

Building a lichen biodiversity baseline for the piedmont of North Carolina



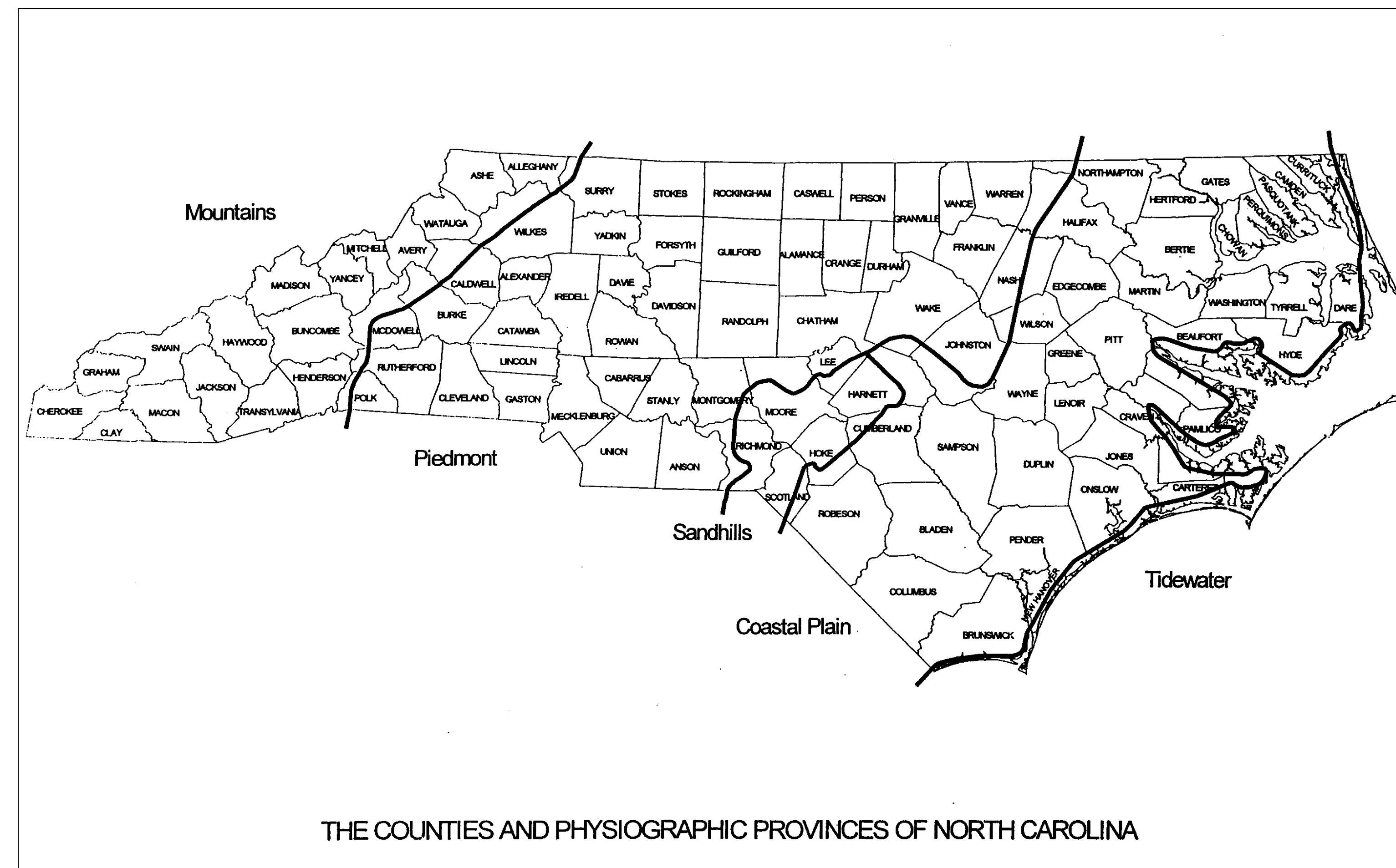
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Introduction

Lichens are composite organisms, consisting of a fungus and a photosynthesising partner, (an alga and/or cyanobacterium), which together make a life form that is distinct from either partner in isolation (Brodo et al. 2001). The relationship is a symbiosis, with the mycobiont providing a habitat for the photobiont, which in turn provides the fungus with carbohydrates for nourishment and in the case of cyanobionts with fixed nitrogen.

Lichens grow on most surfaces, including rocks, bark, wood and soil. They come in a wide array of colors. Morphologically they are also varied, with three major growth forms or habits: crustose (crust-like), foliose (leaf-like) and fruticose (shrub-like or otherwise three-dimensional) (Fig. 1).



Current understanding of NC Piedmont lichen diversity

From the field surveys, plus a refined understanding of the Piedmont Ecoregion, and a review of collection records of the New York Botanical Garden's virtual herbarium, the current lichen checklist for the North Carolina Piedmont region numbers over 380 species. However, this is still preliminary as much of the Piedmont has yet to be explored. A complete inventory of the lichens of the North Carolina Piedmont may yield a diversity up to 500 species. This includes species yet to be discovered, as 13 new species were described during the time of this project (2005-2009).

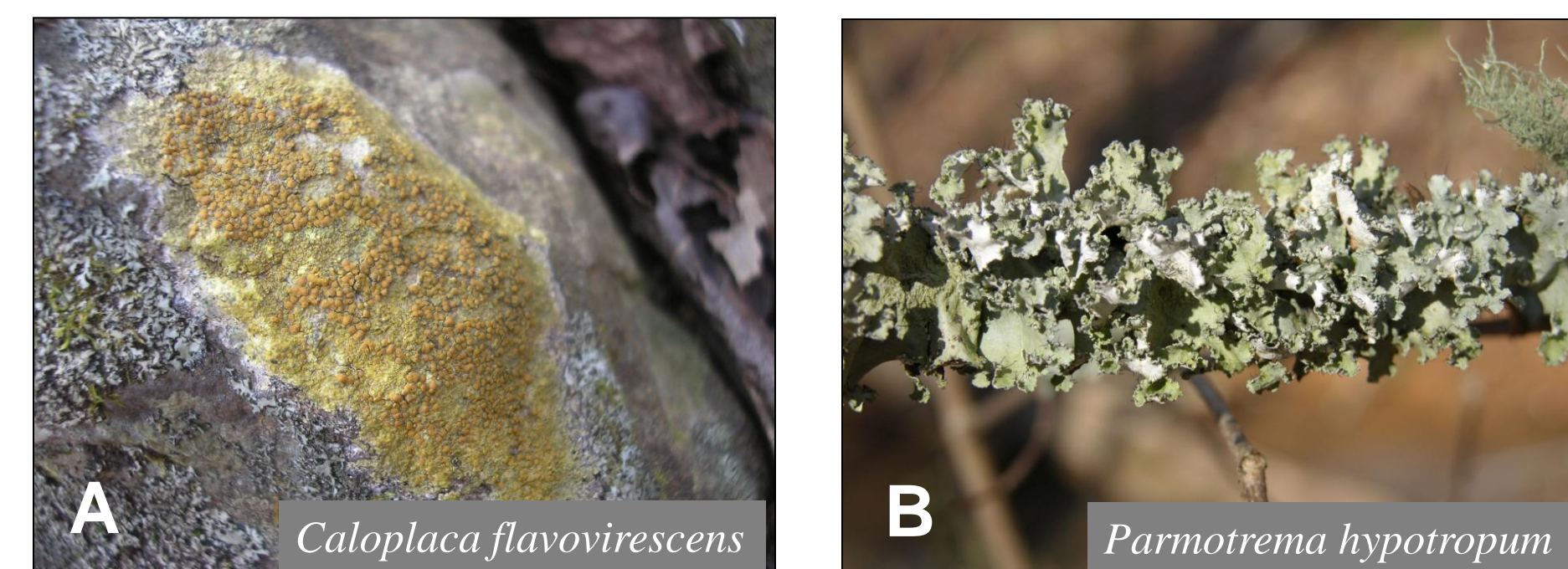


Fig. 1. Lichen habits & substrates. A. crustose on rock, B. foliose on bark, C. fruticose on wood.

Stage I: state checklist

The first step toward building a lichen flora is to determine what is already known. Therefore, the literature was reviewed to estimate the number of lichen species documented in North Carolina. During the initial review an online state checklist was found (<http://www.checklists.de>), documenting about 130 species, as well as several scattered reports. An attempt to compile a more comprehensive checklist from these sources 2005 resulted in a 4-fold increase. Peer review was post-publication, which resulted in a subsequent revision published later that year with an increase of over 100 additional species. With many discoveries being made through active lichen exploration, this too became obsolete. The online version was updated, incorporating these checklist revisions with the aim to keep the growing checklist current through periodic updates. Monitoring of the literature (print and online) continues with the current listed lichen diversity in North Carolina approaching 1,000 species.

NC lichen checklist version	No. species
Feuerer (2004) (online)	136
Perlmutter (2005)	605
Perlmutter & Greene (2005)	731
Perlmutter (2008) (online)	853
Perlmutter (unpubl.)	944

Stage II: herbaria review

To complete the background information stage of this project, local herbaria holdings plus records of 15 online herbaria databases were reviewed for lichen species of the North Carolina Piedmont, producing a first checklist of lichens of this region with a total of 338 species, including 22 state records (Perlmutter 2006). This flora was broken down by growth habit, and was found to be biased toward the more easily collected and identified foliose and fruticose habits.

Habit	No. Species	Percent of reviewed collections
Crustose	107	32%
Foliose	158	47%
Fruticose	73	21%

Stage III: field surveys

Several field surveys and collecting trips were made throughout the North Carolina Piedmont, including state parks, nature preserves and the City of Raleigh. These yielded several additions to the state and regional checklists, plus new species to science.

Area surveyed	No. species	New Piedmont records
William B. Umstead State Park (2006-7)	153	46
Mason Farm Biol. Reserve (2007)	104	14
Uwharrie Mtns (2008)	73	6



Chryothrix insulzans R.C. Harris & Ladd
Described 2008. On rock.

Lepraria friabilis Lendemer et al.
Described 2008. On pine.

Leiorreuma explicans Lendemer & K. Knudsen
Described 2008. On maple.

Literature cited

- Brodo, I.M., S.D. Sharnoff & S. Sharnoff. *Lichens of North America*. Yale University Press, n=New Haven Connecticut.
- Perlmutter, G.B. 2005. Lichen checklist for North Carolina, USA. *Evansia* 22(2): 51-77.
- 2008. Checklist of lichens and lichenicolous fungi of North Carolina (USA). Version 1 October 2008. - <http://www.checklists.de>.
- and D.N. Greene. 2005. Corrections and additions to the North Carolina, USA lichen checklist. *Evansia* 22(4): 126-137.

Acknowledgments

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For further information

Please contact lushik@aol.com. Related checklists can be found at <http://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm>, <http://sciweb.nybg.org/science2/hcol/lena/index.asp>, and <http://www.checklists.de>. Electronic copies of published reports from this project are available upon request.

Prior to this project, very little was known of the lichen diversity of North Carolina Piedmont habitats. The aim of this Final Project was to build a lichen biodiversity baseline of the North Carolina Piedmont for future studies including those involving impacts of land use changes (i.e. real estate development and resulting habitat loss), air pollution and climate change. This Project consists of three stages:

1. a working checklist for the state of North Carolina compiled from the literature,
2. an annotated checklist of lichen taxa of the state's Piedmont physiographic province built largely from an extensive herbaria survey, and
3. a lichen flora based on field surveys.