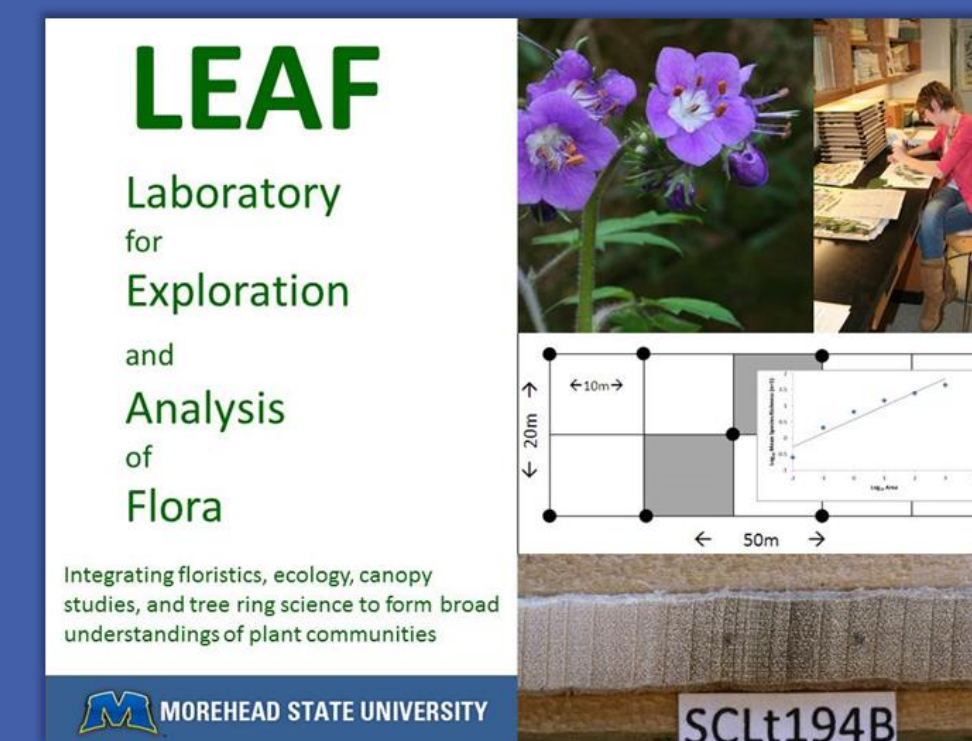


# Catalogue of lichen species in the Rowan County Sphagnum Swamp, Rowan County, Kentucky

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## Abstract

Rowan County Sphagnum Swamp (RCSS) is one of the best remaining examples of a bottomland swamp forest left in the Knobs region of Kentucky. Bottomland swamp forests are characterized by soil with a high percentage of organic matter above clay and Devonian shale. This arrangement leads to standing water much of the year and a strongly acidic soil. Common tree species in the Rowan County Sphagnum Swamp include *Acer rubrum* (red maple), *Quercus palustris* (pin oak), *Liquidambar styraciflua* (sweet gum), *Nyssa sylvatica* (sour gum) and *Betula nigra* (river birch). Bottomland swamp forests used to be more common, but have dwindled due to land clearing for timber and agriculture. The research project included cataloging the species of lichens found in the Rowan County Sphagnum Swamp through six field trips to the study site. Eighty-five collections were made with samples being deposited in the Morehead State University Herbarium (MDKY). Lichen samples were identified using dissecting and compound microscopes, C (bleach) and K (KOH) chemical tests, and observation under ultraviolet light. Common species of lichens included *Buellia erubescens*, *Lecanora hybocarpa*, *Punctelia rudecta*, and *P. missouriensis*. Uncommon species included *Lecanora thysanophora*. This research was supported by a Morehead State University Undergraduate Research Fellowship.

## Introduction

Lichens are a representation of mutualism between fungi and a photosynthetic organism, either algae or cyanobacteria (Brodo et al. 2001). There are three growth forms of lichens: crustose, foliose, and fruticose. Crustose lichens do not have a distinguishable lower surface as they grow heavily attached or even intertwined with the substrate (Brodo et al. 2001). They cannot be removed from their substrate. Fruticose lichens do not have a recognizable upper and lower surface, and typically grow upright or in a branching pattern. They are similar to foliose lichen in having a layered structure, but typically have stalks or branches that act as fruiting bodies (Brodo et al. 2001). Foliose lichens typically have an identifiable upper and lower surface, have identifiable layers that can be helpful for identifying species, and can be strongly or loosely attached to their substrate (Brodo et al. 2001).

The objectives of this study were to document the lichen species richness of the Rowan County Sphagnum Swamp and to determine the biogeographical distributions of the species represented in the swamp.

## Site Description

The Rowan County Sphagnum Swamp is located on the east side of the Licking River valley, slightly north of Green Mountain, and west of Rt. 1722. The elevation for the site is around 650 ft. It is one of the last remaining bottomland swamp forests in the Knobs region of Kentucky. Like other bottomland swamp forests, it is characterized by acidic soils over Devonian shale. From November to May, there is standing water present throughout the study site. Dominant tree species in the study area include *Acer rubrum*, *Quercus palustris*, *Betula nigra*, and *Nyssa sylvatica*.



Figure 1: Typical fall scene in the Rowan County Sphagnum Swamp.

## Methods

136 samples were collected over the course of six trips to the Rowan County Sphagnum Swamp. Once collected, lichen samples were allowed to air dry before they were identified. Samples were identified using dissecting and compound microscopes, morphological features and chemical tests. The chemical tests used to identify samples were C (bleach) and KOH tests. Along with chemical tests, another strategy used to identify samples was the ultraviolet (UV) light test. Samples were identified to species using dichotomous keys. The dichotomous key used to identify foliose and fruticose lichen samples was created by Dr. Allen Risk, and the key used to identify crustose lichens was located in Keys to Lichens of North America revised and expanded. Another resource used to identify lichen samples was Lichens of North America.

Once samples were identified, they were stored in archival packets and labeled for storage in the Morehead State Herbarium (MDKY). Once labeled and stored in MDKY, information about the samples collected in the Rowan County Sphagnum Swamp was collected in Excel and the most common species were identified. The biogeographical distribution for each species was based on maps within the CNALH website.

Genus	Species
Parmotrema	5
Hypotrachyna	3
Lecanora	3
Physcia	3
Punctelia	3
Cladonia	2
Myelochroa	2
Phaeophyscia	2
Pyxine	2
Arthonia	1
Bacidia	1
Baculifera	1
Buellia	1
Canoparmelia	1
Crespoa	1
Flavoparmelia	1
Graphis	1
Heterodermia	1
Lecidea	1
Lepra	1
Parmelia	1
Pertusaria	1
Placynthiella	1
Pseudosagedia	1
Rinodina	1
Ropalospora	1
Usnea	1
Zwackia	1

Table 1: Inventory of the number of species per genus collected in the Rowan County Sphagnum Swamp.



Figure 2: An example of crustose, foliose, and fruticose lichens. a.) crustose lichens, mixture of *Buellia* and *Lecanora*. b.) foliose lichen, *Parmotrema hypoleucinum*. c.) fruticose lichen, *Cladonia cristatella*.

## Results

46 species in 28 genera were represented in the 136 total samples collected. The most common species collected was *Lecanora hybocarpa* (12 samples), with the second, third, and fourth most common being *Buellia erubescens*, *Punctelia rudecta*, and *Lecidea varians* (8 samples). Of the genera collected in the swamp, the most diverse genus was *Parmotrema* with 5 species. There were multiple genera with three species represented at the swamp including: *Hypotrachyna*, *Lecanora*, *Physcia*, and *Punctelia*. Notably, no cyanolichens were collected at the swamp and a lower than expected number of *Cladonia* species was collected.

There were 17 species of crustose lichens collected, 25 species of foliose lichens collected, and 3 species of fruticose lichen collected. The 17 species of crustose lichens represent 14 genera while the 25 species of foliose lichens represent 12 genera. The 3 species of fruticose lichens represent 2 genera.

For the biogeography categories represented in the swamp, most species (26) fell into the East-Temperate category. The next most common category represented was Pan-Temperate with 8 species. Both Appalachia-Great-Lakes and Coastal Plain were somewhat represented with 3 species and 4 species respectively. Notable samples included *Pertusaria xanthodes*, as this was only the second recorded sample of this species in the state of Kentucky. Two species previously unreported for Kentucky were *Zwackia viridis* and *Rinodina maculans*.

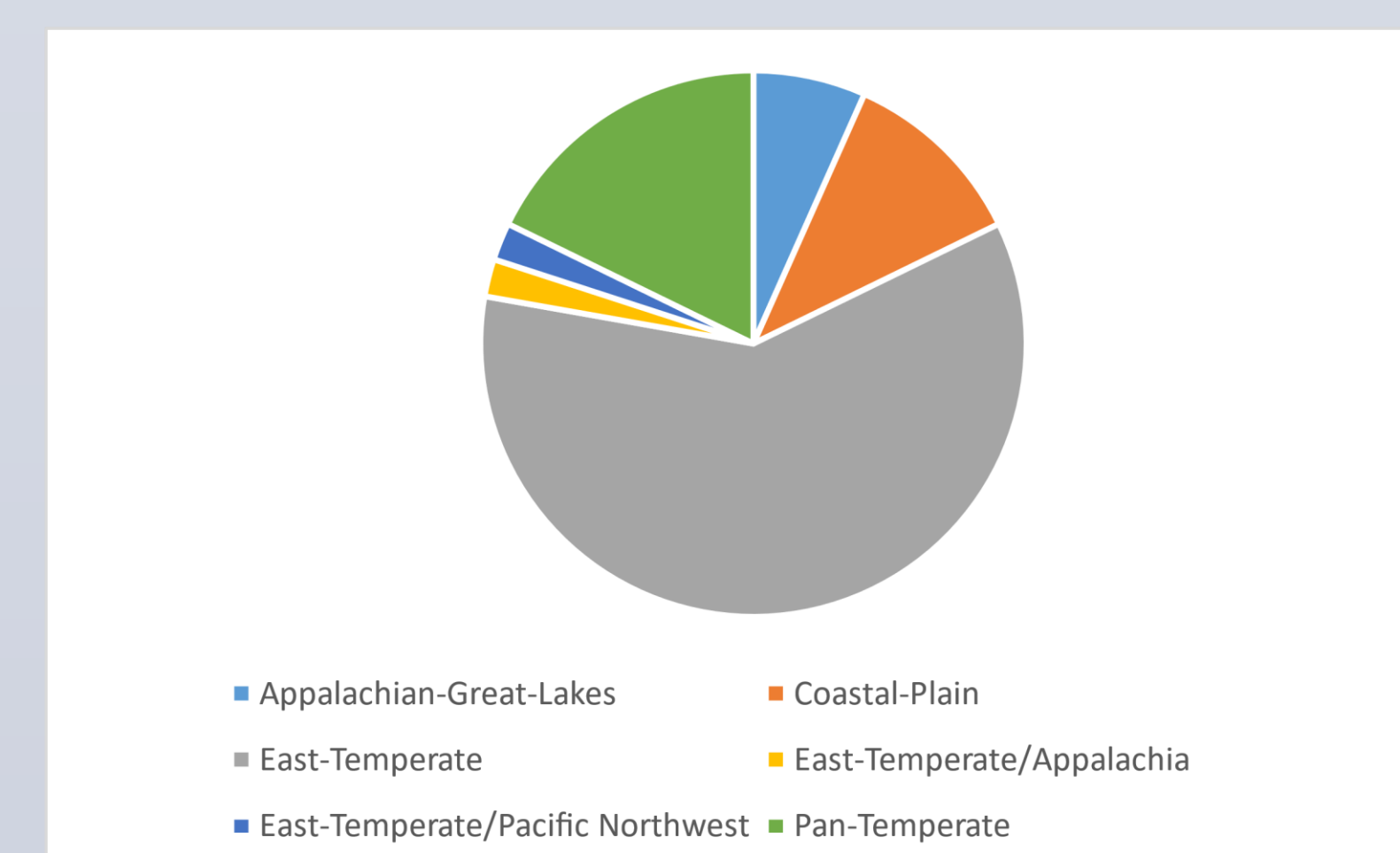


Figure 3: Representation of the biogeographic distributions found in the Rowan County Sphagnum Swamp.

## Discussion

As previously mentioned, the most common biogeography category represented was East-Temperate (27 species) with the second most common being Pan-Temperate (8 species) (Figure 3). Lichens in these categories are likely tolerant species and can withstand multiple weather conditions seen in the region as well as multiple types of substrate. Some lichen species are less tolerant and are only found in the Appalachian-Great-Lakes region (3 species). The East-Temperate/Appalachia and East-Temperate/Pacific Northwest each had 1 species (Figure 3). The most interesting category found in the RCSS was the species that typically follow Coastal Plain (5 species) (Figure 3) distribution. Species in this category include: *Zwackia viridis*, *Baculifera curtisii*, *Pertusaria xanthodes*, *Parmotrema hypoleucinum* and *Rinodina maculans*. The presence of these lichens match the Coastal Plain vascular flora found in the RCSS.

There were notably few *Cladonia* species present in the collection from RCSS. While *Cladonia* squamules were commonly seen on-site, podetia would be necessary for an accurate ID. The relative scarcity of *Cladonia* could be due to the standing water and lack of rock substrate available in the study, as well as the high soil acidity.

Beyond the few *Cladonia* species, the low lichen species richness could be affected by the age of the forest. RCSS is relatively young, and the lack of older, larger trees could limit the number of lichen species present. This study also focused on lichens at zone 1 on trees. While one trip included samples taken from zones 2 and 3 via tree climbing, the majority of the samples only represent lichens found on trunks of trees. This could also affect the number of lichen species represented, as some species may only be represented higher in trees.

## References

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Consortium of North American Lichen Herbaria (<http://lichenportal.org/portal/index.php>)

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