* (*capensis*/*pallida*), *Juncus* spp. (*effusus* ssp. *solutus*/*pylaei*), *Galium* spp. (*tinctorum*/*triflorum*), *Persicaria sagittata*, *Solidago patula* var. *patula*, and *Viola macloskeyi* var. *pallens*. Common sedges may include *Carex echinata* ssp. *echinata*, *Carex leptalea var. leptalea*, *Carex atlantica*, *Carex* spp. (section Ovales), *Carex lurida*, *Scirpus cyperinus* s.l. (includes *S. atrovirens*, *S. georgianus*, *S. hattorianus*, and *S. polyphyllus*), *Juncus* spp. (*acuminatus*/*canadensis*/*subcaudatus*), and *Luzula echinata*. Additional common herbaceous associates may include *Epilobium coloratum*, *Houstonia serpyllifolia*, *Symphyotrichum puniceum* var. *puniceum*, *Galium asprellum*, *Sphenopholis pensylvanica*, *Mimulus ringens* var. *ringens*, *Viola primulifolia*, *Rubus hispidus*, and *Clematis virginiana* (Appendix B.2).

The **Shrub Bog** as described here is included in the NVC association CEGL003915 (NatureServe 2009) but the **Shrub Bog** is more broadly defined (Appendix D). The **Shrub Bog** is more narrowly defined than Schafale and Weakley's (1990) concept of Southern Appalachian Bog (Northern Subtype) and Southern Appalachian Bog (Southern Subtype) (Appendix D).

2.3 Acidic Bog (9 plots)

Lyonia ligustrina var. *ligustrina* – *Viburnum cassinoides* / *Carex echinata* var. *echinata* – *Scirpus expansus* / *Sphagnum* spp.

The **Acidic Bog** occupies elevations ranging from 1,020 to 1,315m. Examples occur in the northern mountains (Avery and Watauga counties) in wide, relatively flat areas of stream headwaters and in the southern mountains, in the broad valley of Panthertown Creek (Jackson County). One example occurs in Macon County, North Carolina.

The vegetation composition of the **Acidic Bog** is typically herb-dominated but small, dense clusters of shrubs and stunted trees are commonly widely scattered throughout, creating a mosaic or zoned pattern. *Acer rubrum* is characteristically present as seedlings or small saplings and stunted individuals of *Betula* spp. (alleghaniensis/lenta), *Pinus strobus*, *Quercus rubra* var. *rubra*, and/or *Tsuga canadensis* may be present. Shrub composition is variable. Typical shrubs may include *Lyonia ligustrina* var. *ligustrina*, *Viburnum cassinoides* var. *cassinoides*, *Kalmia latifolia*, and *Rhododendron maximum*. Herbaceous composition is variable and may include *Carex echinata* var. *echinata*, *Scirpus expansus*, *Viola macloskeyi* var. *pallens*, *Galium* spp. (*tinctorum*/*triflorum*), *Juncus* spp.

(*acuminatus*/*canadensis*/*subcaudatus*), *Osmunda cinnomomea* var. *cinnamomea*, *Solidago patula* var. *patula*, *Juncus* spp. (*effusus* ssp. *solutus*/*pylaei*), *Symphyotrichum puniceum* var. *puniceum*, *Hypericum densiflorum*, *Carex crinita* s.l. (includes *C. gynandra* and *C. mitchelliana*), *Carex leptalea* var. *leptalea*, *Carex lurida*, *Holcus lanatus*, *Lycopus uniflorus*, *Epilobium leptophyllum*, *Glyceria striata* var. *striata*, *Chelone cuthbertii*, *Impatiense* sp. (*capensis*/*pallida*), *Scirpus* spp., *Solidago altissima* var. *altissima*, *Drosera rotundifolia* var. *rotundifolia* and/or *Hypericum muticum* var. *muticum* (Appendix A).

The **Acidic Bog** as described here containes elements of the NVC association CEGL004158 (NatureServe 2009) but substantial revision is needed to better synonymize these concepts (Appendix D). The **Acidic Bog** is comparable, but more broadly defined, than the NVC associations CEGL003915, CEGL003916, and CEGL 4156 (Appendix D). The **Acidic Bog** occurs in both the northern and southern portions of the study region and is compara ble to Schafale and Weakley's (1990) concepts of Southern Appalachian Bog (Northern Subtype) and Southern Appalachian Bog (Southern Subtype) (Appendix D).

2.4 High Elevation Mosaic Bog (5 plots):

Vaccinium simulatum / *Osmunda cinnamomea* var. *cinnamomea – Oclemena acuminata* / *Sphagnum* spp. - *Polytrichum* spp.

The **High Elevation Mosaic Bog** is restricted to the flat headwater region of Beech Creek at an elevation of approximately 1,400 m.

Community composition is characterized by patches of relatively small and often dense clusters of shrubs and trees that create a mosaic or zoned pattern scattered among a thick herbaceous and bryophyte layer of *Sphagnum* spp. Characteristic trees include *Betula* spp. (*alleghaniensis*/*lenta*), *Picea rubens* and *Tsuga canadensis*. Additional trees may include *Acer rubrum*, *Pinus strobus*, and *Tsuga canadensis*. *Vaccinium simulatum* is a characteristic shrub in association with *Rhododendron maximum*, *Aronia melanocarpa*, *Kalmia latifolia*, and/or *Salix sericea*. Other shrub associates may include *Viburnum cassinoides, Rubus* spp. (*R. allegheniensis*, *R. argutus*, and/or *R. canadensis*), *Sambucus canadensis* and *Amelanchier* spp. (*A. arborea* or *A. laevis*). Characteristic herbs include *Oclemena acuminata* and *Chamerion platyphyllum*. Typical dominant taxa of the herbaceous layer includes *Juncus* spp. (*effusus* ssp. *solutus*/*pylaei*), *Osmunda cinnamomea* var. *cinnamomea*, *Scirpus* spp. (may include *S. cyperinus*, *S. atrovirens*, *S. cyperinus*, *S. georgianus*, *S. hattorianus* and/or *S. polyphyllus*), *Solidago patula* var. *patula*, and *Viola macloskeyi* var. *pallens*. Additional herbaceous dominants may include *Carex atlantica*, *Impatiens* sp. (*I. capensis* and/or *I. pallida*), *Lycopus uniflorus Platanthera clavellata*, *Potentilla canadensis*, and *Solidago* spp.

The **High Elevation Mosaic Bog** is comparable to the NVC association CEGL004158 (NatureServe 2009) but substantial revision is needed. Currently, the concept of **High Elevation Mosiac Bog** as described here is more narrowly defined than the NVC association CEGL004158. Similarly, Schafale and Weakley's (1990) concept of Southern Appalachian Bog (Northern Subtype) is comparable to, but broader than, the concept of **High Elevation Mosiac Bog** presented here (Appendix D).

The **High Elevation Mosiac Bog** is most comparable to the NVC associations CEGL003913 and CEGL004158 but the **High Elevation Mosiac Bog** occupies a different geographic scope and has less floristic variation than these associations (NatureServe 2009) (Appendix D). Revisions are needed to improve synonymy among concepts. The **Mosaic Bog** is falls within the concept of Schafale and Weakley's (1990) Southern Appalachian Bog (Northern Subtype) (Appendix D).

2.5 Mosaic Bog (12 plots)

Salix sericea / *Osmunda cinnamomea* var. *cinnamomea* - *Carex echinata* ssp. *echinata* / *Sphagnum* spp.

The **Mosaic Bog** occurs in the northern mountains at higher elevations, ranging from 1228 to 1291m. Examples occur along broad areas of tributaries leading to Long Hope Creek (Ashe Co., Watauga Co.), in the broad headwater regions of Kentucky Creek (Avery Co.), and in the broad floodplain of the Linville River (Avery County).

The **Mosaic Bog** is characterized by small, dense clusters of shrubs and stunted trees that are widely scattered among a thick herbaceous and bryophyte layer, creating a mosaic or zoned pattern. *Acer rubrum* may be present as seedlings or small saplings and stunted individuals of *Tsuga canadensis* and *Picea rubens* may be present. Shrub composition is variable and typically reduced to small patches of relatively short (< 1-2 m) individuals. Shrubs present may include *Salix sericea, Lyonia ligustrina var. ligustrina, Kalmia latifolia, Viburnum cassinoides, Rosa palustris, Vaccinium corymbosum, Amelanchier* spp. and (*arborea/laevis*). The dwarf shrubs *Vaccinium macrocarpon* and *Rubus hispidus* are typically present. The herbaceous layer dominates composition and is composed of a variety of graminoids, forbs, and the fern *Osmunda cinnamomea* var. *cinnamomea*. Typical graminoids include *Carex echinata* ssp. *echinata*, *Juncus* spp. (*acuminatus*/*canadensis/subcaudatus*), *Eriophorum virginicum, Carex leptalea* var. *leptalea*, *Juncus effusus* s.l. (includes *J. pylaei*), *Scirpus expansus* and *Carex crinita* s.l. (includes *C. gynandra* and *C. mitchelliana*), *Eriophorum virginicum, Eleocharis tenuis,* and *Sphenopholis pensylvanica*. Common forbs that may be present include *Solidago patula var. patula, Houstonia serpyllifolia, Drosera rotundifolia var. rotundifolia, Epilobium leptophyllum, Viola macloskeyi var. pallens, Oxypolis rigidior, Platanthera clavellata, Viola cucullata, Packera aurea, Eupatorium perfoliatum*, *Scirpus* spp. (*atrovirens/cyperinus/georgianus/hattorianus/polyphyllus*), *Clematis virginiana, Linum striatum, Parnassia asarifolia, Rhynchospora capitellata, Persicaria sagittata, Dryopteris cristata*, *Symphyotrichum puniceum var. puniceum*, *Lycopus uniflorus*, *Fragaria virginiana,* and *Lilium grayi.*

The **Mosaic Bog** is most comparable to the NVC associations CEGL003913 and CEGL004158 but the **Mosaic Bog** is broader in floristic variation and in geographic scope than these associations (NatureServe 2009). The **Mosaic Bog** also also has elements of the NVC associations CEGL003915 (NatureServe 2009) (Appendix D). Revisions are needed to improve synonymy among concepts. The **Mosaic Bog** is falls within the concept of Schafale and Weakley's (1990) Southern Appalachian Bog (Northern Subtype) (Appendix D).

2.6 Mountaintop Fen (4 plots)

Cladium mariscoides – *Solidago uliginosa* var. *uliginosa* / *Sphagnum* spp.

The **Mountaintop Fen** is restricted to one site, Bluff Mountain, located in Ashe County at an elevation of 1,370 m. This community type represents a unique assemblage of vegetation, distinctive in lacking canopy coverage, having minimal scattered shrubs, and having a dominance of graminoids, particularly the sedge *Cladium mariscoides*. Shrubs that may be present in small patches of low abundance or concentrated near wetland edges include *Alnus serrulata*, *Kalmia latifolia*, and *Rhododendron* sp. (subgenus Hymenanthes). *Acer rubrum* and/or *Acer saccharum* may occasionally contribute to the shrub composition. The herbaceous layer is dominated by graminoids and other forbs, which vary spatially in abundance and composition. *Cladium mariscoides* is a characteristic dominant throughout the herbaceous layer in association with *Carex atlantica*, *Drosera rotundifolia var. rotundifolia*, *Eriophorum virginicum*, *Linum striatum*, *Lycopus uniflorus*, *Parnassia grandifolia*, *Rhynchospora capitellata*, *Sanguinaria canadensis*, *Solidago uliginosa var. uliginosa*, *Hydrophyllum canadense*, and *Xyris torta*. Additional common herbaceous taxa include *Oxypolis rigidior*, *Rhynchospora alba, Juncus* spp. (*acuminatus*/*canadensis*/*subcaudatus*), *Triantha glutinosa*, *Carex leptalea* var. *leptalea*, *Carex stricta*, *Utriculatia cornuta*, *Osmunda regalis* var. *spectabilis*, *Gentiana* sp., *Houstonia serpyllifolia, Carex buxbaumii*, *Osmunda regalis* var. *spectabilis*, and *Linum striatum.* Other typical herbs found throughout but usually not as dominants include *Drosera rotundifolia var. rotundifolia*, *Lycopodium clavatum*, *Hydrophyllum canadense*, *Xyris torta, Oxypolis rigidior*, *Juncus* sp., *Osmunda regalis* var. *spectabilis, Tofieldia glabra*, *Houstonia serpyllifolia*, *Gentiana* sp., *Solidago patula var. patula, Viola cucullata, Packera aurea, Eleocharis tenuis*, *Dichanthelium dichotomum*, and *Platanthera lacera.*

The **Mountaintop Fen** as described here is consistent with Schafale and Weakley's (1990) concept of Southern Appalachian Fen and the NVC association CEGL004167 (NatureServe 2009) (Appendix D). Revisions are needed to improve synonymy among concepts.

2.7 Low Elevation Bog (11 plots)

Lyonia ligustrina var. *ligustrina – Aronia arbutifolia* / *Eriophorum virginicum – Solidago patula* var. *patula / Sphagnum spp.*

The **Low Elevation Bog** occurs at lower elevations from about 800 m to 1,200 m. Examples occur in Ashe, Alleghany, Yancy, and Burk Counties.

The **Low Elevation Bog** is generally open and herb-dominated but patches of shrubs may occur. Mats of *Sphagnum* spp. are common. Trees such as *Acer rubrum*, *Liriodendron tulipifera* var. *tulipifera*, and *Pinus strobus* may be widely scattered throughout or dominate on edges but typically contribute little to to overall abundance. Herbaceous composition is variable, but graminoids such as *Eriophorum virginicum, Juncus* spp., *Dichanthelium lucidum, Carex leptalea, Carex atlantica*, and *Carex echinata* ssp. *echinata* and *Rhynchospora capitellata* are common. Characteristic forbs include *Solidago patula var. patula* and *Vernonia noveboracensis*. Additional herbaceous associates may include *Drosera rotundifolia* var. *rotundifolia*, *Viola primulifolia, Osmunda regalis* var. *spectabilis, Eriocaulon decangulare* var. *decangulare*, *Pogonia ophioglossoides*, *Scirpus expansus*, and *Symphyotrichum puniceum* var. *puniceum*. Less common herbaceous taxa that may be present include *Eupatorium perfoliatum*, *Lycopus uniflorus*, *Oxypolis rigidior*, *Osmunda* *cinnamomea var. cinnamomea*, *Andropogon* spp., *Carex folliculata, Schizachyrium scoparium* var. *scoparium*, *Eleocharis tenuis*, *Chelone cuthbertii*, *Platanthera clavellata, Linum striatum*, *Galium triflorum, Viola macloskeyi* var. *pallens, Xanthorhiza simplicissima*, *Carex buxbaumii*, *Packera crawfordii*, *Eutrochium fistulosum*, *Polygala sanguinea*, *Carex intumescens, Dichanthelium dichotomum*, *Hydrophyllum canadense,* and *Viola cucullata*.

The **Low Elevation Bog** is most comparable to the NVC associations CEGL003916 and CEGL004158 but also has elements of CEGL003915 (NatureServe 2009) (Appendix D). Revisions are needed to improve synonymy among concepts. The **Low Elevation Bog** is falls within the concept of Schafale and Weakley's (1990) Southern Appalachian Bog (Northern Subtype) (Appendix D).

2.8 High Elevation Valley Fen (15 plots)

Carex echinata spp. *echinata – Vaccinium macrocarpon* / *Sphagnum* spp.

The **High Elevation Valley Fen** occurs within the amphibolite region of the southern Blue Ridge region of North Carolina at higher elevations, ranging from 1303 to 1342 m. Examples are found in headwater basins and valley bottoms of the Long Hope Creek (Ashe Watauga Counties) and a headwater basin of Howards Creek (Avery County).

The **High Elevation Valley Fen** is predominately herbaceous but may contain scattered patches of low shrubs, usually not reaching more than 1 meter in height, particularly *Rosa palustris* and *Lyonia ligustrina* var. *ligustrina,* and occasionally *Salix sericea*. *Acer rubrum* is occasionally present as small saplings. The dwarf shrub *Vaccinium macrocarpon* is characteristically present and locally dominant. Herbaceous composition is somewhat variable, but *Carex echinata* ssp. *echinata*, *Carex leptalea* var. *leptalea, Solidago patula* var. *patula,* and *Houstonia serpyllifolia* are characteristic dominants in association with less dominant taxa such as *Juncus* spp. (*acuminatus*/*canadensis*/ *subcaudatus*), *Drosera rotundifolia* var. *rotundifolia*, and *Oxypolis rigidior*. Additional herbaceous dominants may include *Packera aurea*, *Schizachyrium scoparium*, *Eriophorum virginicum*, *Rhynchospora capitellata*, *Rhynchospora alba*, *Parnassia asarifolia*, and *Thelypteris palustris* var. *pubescens*. Less common herbaceous associates may include *Juncus effusus* s.l. (includes *J. pylaei*), *Pogonia ophioglossoides*, *Viola cucullata*, *Galium asprellum*, *Epilobium leptophyllum, Carex buxbaumii*, *Linum striatum*, *Scirpus* spp., *Eleocharis tenuis* var. *tenuis*, *Luzula echinata*, *Viola macloskeyi* var. *pallens*, and *Hypericum mutilum* var. *mutilum*. *Sphagnum* spp. are typically dominant.

The **High Elevation Valley Fen** is comparable to the NVC association CEGL004157 (NatureServe 2009). The **High Elevation Valley Fen** includes more floristic variation and is a slightly broader geographic scope than CEGL004157 (Appendix D). In contrast, Schafale and Weakley’s (1990) concept of Southern Appalachian Bog (Northern Subtype) is broader in both floristic variation and geographic range then the concept of **High Elevation Valley Fen** presented here (Appendix D).

DISCUSSION

This study provides a comprehensive classification and description of montane non-alluvial wetlands of the southern Blue Ridge region of North Carolina. The use of detailed, quantitative vascular plant data from standard plots allows partitioning of community types based on vegetation data alone, in addition to a comprehensive assessment of distinctive community characteristics. The resultant descriptions of communities in terms of elevation and soil characteristics should assist in field identification of communities.

Our approach both correlates and contrasts with previous classifications of montane non-alluvial wetlands. By providing a hierarchical framework of vegetation classes and communities, we provide correlation at the highest level (vegetation classes), but at the finer-scale of the community our approach often contracts with previous classifications. Previous classifications have been based on qualitative data. This study presents a first approximation of a geographically broad classification based on quantitative data. The addition of new data in the future will doubtless suggest modifications to the classification presented herein. However, conservation workers and land managers require a classification system that is relevant to the geographic scope and variation of their region yet is manageable in terms of ease community recognition. The vegetation classification of Schafale and Weakley (1990) has heretofore provided such a classification, albeit a subjective one based on qualitative observation rather than quantitative field data. It is hoped that this work will also become a useful reference for scientists and land managers working within the southern Blue Ridge region of North Carolina and surrounding states.

Our study is comparable to the U.S. National Vegetation Classification (NVC; NatureServe 2008), but indicates that substantial revision is needed to more accurately describe the non-alluvial wetlands of the southern Blue Ridge region. While some types are currently described such that they are compatible with communities described in this study, most types are only vaguely comparable (see Appendix D). The NVC classification spans the entire United States, is derived from both qualitative and quantitative information, and strives for more narrowly defined and homogeneous units (associations) with the goal of providing a framework for precise documentation of ecological context and biodiversity significance (see Federal Geographic Data Committee 2008, Jennings et al. 2009). Communities of the present study span more floristic variation and reflect a more even coverage than NVC community "associations". Moreover, our classification is more practical and identifiable for the typical user.

To facilitate crosswalks between classifications, we identified NVC associations that currently describe montane non-alluvial wetlands of North Carolina. We highlight those that can be compared to the communities of this study (Appendix D). We anticipate that the data collected and communities defined in this study will be used to refine or define the vegetation associations of the NVC following the U.S. Federal Data Committee standards (Federal Geographic Data Committee 2008) and the Ecological Society of America guidelines (Jennings et al. 2009).

CONCLUSION

This study provides the first quantitative and comprehensive description of the vegetational variation found among non-alluvial wetlands spanning the broad geographic range of the southern Blue Ridge region of North Carolina. Results of this study indicate that vegetational composition varies with elevation and soil nutrients while geography seems less important. However, disturbance from flooding (e.g., resulting from beaver activity) and anthropogenic alteration create a recognizable compositional variation that crosses environmental gradients.

The communities described in this study differ substantially from those described in the current National Vegetation Classification (NVC, NaturServe 2009). This result points to the importance of quantitative data in community description, especially for insular communities. The vegetational variation of insular communities is high compared to that of communities that occur more widely in the landscape as repeatable patterens. Because non-alluvial wetlands of the southern Blue Ridge region are geographically isolated from one another, the chance for dispersal between them is limited. Thus each individual wetland is maintained largely by local processes. Each wetland thus has its own unique assemblage of vegetation that is often only vaguely comparable to that of the next wetland.

Due to the insular nature and relatively high vegetational variation found among non-alluvial wetlands of the southern Blue Ridge region, is imperative that each and every wetland be quantitatively inventoried to gain a comprehensive understanding of these systems. The data collected in this study were obtained from a significant number of sites and represent the variation found among them. However, sites remain that have not been sampled and more sampling is needed to better understand the variation found within sites. Data are particularly lacking for the lower elevation non-alluvial wetlands found south of the Asheville Basin, particularly in the drainage basin of the French Broad River. Further, the SATURATED FORESTS AND SEEPS vegetation class represents a relatively small sample of the very large and extensive range of variation in vegetation assemblages found scattered throughout seeps and saturated forests of the southern Blue Ridge region of North Carolina.

Additional sampling of vegetation assemblages that falls within this broadly defined vegetation class is needed to better understand the compositional variation found therein.

The results of this study provided much needed baseline data to help guide management decisions and to detect changes over time as a result of management and impacts of climate change (Parry et al. 2007). Appropriate methods of management of montane non-alluvial wetlands of the southern Blue Ridge region are very poorly developed because these ecosystems are differ greatly from those in the surrounding landscape. It is likely that new and unusual (relative to the surrounding landscape) approaches are needed to effectively manage and conserve the southern non-alluvial wetlands.

Finally, the quantitative data collected and described here, when combined with that of Virginia and West Virginia (e.g., Fleming et al. 2006, Byers et al. 2007), will provide a better overall comprehensive understanding of southern and central Appalachian montane non-alluvial wetlands.

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APPENDICES

APPENDIX A

Plot Data

Appendix A. Listing of plots analyzed in this project, including Carolina Vegetation Survey (CVS) Plot ID code, Plot ID code used in this project, data Collector, Plot Size (m^2), County of occurrence, Site Number, and Community code. Bolded Plot ID numbers indicate those plots that were treated in analysis of Vegetation Class I but initially clustered with Vegetation Class II. Data are in ascending order of plot ID. CVS Plot ID codes are unique and have three parts: project number, team number, and plot number. Plot ID codes used in this project are also unique and are condensed (to 7 characters) from the CVS Plot ID codes. Many data collectors contributed to the CVS data base and their identity (where Collector = CVS) may be determined from Carolina Vegetation Survey archives. Plots where Collector = Wichmann were inventoried by the author and assistants specifically for this project. Data were collected from 68 Sites distributed across 12 Counties in North Carolina (Fig. 2). A guide to communities referenced by Community codes may be found in Appendix D.

CVS Plot ID	Plot ID	Collector	Plot Size (m^2)	County	Site Number	Community
009-01-0134	P091134	CVS	1000	Yancey	14	1.4
011-0C-0347	P11C347	CVS	1000	Haywood	58	1.2
011-0C-0354	P11C354	CVS	200	Haywood	57	1.2
011-0C-0459	P11C459	CVS	200	Haywood	58	1.2
011-0C-0460	P11C460	CVS	200	Haywood	58	1.2
020-01-0360	P201360	CVS	200	Macon	60	1.1
020-03-0351	P203351	CVS	400	Macon	61	1.1
020-05-0354	P205354	CVS	200	Macon	55	Outlier
020-05-0356	P205356	CVS	1000	Macon	55	Outlier
020-05-0357	P205357	CVS	100	Macon	55	Outlier
022-01-0378	P221378	CVS	400	Haywood	17	1.1
022-01-0379	P221379	CVS	100	Haywood	18	1.1
022-02-0380	P222380	CVS	1000	Jackson	48	1.1
022-05-0378	P225378	CVS	400	Transylvania	63	1.1
022-05-0379	P225379	CVS	1000	Jackson	56	1.3
022-07-0379	P227379	CVS	400	Jackson	49	1.4
022-07-0381	P227381	CVS	100	Jackson	29	1.1
035-04-0507	P354507	CVS	600	Transylvania	11	1.4
035-09-0504	P359504	CVS	400	Transylvania	11	1.4
035-09-0505	P359505	CVS	1000	Transylvania	11	1.4
041-02-0575	P412575	CVS	100	Alleghany	8	1.4
041-02-0579	P412579	CVS	100	Watauga	41	2.8
041-02-0580	P412580	CVS	100	Watauga	40	2.8
041-04-0576	P414576	CVS	1000	Watauga	32	1.1
041-05-0576	P415576	CVS	1000	Alleghany	8	1.3
041-05-0577	P415577	CVS	300	Watauga	41	2.8
041-05-0578	P415578	CVS	300	Watauga	41	2.8
041-05-0581	P415581	CVS	100	Watauga	41	2.8
041-05-0582	P415582	CVS	100	Watauga	40	2.8
041-05-0583	P415583	CVS	100	Watauga	40	2.8

041-07-0575	P417575	CVS	200	Alleghany	8	1.4
041-07-0576	P417576	CVS	100	Alleghany	8	1.4
041-07-0577	P417577	CVS	100	Ashe	4	1.4
041-07-0578	P417578	CVS	100	Ashe	4	1.4
041-07-0580	P417580	CVS	100	Ashe	37	2.5
041-07-0581	P417581	CVS	100	Ashe	37	2.5
041-07-0582	P417582	CVS	100	Ashe	37	2.5
041-07-0583	P417583	CVS	100	Ashe	36	2.5
041-07-0585	P417585	CVS	100	Alleghany	7	1.4
041-07-0586	P417586	CVS	100	Alleghany	7	1.4
041-07-0587	P417587	CVS	100	Ashe	5	1.4
041-07-0588	P417588	CVS	100	Alleghany	59	2.7
041-07-0589	P417589	CVS	100	Alleghany	59	Outlier
041-07-0590	P417590	CVS	100	Alleghany	59	2.1
041-07-0591	P417591	CVS	100	Alleghany	59	Outlier
041-07-0592	P417592	CVS	100	Alleghany	8	1.4
041-09-0579	P419579	CVS	100	Ashe	3	2.6
042-01-0626	P421626	CVS	300	Transylvania	65	1.4
042-01-0627	P421627	CVS	1000	Transylvania	65	1.4
042-07-0627	P427627	CVS	300	Transylvania	38	1.4
042-07-0628	P427628	CVS	1000	Transylvania	65	1.4
042-07-0629	P427629	CVS	1000	Transylvania	9	1.4
073-09-0001	P739001	Wichmann	100	Henderson	10	1.4
073-09-0002	P739002	Wichmann	100	Transylvania	30	1.4
073-09-0003	P739003	Wichmann	100	Transylvania	12	1.4
073-09-0004	P739004	Wichmann	100	Macon	20	2.3
073-09-0005	P739005	Wichmann	100	Jackson	15	2.1
073-09-0006	P739006	Wichmann	100	Jackson	49	2.3
073-09-0007	P739007	Wichmann	1000	Jackson	49	2.3
073-09-0008	P739008	Wichmann	100	Jackson	45	2.2
073-09-0009	P739009	Wichmann	100	Transylvania	6	1.3
073-09-0010	P739010	Wichmann	100	Jackson	44	2.2
073-09-0011	P739011	Wichmann	100	Jackson	44	Outlier
073-09-0012	P739012	Wichmann	100	Jackson	44	2.2
073-09-0013	P739013	Wichmann	100	Clay	16	2.2
073-09-0014	P739014	Wichmann	100	Clay	16	2.2
073-09-0015	P739015	Wichmann	100	Macon	46	2.2
073-09-0016	P739016	Wichmann	100	Macon	46	2.2
073-09-0017	P739017	Wichmann	100	Macon	46	2.2
073-09-0018	P739018	Wichmann	100	Transylvania	66	1.4
073-09-0019	P739019	Wichmann	100	Transylvania	67	1.4
073-09-0020	P739020	Wichmann	100	Transylvania	64	1.4
073-09-0021	P739021	Wichmann	100	Henderson	19	1.4
073-09-0022	P739022	Wichmann	100	Henderson	19	2.1

073-09-0023	P739023	Wichmann	100	Avery	62	2.2
073-09-0024	P739024	Wichmann	100	Avery	51	1.3
073-09-0025	P739025	Wichmann	100	Avery	62	2.5
073-09-0026	P739026	Wichmann	100	Watauga	34	2.8
073-09-0027	P739027	Wichmann	100	Watauga	34	2.1
073-09-0028	P739028	Wichmann	100	Watauga	34	2.5
073-09-0029	P739029	Wichmann	100	Watauga	31	2.3
073-09-0030	P739030	Wichmann	100	Watauga	43	2.5
073-09-0031	P739031	Wichmann	100	Watauga	36	2.5
073-09-0032	P739032	Wichmann	100	Watauga	35	2.8
073-09-0033	P739033	Wichmann	100	Watauga	35	2.8
073-09-0034	P739034	Wichmann	100	Watauga	39	2.1
073-09-0035	P739035	Wichmann	100	Watauga	34	2.8
073-09-0036	P739036	Wichmann	100	Watauga	33	2.8
073-09-0037	P739037	Wichmann	100	Watauga	33	1.3
073-09-0038	P739038	Wichmann	100	Watauga	42	2.3
073-09-0039	P739039	Wichmann	100	Watauga	42	2.3
073-09-0040	P739040	Wichmann	100	Watauga	35	2.8
073-09-0041	P739041	Wichmann	100	Burke	25	2.7
073-09-0042	P739042	Wichmann	100	Burke	25	2.7
073-09-0043	P739043	Wichmann	100	Avery	62	2.2
073-09-0044	P739044	Wichmann	100	Watauga	54	2.5
073-09-0045	P739045	Wichmann	100	Ashe	5	1.4
073-09-0046	P739046	Wichmann	100	Ashe	3	2.6
073-09-0047	P739047	Wichmann	100	Ashe	3	2.6
073-09-0048	P739048	Wichmann	100	Ashe	3	2.6
073-09-0049	P739049	Wichmann	100	Ashe	24	2.1
073-09-0050	P739050	Wichmann	100	Ashe	21	2.1
073-09-0051	P739051	Wichmann	100	Watauga	26	2.3
073-09-0052	P739052	Wichmann	100	Watauga	1	2.4
073-09-0054	P739054	Wichmann	100	Watauga	1	2.1
073-09-0059	P739059	Wichmann	100	Alleghany	59	2.1
073-09-0060	P739060	Wichmann	100	Alleghany	59	2.7
073-09-0061	P739061	Wichmann	100	Alleghany	59	2.7
073-09-0062	P739062	Wichmann	100	Alleghany	28	2.7
073-09-0063	P739063	Wichmann	100	Alleghany	28	1.4
073-09-0064	P739064	Wichmann	100	Alleghany	28	2.7
073-09-0065	P739065	Wichmann	100	Alleghany	7	1.4
073-09-0066	P739066	Wichmann	100	Avery	51	1.3
073-09-0067	P739067	Wichmann	100	Avery	51	1.3
073-09-0068	P739068	Wichmann	100	Avery	62	2.2
073-09-0069	P739069	Wichmann	100	Avery	62	2.5
073-09-0070	P739070	Wichmann	100	Watauga	53	2.5
073-09-0071	P739071	Wichmann	100	Watauga	54	2.5

073-09-0072	P739072	Wichmann	100	Watauga	1	2.4
073-09-0073	P739073	Wichmann	100	Watauga	1	2.4
073-09-0074	P739074	Wichmann	100	Watauga	1	2.1
073-09-0075	P739075	Wichmann	100	Avery	51	1.3
073-09-0076	P739076	Wichmann	100	Avery	51	1.3
073-09-0077	P739077	Wichmann	100	Avery	2	2.2
073-09-0078	P739078	Wichmann	100	Avery	2	2.2
073-09-0079	P739079	Wichmann	100	Yancey	13	2.7
073-09-0080	P739080	Wichmann	100	Yancey	13	2.7
073-09-0081	P739081	Wichmann	100	Avery	47	2.3
073-09-0082	P739082	Wichmann	100	Avery	47	2.3
073-09-0083	P739083	Wichmann	100	Watauga	1	2.4
073-09-0084	P739084	Wichmann	100	Watauga	1	2.4
073-09-0085	P739085	Wichmann	100	Watauga	27	2.1
073-09-0086	P739086	Wichmann	100	Watauga	53	2.8
073-09-0087	P739087	Wichmann	100	Watauga	53	2.8
073-09-0088	P739088	Wichmann	100	Yancey	13	2.7
073-09-0089	P739089	Wichmann	100	Yancey	13	2.7
073-09-0090	P739090	Wichmann	100	Ashe	23	2.1
073-09-0091	P739091	Wichmann	100	Ashe	22	2.1
073-09-0092	P739092	Wichmann	100	Avery	50	2.2
073-09-0093	P739093	Wichmann	100	Watauga	52	1.3
073-09-0094	P739094	Wichmann	100	Watauga	52	1.3
073-09-0095	P739095	Wichmann	100	Ashe	51	1.3

APPENDIX B.1

Vegetation data for the SATURATED FORESTS AND SEEPS vegetation class

Appendix B.1. Listing of taxa by community type for vegetation class I, SATURATED FORESTS AND SEEPS. Each community type is represented by its number. For each community type, the number of plots, mean elevation (m), mean soil depth (cm), mean bryophyte cover class (CC) and mean species richness (per 100 m²) are indicated. All taxa present in a community type are listed; a line separates prevalent taxa from non-prevalent taxa. Taxa are listed in alphabetical order after sorting in descending order of Constancy (C) and then Cover Class (CC). The typical stratum occupied by each taxon is indicated (T=tree, S=shrub, SS=subshrub, H=herb, V=vine). Calculated values of Frequency (FQ), Mean Cover (MC), Relative Cover (RC), Fidelity (FI), Indicator Value (IV) and Scaled Indicator Value (IVS) are also given for each taxon. Boldface values (C≥60, CC≥4, IV≥30, IVS≥15) indicate taxa that are considered characteristic and/or abundant in written descriptions of communities and in community names.

Community Number:	1.1
Number of plots:	8
Mean elevation (m):	1502
Mean soil depth (cm):	31
Mean Bryophyte Cover (CC):	6
Mean sp richness/100 m²:	27

Taxon Name	Stratum	C	CC	FQ	MC	RC	FI	IV	IVS
Betula [alleghaniensis + lenta]	T	**100**	**5**	8	7.88	+	36	**36**	**29**
Athyrium asplenioides	H	**75**	3	6	1.50	+	40	**30**	5
Eurybia chlorolepis	H	**63**	**4**	5	2.38	+	83	**52**	**12**
Oclemena acuminata	H	**63**	**4**	5	2.88	+	45	28	8
Dennstaedtia punctilobula	H	**63**	**4**	5	2.75	+	42	26	7
Angelica triquinata	H	**63**	3	5	1.50	+	83	**52**	8
Prenanthes sp.	H	**63**	3	5	1.13	+	83	**52**	6
Chelone [glabra + obliqua]	H	**63**	3	5	1.63	+	33	21	3
Viola cucullata	H	**63**	3	5	1.38	+	28	17	2
Arisaema triphyllum	H	**63**	3	5	1.25	+	25	16	2
Fagus grandifolia	T	50	**4**	4	2.25	+	80	**40**	9

Aesculus flava	T	50	**4**	4	2.38	+	67	**33**	8
Carex ruthii	H	50	**4**	4	2.13	+	44	22	5
Rhododendron maximum	S	50	**4**	4	2.25	-	12	6	1
Abies fraseri	T	50	3	4	1.88	+	80	**40**	8
Agrostis altissima	H	50	3	4	1.75	+	80	**40**	7
Oxalis montana	H	50	3	4	1.25	+	80	**40**	5
Veratrum virginicum	H	50	3	4	1.13	+	80	**40**	5
Diphylleia cymosa	H	50	3	4	1.38	+	57	29	4
Rubus allegheniensis	SS	50	3	4	1.25	+	50	25	3
Carex flexuosa	H	50	3	4	1.25	+	44	22	3
Glyceria melicaria	H	50	3	4	1.75	+	36	18	3
Rhododendron catawbiense	S	50	3	4	1.50	+	31	15	2
Amanchier spp. [arborea + laevis]	S	50	3	4	1.00	-	12	6	1
Acer rubrum	T	50	3	4	1.75	-	9	4	1
Solidago curtisii	H	50	2	4	0.88	+	80	**40**	4
Monarda didyma	H	38	3	3	1.25	+	100	**38**	5
Blephilia ciliata	H	38	3	3	1.00	+	100	**38**	4
Vaccinium erythrocarpum	S	38	3	3	1.00	+	75	28	3
Chone lyonii	H	38	3	3	1.25	+	60	23	3
Acer spicatum	T	38	3	3	1.75	+	50	19	3
Fraxinus ssp.	T	38	3	3	1.63	+	43	16	3
Huperzia lucidula	H	38	3	3	1.13	+	43	16	2
Hamamelis virginiana var. virginiana	S	38	3	3	1.75	+	38	14	2
Solidago patula var. patula	H	38	3	3	1.38	+	17	6	1
Viburnum cassinoides	S	38	3	3	1.13	-	8	3	0
Dryopteris campyloptera	H	38	2	3	0.88	+	100	**38**	3
Trautvetteria caroliniensis var. caroliniensis	H	38	2	3	0.88	+	100	**38**	3
Carex aestivalis	H	38	2	3	0.75	+	100	**38**	3
Thalictrum clavatum	H	38	2	3	0.88	+	75	28	2
Brachyelytrum [aristosum + erectum]	H	38	2	3	0.63	+	60	23	1
Danthonia compressa	H	38	2	3	0.63	+	50	19	1
Viola blanda	H	38	2	3	0.75	+	33	13	1
Sorbus americana	T	38	2	3	0.63	+	30	11	1

Maianthemum canadense	H	38	2	3	0.88	-	20	8	1
Thypteris noveboracensis	H	38	2	3	0.75	-	16	6	0
Houstonia serpyllifolia	H	38	2	3	0.75	+	16	6	0
Impatiens [capensis +pallida]	H	38	2	3	0.75	-	12	5	0
Rudbeckia laciniata	H	25	3	2	1.50	+	100	25	4
Acer saccharum	T	25	3	2	1.38	+	100	25	3
Picea rubens	T	25	3	2	1.13	-	13	3	0
Acer nigrum	T	25	2	2	0.88	+	100	25	2
Laportea canadensis	H	25	2	2	0.88	+	100	25	2
Actaea [podocarpa + racemosa]	H	25	2	2	0.75	+	100	25	2
Carex Sect. Carexeyanae	H	25	2	2	0.63	+	100	25	2
Cardamine diphylla	H	25	2	2	0.50	+	100	25	1
Micranthes micranthidifolia	H	25	2	2	0.50	+	100	25	1
Sambucus racemosa var. pubens	H	25	2	2	0.38	+	100	25	1
Viburnum lantana	S	25	2	2	0.75	+	67	17	1
Magnolia acuminata var. acuminata	T	25	2	2	0.75	+	67	17	1
Aconitum uncinatum	H	25	2	2	0.50	+	67	17	1
Parnassia asarifolia	H	25	2	2	0.50	+	67	17	1
Thalictrum spp.	H	25	2	2	0.38	+	67	17	1
Ribes cynosbati	S	25	2	2	0.38	+	67	17	1
Acer pensylvanicum	T	25	2	2	0.50	+	50	13	1
Smilax herbacea	H	25	2	2	0.50	+	50	13	1
Monotropa uniflora	H	25	2	2	0.38	+	50	13	0
Polystichum acrostichoides	H	25	2	2	0.25	+	50	13	0
Quercus montana	T	25	2	2	0.25	+	50	13	0
Prunus pensylvanica	T	25	2	2	0.88	+	40	10	1
Halesia tetraptera var. tetraptera	S	25	2	2	0.75	+	40	10	1
Lonicera canadensis	V	25	2	2	0.38	+	40	10	0
Trillium erectum	H	25	2	2	0.38	+	40	10	0
Agrostis perennans	H	25	2	2	0.50	+	33	8	0
Carex [crinita + gynandra + mitchliana]	H	25	2	2	0.75	+	29	7	1

Listera smallii	H	25	2	2	0.50	+	22	6	0
Ilex montana	S	25	2	2	0.75	+	20	5	0
Rubus canadensis	SS	25	2	2	0.38	-	20	5	0
Vaccinium simulatum	S	25	2	2	0.88	+	17	4	0
Clethra acuminata	S	25	2	2	0.88	+	17	4	0
Oxypolis rigidior	H	25	2	2	0.75	+	17	4	0
Carex intumescens	H	25	2	2	0.75	-	15	4	0
Carex leptalea var. leptalea	H	25	2	2	0.38	-	11	3	0
Mitchla repens	H	25	2	2	0.50	-	10	2	0
Galium [tinctorum + triflorum]	H	25	2	2	0.38	-	9	2	0
Vaccinium corymbosum	S	25	2	2	0.50	-	8	2	0
Tilia americana var. heterophylla	H	13	2	1	0.88	+	100	13	1
Eurybia divaricata	H	13	2	1	0.88	+	100	13	1
Aconitum reclinatum	H	13	2	1	0.63	+	100	13	1
Robinia pseudoacacia	H	13	2	1	0.50	+	100	13	1
Caulophyllum thalictroides	H	13	2	1	0.38	+	100	13	0
Deparia acrostichoides	H	13	2	1	0.38	+	100	13	0
Muhlenbergia tenuiflora	H	13	2	1	0.38	+	100	13	0
Prosartes lanuginosa	H	13	2	1	0.25	+	100	13	0
Agrimonia spp.	H	13	2	1	0.25	+	100	13	0
Streptopus lanceolatus var. lanceolatus	H	13	2	1	0.25	+	100	13	0
Symphyotrichum retroflexum	H	13	2	1	0.25	+	100	13	0
Botrypus virginianus	H	13	2	1	0.25	+	100	13	0
Carex gracilescens	H	13	2	1	0.25	+	100	13	0
Carex laxiflora	H	13	2	1	0.25	+	100	13	0
Carex woodii	H	13	2	1	0.25	+	100	13	0
Circaea alpina ssp. alpina	H	13	2	1	0.25	+	100	13	0
Clintonia umbellulata	H	13	2	1	0.25	+	100	13	0
Cystopteris protrusa	H	13	2	1	0.25	+	100	13	0
Galium asprlum	H	13	2	1	0.25	+	100	13	0
Glyceria nubigena	H	13	2	1	0.25	+	100	13	0
Lilium grayi	H	13	2	1	0.25	+	100	13	0
Monarda clinopodia	H	13	2	1	0.25	+	100	13	0

Phryma leptostachya var. leptostachya,	H	13	2	1	0.25	+	100	13	0
Platanthera peramoena	H	13	2	1	0.25	+	100	13	0
Poaceae spp.	H	13	2	1	0.25	+	100	13	0
Scleria oligantha	H	13	2	1	0.25	+	100	13	0
Scleria pauciflora	H	13	2	1	0.25	+	100	13	0
Scleria triglomerata	H	13	2	1	0.25	+	100	13	0
Viola rotundifolia	H	13	2	1	0.25	+	100	13	0
Polygonatum biflorum	H	13	2	1	0.13	+	100	13	0
Boechera laevigata	H	13	2	1	0.13	+	100	13	0
Uvularia perfoliata	H	13	2	1	0.13	+	100	13	0
Carex pensylvanica	H	13	2	1	0.13	+	100	13	0
Collinsonia canadensis	H	13	2	1	0.13	+	100	13	0
Cryptotaenia canadensis	H	13	2	1	0.13	+	100	13	0
Dioscorea [quaternata + villosa]	H	13	2	1	0.13	+	100	13	0
Epifagus virginiana	H	13	2	1	0.13	+	100	13	0
Eutrochium maculatum var. maculatum	H	13	2	1	0.13	+	100	13	0
Persicaria virginiana	H	13	2	1	0.13	+	100	13	0
Ranuculus spp.	H	13	2	1	0.13	+	100	13	0
Scleria muehlenbergii	H	13	2	1	0.13	+	100	13	0
Carex appalachica	H	13	2	1	0.25	+	50	6	0
Thaspium barbinode	H	13	2	1	0.25	+	50	6	0
Cornus alternifolia	S	13	2	1	0.25	+	50	6	0
Eutrochium spp.	H	13	2	1	0.25	+	50	6	0
Carex bromoides	H	13	2	1	0.25	+	50	6	0
Festuca subverticillata	H	13	2	1	0.25	+	50	6	0
Luzula acuminata	H	13	2	1	0.25	+	50	6	0
Platanthera psycodes	H	13	2	1	0.25	+	50	6	0
Maianthemum racemosum ssp. racemosum	T	13	2	1	0.13	+	50	6	0
Actaea pachypoda	H	13	2	1	0.13	+	50	6	0
Bromus spp.	H	13	2	1	0.13	+	50	6	0
Houstonia caerulea	H	13	2	1	0.13	+	50	6	0
Scirpus pansus	H	13	2	1	0.13	+	50	6	0
Solidago glomerata	H	13	2	1	0.50	+	33	4	0

Lysimachia quadriflora	H	13	2	1	0.13	+	33	4	0
Crataegus spp.	S	13	2	1	0.13	+	33	4	0
Clintonia borealis	H	13	2	1	0.13	+	33	4	0
Fallopia [convolvulus + scandens]	H	13	2	1	0.25	+	25	3	0
Carex stricta	H	13	2	1	0.63	+	20	3	0
Dryopteris intermedia	H	13	2	1	0.25	+	20	3	0
Gentiana [linearis + saponaria].	H	13	2	1	0.13	-	20	3	0
Gaylussacia ursina	S	13	2	1	0.25	-	17	2	0
Luzula echinata	H	13	2	1	0.25	+	17	2	0
Scirpus spp.	H	13	2	1	0.13	-	17	2	0
Magnolia fraseri	T	13	2	1	0.50	-	14	2	0
Packera aurea	H	13	2	1	0.13	-	14	2	0
Juncus gymnocarpus	H	13	2	1	0.50	+	10	1	0
Prunus serotina var. serotina	S	13	2	1	0.25	-	8	1	0
Sambucus canadensis	S	13	2	1	0.13	-	8	1	0
Quercus rubra var. rubra	T	13	2	1	0.25	-	6	1	0
Smilax rotundifolia	H	13	2	1	0.13	-	6	1	0
Medeola virginiana	H	13	2	1	0.13	-	6	1	0
Trillium undulatum	H	13	2	1	0.13	-	6	1	0
Smilax glauca	V	13	2	1	0.13	-	5	1	0
Viola macloskeyi var. pallens	H	13	2	1	0.63	-	5	1	0
Tsuga canadensis	T	13	2	1	0.38	-	5	1	0
Kalmia latifolia	S	13	2	1	0.13	-	3	0	0

Community Number:	1.2
Number of plots:	4
Mean elevation (m):	1685
Mean soil depth (cm):	42
Mean Bryophyte Cover (CC):	7
Mean sp richness/100 m²:	33

Taxon Name	Stratum	C	CC	FQ	MC	RC	FI	IV	IVS
Carex ruthii	H	**100**	**5**	4	5.75	+	44	**44**	**26**
Avenella flexuosa	H	**100**	**4**	4	2.50	+	80	**80**	**20**
Carex spp. [crinita + gynandra + mitchliana]	H	**100**	**4**	4	4.25	+	57	**57**	**24**
Juncus spp. [acuminatus + canadensis + subcaudatus]	H	**100**	**4**	4	2.00	+	40	**40**	8
Carex flexuosa	H	**100**	3	4	1.75	+	44	**44**	8
Platanthera clavlata	H	**100**	3	4	1.25	+	25	25	3
Hypericum densiflorum	S	**75**	**4**	3	3.50	+	43	**32**	**11**
Lyonia ligustrina var. ligustrina	S	**75**	**4**	3	2.00	+	15	11	2
Oclemena acuminata	H	**75**	**4**	3	2.50	+	27	20	5
Osmunda cinnamomea var. cinnamomea	H	**75**	**4**	3	2.75	+	9	7	2
Scirpus ssp.	H	**75**	**4**	3	2.00	+	50	**38**	8
Amanchier spp. [arborea + laevis]	S	**75**	3	3	1.25	-	9	7	1
Aronia manocarpa	S	**75**	3	3	1.75	+	18	13	2
Calamagrostis cinnoides	H	**75**	3	3	1.50	+	75	**56**	8
Juncus gymnocarpus	H	**75**	3	3	1.25	+	30	23	3
Rhododendron catawbiense	S	**75**	3	3	1.50	+	23	17	3
Rubus canadensis	SS	**75**	3	3	1.25	+	30	23	3
Solidago patula var. patula	H	**75**	3	3	1.50	+	17	13	2
Viburnum cassinoides	S	**75**	3	3	1.50	-	8	6	1
Hypericum graveolens	H	50	**4**	2	2.00	+	100	**50**	**10**
Hypericum mitchlianum	H	50	**4**	2	2.25	+	67	**33**	8
Solidago glomerata	H	50	**4**	2	2.00	+	67	**33**	7
Acer rubrum	T	50	3	2	1.50	-	4	2	0

Betula [alleghaniensis + lenta]	T	50	3	2	1.25	-	9	5	1
Danthonia compressa	H	50	3	2	1.00	+	33	17	2
Juncus [effusus ssp. solutus + pylaei]	H	50	3	2	1.00	+	22	11	1
Lycopodium clavatum	H	50	3	2	1.00	+	100	**50**	5
Vaccinium stamineum	S	50	3	2	1.75	+	67	**33**	6
Agrostis perennans	H	50	2	2	0.75	+	33	17	1
Dennstaedtia punctilobula	H	50	2	2	0.75	+	17	8	1
Houstonia serpyllifolia	H	50	2	2	0.50	-	11	5	0
Sorbus americana	T	50	2	2	0.50	+	20	10	1
Vaccinium pallidum	S	50	2	2	0.50	+	67	**33**	2
Pieris floribunda	H	25	3	1	1.00	+	100	25	3
Rubus argutus	SS	25	3	1	1.00	+	50	13	1
Vaccinium corymbosum	S	25	3	1	1.50	+	4	1	0
Abies fraseri	T	25	2	1	0.50	+	20	5	0
Acer spicatum	T	25	2	1	0.25	-	17	4	0
Acer pensylvanicum	T	25	2	1	0.25	+	25	6	0
Aesculus flava	T	25	2	1	0.50	+	17	4	0
Agrostis altissima	H	25	2	1	0.50	+	20	5	0
Angica triquinata	H	25	2	1	0.50	+	17	4	0
Bromus spp.	H	25	2	1	0.25	+	50	13	0
Carex intumescens	H	25	2	1	0.50	-	8	2	0
Carex leptalea var. leptalea	H	25	2	1	0.50	-	5	1	0
Carex lurida	H	25	2	1	0.50	+	17	4	0
Carex sect. Ovales	H	25	2	1	0.50	+	25	6	0
Carex vulpinoidea	H	25	2	1	0.50	+	100	25	1
Cuscuta spp.	H	25	2	1	0.50	+	100	25	1
Dendrolycopodium dendroideum	H	25	2	1	0.50	+	50	13	1
Dendrolycopodium obscurum	H	25	2	1	0.50	+	13	3	0
Diervilla sessilifolia	H	25	2	1	0.25	+	100	25	1
Eurybia chlorolepis	H	25	2	1	0.25	-	17	4	0
Eutrochium spp.	H	25	2	1	0.50	+	50	13	1

Festuca subverticillata	H	25	2	1	0.50	+	50	13	1
Glyceria micaria	H	25	2	1	0.50	-	9	2	0
Houstonia spp.	H	25	2	1	0.50	+	100	25	1
Houstonia caerulea	H	25	2	1	0.50	+	50	13	1
Hypericum hypericoides	H	25	2	1	0.25	+	100	25	1
Impatiens [capensis +pallida]	H	25	2	1	0.50	-	4	1	0
Kalmia latifolia	S	25	2	1	0.25	-	3	1	0
Luzula acuminata	H	25	2	1	0.25	+	50	13	0
Luzula multiflora var. multiflora	H	25	2	1	0.50	+	100	25	1
Menziesia pilosa	S	25	2	1	0.50	+	17	4	0
Picea rubens	T	25	2	1	0.25	-	7	2	0
Pinus rigida	T	25	2	1	0.25	-	7	2	0
Platanthera psycodes	H	25	2	1	0.25	+	50	13	0
Potentilla canadensis	H	25	2	1	0.50	+	50	13	1
Prenanthes spp.	H	25	2	1	0.25	+	17	4	0
Prunus pensylvanica	T	25	2	1	0.25	-	20	5	0
Ribes cynosbati	S	25	2	1	0.25	+	33	8	0
Salix sericea	S	25	2	1	0.75	+	25	6	0
Symphyotrichum cordifolium	H	25	2	1	0.50	+	100	25	1
Symphyotrichum puniceum var. puniceum	H	25	2	1	0.50	-	8	2	0
Tsuga canadensis	T	25	2	1	0.25	-	5	1	0
Vaccinium erythrocarpum	S	25	2	1	0.50	+	25	6	0
Viola affinis	H	25	2	1	0.50	+	100	25	1
Viola blanda	H	25	2	1	0.50	+	11	3	0
Viola macloskeyi var. pallens	H	25	2	1	0.50	-	5	1	0
Viola sagittata	H	25	2	1	0.25	+	100	25	1

Community Number:	1.3
Number of plots:	12
Mean elevation (m):	1215
Mean soil depth (cm):	99
Mean Bryophyte Cover (CC):	6
Mean sp richness/100 m²:	40

Taxon Name	Stratum	C	CC	FQ	MC	RC	FI	IV	IVS
Rhododendron maximum	S	**100**	**5**	12	6.50	+	35	**35**	**23**
Kalmia latifolia	S	**100**	**4**	12	4.33	+	32	**32**	**14**
Viburnum cassinoides	S	**92**	**4**	11	4.50	+	28	26	**12**
Acer rubrum	T	**83**	**4**	10	4.75	-	22	19	9
Picea rubens	T	**83**	**4**	10	4.83	+	67	**56**	**27**
Ilex verticillata	S	**75**	**4**	9	3.75	+	36	27	**10**
Maianthemum canadense	H	**75**	**4**	9	2.92	+	60	**45**	**13**
Osmunda cinnamomea var. cinnamomea	H	**75**	**4**	9	3.17	+	28	21	7
Arisaema triphyllum	H	**75**	3	9	1.50	+	45	**34**	5
Rubus hispidus	SS	**75**	3	9	1.42	+	32	24	3
Aronia manocarpa	S	**67**	**4**	8	2.42	+	47	**31**	8
Carex leptalea var. leptalea	H	**67**	**4**	8	3.25	+	42	28	9
Solidago patula var. patula	H	**67**	**4**	8	2.42	+	44	**30**	7
Sphagnum spp.	B	**67**	**4**	8	3.83	+	42	28	**11**
Mitchla repens	H	**67**	3	8	1.42	+	38	25	4
Viola macloskeyi var. pallens	H	**67**	3	8	1.67	+	36	24	4
Betula [alleghaniensis + lenta]	T	**58**	**4**	7	2.58	+	32	19	5
Tsuga canadensis	T	**58**	**4**	7	2.58	+	32	19	5
Amanchier spp. [arborea + laevis]	S	**58**	3	7	1.83	+	21	12	2
Trillium undulatum	H	**58**	2	7	0.92	+	41	24	2
Clethra acuminata	S	50	**4**	6	2.25	+	50	25	6
Rhododendron catawbiense	S	50	**4**	6	2.50	+	46	23	6
Sambucus canadensis	S	50	3	6	1.67	+	50	25	4

Symphyotrichum puniceum var. puniceum	H	50	3	6	1.58	+	50	25	4
Vaccinium corymbosum	S	50	3	6	1.67	+	25	13	2
Alnus serrulata	S	42	**4**	5	2.17	+	24	10	2
Impatiens [capensis +pallida]	H	42	3	5	1.33	+	20	8	1
Lyonia ligustrina var. ligustrina	S	42	3	5	1.67	+	25	10	2
Packera aurea	H	42	3	5	1.00	+	71	**30**	3
Vaccinium simulatum	S	42	3	5	1.25	+	42	17	2
Carex trisperma var. trisperma	H	42	2	5	0.83	+	100	**42**	3
Galium [tinctorum + triflorum]	H	42	2	5	0.75	-	22	9	1
Platanthera clavlata	H	42	2	5	0.75	+	31	13	1
Sorbus americana	T	42	2	5	0.92	+	50	21	2
Carex echinata ssp. echinata	H	33	3	4	1.33	+	36	12	2
Chone [glabra + obliqua]	H	33	3	4	1.25	+	27	9	1
Ilex collina	S	33	3	4	1.50	+	100	**33**	5
Pinus rigida	T	33	3	4	1.83	+	27	9	2
Glyceria striata var. striata	H	33	2	4	0.75	+	44	15	1
Houstonia serpyllifolia	H	33	2	4	0.67	+	21	7	0
Listera smallii	H	33	2	4	0.58	+	44	15	1
Thypteris palustris var. pubescens	H	33	2	4	0.75	+	67	22	2
Viola blanda	H	33	2	4	0.75	+	44	15	1
Glyceria micaria	H	25	3	3	1.33	+	27	7	1
Salix sericea	S	25	3	3	1.33	+	75	19	3
Athyrium asplenioides	H	25	2	3	0.42	-	20	5	0
Carex bullata	H	25	2	3	0.92	+	60	15	1
Clematis virginiana	H	25	2	3	0.75	+	38	9	1
Diphylleia cymosa	H	25	2	3	0.58	+	43	11	1
Dulichium arundinaceum var. arundinaceum	H	25	2	3	0.50	+	100	25	1
Ilex montana	S	25	2	3	0.67	+	30	8	1
Kalmia carolina	S	25	2	3	0.67	-	27	7	0
Lonicera canadensis	V	25	2	3	0.75	+	60	15	1
Luzula echinata	H	25	2	3	0.42	+	50	13	1

Oxypolis rigidior	H	25	2	3	0.58	+	25	6	0
Persicaria sagittata	H	25	2	3	0.50	+	25	6	0
Rosa multiflora	S	25	2	3	0.33	+	50	13	0
Solidago altissima var. altissima	H	25	2	3	0.50	+	100	25	1
Toxicodendron vernix	T	25	2	3	0.83	+	38	9	1
Trillium erectum	H	25	2	3	0.33	+	60	15	1
Viola cucullata	H	25	2	3	0.67	-	17	4	0
Acer spicatum	T	17	2	2	0.25	-	33	6	0
Aronia prunifolia	S	17	2	2	0.33	+	67	11	0
Carex baileyi	H	17	2	2	0.50	-	25	4	0
Carex stipata var. stipata	H	17	2	2	0.25	+	100	17	0
Chone lyonii	H	17	2	2	0.33	+	40	7	0
Clintonia borealis	H	17	2	2	0.17	+	67	11	0
Dryopteris carthusiana	H	17	2	2	0.33	+	100	17	1
Fraxinus ssp.	T	17	2	2	0.75	+	29	5	0
Juncus [effusus ssp. solutus + pylaei]	H	17	2	2	0.42	+	22	4	0
Lonicera dioica var. dioica	V	17	2	2	0.50	+	100	17	1
Medeola virginiana	H	17	2	2	0.25	-	13	2	0
Oclemena acuminata	H	17	2	2	0.17	-	18	3	0
Oxalis violacea	H	17	2	2	0.33	+	100	17	1
Prunus serotina var. serotina	S	17	2	2	0.33	-	17	3	0
Quercus rubra var. rubra	T	17	2	2	0.67	-	13	2	0
Rhododendron [subgenus Hymenanthes]	S	17	2	2	0.50	-	18	3	0
Rubus allegheniensis	SS	17	2	2	0.25	-	25	4	0
Rubus canadensis	SS	17	2	2	0.58	+	20	3	0
Scirpus spp.	H	17	2	2	0.33	+	33	6	0
Sphenopholis pensylvanica	H	17	2	2	0.25	+	50	8	0
Actaea pachypoda	H	8	2	1	0.17	+	50	4	0
Aesculus flava	T	8	2	1	0.33	-	17	1	0
Agrostis perennans	H	8	2	1	0.17	-	17	1	0
Carex atlantica	H	8	2	1	0.17	-	11	1	0
Carex bromoides	H	8	2	1	0.17	+	50	4	0
Carex ruthii	H	8	2	1	0.17	-	11	1	0

Chone cuthbertii	H	8	2	1	0.25	-	14	1	0
Dendrolycopodium obscurum	H	8	2	1	0.17	-	13	1	0
Dryopteris intermedia	H	8	2	1	0.17	-	20	2	0
Eleocharis tenuis	H	8	2	1	0.17	+	100	8	0
Eutrochium fistulosum	H	8	2	1	0.17	+	33	3	0
Gentiana [linearis + saponaria].	H	8	2	1	0.17	+	20	2	0
Glyceria laxa	H	8	2	1	0.17	-	33	3	0
Huperzia lucidula	H	8	2	1	0.17	-	14	1	0
Hypericum mitchlianum	H	8	2	1	0.17	-	33	3	0
Isoetes valida	H	8	2	1	0.17	+	100	8	0
Ligustrum sinense	H	8	2	1	0.17	+	100	8	0
Ludwigia alternifolia	H	8	2	1	0.17	+	50	4	0
Lycopus uniflorus	H	8	2	1	0.17	-	14	1	0
Lycopus virginicus	H	8	2	1	0.17	-	8	1	0
Lysimachia ciliata	H	8	2	1	0.25	+	33	3	0
Lysimachia terrestris	H	8	2	1	0.17	+	50	4	0
Magnolia acuminata var. acuminata	T	8	2	1	0.50	+	33	3	0
Menziesia pilosa	S	8	2	1	0.25	+	17	1	0
Micranthes pensylvanica	H	8	2	1	0.17	+	100	8	0
Mimulus ringens var. ringens	H	8	2	1	0.25	+	33	3	0
Muhlenbergia schreberi	H	8	2	1	0.17	+	100	8	0
Orontium aquaticum	H	8	2	1	0.17	+	50	4	0
Oxalis [Sect. Corniculatae]	H	8	2	1	0.17	+	50	4	0
Parnassia asarifolia	H	8	2	1	0.17	+	33	3	0
Pinus strobus	T	8	2	1	0.50	-	4	0	0
Prunus pensylvanica	T	8	2	1	0.50	+	20	2	0
Rosa palustris	S	8	2	1	0.25	-	11	1	0
Sagittaria latifolia	H	8	2	1	0.25	+	50	4	0
Scirpus pansus	H	8	2	1	0.17	+	50	4	0
Scutellaria lateriflora	H	8	2	1	0.17	+	100	8	0
Smilax herbacea	H	8	2	1	0.17	+	25	2	0
Taxus canadensis	S	8	2	1	0.33	+	100	8	0
Triadenum virginicum	H	8	2	1	0.17	+	33	3	0

Trillium cuneatum	H	8	2	1	0.17	+	100	8	0
Vaccinium macrocarpon	DS	8	2	1	0.17	+	50	4	0
Anemone quinquefolia var. quinquefolia	H	8	1	1	0.08	-	25	2	0
Crataegus spp.	S	8	1	1	0.08	+	33	3	0
Goodyera pubescens	H	8	1	1	0.08	-	17	1	0
Hypericum mutilum var. mutilum	H	8	1	1	0.08	-	25	2	0
Lactuca spp.	H	8	1	1	0.08	+	50	4	0
Leersia virginica	H	8	1	1	0.08	+	100	8	0
Liriodendron tulipifera var. tulipifera	T	8	1	1	0.08	-	8	1	0
Oxalis montana	H	8	1	1	0.08	-	20	2	0
Parthenocissus quinquefolia	T	8	1	1	0.08	+	33	3	0
Quercus alba	T	8	1	1	0.08	-	6	1	0
Quercus vutina	T	8	1	1	0.08	+	100	8	0
Rubus argutus	SS	8	1	1	0.08	-	50	4	0
Solidago [speciosa var. speciosa + rugosa var. sphagnifolia]	H	8	1	1	0.08	-	20	2	0
Toxicodendron radicans var. radicans	V	8	1	1	0.08	-	17	1	0
Viola primulifolia	H	8	1	1	0.08	-	10	1	0

Community Number:	1.4
Number of plots:	28
Mean elevation (m):	869
Mean soil depth (cm):	80
Mean Bryophyte Cover (CC):	6
Mean sp richness/100 m²:	40

Taxon Name	Stratum	C	CC	FQ	MC	RC	FI	IV	IVS
Acer rubrum	T	**100**	**5**	29	6.69	+	64	**64**	**43**
Pinus strobus	T	**83**	**4**	24	3.62	+	96	**79**	**29**
Kalmia latifolia	S	**79**	**4**	23	3.62	+	62	**49**	**18**
Nyssa sylvatica	T	**76**	**4**	22	3.34	+	100	**76**	**25**
Viburnum cassinoides	S	**76**	**4**	22	2.14	-	56	43	9
Osmunda cinnamomea var. cinnamomea	H	**69**	**4**	20	2.55	+	63	43	11
Amanchier spp. [arborea + laevis]	S	**69**	3	20	1.76	+	59	41	7
Rubus hispidus	SS	**66**	3	19	1.97	+	68	44	9
Rhododendron maximum	S	**62**	**4**	18	2.41	-	53	33	8
Smilax glauca	V	**62**	3	18	1.03	+	95	**59**	6
Carex folliculata	H	59	**4**	17	2.24	+	100	**59**	**13**
Alnus serrulata	S	55	**4**	16	2.34	+	76	42	10
Ilex verticillata	S	55	**4**	16	2.14	+	64	35	8
Galium [tinctorum + triflorum]	H	55	3	16	1.07	+	70	38	4
Impatiens [capensis +pallida]	H	55	3	16	1.03	+	64	35	4
Thypteris noveboracensis	H	55	3	16	1.83	+	84	46	8
Quercus alba	T	52	3	15	1.41	+	94	48	7
Vaccinium corymbosum	S	52	3	15	1.55	+	63	32	5
Smilax rotundifolia	V	52	2	15	0.97	+	94	48	5
Aronia arbutifolia	S	45	3	13	1.17	+	100	45	5
Tsuga canadensis	T	45	3	13	1.86	+	59	26	5
Medeola virginiana	H	45	2	13	0.76	+	81	36	3
Quercus rubra var. rubra	T	45	2	13	0.97	+	81	36	4

Symplocarpus foetidus	H	41	**4**	12	2.17	+	100	41	9
Dalibarda repens	H	41	3	12	1.31	+	100	41	5
Lyonia ligustrina var. ligustrina	S	41	3	12	1.76	+	60	25	4
Viola macloskeyi var. pallens	H	41	3	12	1.07	-	55	23	2
Sphagnum spp.	B	38	**4**	11	2.34	+	58	22	5
Liriodendron tulipifera var. tulipifera	T	38	3	11	1.00	+	92	35	3
Galax urceolata	H	38	2	11	0.97	+	100	38	4
Lycopus virginicus	H	38	2	11	0.83	+	92	35	3
Mitchella repens	H	38	2	11	0.79	-	52	20	2
Pinus rigida	T	34	**4**	10	2.14	+	67	23	5
Carex intumescens	H	34	3	10	1.21	+	77	27	3
Houstonia serpyllifolia	H	34	2	10	0.66	-	53	18	1
Viola cucullata	H	34	2	10	0.76	-	56	19	1
Rhododendron spp. [subgenus Hymenanthes]	S	31	3	9	1.03	+	82	25	3
Osmunda regalis var. spectabilis	H	31	2	9	0.90	+	100	31	3
Persicaria sagittata	H	31	2	9	0.55	+	75	23	1
Prunus serotina var. serotina	S	31	2	9	0.55	+	75	23	1
Trillium undulatum	H	31	2	9	0.52	+	53	16	1
Viola primulifolia	H	31	2	9	0.55	+	90	28	2
Leucothoe fontanesiana	S	28	3	8	1.21	+	100	28	3
Carex atlantica	H	28	2	8	0.93	+	89	25	2
Carex leptalea var. leptalea	H	28	2	8	0.52	-	42	12	1
Hexastylis spp.	H	28	2	8	0.52	+	100	28	1
Kalmia carolina	S	28	2	8	0.97	+	73	20	2
Rosa palustris	S	28	2	8	0.72	+	89	25	2
Carex echinata ssp. echinata	H	24	2	7	0.48	-	64	15	1
Ilex opaca var. opaca	S	24	2	7	0.69	+	100	24	2
Oxypolis rigidior	H	24	2	7	0.34	-	58	14	0
Platanthera clavlata	H	24	2	7	0.45	-	44	11	0
Quercus coccinea	T	24	2	7	0.79	+	100	24	2
Xanthorhiza simplicissima	S	24	2	7	0.55	+	100	24	1

Arisaema triphyllum	H	21	2	6	0.38	-	30	6	0
Aronia manocarpa	S	21	2	6	0.59	-	35	7	0
Athyrium asplenioides	H	21	2	6	0.41	-	40	8	0
Carex baileyi	H	21	2	6	0.76	+	75	16	1
Chone [glabra + obliqua]	H	21	2	6	0.55	-	40	8	0
Chone cuthbertii	H	21	2	6	0.38	+	86	18	1
Dendrolycopodium obscurum	H	21	2	6	0.52	+	75	16	1
Juncus [acuminatus + canadensis + subcaudatus]	H	21	2	6	0.45	+	60	12	1
Juncus gymnocarpus	H	21	2	6	0.59	+	60	12	1
Lindera benzoin	S	21	2	6	0.48	+	100	21	1
Lycopus uniflorus	H	21	2	6	0.41	+	86	18	1
Magnolia fraseri	T	21	2	6	0.83	+	86	18	1
Vaccinium fuscatum	S	21	2	6	0.76	+	100	21	2
Betula [alleghaniensis + lenta]	T	17	2	5	0.52	-	23	4	0
Carex lurida	H	17	2	5	0.52	+	83	14	1
Clematis virginiana	H	17	2	5	0.28	-	63	11	0
Cornus amomum	S	17	2	5	0.34	+	100	17	1
Dennstaedtia punctilobula	H	17	2	5	0.48	-	42	7	0
Gaylussacia ursina	S	17	2	5	0.41	+	83	14	1
Glyceria striata var. striata	H	17	2	5	0.55	+	56	10	1
Goodyera pubescens	H	17	2	5	0.31	+	83	14	0
Hamamis virginiana var. virginiana	S	17	2	5	0.45	-	63	11	0
Ilex montana	S	17	2	5	0.52	-	50	9	0
Juncus [effusus ssp. solutus + pylaei]	H	17	2	5	0.38	+	56	10	0
Lygodium palmatum	H	17	2	5	0.38	+	100	17	1
Oxydendrum arboreum	T	17	2	5	0.69	+	100	17	1
Rhododendron catawbiense	S	17	2	5	0.48	+	100	17	1
Sambucus canadensis	S	17	2	5	0.34	-	42	7	0
Symphyotrichum puniceum var. puniceum	H	17	2	5	0.28	-	42	7	0
Toxicodendron radicans var. radicans	V	17	2	5	0.21	+	83	14	0
Toxicodendron vernix	T	17	2	5	0.66	+	63	11	1
Vaccinium simulatum	S	17	2	5	0.41	-	42	7	0
Viburnum dentatum	S	17	2	5	0.52	+	100	17	1

Carex stricta	H	14	2	4	0.72	+	80	11	1
Chimaphila maculata	H	14	2	4	0.24	+	100	14	0
Clethra acuminata	S	14	2	4	0.28	-	33	5	0
Dichanthium dichotomum	H	14	2	4	0.24	+	100	14	0
Euonymus americanus	S	14	2	4	0.21	+	100	14	0
Gaylussacia baccata	S	14	2	4	0.31	+	100	14	0
Helonias bullata	H	14	2	4	0.52	+	100	14	1
Hydrocotyle americana	H	14	2	4	0.45	+	100	14	1
Hypericum densiflorum	H	14	2	4	0.41	-	57	8	0
Iris virginica	S	14	2	4	0.28	+	100	14	0
Menziesia pilosa	S	14	2	4	0.28	+	67	9	0
Pilea pumila	S	14	2	4	0.24	+	100	14	0
Sassafras albidum	T	14	2	4	0.14	+	100	14	0
Solidago [speciosa + rugosa var. sphagnifolia]	H	14	2	4	0.28	+	80	11	0
Solidago patula var. patula	H	14	2	4	0.38	-	22	3	0
Spiraea alba	S	14	2	4	0.28	+	100	14	0
Spiraea tomentosa	S	14	2	4	0.31	+	100	14	0
Anemone quinquefolia var. quinquefolia	H	10	2	3	0.17	+	75	8	0
Bidens spp.	H	10	2	3	0.14	+	100	10	0
Carex sect. Ovales	H	10	2	3	0.14	+	75	8	0
Dryopteris intermedia	H	10	2	3	0.28	+	60	6	0
Eubotrys racemosa	H	10	2	3	0.41	+	100	10	0
Fallopia [convolvulus + scandens]	H	10	2	3	0.21	+	75	8	0
Gaultheria procumbens	H	10	2	3	0.21	+	100	10	0
Gentiana [linearis + saponaria].	H	10	2	3	0.17	+	60	6	0
Glyceria micaria	H	10	2	3	0.52	-	27	3	0
Halesia tetraptera var. tetraptera	S	10	2	3	0.14	-	60	6	0
Huperzia lucidula	H	10	2	3	0.28	-	43	4	0
Hypericum mutilum var. mutilum	H	10	2	3	0.17	+	75	8	0
Listera smallii	H	10	2	3	0.17	-	33	3	0
Maianthemum canadense	H	10	2	3	0.28	-	20	2	0
Microstegium vimineum	H	10	2	3	0.14	+	100	10	0
Persicaria longiseta	H	10	2	3	0.21	+	100	10	0

Pycnanthemum [tenuifolium + virginianum]	H	10	2	3	0.21	+	100	10	0
Pyrularia pubera	H	10	2	3	0.21	+	100	10	0
Rosa multiflora	S	10	2	3	0.14	-	50	5	0
Rubus canadensis	SS	10	2	3	0.21	-	30	3	0
Symphyotrichum dumosum var. dumosum	H	10	2	3	0.17	+	100	10	0
Symplocos tinctoria	H	10	2	3	0.17	+	100	10	0
Vitis aestivalis	H	10	2	3	0.28	+	100	10	0
Woodwardia areolata	H	10	2	3	0.34	+	100	10	0
Amianthium muscitoxicum	H	7	2	2	0.10	+	100	7	0
Bartonia virginica	H	7	2	2	0.10	+	100	7	0
Brachyelytrum [aristosum + erectum]	H	7	2	2	0.10	-	40	3	0
Carex allegheniensis	H	7	2	2	0.10	+	100	7	0
Carex bullata	H	7	2	2	0.45	-	40	3	0
Carex debilis	H	7	2	2	0.24	+	100	7	0
Carex Sect. Hymenochlaenae	H	7	2	2	0.14	+	100	7	0
Carex tribuloides	H	7	2	2	0.14	+	100	7	0
Carya glabra	T	7	2	2	0.14	+	100	7	0
Cornus florida	T	7	2	2	0.17	+	100	7	0
Dichanthium lucidum	H	7	2	2	0.14	+	100	7	0
Eutrochium fistulosum	H	7	2	2	0.14	+	67	5	0
Fraxinus ssp.	T	7	2	2	0.24	-	29	2	0
Glyceria laxa	H	7	2	2	0.31	+	67	5	0
Hypericum prolificum	H	7	2	2	0.10	+	100	7	0
Ilex ambigua	S	7	2	2	0.14	+	100	7	0
Luzula echinata	H	7	2	2	0.10	-	33	2	0
Lysimachia ciliata	H	7	2	2	0.10	-	67	5	0
Lysimachia quadriflora	H	7	2	2	0.10	+	67	5	0
Malus angustifolia	T	7	2	2	0.14	+	100	7	0
Mimulus ringens var. ringens	H	7	2	2	0.14	+	67	5	0
Parthenocissus quinquefolia	T	7	2	2	0.10	+	67	5	0
Persicaria setacea	H	7	2	2	0.14	+	100	7	0
Picea rubens	T	7	2	2	0.10	-	13	1	0
Polygala sanguinea	H	7	2	2	0.10	+	100	7	0

Polystichum acrostichoides	H	7	2	2	0.14	+	50	3	0
Pteridium aquilinum	H	7	2	2	0.10	+	100	7	0
Quercus montana	T	7	2	2	0.24	+	50	3	0
Rubus allegheniensis	SS	7	2	2	0.17	-	25	2	0
Sarracenia purpurea var. montana	H	7	2	2	0.24	+	100	7	0
Sphenopholis pensylvanica	H	7	2	2	0.14	+	50	3	0
Thelypteris simulata	H	7	2	2	0.28	+	100	7	0
Thypteris palustris var. pubescens	H	7	2	2	0.17	-	33	2	0
Triadenum virginicum	H	7	2	2	0.17	+	67	5	0
Viola sororia	H	7	2	2	0.14	+	100	7	0
Vitis labrusca	H	7	2	2	0.24	+	100	7	0
Melampyrum lineare	H	7	1	2	0.07	+	100	7	0
Monotropa uniflora	H	7	1	2	0.07	-	50	3	0
Aconitum uncinatum	H	3	2	1	0.10	-	33	1	0
Arisaema triphyllum	H	3	2	1	0.10	+	100	3	0
Carduus nutans ssp. macrolepis	H	3	2	1	0.14	+	100	3	0
Carex appalachica	H	3	2	1	0.17	+	50	2	0
Carex torta	H	3	2	1	0.14	+	100	3	0
Carya alba	T	3	2	1	0.10	+	100	3	0
Cicuta maculata var. maculata	H	3	2	1	0.10	+	100	3	0
Dryopteris cristata	H	3	2	1	0.10	+	100	3	0
Fagus grandifolia	T	3	2	1	0.10	-	20	1	0
Magnolia tripetala	T	3	2	1	0.21	+	100	3	0
Malus coronaria	T	3	2	1	0.17	+	100	3	0
Onoclea sensibilis var. sensibilis	H	3	2	1	0.10	+	100	3	0
Orontium aquaticum	H	3	2	1	0.10	+	50	2	0
Packera aurea	H	3	2	1	0.17	-	14	0	0
Ptandra virginica	H	3	2	1	0.10	+	100	3	0
Sanguinaria canadensis	H	3	2	1	0.17	+	100	3	0
Solidago curtisii	H	3	2	1	0.17	-	20	1	0
Sporobolus spp.	H	3	2	1	0.21	+	100	3	0
Vaccinium macrocarpon	SS	3	2	1	0.17	+	50	2	0
Vaccinium myrtilloides	S	3	2	1	0.17	+	100	3	0

Vaccinium pallidum	S	3	2	1	0.10	+	33	1	0
Viburnum lantana	S	3	2	1	0.10	-	33	1	0
Viola blanda	H	3	2	1	0.14	-	11	0	0
Acer pensylvanicum	T	3	1	1	0.03	-	25	1	0
Agrostis capillaris	H	3	1	1	0.03	+	100	3	0
Agrostis perennans	H	3	1	1	0.03	-	17	1	0
Apios americana	H	3	1	1	0.07	+	100	3	0
Aronia prunifolia	S	3	1	1	0.07	-	33	1	0
Avenella flexuosa	H	3	1	1	0.07	-	20	1	0
Boehmeria cylindrica	H	3	1	1	0.07	+	100	3	0
Boykinia aconitifolia	H	3	1	1	0.07	+	100	3	0
Calamagrostis cinnoides	H	3	1	1	0.03	-	25	1	0
Calycanthus floridus	H	3	1	1	0.03	+	100	3	0
Campanula aparinoides	H	3	1	1	0.07	+	100	3	0
Carex [crinita + gynandra + mitchliana]	H	3	1	1	0.07	-	14	0	0
Carex cumberlandensis	H	3	1	1	0.03	+	100	3	0
Carex flexuosa	H	3	1	1	0.07	-	11	0	0
Carex muricata ssp. lamprocarpa	H	3	1	1	0.07	+	100	3	0
Carya glabra	T	3	1	1	0.03	+	100	3	0
Celastrus orbiculatus	V	3	1	1	0.07	+	100	3	0
Chamairium luteum	H	3	1	1	0.07	+	100	3	0
Chasmanthium laxum	H	3	1	1	0.03	+	100	3	0
Chionanthus virginicus	S	3	1	1	0.07	+	100	3	0
Coptis trifolia var. groenlandica	H	3	1	1	0.07	+	100	3	0
Cornus alternifolia	S	3	1	1	0.07	-	50	2	0
Crataegus spp.	S	3	1	1	0.03	-	33	1	0
Cypripedium acaule	H	3	1	1	0.03	+	100	3	0
Danthonia compressa	H	3	1	1	0.07	-	17	1	0
Dendrolycopodium dendroideum	H	3	1	1	0.07	-	50	2	0
Dichanthium acuminatum	H	3	1	1	0.07	+	100	3	0
Diphasiastrum digitatum	H	3	1	1	0.07	+	100	3	0
Dolingeria umblata	H	3	1	1	0.03	+	100	3	0
Drosera rotundifolia var. rotundifolia	H	3	1	1	0.03	+	100	3	0

Dryopteris marginalis	H	3	1	1	0.03	+	100	3	0
Eriophorum virginicum	H	3	1	1	0.07	+	100	3	0
Euonymus atropurpureus var. atropurpureus	S	3	1	1	0.07	+	100	3	0
Filipendula rubra	H	3	1	1	0.07	+	100	3	0
Gratiola [brevifolia+ virginiana+ viscidula]	H	3	1	1	0.07	+	100	3	0
Hexastylis arifolia var. arifolia	H	3	1	1	0.07	+	100	3	0
Holcus lanatus	H	3	1	1	0.03	+	100	3	0
Kalmia angustifolia	S	3	1	1	0.07	+	100	3	0
Lactuca spp.	H	3	1	1	0.07	+	50	2	0
Lobia puberula var. simulans	H	3	1	1	0.03	+	100	3	0
Ludwigia alternifolia	H	3	1	1	0.03	-	50	2	0
Ludwigia palustris	H	3	1	1	0.07	+	100	3	0
Lysimachia lanceolata	H	3	1	1	0.07	+	100	3	0
Lysimachia terrestris	H	3	1	1	0.07	-	50	2	0
Maianthemum racemosum ssp. racemosum	T	3	1	1	0.03	-	50	2	0
Muhlenbergia frondosa	H	3	1	1	0.03	+	100	3	0
Murdannia keisak	H	3	1	1	0.07	+	100	3	0
Oclemena acuminata	H	3	1	1	0.07	-	9	0	0
Oxalis [Sect. Corniculatae]	H	3	1	1	0.03	-	50	2	0
Platanthera lacera	H	3	1	1	0.03	+	100	3	0
Pogonia ophioglossoides	H	3	1	1	0.03	+	100	3	0
Potamogeton pulcher	H	3	1	1	0.07	+	100	3	0
Potentilla canadensis	H	3	1	1	0.03	-	50	2	0
Prunus pensylvanica	T	3	1	1	0.07	-	20	1	0
Rhynchospora alba	H	3	1	1	0.07	+	100	3	0
Sagittaria latifolia	H	3	1	1	0.07	-	50	2	0
Sanicula spp.	H	3	1	1	0.07	+	100	3	0
Sceptridium biternatum	H	3	1	1	0.03	+	100	3	0
Sisyrinchium	H	3	1	1	0.07	+	100	3	0
Smilax herbacea	H	3	1	1	0.03	-	25	1	0
Smilax laurifolia	H	3	1	1	0.07	+	100	3	0
Sparganium americanum	H	3	1	1	0.07	+	100	3	0
Spiranthes cernua	H	3	1	1	0.07	+	100	3	0

Stenanthium gramineum	H	3	1	1	0.03	+	100	3	0
Thalictrum clavatum	H	3	1	1	0.07	-	25	1	0
Thalictrum spp.	H	3	1	1	0.03	-	33	1	0
Thaspium barbinode	H	3	1	1	0.03	-	50	2	0
Vaccinium stamineum	S	3	1	1	0.07	-	33	1	0
Veratrum virginicum	S	3	1	1	0.07	-	20	1	0
Vernonia noveboracensis	H	3	1	1	0.07	+	100	3	0
Viburnum prunifolium	S	3	1	1	0.07	+	100	3	0
Viola hastata	H	3	1	1	0.03	+	100	3	0
Viola lanceolata	H	3	1	1	0.07	+	100	3	0
Viola pubescens	H	3	1	1	0.07	+	100	3	0

APPENDIX B.2

Vegetation data for the **BOGS AND FENS** vegetation class

Appendix B.2. Listing of taxa by community type for vegetation class II, BOGS AND FENS. Each community type is represented by its number. For each community type, the number of plots, mean elevation (m), mean soil depth (cm), mean bryophyte cover class (CC) and mean species richness (per 100 m²) are indicated. All taxa present in a community type are listed; a line separates prevalent taxa from non-prevalent taxa. Taxa are listed in alphabetical order after sorting in descending order of Constancy (C) and then Cover Class (CC). The typical stratum occupied by each taxon is indicated (T=tree, S=shrub, SS=subshrub, H=herb, V=vine). Calculated values of Frequency (FQ), Mean Cover (MC), Relative Cover (RC), Fidelity (FI), Indicator Value (IV) and Scaled Indicator Value (IVS) are also given for each taxon. Boldface values (C≥60, CC≥4, IV≥30, IVS≥15) indicate taxa that are considered characteristic and/or abundant in written descriptions of communities and in community names.

Community Number:	2.1
Number of plots:	13
Mean elevation (m):	1012
Mean soil depth (cm):	78
Mean Bryophyte Cover (CC):	8
Mean sp richness/100 m²:	34

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Juncus [effusus ssp. solutus + pylaei]	H	**100**	**5**	13	5.54	+	21	21	**12**
Persicaria sagittata	H	**100**	**4**	13	2.31	+	35	**35**	8
Galium [tinctorum + triflorum]	H	**92**	**4**	12	2.08	+	24	22	5
Impatiens [capensis +pallida]	H	**92**	**4**	12	2.23	+	36	**34**	7
Carex lurida	H	**85**	**4**	11	3.23	+	37	**31**	**10**
Carex sect. Ovales	H	**85**	**4**	11	2.77	+	44	**37**	**10**
Hypericum mutilum var. mutilum	H	**85**	**4**	11	2.00	+	39	**33**	7
Juncus [acuminatus + canadensis + subcaudatus]	H	**85**	**4**	11	2.23	+	17	15	3
Eupatorium perfoliatum	H	**85**	3	11	1.85	+	41	**34**	6
Scirpus expansus	H	**77**	**4**	10	3.62	+	26	20	7
Sphagnum spp.	B	**77**	**4**	10	4.23	-	15	11	5

Acer rubrum	T	**77**	3	10	1.85	-	14	11	2
Viola macloskeyi var. pallens	H	**77**	3	10	1.77	+	19	15	3
Carex echinata ssp. echinata	H	**69**	**4**	9	2.15	-	14	10	2
Solidago patula var. patula	H	**69**	3	9	1.62	-	13	9	1
Symphyotrichum puniceum var. puniceum	H	**69**	3	9	1.85	+	23	16	3
Alnus serrulata	S	**62**	**4**	8	3.15	+	42	26	8
Scirpus spp.	H	**62**	**4**	8	2.46	+	23	14	3
Spiraea tomentosa	S	**62**	**4**	8	2.00	+	35	21	4
Carex leptalea var. leptalea	H	**62**	3	8	1.54	-	13	8	1
Dichanthium dichotomum	H	**62**	3	8	1.38	+	62	**38**	5
Lycopus uniflorus	H	**62**	3	8	1.23	+	24	15	2
Solidago spp. [speciosa + rugosa var. sphagnifolia]	H	**62**	3	8	1.38	+	47	29	4
Carex [crinita + gynandra + mitchliana]	H	54	3	7	1.46	+	27	14	2
Carex atlantica	H	54	3	7	1.85	+	21	11	2
Leersia virginica	H	54	3	7	1.23	+	78	**42**	5
Eleocharis tenuis	H	46	3	6	1.38	+	27	13	2
Glyceria striata var. striata	H	46	3	6	1.00	+	33	15	2
Rhynchospora capitlata	H	46	3	6	1.08	-	17	8	1
Rubus hispidus	SS	46	3	6	1.08	-	14	6	1
Mimulus ringens var. ringens	H	46	2	6	0.77	+	38	17	1
Agrostis perennans	H	38	3	5	1.31	+	71	27	4
Salix sericea	S	38	3	5	1.00	-	12	5	0
Leersia oryzoides	H	38	2	5	0.77	+	45	17	1
Vernonia noveboracensis	H	38	2	5	0.92	+	23	9	1
Carex intumescens	H	31	2	4	0.77	+	31	9	1
Dichanthium lucidum	H	31	2	4	0.69	+	31	9	1
Dulichium arundinaceum var. arundinaceum	H	31	2	4	0.77	+	80	25	2
Epilobium leptophyllum	H	31	2	4	0.69	-	11	4	0
Glyceria micaria	H	31	2	4	0.62	+	40	12	1
Gratiola [brevifolia+ virginiana+ viscidula]	H	31	2	4	0.54	+	67	21	1
Henium [autumnale + brevifolum]	H	31	2	4	0.54	+	67	21	1

Lyonia ligustrina var. ligustrina	S	31	2	4	0.77	-	8	2	0
Packera aurea	H	31	2	4	0.46	-	15	5	0
Sagittaria latifolia	H	31	2	4	0.69	+	80	25	2
Sambucus canadensis	S	31	2	4	0.69	+	25	8	1
Sphenopholis pensylvanica	H	31	2	4	0.54	+	17	5	0
Symplocarpus foetidus	H	31	2	4	0.92	+	50	15	1
Agalinis purpurea	H	23	2	3	0.46	+	75	17	1
Betula alleghaniensis	T	23	2	3	0.38	-	9	2	0
Campanula aparinoides	H	23	2	3	0.38	+	75	17	1
Carex baileyi	H	23	2	3	0.85	+	30	7	1
Carex laevivaginata	H	23	2	3	0.54	+	43	10	1
Carex stipata var. stipata	H	23	2	3	0.46	+	50	12	1
Clematis virginiana	H	23	2	3	0.46	-	17	4	0
Dichanthium clandestinum	H	23	2	3	0.23	+	100	23	1
eocharis obtusa	H	23	2	3	0.38	+	75	17	1
Epilobium coloratum	H	23	2	3	0.31	+	27	6	0
Holcus lanatus	H	23	2	3	0.54	+	25	6	0
Hypericum densiflorum	H	23	2	3	0.46	-	11	2	0
Lycopus virginicus	H	23	2	3	0.38	+	21	5	0
Osmunda cinnamomea var. cinnamomea	H	23	2	3	0.46	-	7	2	0
Potentilla canadensis	H	23	2	3	0.31	+	38	9	0
Pycnanthemum [tenuifolium + virginianum]	H	23	2	3	0.62	+	38	9	1
Rhododendron maximum	S	23	2	3	0.46	-	9	2	0
Rosa palustris	S	23	2	3	0.77	-	7	2	0
Rubus canadensis	SS	23	2	3	0.46	+	33	8	0
Thypteris palustris var. pubescens	H	23	2	3	0.46	-	13	3	0
Aronia arbutifolia	S	15	2	2	0.23	-	15	2	0
Bidens spp.	H	15	2	2	0.15	+	100	15	0
Carex debilis	H	15	2	2	0.31	+	50	8	0
Carex folliculata	H	15	2	2	0.23	-	17	3	0
Carex ruthii	H	15	2	2	0.46	+	40	6	0
Chamerion platyphyllum	H	15	2	2	0.31	+	40	6	0
Chone lyonii	H	15	2	2	0.31	+	50	8	0

Cyperus strigosus	H	15	2	2	0.31	+	100	15	0
Dryopteris cristata	H	15	2	2	0.69	+	22	3	0
Eutrochium fistulosum	H	15	2	2	0.23	+	33	5	0
Galium asprlum	H	15	2	2	0.31	-	13	2	0
Hydrocotyle americana	H	15	2	2	0.31	+	100	15	0
Hypericum punctatum	H	15	2	2	0.23	-	15	2	0
Juncus biflorus	H	15	2	2	0.31	+	40	6	0
Ludwigia palustris	H	15	2	2	0.31	+	25	4	0
Lysimachia terrestris	H	15	2	2	0.23	+	50	8	0
Microstegium vimineum	H	15	2	2	0.23	+	100	15	0
Oxypolis rigidior	H	15	2	2	0.31	-	6	1	0
Rhododendron [subgenus Hymenanthes]	S	15	2	2	0.31	-	13	2	0
Sanguinaria canadensis	H	15	2	2	0.38	+	25	4	0
Sparganium americanum	H	15	2	2	0.23	+	40	6	0
Triadenum virginicum	H	15	2	2	0.38	+	40	6	0
Viola affinis	H	15	2	2	0.38	+	67	10	0
Viola cucullata	H	15	2	2	0.31	-	7	1	0
Viola primulifolia	H	15	2	2	0.38	-	11	2	0
Achillea millefolium	H	8	2	1	0.15	+	100	8	0
Agrostis capillaris	H	8	2	1	0.15	+	100	8	0
Aronia prunifolia	S	8	2	1	0.15	-	14	1	0
Carex allegheniensis	H	8	2	1	0.15	+	50	4	0
Carex annectens	H	8	2	1	0.15	+	100	8	0
Carex bromoides	H	8	2	1	0.15	+	50	4	0
Carex bullata	H	8	2	1	0.15	+	20	2	0
Carex stricta	H	8	2	1	0.23	+	33	3	0
Carex swanii	H	8	2	1	0.15	+	100	8	0
Carex tribuloides	H	8	2	1	0.15	+	100	8	0
Chone cuthbertii	H	8	2	1	0.15	-	10	1	0
Dennstaedtia punctilobula	H	8	2	1	0.15	+	33	3	0
Eupatorium pilosum	H	8	2	1	0.15	+	33	3	0
Fragaria virginiana	H	8	2	1	0.15	-	9	1	0
Glyceria laxa	H	8	2	1	0.54	+	50	4	0

Hastylis shuttleworthii var. shuttleworthii	H	8	2	1	0.15	+	100	8	0
Houstonia serpyllifolia	H	8	2	1	0.15	-	2	0	0
Hydrophyllum canadense	H	8	2	1	0.15	-	7	1	0
Ilex verticillata	S	8	2	1	0.15	-	7	1	0
Lindera benzoin	S	8	2	1	0.31	+	100	8	0
Linum striatum	H	8	2	1	0.15	-	4	0	0
Luzula echinata	H	8	2	1	0.15	-	7	1	0
Maianthemum canadense	H	8	2	1	0.15	+	33	3	0
Nyssa sylvatica	T	8	2	1	0.38	+	25	2	0
Oenothera [perennis + tetragona]	H	8	2	1	0.15	+	17	1	0
Oenothera fruticosa	H	8	2	1	0.15	+	33	3	0
Osmunda regalis var. spectabilis	H	8	2	1	0.15	-	6	0	0
Persicaria longiseta	H	8	2	1	0.15	+	100	8	0
Polygonum punctatum	H	8	2	1	0.15	+	50	4	0
Prunla vulgaris	H	8	2	1	0.15	+	50	4	0
Prunus serotina var. serotina	S	8	2	1	0.15	+	100	8	0
Ptandra virginica	H	8	2	1	0.15	+	50	4	0
Ranuculus spp.	H	8	2	1	0.15	+	100	8	0
Rosa multiflora	S	8	2	1	0.15	+	33	3	0
Rubus bifrons	SS	8	2	1	0.15	+	100	8	0
Rubus pensilvanicus	SS	8	2	1	0.15	+	100	8	0
Sarracenia jonesii	H	8	2	1	0.15	+	100	8	0
Solidago altissima var. altissima	H	8	2	1	0.15	-	8	1	0
Solidago rugosa	H	8	2	1	0.15	+	20	2	0
Thalictrum spp.	H	8	2	1	0.23	+	33	3	0
Toxicodendron vernix	T	8	2	1	0.15	+	33	3	0
Vaccinium fuscatum	S	8	2	1	0.23	+	25	2	0
Vaccinium macrocarpon	DS	8	2	1	0.15	-	4	0	0
Viburnum dentatum	S	8	2	1	0.15	+	33	3	0
Viola blanda	H	8	2	1	0.15	-	13	1	0
Vitis labrusca	H	8	2	1	0.15	+	50	4	0
Woodwardia areolata	H	8	2	1	0.15	+	33	3	0
Agrostis altissima	H	8	1	1	0.08	+	100	8	0

Amanchier arborea	S	8	1	1	0.08	-	5	0	0
Anthoxanthum odoratum	H	8	1	1	0.08	+	33	3	0
Arisaema triphyllum	H	8	1	1	0.08	-	10	1	0
Aronia manocarpa	S	8	1	1	0.08	-	4	0	0
Athyrium asplenioides	H	8	1	1	0.08	+	33	3	0
Carex stylofla	H	8	1	1	0.08	+	100	8	0
Chone [glabra + obliqua]	H	8	1	1	0.08	-	8	1	0
Clintonia borealis	H	8	1	1	0.08	+	100	8	0
Dryopteris carthusiana	H	8	1	1	0.08	+	50	4	0
Eriophorum virginicum	H	8	1	1	0.08	-	3	0	0
Heiracium spp.	H	8	1	1	0.08	+	50	4	0
Hypericum mitchlianum	H	8	1	1	0.08	-	20	2	0
Isoetes valida	H	8	1	1	0.08	-	11	1	0
Kalmia latifolia	S	8	1	1	0.08	-	3	0	0
Liriodendron tulipifera var. tulipifera	T	8	1	1	0.08	-	14	1	0
Lobia puberula var. simulans	H	8	1	1	0.08	+	100	8	0
Lysimachia ciliata	H	8	1	1	0.08	+	33	3	0
Phleum pratense ssp. pratense	H	8	1	1	0.08	+	100	8	0
Pycnanthemum tenuifolium	H	8	1	1	0.08	-	25	2	0
Schizachyrium scoparium var. scoparium	H	8	1	1	0.08	-	5	0	0
Sicyos angulatus	H	8	1	1	0.08	+	100	8	0
Solidago gigantea	H	8	1	1	0.08	+	100	8	0
Tussilago farfara	H	8	1	1	0.08	+	100	8	0

Community Number:	2.2
Number of plots:	14
Mean elevation (m):	1111
Mean soil depth (cm):	93
Mean Bryophyte Cover (CC):	8
Mean sp richness/100 m²:	32

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Sphagnum spp.	B	**100**	**5**	14	6.86	+	21	21	**14**
Impatiens [capensis +pallida]	H	**100**	**4**	14	2.79	+	42	**42**	**12**
Juncus [effusus ssp. solutus + pylaei]	H	**86**	**4**	12	2.86	+	19	17	5
Viburnum cassinoides	S	**86**	**4**	12	3.36	+	31	26	9
Galium [tinctorum + triflorum]	H	**86**	3	12	1.64	+	24	21	3
Persicaria sagittata	H	**86**	3	12	1.79	+	32	28	5
Acer rubrum	T	**79**	**4**	11	2.29	-	15	12	3
Lyonia ligustrina var. ligustrina	S	**79**	**4**	11	3.21	+	21	16	5
Salix sericea	S	**79**	**4**	11	4.21	+	26	21	9
Rosa palustris	S	**71**	**4**	10	3.21	+	23	16	5
Solidago patula var. patula	H	**71**	**4**	10	3.29	-	14	10	3
Viola macloskeyi var. pallens	H	**71**	3	10	1.86	+	19	14	3
Osmunda cinnamomea var. cinnamomea	H	**64**	**4**	9	2.93	+	20	13	4
Arisaema triphyllum	H	**64**	3	9	1.29	+	90	**58**	7
Carex echinata ssp. echinata	H	57	**4**	8	2.64	-	13	7	2
Carex leptalea var. leptalea	H	57	**4**	8	2.36	-	13	8	2
Sambucus canadensis	S	57	3	8	1.93	+	50	29	6
Betula [alleghaniensis + lenta]	T	50	**4**	7	2.43	+	21	10	3
Carex atlantica	H	50	3	7	1.86	+	21	11	2
Epilobium coloratum	H	50	3	7	1.00	+	64	**32**	3
Houstonia serpyllifolia	H	50	3	7	1.14	-	17	9	1
Scirpus spp.	H	50	3	7	1.64	+	20	10	2
Symphyotrichum puniceum var. puniceum	H	50	3	7	1.50	+	18	9	1

Tsuga canadensis	T	43	**4**	6	2.00	+	30	13	3
Galium asprlum	H	43	3	6	1.00	+	40	17	2
Rhododendron maximum	S	43	3	6	1.64	+	17	7	1
Sphenopholis pensylvanica	H	43	3	6	1.00	+	26	11	1
Carex sect. Ovales	H	43	2	6	0.86	+	24	10	1
Mimulus ringens var. ringens	H	43	2	6	0.86	+	38	16	1
Viola primulifolia	H	43	2	6	0.86	+	32	14	1
Ilex verticillata	S	36	3	5	1.86	+	36	13	2
Carex lurida	H	36	2	5	0.79	-	17	6	0
Clematis virginiana	H	36	2	5	0.86	+	28	10	1
Juncus [acuminatus + canadensis + subcaudatus]	H	36	2	5	0.71	-	8	3	0
Luzula echinata	H	36	2	5	0.86	+	33	12	1
Rubus hispidus	SS	36	2	5	0.93	-	12	4	0
Scirpus pansus	H	29	3	4	1.21	-	11	3	0
Spiraea alba	S	29	3	4	1.29	+	80	23	3
Carex [crinita + gynandra + mitchliana]	H	29	2	4	0.57	-	15	4	0
Juncus Hymnocarpus	H	29	2	4	0.93	+	57	16	2
Leersia oryzoides	H	29	2	4	0.57	+	36	10	1
Lilium grayi	H	29	2	4	0.50	+	36	10	1
Ludwigia palustris	H	29	2	4	0.50	+	50	14	1
Thypteris palustris var. pubescens	H	29	2	4	0.79	-	17	5	0
Viola blanda	H	29	2	4	0.93	+	50	14	1
Glyceria micaria	H	21	3	3	1.00	+	30	6	1
Amanchier arborea	S	21	2	3	0.43	-	14	3	0
Carex laevivaginata	H	21	2	3	0.71	+	43	9	1
Chone [glabra + obliqua]	H	21	2	3	0.57	+	23	5	0
Epilobium leptophyllum	H	21	2	3	0.43	-	9	2	0
Glyceria striata var. striata	H	21	2	3	0.57	+	17	4	0
Hypericum densiflorum	H	21	2	3	0.86	-	11	2	0
Hypericum mutilum var. mutilum	H	21	2	3	0.43	-	11	2	0
Kalmia latifolia	S	21	2	3	0.64	-	9	2	0

Lycopus virginicus	H	21	2	3	0.43	+	21	5	0
Onoclea sensibilis var. sensibilis	H	21	2	3	0.50	+	75	16	1
Osmunda regalis var. spectabilis	H	21	2	3	0.57	-	17	4	0
Rhododendron [subgenus Hymenanthes]	S	21	2	3	0.50	+	19	4	0
Rubus argutus	SS	21	2	3	0.64	+	33	7	0
Sparganium americanum	H	21	2	3	0.57	+	60	13	1
Triadenum virginicum	H	21	2	3	0.43	+	60	13	1
Vaccinium simulatum	S	21	2	3	0.36	-	23	5	0
Vernonia noveboracensis	H	21	2	3	0.43	-	14	3	0
Viola cucullata	H	21	2	3	0.64	-	11	2	0
Aronia arbutifolia	S	14	2	2	0.64	+	15	2	0
Aronia manocarpa	S	14	2	2	0.57	-	9	1	0
Carex bullata	H	14	2	2	0.21	+	40	6	0
Carex stipata var. stipata	H	14	2	2	0.36	+	33	5	0
Clethra acuminata	S	14	2	2	0.36	+	67	10	0
Eupatorium perfoliatum	H	14	2	2	0.29	-	7	1	0
Fraxinus ssp.	T	14	2	2	0.21	+	50	7	0
Gratiola [brevifolia+ virginiana+ viscidula]	H	14	2	2	0.21	+	33	5	0
Ilex montana	S	14	2	2	0.36	+	67	10	0
Isoetes valida	H	14	2	2	0.43	+	22	3	0
Oxypolis rigidior	H	14	2	2	0.21	-	6	1	0
Pinus strobus	T	14	2	2	0.43	-	14	2	0
Quercus rubra var. rubra	T	14	2	2	0.21	-	22	3	0
Rubus setosus	SS	14	2	2	0.29	+	67	10	0
Thypteris noveboracensis	H	14	2	2	0.36	+	33	5	0
Trautvetteria caroliniensis var. caroliniensis	H	14	2	2	0.43	+	100	14	1
Aesculus flava	T	7	2	1	0.21	+	100	7	0
Agrostis perennans	H	7	2	1	0.14	-	14	1	0
Alnus serrulata	S	7	2	1	0.57	-	5	0	0
Angica triquinata	H	7	2	1	0.36	+	100	7	0
Aronia prunifolia	S	7	2	1	0.21	+	14	1	0
Athyrium asplenioides	H	7	2	1	0.14	+	33	2	0
Blephilia ciliata	H	7	2	1	0.14	+	100	7	0

Campanula aparinoides	H	7	2	1	0.14	+	25	2	0
Cardamine pensylvanica	H	7	2	1	0.14	+	100	7	0
Carex bromoides	H	7	2	1	0.29	+	50	4	0
Carex buxbaumii	H	7	2	1	0.36	-	8	1	0
Carex folliculata	H	7	2	1	0.21	-	8	1	0
Carex intumescens	H	7	2	1	0.21	-	8	1	0
Carex ruthii	H	7	2	1	0.29	+	20	1	0
Carpinus caroliniana	T	7	2	1	0.36	+	50	4	0
Chimaphila maculata	H	7	2	1	0.21	+	100	7	0
Dennstaedtia punctilobula	H	7	2	1	0.14	+	33	2	0
Dryopteris cristata	H	7	2	1	0.21	-	11	1	0
eocharis obtusa	H	7	2	1	0.21	+	25	2	0
Erechtites hieraciifolia var. hieraciifolia	H	7	2	1	0.14	+	33	2	0
Eutrochium maculatum var. maculatum	H	7	2	1	0.14	+	100	7	0
Gentiana [linearis + saponaria]	H	7	2	1	0.14	+	14	1	0
Glyceria laxa	H	7	2	1	0.14	+	50	4	0
Hydrophyllum canadense	H	7	2	1	0.14	-	7	0	0
Leersia virginica	H	7	2	1	0.14	-	11	1	0
Linum striatum	H	7	2	1	0.14	-	4	0	0
Liriodendron tulipifera var. tulipifera	T	7	2	1	0.14	-	14	1	0
Lycopus uniflorus	H	7	2	1	0.14	-	3	0	0
Micranthes micranthidifolia	H	7	2	1	0.29	+	100	7	0
Myosotis scorpioides	H	7	2	1	0.21	+	100	7	0
Nyssa sylvatica	T	7	2	1	0.29	+	25	2	0
Oxalis violacea	H	7	2	1	0.14	+	100	7	0
Packera aurea	H	7	2	1	0.36	-	4	0	0
Platanthera grandiflora	H	7	2	1	0.14	+	33	2	0
Polygala sanguinea	H	7	2	1	0.14	-	13	1	0
Polygonum punctatum	H	7	2	1	0.14	+	50	4	0
Rhododendron catawbiense	S	7	2	1	0.29	+	50	4	0
Rosa multiflora	S	7	2	1	0.14	+	33	2	0
Rubus allegheniensis	SS	7	2	1	0.14	-	14	1	0
Sagittaria latifolia	H	7	2	1	0.29	+	20	1	0

Solidago altissima var. altissima	H	7	2	1	0.14	-	8	1	0
Vaccinium macrocarpon	DS	7	2	1	0.14	-	4	0	0
Veratrum virginicum	S	7	2	1	0.21	+	33	2	0
Viola sororia	H	7	2	1	0.14	-	25	2	0
Xanthorhiza simplicissima	S	7	2	1	0.29	+	20	1	0
Acer saccharum	T	7	1	1	0.07	+	33	2	0
Actaea pachypoda	H	7	1	1	0.07	+	100	7	0
Lysimachia ciliata	H	7	1	1	0.07	+	33	2	0
Trillium erectum	H	7	1	1	0.07	+	100	7	0
Woodwardia areolata	H	7	1	1	0.07	+	33	2	0

Community Number:	2.3
Number of plots:	9
Mean elevation (m):	1181
Mean soil depth (cm):	85
Mean Bryophyte Cover (CC):	9
Mean sp richness/100 m²:	32

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Carex echinata ssp. echinata	H	**100**	**5**	9	6.11	+	14	14	9
Sphagnum spp.	B	**100**	**5**	9	9.67	+	13	13	**13**
Acer rubrum	T	**100**	**4**	9	2.56	+	12	12	3
Rubus hispidus	SS	**89**	**5**	8	5.00	+	19	17	8
Scirpus expansus	H	**78**	**4**	7	4.11	+	18	14	6
Viola macloskeyi var. pallens	H	**78**	**4**	7	2.00	+	13	10	2
Galium [tinctorum + triflorum]	H	**78**	3	7	1.56	+	14	11	2
Juncus [acuminatus + canadensis + subcaudatus]	H	**78**	3	7	1.78	-	11	9	2
Betula sp. [alleghaniensis + lenta]	T	**67**	**4**	6	2.56	+	18	12	3
Lyonia ligustrina var. ligustrina	S	**67**	**4**	6	2.67	+	11	8	2
Osmunda cinnamomea var. cinnamomea	H	**67**	**4**	6	2.67	+	13	9	2
Solidago patula var. patula	H	**67**	**4**	6	3.11	-	9	6	2
Viburnum cassinoides	S	**67**	**4**	6	2.22	+	15	10	2
Juncus [effusus ssp. solutus + pylaei]	H	**67**	3	6	1.44	-	10	6	1
Kalmia latifolia	S	**67**	3	6	1.89	+	17	11	2
Symphyotrichum puniceum var. puniceum	H	**67**	3	6	1.22	+	15	10	1
Hypericum densiflorum	H	56	**4**	5	2.00	+	18	10	2
Carex [crinita + gynandra + mitchliana]	H	56	3	5	1.33	+	19	11	1
Carex leptalea var. leptalea	H	56	3	5	1.33	-	8	5	1
Carex lurida	H	56	3	5	1.11	+	17	9	1
Holcus lanatus	H	56	3	5	1.22	+	42	23	3
Lycopus uniflorus	H	56	3	5	1.78	+	15	8	1
Pinus strobus	T	56	3	5	1.67	+	36	20	3

Rhododendron maximum	S	56	3	5	1.78	+	14	8	1
Epilobium leptophyllum	H	56	2	5	0.89	+	14	8	1
Glyceria striata var. striata	H	56	2	5	0.89	+	28	15	1
Chone cuthbertii	H	44	3	4	1.00	+	40	18	2
Impatiens [capensis +pallida]	H	44	3	4	1.00	+	12	5	1
Scirpus spp.	H	44	3	4	1.11	-	11	5	1
Solidago altissima var. altissima	H	44	3	4	1.33	+	33	15	2
Vaccinium corymbosum	S	44	3	4	1.22	+	27	12	1
Drosera rotundifolia var. rotundifolia	H	44	2	4	0.78	-	10	4	0
Hypericum mutilum var. mutilum	H	44	2	4	0.78	+	14	6	0
Carex folliculata	H	33	3	3	1.33	+	25	8	1
Leucothoe fontanesiana	S	33	3	3	1.00	+	100	**33**	3
Salix sericea	S	33	3	3	1.44	-	7	2	0
Amanchier arborea	S	33	2	3	0.89	+	14	5	0
Carex sect. Ovales	H	33	2	3	0.67	-	12	4	0
Houstonia serpyllifolia	H	33	2	3	0.78	-	7	2	0
Hypericum punctatum	H	33	2	3	0.56	+	23	8	0
Lycopus virginicus	H	33	2	3	0.67	+	21	7	0
Persicaria sagittata	H	33	2	3	0.67	-	8	3	0
Platanthera clavlata	H	33	2	3	0.44	+	17	6	0
Platanthera lacera	H	33	2	3	0.56	+	20	7	0
Quercus rubra var. rubra	T	33	2	3	0.67	+	33	11	1
Spiranthes cernua	H	33	2	3	0.56	+	50	17	1
Aronia prunifolia	S	22	2	2	0.56	+	29	6	0
Eupatorium perfoliatum	H	22	2	2	0.33	-	7	2	0
Glyceria micaria	H	22	2	2	0.56	+	20	4	0
Isoetes valida	H	22	2	2	0.44	+	22	5	0
Juncus gymnocarpus	H	22	2	2	0.78	+	29	6	0
Polygala sanguinea	H	22	2	2	0.33	+	25	6	0
Rhododendron [subgenus Hymenanthes]	S	22	2	2	0.44	+	13	3	0
Rhynchospora capitlata	H	22	2	2	0.44	-	6	1	0

Schizachyrium scoparium var. scoparium	H	22	2	2	0.33	-	10	2	0
Solidago [speciosa + rugosa var. sphagnifolia]	H	22	2	2	0.78	+	12	3	0
Sphenopholis pensylvanica	H	22	2	2	0.44	-	9	2	0
Thypteris noveboracensis	H	22	2	2	0.44	+	33	7	0
Tsuga canadensis	T	22	2	2	0.78	-	10	2	0
Viola cucullata	H	22	2	2	0.56	-	7	2	0
Viola primulifolia	H	22	2	2	0.44	-	11	2	0
Andropogon glomeratus	H	11	2	1	0.22	-	13	1	0
Aronia arbutifolia	S	11	2	1	0.33	-	8	1	0
Aronia manocarpa	S	11	2	1	0.22	-	4	0	0
Carex atlantica	H	11	2	1	0.44	-	3	0	0
Carex debilis	H	11	2	1	0.22	+	25	3	0
Carex intumescens	H	11	2	1	0.44	+	8	1	0
Carex Sect. Hymenochlaenae	H	11	2	1	0.22	+	25	3	0
Cornus amomum	S	11	2	1	0.44	+	100	11	0
Dolingeria umblata	H	11	2	1	0.44	+	33	4	0
Dryopteris carthusiana	H	11	2	1	0.22	+	50	6	0
Dryopteris cristata	H	11	2	1	0.22	-	11	1	0
Ilex verticillata	S	11	2	1	0.56	-	7	1	0
Leersia oryzoides	H	11	2	1	0.11	-	9	1	0
Lycopodila alopecuroides	H	11	2	1	0.22	+	50	6	0
Oxypolis rigidior	H	11	2	1	0.22	-	3	0	0
Parnassia asarifolia	H	11	2	1	0.22	-	6	1	0
Potentilla canadensis	H	11	2	1	0.11	-	13	1	0
Pycnanthemum [tenuifolium + virginianum]	H	11	2	1	0.11	-	13	1	0
Rhododendron catawbiense	S	11	2	1	0.33	+	25	3	0
Rosa multiflora	S	11	2	1	0.22	+	33	4	0
Rosa palustris	S	11	2	1	0.22	-	2	0	0
Rubus argutus	SS	11	2	1	0.22	-	11	1	0
Rubus setosus	SS	11	2	1	0.44	+	33	4	0
Salix occidentalis	S	11	2	1	0.22	-	14	2	0
Salix nigra	S	11	2	1	0.56	+	100	11	1
Sambucus canadensis	S	11	2	1	0.22	-	6	1	0

Sorbus americana	T	11	2	1	0.22	+	50	6	0
Spiraea tomentosa	S	11	2	1	0.22	-	4	0	0
Taraxacum officinale	H	11	2	1	0.11	+	100	11	0
Vaccinium fuscatum	S	11	2	1	0.33	+	25	3	0
Vaccinium macrocarpon	DS	11	2	1	0.22	-	4	0	0
Vaccinium simulatum	S	11	2	1	0.22	-	8	1	0
Viola sororia	H	11	2	1	0.44	+	25	3	0

Community Number:	2.4
Number of plots:	5
Mean elevation (m):	1400
Mean soil depth (cm):	102
Mean Bryophyte Cover (CC):	8
Mean sp richness/100 m²:	35

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Rhododendron maximum	S	**100**	**5**	5	5.20	+	14	14	7
Sphagnum spp.	B	**100**	**5**	5	8.80	+	7	7	7
Vaccinium simulatum	S	**100**	**4**	5	2.80	+	38	**38**	**11**
Aronia manocarpa	S	**100**	**4**	5	3.80	+	22	22	8
Betula alleghaniensis	T	**100**	**4**	5	4.40	+	15	15	6
Kalmia latifolia	S	**100**	**4**	5	3.80	+	14	14	5
Scirpus spp.	H	**100**	**4**	5	3.20	+	14	14	5
Salix sericea	S	**100**	**4**	5	3.60	+	12	12	4
Osmunda cinnamomea var. cinnamomea	H	**100**	**4**	5	4.40	+	11	11	5
Viola macloskeyi var. pallens	H	**100**	**4**	5	3.60	+	10	10	3
Juncus [acuminatus + canadensis + subcaudatus]	H	**100**	**4**	5	2.80	+	8	8	2
Solidago patula var. patula	H	**100**	**4**	5	4.60	+	7	7	3
Acer rubrum	T	**100**	**4**	5	3.60	+	7	7	2
Oclemena acuminata	H	**80**	**4**	4	2.20	+	100	**80**	**18**
Picea rubens	T	**80**	**4**	4	2.40	+	29	23	5
Carex atlantica	H	**80**	**4**	4	4.00	+	12	10	4
Rubus argutus	SS	**80**	3	4	1.60	+	44	**36**	6
Fragaria virginiana	H	**80**	3	4	1.60	+	36	29	5
Epilobium leptophyllum	H	**80**	3	4	1.40	+	11	9	1
Carex echinata ssp. echinata	H	**80**	3	4	1.60	-	6	5	1
Tsuga canadensis	T	**60**	**4**	3	2.60	+	15	9	2
Carex leptalea Wahlenberg var. leptalea	H	**60**	**4**	3	2.40	-	5	3	1
Chamerion platyphyllum	H	**60**	3	3	1.20	+	60	**36**	4

Carex baileyi	H	**60**	3	3	1.40	+	30	18	3
Holcus lanatus	H	**60**	3	3	1.60	+	25	15	2
Symphyotrichum puniceum var. puniceum	H	**60**	3	3	1.40	+	8	5	1
Viburnum cassinoides	S	**60**	3	3	1.40	-	8	5	1
Galium [tinctorum + triflorum]	H	**60**	3	3	1.20	-	6	4	0
Juncus [effusus ssp. solutus + pylaei]	H	**60**	3	3	1.80	-	5	3	1
Rubus allegheniensis	SS	40	3	2	1.00	+	29	11	1
Potentilla canadensis	H	40	3	2	1.20	+	25	10	1
Solidago altissima var. altissima	H	40	3	2	1.20	+	17	7	1
Sambucus canadensis	S	40	3	2	1.20	+	13	5	1
Amanchier arborea	S	40	3	2	1.00	+	10	4	0
Lycopus uniflorus	H	40	3	2	1.00	+	6	2	0
Acer spicatum	T	40	2	2	0.60	+	100	**40**	2
Glyceria striata var. striata	H	40	2	2	0.80	+	11	4	0
Platanthera clavlata	H	40	2	2	0.80	+	11	4	0
Impatiens [capensis +pallida]	H	40	2	2	0.60	-	6	2	0
Lycopodium clavatum	H	20	3	1	1.00	+	100	20	2
Dolingeria umblata	H	20	3	1	1.20	+	33	7	1
Carex stipata var. stipata	H	20	3	1	1.20	+	17	3	0
Ribes rotundifolium	S	20	2	1	0.80	+	100	20	2
Dryopteris intermedia	H	20	2	1	0.60	+	100	20	1
Carex Sect. Carexeyanae	H	20	2	1	0.40	+	100	20	1
Diphasiastrum digitatum	H	20	2	1	0.40	+	100	20	1
Ribes americanum	S	20	2	1	0.40	+	100	20	1
Mitchla repens	H	20	2	1	0.40	+	50	10	0
Dennstaedtia punctilobula	H	20	2	1	0.60	+	33	7	0
Athyrium asplenioides	H	20	2	1	0.40	+	33	7	0
Il montana	S	20	2	1	0.40	+	33	7	0
Maianthemum canadense	H	20	2	1	0.40	+	33	7	0
Trillium undulatum	H	20	2	1	0.40	+	33	7	0
Platanthera grandiflora	H	20	2	1	0.20	+	33	7	0

Fraxinus ssp.	T	20	2	1	0.80	+	25	5	0
Rhododendron catawbiense	S	20	2	1	0.40	+	25	5	0
Gaultheria procumbens	H	20	2	1	0.80	+	20	4	0
Spiranthes cernua	H	20	2	1	0.20	+	17	3	0
Carex laevivaginata	H	20	2	1	0.40	+	14	3	0
Viola blanda	H	20	2	1	0.40	+	13	3	0
Rubus canadensis	SS	20	2	1	0.60	+	11	2	0
Leersia virginica	H	20	2	1	0.40	+	11	2	0
Quercus rubra var. rubra	T	20	2	1	0.40	+	11	2	0
Vaccinium corymbosum	S	20	2	1	0.60	+	7	1	0
Platanthera lacera	H	20	2	1	0.40	-	7	1	0
Solidago [speciosa + rugosa var. sphagnifolia]	H	20	2	1	0.60	+	6	1	0
Clematis virginiana	H	20	2	1	0.60	+	6	1	0
Viola primulifolia	H	20	2	1	0.40	-	5	1	0
Sphenopholis pensylvanica	H	20	2	1	0.20	-	4	1	0
Thypteris palustris var. pubescens	H	20	2	1	0.20	-	4	1	0
Packera aurea	H	20	2	1	0.60	-	4	1	0
Rubus hispidus	SS	20	2	1	0.40	-	2	0	0

Community Number:	2.5
Number of plots:	12
Mean elevation (m):	1282
Mean soil depth (cm):	56
Mean Bryophyte Cover (CC):	9
Mean sp richness/100 m²:	44

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Osmunda cinnamomea var. cinnamomea	H	**100**	**5**	12	5.08	+	27	27	**14**
Carex echinata ssp. echinata	H	**100**	**5**	12	6.75	+	19	19	**13**
Salix sericea	S	**100**	**4**	12	4.92	+	29	29	**14**
Solidago patula var. patula	H	**100**	**4**	12	4.92	+	17	17	9
Acer rubrum	T	**100**	**4**	12	3.00	+	16	16	5
Rhododendron maximum	S	**92**	**4**	11	4.00	+	31	29	**12**
Kalmia latifolia	S	**92**	**4**	11	3.08	+	31	29	9
Houstonia serpyllifolia	H	**92**	**4**	11	2.08	+	27	25	5
Drosera rotundifolia var. rotundifolia	H	**92**	**4**	11	2.00	+	27	25	5
Lyonia ligustrina var. ligustrina	S	**92**	**4**	11	4.50	+	21	19	9
Carex leptalea var. leptalea	H	**92**	**4**	11	3.42	+	18	17	6
Juncus [acuminatus + canadensis + subcaudatus]	H	**92**	**4**	11	2.25	+	17	16	4
Epilobium leptophyllum	H	**92**	3	11	1.75	+	31	29	5
Viola macloskeyi var. pallens	H	**83**	3	10	1.75	+	19	16	3
Viburnum cassinoides	S	**75**	**4**	9	3.42	+	23	17	6
Juncus [effusus ssp. solutus + pylaei]	H	**75**	**4**	9	2.58	+	15	11	3
Oxypolis rigidior	H	**75**	3	9	1.50	+	26	19	3
Galium [tinctorum + triflorum]	H	**75**	3	9	1.50	+	18	14	2
Chone [glabra + obliqua]	H	**67**	**4**	8	2.67	+	62	**41**	**11**
Sphagnum spp.	B	**67**	**4**	8	4.58	-	12	8	4
Picea rubens	T	58	**4**	7	2.33	+	50	29	7
Tsuga canadensis	T	58	**4**	7	2.17	+	35	20	4
Hypericum punctatum	H	58	3	7	1.17	+	54	**31**	4

Vaccinium corymbosum	S	58	3	7	1.25	+	47	27	3
Platanthera clavlata	H	58	3	7	1.08	+	39	23	2
Amanchier arborea	S	58	3	7	1.00	+	33	19	2
Packera aurea	H	58	3	7	1.42	+	26	15	2
Viola cucullata	H	58	3	7	1.17	+	26	15	2
Rubus hispidus	SS	58	3	7	1.92	-	16	9	2
Rosa palustris	S	58	3	7	1.92	+	16	9	2
Carex [crinita + gynandra + mitchliana]	H	50	**4**	6	2.08	+	23	12	2
Scirpus pansus	H	50	**4**	6	2.67	+	16	8	2
Clematis virginiana	H	50	3	6	1.17	+	33	17	2
Linum striatum	H	50	3	6	1.00	+	26	13	1
Eupatorium perfoliatum	H	50	3	6	1.00	+	22	11	1
Betula alleghaniensis	T	50	3	6	1.75	+	18	9	2
Scirpus spp.	H	50	3	6	1.08	-	17	9	1
Parnassia asarifolia	H	42	3	5	1.42	+	28	12	2
eocharis tenuis	H	42	3	5	1.08	+	23	9	1
Vaccinium macrocarpon	DS	42	3	5	1.58	-	19	8	1
Hypericum densiflorum	H	42	3	5	1.00	-	18	7	1
Eriophorum virginicum	H	42	3	5	1.67	+	16	7	1
Rhynchospora capitlata	H	42	3	5	1.08	-	14	6	1
Dryopteris cristata	H	42	2	5	0.92	+	56	23	2
Fragaria virginiana	H	42	2	5	0.83	+	45	19	2
Lilium grayi	H	42	2	5	0.67	+	45	19	1
Sphenopholis pensylvanica	H	42	2	5	0.67	+	22	9	1
Carex lurida	H	42	2	5	0.92	-	17	7	1
Lycopus uniflorus	H	42	2	5	0.83	-	15	6	1
Persicaria sagittata	H	42	2	5	0.67	-	14	6	0
Symphyotrichum puniceum var. puniceum	H	42	2	5	0.92	-	13	5	0
Ilex collina	S	33	3	4	1.50	+	100	**33**	5
Aronia manocarpa	S	33	3	4	1.17	+	17	6	1
Spiraea tomentosa	S	33	3	4	1.08	+	17	6	1

Thypteris palustris var. pubescens	H	33	3	4	1.17	+	17	6	1
Solidago rugosa	H	33	2	4	0.67	+	80	27	2
Lycopus virginicus	H	33	2	4	0.67	+	29	10	1
Luzula echinata	H	33	2	4	0.75	+	27	9	1
Mimulus ringens var. ringens	H	33	2	4	0.50	+	25	8	0
Carex sect. Ovales	H	33	2	4	0.67	-	16	5	0
Hypericum mutilum var. mutilum	H	33	2	4	0.67	-	14	5	0
Asclepias incarnata	H	25	2	3	0.58	+	50	13	1
Oenothera [perennis + tetragona]	H	25	2	3	0.42	+	50	13	1
Rubus allegheniensis	SS	25	2	3	0.50	+	43	11	1
Rubus canadensis	SS	25	2	3	0.50	+	33	8	0
Carex baileyi	H	25	2	3	0.50	+	30	8	0
Platanthera lacera	H	25	2	3	0.50	+	20	5	0
Solidago [speciosa + rugosa var. sphagnifolia]	H	25	2	3	0.50	+	18	4	0
Osmunda regalis var. spectabilis	H	25	2	3	0.58	-	17	4	0
Vernonia noveboracensis	H	25	2	3	0.42	-	14	3	0
Taxus canadensis	S	17	2	2	0.42	+	100	17	1
Carex trisperma var. trisperma	H	17	2	2	0.33	+	100	17	1
Crataegus spp.	S	17	2	2	0.25	+	100	17	0
Chone lyonii	H	17	2	2	0.33	+	50	8	0
Gaultheria procumbens	H	17	2	2	0.33	+	40	7	0
Lonicera dioica var. dioica	V	17	2	2	0.42	+	33	6	0
Thypteris noveboracensis	H	17	2	2	0.42	+	33	6	0
Salix occidentalis	S	17	2	2	0.58	+	29	5	0
Aronia prunifolia	S	17	2	2	0.33	+	29	5	0
Gentiana [linearis + saponaria].	H	17	2	2	0.33	+	29	5	0
Potentilla canadensis	H	17	2	2	0.33	+	25	4	0
Vaccinium simulatum	S	17	2	2	0.42	+	15	3	0
Ilex verticillata	S	17	2	2	0.75	+	14	2	0
Pinus strobus	T	17	2	2	0.50	-	14	2	0
Hydrophyllum canadense	H	17	2	2	0.33	-	13	2	0
Carex atlantica	H	17	2	2	0.50	-	6	1	0
Gaylussacia ursina	S	8	2	1	0.25	+	100	8	0

Juncus dichotomus	H	8	2	1	0.17	+	100	8	0
Ligustrum sinense	H	8	2	1	0.17	+	100	8	0
Oxalis montana	H	8	2	1	0.17	+	100	8	0
Phalaris arundinacea	H	8	2	1	0.17	+	100	8	0
Quercus vutina	T	8	2	1	0.17	+	100	8	0
Menziesia pilosa	S	8	2	1	0.33	+	50	4	0
Gaylussacia baccata	S	8	2	1	0.17	+	50	4	0
Hamamis virginiana var. virginiana	S	8	2	1	0.17	+	50	4	0
Ptandra virginica	H	8	2	1	0.17	+	50	4	0
Anthoxanthum odoratum	H	8	2	1	0.17	+	33	3	0
Maianthemum canadense	H	8	2	1	0.17	+	33	3	0
Platanthera grandiflora	H	8	2	1	0.17	+	33	3	0
Veratrum virginicum	S	8	2	1	0.17	+	33	3	0
Woodwardia areolata	H	8	2	1	0.17	+	33	3	0
Rhododendron catawbiense	S	8	2	1	0.42	+	25	2	0
Dichanthium acuminatum	H	8	2	1	0.33	+	25	2	0
Viola sororia	H	8	2	1	0.25	+	25	2	0
Agalinis purpurea	H	8	2	1	0.17	+	25	2	0
Onoclea sensibilis var. sensibilis	H	8	2	1	0.17	+	25	2	0
Galax urceolata	H	8	2	1	0.25	+	20	2	0
Parnassia grandifolia	H	8	2	1	0.25	+	20	2	0
Carex bullata	H	8	2	1	0.17	+	20	2	0
Hypericum mitchlianum	H	8	2	1	0.17	+	20	2	0
Henium [autumnale + brevifolum]	H	8	2	1	0.17	+	17	1	0
Saginla apoda	H	8	2	1	0.17	-	17	1	0
Cladium mariscoides	H	8	2	1	0.17	-	14	1	0
Polygala sanguinea	H	8	2	1	0.17	-	13	1	0
Solidago altissima var. altissima	H	8	2	1	0.33	-	8	1	0
Holcus lanatus	H	8	2	1	0.17	-	8	1	0
Sambucus canadensis	S	8	2	1	0.17	-	6	1	0
Pogonia ophioglossoides	H	8	2	1	0.17	-	6	0	0
Glyceria striata var. striata	H	8	2	1	0.17	-	6	0	0
Boykinia aconitifolia	H	8	1	1	0.08	+	100	8	0

Calamagrostis cinnoides	H	8	1	1	0.08	+	50	4	0
Mitchla repens	H	8	1	1	0.08	+	50	4	0
Dolingeria umblata	H	8	1	1	0.08	-	33	3	0
Trillium undulatum	H	8	1	1	0.08	+	33	3	0
Carex Sect. Hymenochlaenae	H	8	1	1	0.08	-	25	2	0
Spiranthes cernua	H	8	1	1	0.08	-	17	1	0
Viola blanda	H	8	1	1	0.08	-	13	1	0

Community Number:	2.6
Number of plots:	4
Mean elevation (m):	1375
Mean soil depth (cm):	25
Mean Bryophyte Cover (CC):	10
Mean sp richness/100 m²:	33

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Solidago uliginosa var. uliginosa	H	**100**	**4**	4	4.25	+	100	**100**	**43**
Parnassia grandifolia	H	**100**	**4**	4	2.50	+	80	**80**	**20**
Sanguinaria canadensis	H	**100**	**4**	4	4.50	+	50	**50**	**23**
Linum striatum	H	**100**	**4**	4	2.50	+	17	17	4
Eriophorum virginicum	H	**100**	**4**	4	2.00	+	13	13	3
Carex atlantica	H	**100**	**4**	4	2.75	+	12	12	3
Lycopus uniflorus	H	**100**	**4**	4	2.00	+	12	12	2
Rhynchospora capitlata	H	**100**	**4**	4	2.25	+	11	11	3
Drosera rotundifolia var. rotundifolia	H	**100**	**4**	4	2.00	+	10	10	2
Acer rubrum	T	**100**	**4**	4	2.00	-	5	5	1
Xyris torta	H	**100**	3	4	1.75	+	67	**67**	**12**
Hydrophyllum canadense	H	**100**	3	4	1.75	+	27	27	5
Cladium mariscoides	H	**75**	**5**	3	5.75	+	43	**32**	**18**
Rhynchospora alba	H	**75**	**4**	3	2.75	+	19	14	4
Alnus serrulata	S	**75**	**4**	3	2.25	+	16	12	3
Oxypolis rigidior	H	**75**	**4**	3	2.00	+	9	6	1
Sphagnum spp.	B	**75**	**4**	3	4.00	-	4	3	1
Juncus [acuminatus + canadensis + subcaudatus]	H	**75**	3	3	1.50	-	5	4	1
Triantha glutinosa	H	**75**	3	3	1.25	+	100	**75**	8
Carex torta	H	50	**4**	2	2.25	+	100	**50**	**11**
Utricularia cornuta	H	50	**4**	2	2.50	+	50	25	6
Carex leptalea var. leptalea	H	50	**4**	2	2.25	-	3	2	0

Galax urceolata	H	50	3	2	1.00	+	40	20	2
Osmunda regalis var. spectabilis	H	50	3	2	1.50	+	11	6	1
Kalmia latifolia	S	50	3	2	1.00	-	6	3	0
Physocarpus opulifolius var. opulifolius	S	50	2	2	0.75	+	100	**50**	4
Acer saccharum	T	50	2	2	0.75	+	67	**33**	3
Gentiana [linearis + saponaria].	H	50	2	2	0.75	+	29	14	1
Rhododendron [subgenus Hymenanthes]	S	50	2	2	0.75	+	13	6	0
Houstonia serpyllifolia	H	50	2	2	0.75	-	5	2	0
Carex stricta	H	25	3	1	1.00	+	33	8	1
Saginla apoda	H	25	3	1	1.00	+	17	4	0
Quercus rubra var. rubra	T	25	3	1	1.50	+	11	3	0
Agrostis [hyemalis + scabra]	H	25	2	1	0.50	+	50	13	1
Oenothera [perennis + tetragona]	H	25	2	1	0.50	+	17	4	0
Spiraea alba	S	25	2	1	0.25	+	20	5	0
Carya glabra	T	25	2	1	0.75	+	100	25	2
Carex gracilescens	H	25	2	1	0.50	+	100	25	1
Coreopsis major	H	25	2	1	0.50	+	100	25	1
Danthonia compressa	H	25	2	1	0.50	+	100	25	1
Medeola virginiana	H	25	2	1	0.50	+	100	25	1
Eurybia chlorolepis	H	25	2	1	0.25	+	100	25	1
Smilax herbacea	H	25	2	1	0.25	+	100	25	1
Gaylussacia baccata	S	25	2	1	0.50	+	50	13	1
Heiracium spp.	H	25	2	1	0.50	+	50	13	1
Menziesia pilosa	S	25	2	1	0.50	+	50	13	1
Polygala cruciata	H	25	2	1	0.50	+	33	8	0
Viola affinis	H	25	2	1	0.50	+	33	8	0
Lysimachia ciliata	H	25	2	1	0.25	+	33	8	0
Dichanthium acuminatum	H	25	2	1	0.50	+	25	6	0
Rhododendron catawbiense	S	25	2	1	0.25	+	25	6	0
Salix occidentalis	S	25	2	1	0.50	+	14	4	0
Andropogon glomeratus	H	25	2	1	0.50	+	13	3	0
Pycnanthemum [tenuifolium + virginianum]	H	25	2	1	0.50	+	13	3	0
Isoetes valida	H	25	2	1	0.50	+	11	3	0

Carex buxbaumii	H	25	2	1	0.50	-	8	2	0
Carex folliculata	H	25	2	1	0.50	+	8	2	0
Dichanthium dichotomum	H	25	2	1	0.50	+	8	2	0
Vaccinium simulatum	S	25	2	1	0.50	+	8	2	0
Platanthera lacera	H	25	2	1	0.50	+	7	2	0
Platanthera clavlata	H	25	2	1	0.25	-	6	1	0
Amanchier arborea	S	25	2	1	0.25	-	5	1	0
eocharis tenuis	H	25	2	1	0.50	-	5	1	0
Aronia manocarpa	S	25	2	1	0.50	-	4	1	0
Packera aurea	H	25	2	1	0.50	-	4	1	0
Viola cucullata	H	25	2	1	0.50	-	4	1	0
Hypericum densiflorum	H	25	2	1	0.50	-	4	1	0
Betula alleghaniensis	T	25	2	1	0.50	-	3	1	0
Lyonia ligustrina var. ligustrina	S	25	2	1	0.50	-	2	0	0

Community Number:	2.7
Number of plots:	49
Mean elevation (m):	909
Mean soil depth (cm):	86
Mean Bryophyte Cover (CC):	6
Mean sp richness/100 m²:	49

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Eriophorum virginicum	H	**100**	**4**	11	3.09	+	34	**34**	**11**
Rubus hispidus	SS	**100**	**4**	11	4.73	+	26	26	**12**
Lyonia ligustrina var. ligustrina	S	**100**	**4**	11	2.73	+	21	21	6
Juncus [acuminatus + canadensis + subcaudatus]	H	**100**	**4**	11	2.45	+	17	17	4
Solidago patula var. patula	H	**100**	**4**	11	3.09	-	16	16	5
Acer rubrum	T	**100**	**4**	11	3.45	+	15	15	5
Sphagnum spp.	B	**91**	**5**	10	7.00	+	15	14	9
Vernonia noveboracensis	H	**91**	**4**	10	2.64	+	45	**41**	**11**
Dichanthium lucidum	H	**82**	**4**	9	2.64	+	69	**57**	**15**
Hypericum densiflorum	H	**82**	**4**	9	3.82	+	32	26	**10**
Drosera rotundifolia var. rotundifolia	H	**82**	3	9	1.64	+	22	18	3
Aronia arbutifolia	S	**73**	**4**	8	2.18	+	62	**45**	**10**
Rhynchospora capitlata	H	**73**	**4**	8	2.27	+	23	17	4
Carex leptalea var. leptalea	H	**73**	**4**	8	2.82	+	13	10	3
Viola primulifolia	H	**73**	3	8	1.45	+	42	**31**	4
Rosa palustris	S	**73**	3	8	1.55	-	18	13	2
Alnus serrulata	S	**67**	**4**	7	3.73	+	37	23	9
Osmunda regalis var. spectabilis	H	**64**	**4**	7	2.91	+	39	25	7
Spiraea tomentosa	S	**62**	**4**	7	2.27	+	30	19	4
Carex atlantica	H	59	**4**	7	2.55	+	21	13	3
Carex echinata ssp. echinata	H	57	**4**	7	2.09	-	11	7	1
Eriocaulon decangulare var. decangulare	H	55	3	7	1.64	+	100	**64**	**10**
Pogonia ophioglossoides	H	52	3	7	1.55	+	41	26	4

Rhododendron [subgenus Hymenanthes]	S	50	3	7	1.36	+	44	28	4
Scirpus pansus	H	47	3	7	1.82	-	18	12	2
Vaccinium macrocarpon	DS	45	**4**	5	2.45	+	19	8	2
Liriodendron tulipifera var. tulipifera	T	45	3	5	1.18	+	71	**32**	4
Andropogon glomeratus	H	45	3	5	1.91	+	63	28	5
Carex folliculata	H	45	3	5	1.45	+	42	19	3
Pinus strobus	T	45	3	5	1.45	+	36	16	2
Schizachyrium scoparium var. scoparium	H	45	3	5	1.09	+	25	11	1
eocharis tenuis	H	45	3	5	1.00	+	23	10	1
Aronia manocarpa	S	45	3	5	1.00	+	22	10	1
Kalmia latifolia	S	45	3	5	1.27	+	14	6	1
Viburnum cassinoides	S	45	3	5	1.64	-	13	6	1
Chone cuthbertii	H	45	2	5	0.91	+	50	23	2
Platanthera clavlata	H	45	2	5	0.82	+	28	13	1
Linum striatum	H	45	2	5	0.91	+	22	10	1
Galium [tinctorum + triflorum]	H	45	2	5	0.82	-	10	5	0
Viola macloskeyi var. pallens	H	45	2	5	0.82	-	10	4	0
Symphyotrichum puniceum var. puniceum	H	45	3	7	1.45	+	18	11	2
Osmunda cinnamomea var. cinnamomea	H	43	3	6	1.91	-	13	7	1
Eupatorium perfoliatum	H	40	3	6	1.00	+	22	12	1
Lycopus uniflorus	H	38	3	6	1.09	+	18	10	1
Xanthorhiza simplicissima	S	36	3	4	1.00	+	80	29	3
Carex buxbaumii	H	36	3	4	1.00	+	33	12	1
Ilex verticillata	S	36	3	4	1.00	+	29	10	1
Rhododendron maximum	S	36	3	4	1.18	-	11	4	0
Packera crawfordii	H	36	2	4	0.91	+	100	**36**	3
Eutrochium fistulosum	H	36	2	4	0.73	+	67	24	2
Polygala sanguinea	H	36	2	4	0.82	+	50	18	1
Dichanthium dichotomum	H	36	2	4	0.91	+	31	11	1
Carex intumescens	H	36	2	4	0.73	+	31	11	1
Hydrophyllum canadense	H	36	2	4	0.64	+	27	10	1
Viola cucullata	H	36	2	4	0.73	+	15	5	0

Oxypolis rigidior	H	35	3	6	1.09	+	17	9	1
Juncus [effusus ssp. solutus + pylaei]	H	33	3	6	1.55	-	10	5	1
Kalmia carolina	S	27	3	3	1.18	+	100	27	3
Rhynchospora gracilenta	H	27	3	3	1.00	+	100	27	3
Rhynchospora alba	H	27	3	3	1.18	+	19	5	1
Hypericum gentianoides	H	27	2	3	0.73	+	100	27	2
Eupatorium rotundifolium	H	27	2	3	0.55	+	100	27	1
Oxydendrum arboreum	T	27	2	3	0.45	+	100	27	1
Smilax glauca	V	27	2	3	0.45	+	100	27	1
Aconitum uncinatum	H	27	2	3	0.55	+	75	20	1
Juncus biflorus	H	27	2	3	0.64	+	60	16	1
Symplocarpus foetidus	H	27	2	3	0.82	+	38	10	1
Pycnanthemum [tenuifolium + virginianum]	H	27	2	3	0.64	+	38	10	1
Solidago altissima var. altissima	H	27	2	3	0.55	+	25	7	0
Vaccinium corymbosum	S	27	2	3	0.64	+	20	5	0
Thypteris palustris var. pubescens	H	27	2	3	0.91	-	13	3	0
Pteridium aquilinum	H	18	2	2	0.45	+	100	18	1
Apios americana	H	18	2	2	0.36	+	100	18	1
Sisyrinchium	H	18	2	2	0.36	+	100	18	1
Bartonia virginica	H	18	2	2	0.27	+	100	18	0
Calopogon tuberosus var. tuberosus	H	18	2	2	0.27	+	100	18	0
Toxicodendron radicans var. radicans	V	18	2	2	0.27	+	100	18	0
Utricularia subulata	H	18	2	2	0.27	+	100	18	0
Eupatorium pilosum	H	18	2	2	0.36	+	67	12	0
Polygala cruciata	H	18	2	2	0.36	+	67	12	0
Toxicodendron vernix	T	18	2	2	0.36	+	67	12	0
Viburnum dentatum	S	18	2	2	0.36	+	67	12	0
Erechtites hieraciifolia var. hieraciifolia	H	18	2	2	0.18	+	67	12	0
Thalictrum spp.	H	18	2	2	0.18	+	67	12	0
Nyssa sylvatica	T	18	2	2	0.55	+	50	9	0
Lysimachia terrestris	H	18	2	2	0.45	+	50	9	0
Vaccinium fuscatum	S	18	2	2	0.45	+	50	9	0

Dichanthium acuminatum	H	18	2	2	0.36	+	50	9	0
Carex ruthii	H	18	2	2	0.45	+	40	7	0
Gaultheria procumbens	H	18	2	2	0.36	+	40	7	0
Galax urceolata	H	18	2	2	0.27	+	40	7	0
Asclepias incarnata	H	18	2	2	0.36	+	33	6	0
Xyris torta	H	18	2	2	0.36	+	33	6	0
Cladium mariscoides	H	18	2	2	0.73	+	29	5	0
Gentiana [linearis + saponaria].	H	18	2	2	0.18	+	29	5	0
Sanguinaria canadensis	H	18	2	2	0.45	+	25	5	0
Ludwigia palustris	H	18	2	2	0.36	+	25	5	0
Quercus rubra var. rubra	T	18	2	2	0.36	+	22	4	0
Platanthera lacera	H	18	2	2	0.27	-	13	2	0
Solidago [speciosa + rugosa var. sphagnifolia]	H	18	2	2	0.27	-	12	2	0
Parnassia asarifolia	H	18	2	2	0.55	-	11	2	0
Clematis virginiana	H	18	2	2	0.27	-	11	2	0
Tsuga canadensis	T	18	2	2	0.55	-	10	2	0
Amanchier arborea	S	18	2	2	0.36	-	10	2	0
Sphenopholis pensylvanica	H	18	2	2	0.45	-	9	2	0
Carex lurida	H	18	2	2	0.36	-	7	1	0
Betula alleghaniensis	T	18	2	2	0.36	-	6	1	0
Houstonia serpyllifolia	H	18	2	2	0.27	-	5	1	0
Vaccinium arboreum	S	9	2	1	0.27	+	100	9	0
Arethusa bulbosa	H	9	2	1	0.18	+	100	9	0
Carex foenea	H	9	2	1	0.18	+	100	9	0
Chamairium luteum	H	9	2	1	0.18	+	100	9	0
Dichanthium commutatum	H	9	2	1	0.18	+	100	9	0
Ilex opaca var. opaca	S	9	2	1	0.18	+	100	9	0
Prosartes lanuginosa	H	9	2	1	0.18	+	100	9	0
Quercus alba	T	9	2	1	0.18	+	100	9	0
Scutlaria integrifolia	H	9	2	1	0.18	+	100	9	0
Solidago puberula	H	9	2	1	0.18	+	100	9	0
Symphyotrichum firmum	H	9	2	1	0.18	+	100	9	0
Carpinus caroliniana	T	9	2	1	0.36	+	50	5	0

Lycopodila alopecuroides	H	9	2	1	0.36	+	50	5	0
Carex allegheniensis	H	9	2	1	0.27	+	50	5	0
Calamagrostis cinnoides	H	9	2	1	0.18	+	50	5	0
Hamamis virginiana var. virginiana	S	9	2	1	0.18	+	50	5	0
Physostegia virginiana	H	9	2	1	0.18	+	50	5	0
Rhododendron catawbiense	S	9	2	1	0.18	+	50	5	0
Vitis labrusca	H	9	2	1	0.18	+	50	5	0
Carex stricta	H	9	2	1	0.18	+	33	3	0
Clethra acuminata	S	9	2	1	0.18	+	33	3	0
Veratrum virginicum	S	9	2	1	0.18	+	33	3	0
Viola sororia	H	9	2	1	0.27	+	25	2	0
Carex debilis	H	9	2	1	0.18	+	25	2	0
Carex Sect. Hymenochlaenae	H	9	2	1	0.18	+	25	2	0
Fraxinus ssp.	T	9	2	1	0.18	+	25	2	0
Pycnanthemum tenuifolium	H	9	2	1	0.18	+	25	2	0
Carex bullata	H	9	2	1	0.18	+	20	2	0
Dulichium arundinaceum var. arundinaceum	H	9	2	1	0.18	+	20	2	0
Hypericum mitchlianum	H	9	2	1	0.18	+	20	2	0
Spiranthes cernua	H	9	2	1	0.18	+	17	2	0
Juncus gymnocarpus	H	9	2	1	0.27	-	14	1	0
Agrostis perennans	H	9	2	1	0.18	-	14	1	0
Salix occidentalis	S	9	2	1	0.18	-	14	1	0
Isoetes valida	H	9	2	1	0.18	-	11	1	0
Glyceria micaria	H	9	2	1	0.18	-	10	1	0
Leersia oryzoides	H	9	2	1	0.55	+	9	1	0
Chone [glabra + obliqua]	H	9	2	1	0.18	-	8	1	0
Hypericum punctatum	H	9	2	1	0.18	-	8	1	0
Carex sect. Ovales	H	9	2	1	0.18	-	4	0	0
Carex [crinita + gynandra + mitchliana]	H	9	2	1	0.18	-	4	0	0
Hypericum mutilum var. mutilum	H	9	2	1	0.18	-	4	0	0
Impatiens [capensis +pallida]	H	9	2	1	0.18	-	3	0	0
Epilobium leptophyllum	H	9	2	1	0.18	-	3	0	0
Salix sericea	S	9	2	1	0.27	-	2	0	0

Platanthera flava	H	9	1	1	0.09	+	100	9	0
Agrostis [hyemalis + scabra]	H	9	1	1	0.09	+	50	5	0
Trillium undulatum	H	9	1	1	0.09	+	33	3	0
Henium [autumnale + brevifolum]	H	9	1	1	0.09	-	17	2	0

Community Number:	2.8
Number of plots:	15
Mean elevation (m):	1322
Mean soil depth (cm):	61
Mean Bryophyte Cover (CC):	7
Mean sp richness/100 m²:	30

Taxon Name	Stratum	C	CC	F	MC	RC	Fi	IV	IVS
Carex echinata ssp. echinata	H	**100**	**5**	15	6.73	+	23	23	**16**
Solidago patula var. patula	H	**100**	**5**	15	5.07	+	22	22	**11**
Carex leptalea var. leptalea	H	**100**	**4**	15	4.67	+	25	25	**12**
Houstonia serpyllifolia	H	**100**	**4**	15	4.40	+	37	**37**	**16**
Rosa palustris	S	**100**	**4**	15	3.87	+	34	**34**	**13**
Vaccinium macrocarpon	DS	**93**	**5**	14	6.27	+	52	**48**	**30**
Packera aurea	H	**87**	**4**	13	2.67	+	48	**42**	**11**
Drosera rotundifolia var. rotundifolia	H	**87**	3	13	1.80	+	32	27	5
Juncus [effusus ssp. solutus + pylaei]	H	**87**	3	13	1.87	-	21	18	3
Schizachyrium scoparium var. scoparium	H	**80**	**4**	12	3.33	+	60	**48**	**16**
Oxypolis rigidior	H	**80**	3	12	1.80	+	34	27	5
Eriophorum virginicum	H	**73**	**4**	11	2.13	+	34	25	5
Acer rubrum	T	**73**	3	11	1.33	-	15	11	1
Parnassia asarifolia	H	**67**	**4**	10	2.07	+	56	**37**	8
Rhynchospora alba	H	**67**	**4**	10	2.40	+	63	**42**	**10**
Rhynchospora capitlata	H	**67**	**4**	10	2.47	+	29	19	5
Juncus [acuminatus + canadensis + subcaudatus]	H	**67**	3	10	1.80	-	16	11	2
Lyonia ligustrina var. ligustrina	S	**60**	**4**	9	2.13	-	17	10	2
Thypteris palustris var. pubescens	H	**60**	**4**	9	2.33	+	38	23	5
Pogonia ophioglossoides	H	**60**	3	9	1.73	+	53	**32**	6
Sphagnum spp.	B	53	**4**	8	3.33	-	12	6	2
Viola cucullata	H	53	3	8	1.20	+	30	16	2
Galium asprlum	H	47	3	7	1.27	+	47	22	3

Epilobium leptophyllum	H	47	2	7	0.93	+	20	9	1
Carex buxbaumii	H	40	3	6	1.87	+	50	20	4
Linum striatum	H	40	2	6	0.73	+	26	10	1
Rubus hispidus	SS	33	3	5	1.00	-	12	4	0
Salix sericea	S	33	3	5	1.47	-	12	4	1
Scirpus spp.	H	33	3	5	1.00	-	14	5	0
eocharis tenuis	H	33	2	5	0.67	+	23	8	1
Hypericum mutilum var. mutilum	H	33	2	5	0.53	-	18	6	0
Luzula echinata	H	33	2	5	0.67	+	33	11	1
Platanthera lacera	H	33	2	5	0.60	+	33	11	1
Viola macloskeyi var. pallens	H	33	2	5	0.67	-	10	3	0

Scirpus pansus	H	27	3	4	1.13	-	11	3	0
Aronia manocarpa	S	27	2	4	0.53	-	17	5	0
Betula alleghaniensis	T	27	2	4	0.40	-	12	3	0
Cirsium muticum	H	27	2	4	0.40	+	100	27	1
Lonicera dioica var. dioica	V	27	2	4	0.53	+	67	18	1
Luzula acuminata	H	27	2	4	0.53	+	100	27	1
Osmunda cinnamomea var. cinnamomea	H	27	2	4	0.80	-	9	2	0
Saginla apoda	H	27	2	4	0.67	+	67	18	1
Viburnum cassinoides	S	27	2	4	0.40	-	10	3	0
Carex oligosperma	H	20	3	3	1.20	+	100	20	2
Carex [crinita + gynandra + mitchliana]	H	20	2	3	0.60	-	12	2	0
Carex intumescens	H	20	2	3	0.33	-	23	5	0
Hydrophyllum canadense	H	20	2	3	0.40	+	20	4	0
Persicaria sagittata	H	20	2	3	0.27	-	8	2	0
Picea rubens	T	20	2	3	0.33	-	21	4	0
Sphenopholis pensylvanica	H	20	2	3	0.33	-	13	3	0
Spiraea tomentosa	S	20	2	3	0.67	-	13	3	0
Amanchier arborea	S	13	2	2	0.20	-	10	1	0
Carex lurida	H	13	2	2	0.27	-	7	1	0
Galium [tinctorum + triflorum]	H	13	2	2	0.20	-	4	1	0

Hypericum densiflorum	H	13	2	2	0.40	-	7	1	0
Hypericum mitchlianum	H	13	2	2	0.20	+	40	5	0
Isoetes valida	H	13	2	2	0.27	+	22	3	0
Kalmia latifolia	S	13	2	2	0.20	-	6	1	0
Lilium grayi	H	13	2	2	0.13	-	18	2	0
Lycopus uniflorus	H	13	2	2	0.27	-	6	1	0
Oenothera fruticosa	H	13	2	2	0.47	+	67	9	0
Osmunda regalis var. spectabilis	H	13	2	2	0.60	-	11	1	0
Pycnanthemum tenuifolium	H	13	2	2	0.40	+	50	7	0
Rubus canadensis	SS	13	2	2	0.27	+	22	3	0
Salix occidentalis	S	13	2	2	0.53	+	29	4	0
Symphyotrichum puniceum var. puniceum	H	13	2	2	0.27	-	5	1	0
Utricularia cornuta	H	13	2	2	0.40	+	50	7	0
Aconitum uncinatum	H	7	2	1	0.13	+	25	2	0
Andropogon glomeratus	H	7	2	1	0.20	-	13	1	0
Anthoxanthum odoratum	H	7	2	1	0.13	+	33	2	0
Carex atlantica	H	7	2	1	0.13	-	3	0	0
Carex Sect. Hymenochlaenae	H	7	2	1	0.20	+	25	2	0
Cladium mariscoides	H	7	2	1	0.53	+	14	1	0
Clematis virginiana	H	7	2	1	0.13	-	6	0	0
Danthonia spicata	H	7	2	1	0.13	+	100	7	0
Epilobium coloratum	H	7	2	1	0.13	-	9	1	0
Fragaria virginiana	H	7	2	1	0.13	-	9	1	0
Glyceria striata var. striata	H	7	2	1	0.13	-	6	0	0
Ilex verticillata	S	7	2	1	0.13	-	7	0	0
Lonicera canadensis	V	7	2	1	0.13	+	100	7	0
Lycopus virginicus	H	7	2	1	0.13	-	7	0	0
Menyanthes trifoliata	H	7	2	1	0.27	+	100	7	0
Oenothera [perennis + tetragona]	H	7	2	1	0.13	+	17	1	0
Pedicularis canadensis	H	7	2	1	0.13	+	100	7	0
Physostegia virginiana	H	7	2	1	0.13	+	50	3	0
Prunla vulgaris	H	7	2	1	0.13	+	50	3	0
Rhododendron maximum	S	7	2	1	0.20	-	3	0	0

Solidago [speciosa + rugosa var. sphagnifolia]	H	7	2	1	0.13	-	6	0	0
Symplocarpus foetidus	H	7	2	1	0.13	-	13	1	0
Vaccinium simulatum	S	7	2	1	0.13	-	8	1	0
Vernonia noveboracensis	H	7	2	1	0.20	-	5	0	0
Viola blanda	H	7	2	1	0.20	-	13	1	0
Viola hastata	H	7	2	1	0.13	+	100	7	0
Aronia prunifolia	S	7	1	1	0.07	-	14	1	0
Asclepias incarnata	H	7	1	1	0.07	-	17	1	0
Carex baileyi	H	7	1	1	0.07	-	10	1	0
Rubus allegheniensis	SS	7	1	1	0.07	-	14	1	0
Rubus argutus	SS	7	1	1	0.07	-	11	1	0
Sorbus americana	T	7	1	1	0.07	+	50	3	0

APPENDIX C

Soil data

Appendix C. Soil nutrients and textural properties averaged across plots within vegetation classes (1.0 and 2.0) and within community types (1.1, 1.2, etc.). See text for full names of vegetation classes and community types. Specific soil variables are as follows: pH, percent base saturation (BS), total cation exchange capacity (CEC; meq/100g), exchangeable cations (Ca, Mg, K; ppm), easily extractable P (ppm), easily extractable micronutrients (Al, Cu, Fe, Mn, Zn; ppm), ratio of exchangeable Ca to Mg (Ca/Mg), percent organic matter (OM; weight loss by ignition), sand, silt, and clay (percent by weight of mineral soil).

Class/ Community	pH	BS	CEC	Ca	Mg	K	P	Al	Cu	Fe	Mn	Zn	Ca/Mg	OM	Clay	Silt	Sand
1.0	4.4	35	11.2	509	103	61	35	792	0.98	264	30.3	2.9	5.5	36.7	5.0	31.6	63.4
1.1	4.2	31	15.2	680	90	81	24	819	0.73	284	24.5	3.6	7.5	40.1	2.2	14.3	83.4
1.2	4.0	28	12.2	412	75	63	55	812	1.35	284	71.6	3.6	6.4	43.3	8.7	73.8	17.5
1.3	4.8	46	12.0	714	185	50	32	597	0.99	217	16.3	2.3	4.0	40.2	3.3	16.3	80.4
1.4	4.4	36	5.2	231	62	49	28	939	0.84	270	8.9	2.2	3.9	23.2	5.7	22.0	72.3
2.0	5.1	51	9.1	653	132	44	22	666	1.18	279	19.5	2.7	5.8	26.7	6.2	23.3	70.4
2.1	5.0	48	8.8	598	96	43	25	848	1.13	380	21.3	3.3	7.1	22.7	10.3	27.2	62.4
2.2	5.0	50	9.5	702	121	49	26	886	1.41	343	24.5	2.9	7.4	20.9	11.0	28.9	60.1
2.3	4.7	42	9.3	585	90	24	36	791	0.81	231	7.0	2.4	7.9	36.3	9.2	26.9	63.9
2.4	4.8	44	10.8	677	101	41	19	421	0.48	173	12.0	3.1	6.6	45.8	2.3	20.5	77.2
2.5	5.2	55	9.5	685	174	53	20	509	1.17	331	17.4	2.9	4.2	30.4	3.7	16.1	80.2
2.6	5.3	58	8.1	642	151	55	6	631	2.05	304	50.3	2.7	4.2	25.0	4.4	38.6	56.9
2.7	5.2	53	6.4	458	116	29	23	634	0.82	177	7.7	1.6	4.7	13.3	5.2	16.7	78.1
2.8	5.4	59	10.7	881	208	55	18	612	1.59	292	16.2	2.8	4.4	19.2	3.7	11.5	84.8

APPENDIX D

Relationship of recognized communities

Appendix D. Communities recognized in the SATURATED FORESTS AND SEEPS and BOGS AND FENS vegetation class are compared with currently recognized associations in the National Vegetation Classification (NVC; NatureServe 2009) and by Schafale and Weakley (1990). Communities are matched at four levels: "<" indicates a concept is narrower than a currently defined concept, "=" indicates two concepts are approximately equal, ">" indicates a concept is broader than a currently defined type, and "> <" indicates the concepts overlap with a currently defined concept, having some unique elements not found in the other. Certainty is ranked on a scale of one to three with 1 being least certain and 3 being most certain. Group numbers and names follow those presented in the text of the document. The number of samples for each community is listed in parentheses after the community name.

Community		Certainty		NVC CEGL	NVC Name		Shafale and Weakley Name
1.1	High Elevation Seep (8)	3	>	4293	*Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata* var. *humilis* Herbaceous Vegetation	=	High Elevation Seep
		3	>	4296	*Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis* Herbaceous Vegetation		
1.2	High Elevation Sedge Seep (4)	3	=	7697	*Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum* spp. Herbaceous Vegetation	=	High Elevation Seep
1.3	High Elevation Saturated Forest (12)	2	>	6277	*Picea rubens - (Tsuga canadensis) / Rhododendron maximum* Saturated Forest	>	Swamp Forest-Bog Complex (Spruce Subtype)
		2	>	3667	*Picea rubens - (Tsuga canadensis) / Rhododendron maximum Saturated Forest*		

1.4	Low Elevation Saturated Forest (28)	2	>	7565	*Tsuga canadensis - Acer rubrum - (Liriodendron tulipifera, Nyssa sylvatica) / Rhododendron maximum / Sphagnum* spp. Forest	=	Swamp Forest-Bog Complex (Typic Subtype)
		2	>	3667	*Picea rubens - (Tsuga canadensis) / Rhododendron maximum Saturated Forest*		
		2	>	3918	*Alnus serrulata - Viburnum nudum* var. *nudum - Chamaedaphne calyculata / Woodwardia areolata - Sarracenia rubra* ssp. *jonesii* Shrubland		
		2	>	8438	*Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum* spp. Herbaceous Vegetation		
2.1	Disturbed Bog (13)	3	>	8433	*Juncus effusus - Chelone glabra - Scirpus* spp. Southern Blue Ridge Beaver Pond Herbaceous Vegetation		no good fit
		3	>	4112	*Juncus effusus* Seasonally Flooded Herbaceous Alliance		
		3	>	4510	*Sparganium americanum - Epilobium leptophyllum* HerbaceousVegetation		
2.2	Shrub Bog (14)	2	>	3915	*Alnus serrulata - Kalmia carolina - Rhododendron catawbiense - Spiraea alba / Carex folliculata - Lilium grayi* Shrubland	<	Southern Appalachian Bog (Northern Subtype)
						<	Southern Appalachian Bog (Southern Subtype)

2.3	Acidic Bog (9)	2	> <	4158	*Carex atlantica - Solidago patula* var. *patula - Lilium grayi / Sphagnum bartlettianum* Herbaceous Vegetation	<	Southern Appalachian Bog (Northern Subtype)
		2	>	3915	*Alnus serrulata - Kalmia carolina - Rhododendron catawbiense - Spiraea alba / Carex folliculata - Lilium grayi* Shrubland		
		2	>	3916	*Alnus serrulata - Rhododendron viscosum - Rhododendron maximum / Juncus gymnocarpus - Chelone cuthbertii* Shrubland	>	Southern Appalachian Bog (Southern Subtype)
		2	>	4156	*Carex (atlantica, echinata, leptalea, lurida) - Solidago patula* Herbaceous Vegetation		
2.4	High Elevation Mosiac Bog (5)	2	>	4158	*Carex atlantica - Solidago patula* var. *patula - Lilium grayi / Sphagnum bartlettianum* Herbaceous Vegetation	<	Southern Appalachian Bog (Northern Subtype)
		2	>	3913	*Rhododendron (maximum, catawbiense) - Ilex collina - Salix sericea / Carex trisperma - Eriophorum virginicum* Shrubland		
2.5	Mosiac Bog (12)	2	>	3913	*Rhododendron (maximum, catawbiense) - Ilex collina - Salix sericea / Carex trisperma - Eriophorum virginicum* Shrubland	<	Southern Appalachian Bog (Northern Subtype)
		2	>	4158	*Carex atlantica - Solidago patula* var. *patula - Lilium grayi / Sphagnum bartlettianum* Herbaceous Vegetation		
		2	> <	3915	*Alnus serrulata - Kalmia carolina - Rhododendron catawbiense - Spiraea alba / Carex folliculata - Lilium grayi* Shrubland		

2.6	Mountaintop Fen (4)	3	=	4167	*Cladium mariscoides - Sanguisorba canadensis / Sphagnum subsecundum* Herbaceous Vegetation	=	Southern Appalachian Fen
2.7	Low Elevation Bog (11)	2	>	3916	*Alnus serrulata - Rhododendron viscosum - Rhododendron maximum / Juncus gymnocarpus - Chelone cuthbertii* Shrubland	>	Southern Appalachian Bog (Northern Subtype)
		2	>	4156	*Carex (atlantica, echinata, leptalea, lurida) - Solidago patula* Herbaceous Vegetation		
		2	> <	3915	*Alnus serrulata - Kalmia carolina - Rhododendron catawbiense - Spiraea alba / Carex folliculata - Lilium grayi* Shrubland		
2.8	High Elevation Valley Fen (15)	3	>	4157	*Carex atlantica - Rhynchospora alba - Parnassia asarifolia / Sphagnum warnstorfii* Herbaceous Vegetation	<	Southern Appalachian Bog (Northern Subtype)

ADDITIONAL NVC ASSOCIATIONS ATTRIBUTED TO OR HAVING POTENTIAL TO OCCUR IN NC:		Notes:
3909	*Alnus serrulata - Lindera benzoin / Scutellaria lateriflora - Thelypteris noveboracensis* Shrubland	Occupies lower elevation seeps which were not targeted as sample sites and were not sampled.
3914	*Alnus serrulata - Rhododendron arborescens / Sarracenia oreophila - Rhynchospora rariflora* Shrubland	1 rare example occurs in NC, not sampled

3849	*Rhododendron maximum / Sphagnum* spp. Shrubland	Common along wetland edges, not sampled
3917	*Alnus serrulata / Sanguisorba canadensis - Parnassia grandifolia - Helenium brevifolium* Shrubland	1 degraded example occurs in NC, not sampled
4994	*Pinus strubus - Acer ruburm* / *Spiraea alba* var. *latifolia* / *Sanquisosrba canadensis* Woodland	Likley not found in NC
4997	*Carex leptalea* - *Parnassia grandiflora* - *Rhyncospora alba* Herbaceous Vegetation	Likley not found in NC