wild flower

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From Frederick Pursh, Flora Americae septentrionalis (1813)

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Beyond all plans and programs, true conservation is ultimately something of the mind-an ideal of those who cherish their past and believe in their future. Our civilization will be measured by its fidelity to this ideal as surely as by its art and poetry and system of justice.

Udall, 1963

wild flower NCNPS Journal

Editor: Katherine Schlosser

Articles on the native plants of North Carolina, the environment, conservation issues, persons of interest, or other related topics are welcome. Submit such articles to the editor electronically (kathyschlosser@aol.com) or by mail to 1402 Bearhollow Road, Greensboro, NC 27410.

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Cover Illustration: *Clarkia pulchella.*

“I met with a singular plant today in blume," wrote Meriwether Lewis on June 1, 1806, "of which I preserved a specemine. It grows on the steep sides of the fertile hills near this place." He described the root, stem, branches and leaves, and finally the parts of the delicate flower later named for him by Frederick Pursh. A label which possibly was written by Pursh, says "A beautifull herbaceous plant from the Kooskooskee & Clark's R. Jun. 1st 1806."

Of the more than 200 specimens collected, only five bear the names of Lewis or Clark:

Clarkia pulchella (Ragged robin)
Lewisia rediviv (Bitterroot)
Linum lewisii (Lewis’ prairie flax)
Lewisia triphylla (Linear leaved montia)
Philadelphus lewisii (Mock orange)

Welcome to Northeastern Coast Chapter

The North Carolina Native Plant Society has formed a new chapter for the northeastern coastal region.

Kathy Mitchell of the NC Aquarium at Manteo on Roanoke Island Susan Ruiz-Evans of the NC Cooperative Extension – Dare County Center recently presented lectures to members of the North Carolina Native Plant Society. Inspired by the enthusiasm of the group and anticipating the participation of local residents, Ms. Mitchell and Ms. Ruiz-Evans accepted the challenge of the NCNPS to create a local chapter for the northeastern coastal region.

The NCNPS, founded by 1951 as the NC Wildflower Preservation Society, promotes enjoyment and conservation of native plants and their habitats through educational programs, advocacy for habitat protection, and propagation of native plants. Chapters feature programs of local interest and hikes to natural areas within an easy day's drive.

Rain Gardens

Lara Rozzell

Looking for a new application for native plants in your yard? How about flood control and water purification?

As cities develop and grow, more of the ground surface is covered with impervious (waterproof) surfaces. During rainstorms, water is stuck on the surface, looking for places to go. Flooding often results. ***Rain gardens*** receive water from an impervious surface, holding the water for a day or two so it can absorb into the ground below.

Residential rain gardens are simple – just small depressions dug in a carefully placed spot in the yard. Water from roof downspouts or the driveway can be directed into the rain garden. In the garden, native plants, mulch, and soil absorb and filter the water. Rain gardens are shallow (3-6 inches), and often quite small. They are designed to hold water for less than 48 hours, so there isn't time for mosquito eggs to hatch and mature while the water is present.

A Durham rain garden mixes native and non-natives, shade and sun tolerant plants

Depending on the amount of water and the soil type in your yard, native plants that usually grow on streambanks or in wetlands will thrive in a rain garden. Native plants growing on streambanks are accustomed to repeatedly "getting their feet wet" in the wetter times of the year, and having their roots in very dry soil during the dryer parts of the year. If you have a well-drained soil, it will be alternately flooded and very dry in the rain garden. If your soil doesn't drain well, you might need wetland plants, accustomed to wet soil for more of the year.

A flooded rain garden right after a rainstorm. Rain gardens are designed to drain within 48 hours to prevent mosquitoes from breeding.

Gardeners have many choices for the look, smell, and feel of their rain garden. The simplest rain garden contains perhaps a single red maple, or a few small shrubs. Or you can liven up the garden with ornamental grasses, brightly flowering perennials, and ground cover. Rain gardens do best in sunny spots, but some landscapes only provide shady spots, so there are shade-tolerant rain garden plants as well. Hardwood mulch gives the garden a finished look, and absorbs pollutants from the water flowing into the garden. Gardens can be planted sparsely or pruned for a formal landscaping look, or planted more densely and allowed to grow and fill the space entirely for a natural, ungroomed look.

Below is a short list of recommended native plants for rain gardens…many

more North Carolina native suggested plants can be seen at www.bae.ncsu.edu/topic/raingarden.

Trees

Red Maple (*Acer rubrum*)
River Birch (*Betula nigra*)
Bald Cypress (*Taxodium distichum*)
Ironwood (*Carpinus caroliniana*)
Fringe tree (*Chionanthus virginicus*)
Redbud (*Cercis canadensis*)

Shrubs

Virginia Sweetspire (*Itea virginica*)
Button Bush (*Cephalanthus occidentalis*)
Inkberry (*Ilex glabra*)
Winterberry (*Ilex verticillata*)
Sweet Pepperbush (*Clethra alnifolia*)
Yaupon Holly (*Ilex vomitoria*)
Leucothoe (*Leucothoe fontanesiana*)
Red Chokeberry (*Aronia arbutifolia*)

Herbaceous Species

Blue Flag Iris (*Iris versicolor*)
Southern Blue Flag Iris (*Iris virginica*)
Pitcher plant (*Sarracenia* spp.)
Cardinal Flower (*Lobelia cardinalis*)
Cinnamon fern (*Osmunda cinnamomea*)
Royal fern (*Osmunda regalis*)
Green and gold (*Chrysogonum virginianum*)
Swamp mallow (*Hibiscus moscheutos*)
River Oats (*Chasmanthium latifolium*)

For a look at the general shape and feel of a rain garden, visit the demonstration rain garden just installed at the Museum of Life and Science in Durham. High school students designed and planted the garden, and were honored in a ribbon-cutting ceremony on August 12th. More demonstration rain gardens are coming soon - the EPA awarded a grant to NCSU Extension to install demonstration rain gardens around the state of North Carolina. Master Gardeners, Extension Agents, and homeowners are working to install 30 gardens by September 30th.

Bill Hunt, NCSU professor of Biological and Agricultural Engineering, recruits grad students to install a rain garden in his home yard during halftime of the Clemson/ NC State game.

Rain gardens add visual interest to the landscape. For many gardeners, they provide an opportunity to use an entirely new set of plants. They also provide diverse habitat. Butterflies are common visitors to rain garden plants, and gardens with vertical structure provide shelter for birds. Carefully selected plants can provide food for birds over the winter. Swamp milkweed provides leafy food for young caterpillars, and nectar for adult butterflies.

Another flood control method can also be useful for your landscaping program. Rain barrels collect water from roof downspouts and save it for watering your lawn or garden. A 1,000 square foot roof catches 623 gallons of water in a 1-inch rain. Raleigh receives 44 inches of rain per year, meaning a small rooftop receives 27,412 gallons of rainwater! You can still have a rain garden with your rain barrels…just direct the overflow from the barrel to your nearby rain garden.

For more information on choosing a site for your rain garden, sizing it properly, and suggested plants, visit www.bae.ncsu.edu/topic/raingarden. If you would like rain garden materials mailed to you, call Lara Rozzell at (919) 513-4477. Take the chance to do your part in cleaning North Carolina water, decreasing stormwater runoff, and creating beautiful native plant habitat!

Crowder's Mountain

Mimi Westervelt

Members of the Triad Chapter met at Crowder's Mountain State Park on July 2, 2005. Joining the group were Jordan Metzgar, a graduate student at Duke focusing on ferns, and Emily, whose focus is lichens.

Emily and Jordan Metzgar, Mimi Westervelt

None of the participants had been to this monadnock* park and all quickly agreed upon the 1.7 mile King's Pinnacle Trail, which begins with a modest ascent peppered with large rock outcroppings. Most of the boulders were cloaked in lichens of varying form and color.

Halfway up the trail Jordan spotted Bradley's spleenwort, *Asplenium bradleyi*, nestled in the crevice of a huge boulder. It is identified by the rachis, which is green in the upper third to one-half and dark (purple to black) in the lower portion. Our second find of the day was dwarf juniper, *Juniperis comminus*. Several mat-like colonies were scattered along the trail. The needles appear in whorls of three, with one side appearing whitish and branchlets being three sided. The older growth of twigs is purplish-brown in color, while newer growth is more yellow.

One of the park rangers gave us of the location of another unusual species, the bear oak, *Quercus ilicifolia*. These were found along the trail, just before the final ascent to the pinnacle. *Quercus ilicifoliais* is only 2 to 3 meters tall, with broad leaves and pointed lobes. Its normal range is limited to Gaston, Stokes and Surry Cos., in NC. {Ken Bridle wrote a wonderful

article in Vol. XII, No.1 edition of thisthe NCNPS newsletter, which describes his experience with forest management to encourage this species.} From here the trail climbs over a small rock sheer, which was made easier to climb by natural ledges and handholds. Along the rock-lined ridge to the summit of King's Pinnacle, we were presented with broad vistas to the north, east and west. Sourwood blossoms littered the trail and there was plenty of room to spread out and enjoy the breeze. Just before lowering myself off the rock sheer, I noticed a few clumps of mountain sandwort, *Arenarua groenlandica,* anchored in the rock.

Cinnamon fern's hairy armpits

I also noticed an oddly familiar fruit hull: that of the American Chestnut, *Castane dentata*. As I searched above for the parent of this nut hull, I was thrilled to discover that the tree was in full bloom, something few in the group had seen before. It's hard to comprehend that this once-dominant species of the American forest has become nearly extinct within a generation.

Walking back down the trail we spotted a few golden rod in bloom, entire-leafed false foxglove, *Gerardia laevigata*, white flowering spurge, *Euphorbia corallota*, running cedar, *Lycopodium complanatum*, and yellow star grass, *Hypoxus hirsuta*. Several colorful varieties of mushroom, fungi and slime mold added interest to the woodland floor this summer day.

Toward the base of the mountain, we explored the banks of a brook, finding Lady Fern, *Athyrium filix-femina*, Royal Fern, *Osmunda regalis,* and Cinnamon Fern, *Osmunda cinnamomea*. Jordan showed the group one of the identifying features of Cinnamon Fern--on the underside of the blade, where the pinna meets the rachis, there lies a small, wooly tuft.

This "hairy armpit", as Jordan referred to it, distinguishes Cinnamon Fern from the sterile fronds of Interrupted Fern. We also noted colonies of yellow root, *Xanthorrhiza simplicissima.*

Leaving the trail, we visited the Park Office's native plant butterfly garden, which was in full bloom. Inside the Visitor's Center were displays of the various trails, local history and photos of the local flora and fauna. Traveling at a plant lover's pace, our morning trek took approximately 3 hours. We recommend a visit in spring when there may be more in bloom and less humidity. In any case, take along a camera, two bottles of water, a lightweight field guide and good hiking boots.

*Monadnock: a solitary piedmont mountain peak that is all remaining after the forces of erosion level out an ancient mountain

Partial Plant List courtesy of Jordan and Emily

Slime Molds, 2 species

Lichens
Cladina sp (Reindeer Moss/lichen)
Lasallia sp (toadskin lichen)
Cladonia sp
Flavoparmelia baltimorensis

Lycopods
Diphasiastrum digitatum (southern running-pine)

Ferns
Asplenium bradleyi (Bradley's spleenwort)
Asplenium platyneuron (ebony spleenwort)
Polystichum acrostichoides (Christmas fern)
Athyrium asplenioides (lady fern)
Osmunda regalis (royal fern)
Osmunda cinnamomea (cinnamon fern)
Pteridium aquilinum (bracken fern)
Botrychium virginianum (rattlesnake fern)

Gymnosperms
Juniperis communis (ground juniper)

Flowering Plants
Hypoxis hirsuta (Yellow star grass)
Castanea dentata (American chestnut) (with male flowers)
Monotropa uniflora (Indian pipe)
Gerardia flava (smooth false foxglove)
Euphorbia corollata (flowering spurge)

Asplenium bradleyi

Juniperus communis

Fairy cups lichen

From the editor:

Sara Martin was a NCNPS scholarship recipient. One of the requirements of her scholarship was that, on completion of her studies, she send us a copy of her thesis. A short version of her work follows, and was accompanied by this note:

"Here is the shortened version of my thesis. If you want a longer more detailed article I can send the full thesis. I am all done with school and taking a break from being a student. I got my masters in biology and am teaching part time at Haywood Community College and at Western Carolina university. I hope to land a full time position at Haywood Community College.

I currently live on the property where I did my research (with my husband) and hope to create a research program here on the land. If you know of any bright students or researchers looking for a location let them know about long branch environmental education center.

Thanks for everything,
Sara Martin
1934 Long Branch Rd. Canton NC 28716
828-646-3662
ecofairy@aol.com"

Measuring Vegetation Response at Long Branch Environmental Education Center

Sara Martin

The effects of environmental factors on plant species have been widely studied throughout the history of ecology. The importance of understanding these relationships has increased in the face of development that leads to habitat fragmentation and climate change. Quantitative description of these relationships is a first step toward understanding them. This study combined a natural experiment with such description to examine whether community composition in stands classified by landscape features can be reliably predicted from vegetation-environment relationships and whether these communities differ in response to disturbance.

Species distributions and community composition

Species composition and diversity change across landscapes due in part to changes in environmental factors that affect plant success. These changes in environmental factors are referred to as environmental gradients. Variation in factors such as light, nutrients, and water—variables that directly affect plant growth—are characterized as direct environmental gradients. Environmental factors like elevation, aspect, and slope do not directly affect plant growth, but they do influence direct gradients. Changes in these factors are described as indirect environmental gradients. Shifts in composition along environmental gradients reflect the fact that species differ in the environmental conditions they can tolerate.

Although many plant species have distributions that span a range of environments, the abundance of a species typically changes along environmental gradients according to variation in the capacity of individuals to grow and reproduce (Huston 1994). Individuals of a species rarely have equal fitness across an entire environmental gradient. Rather, individual fitness is typically higher in regions of a gradient where physiological performance is maximized (MacArthur 1960; Mueller-Dumbois and Ellenberg 1974). The abundance of a species will often correspond to this pattern in individual fitness, with a species reaching maximum abundance where environmental conditions are optimal (MacArthur 1960; Whittaker et al. 1973; Austin 2002; Austin and Smith 1989). Abundance tends to decline toward lower ends of resource and productivity gradients due to stress from abiotic limitation; it also often

declines toward higher ends of such gradients due to competition (Grime 1979; Huston 1994). Consequently, most species have a unimodal distribution with respect to resource and productivity gradients, albeit they are often asymmetric (Austin 2002).

Changes in species' abundance patterns across landscapes are, like the underlying environmental gradients, usually gradual; therefore abrupt lines of demarcation rarely occur between different communities. The gradual nature of shifts in species composition is due to a variety of gradients changing independently of one another across the landscape (Whittaker 1956). Plant communities, then, are not the result of some random assortment of species; rather, they are changing mosaics of individual species with similar responses to environmental conditions.

Environmental gradients

Variables such as aspect, elevation, and slope curvature influence species diversity and community composition because they create gradients in variables that directly influence growth and reproduction. For example, species composition typically shifts from drought-tolerant species to shade-tolerant species when moving from south-facing to north-facing slopes because of changes in light, moisture, and soil nutrients (Whittaker 1956; Melillo et al. 1982; Hicks and Frank 1984; Lipscomb and Nilsen 1990; Olivero and Hix 1998; Hutchinson et al. 1999). Similarly, a shift from shade-tolerant to drought-tolerant species typically coincides with increased elevation in mesic regions characteristic of the eastern United States (Whittaker 1956). Not surprisingly, aspect and elevation also interact to affect species' abundances. Ginseng (*Panax quinquefolius*), for instance, is found at different elevations depending on aspect due to the effects these factors have on moisture and temperature (McGraw et al. 2003). Slope curvature also causes changes in species composition between noses and hollows due to movement of water and soil nutrients (Stephenson and Mills 1999; White et al. 2001). Like aspect, slope curvature interacts with elevation. For example, the presence of heath balds can be directly related to the interaction between slope position and elevation (White et al. 2001). Local topography can also cause shading of lower elevations, creating an environment that selects against species that lack shade tolerance (McNab 1992). All of these vegetation-environment patterns found in relation to landscape features lead us to believe that we can predict environmental conditions and community composition or at least community dominants from landscape features.

Disturbance and community composition

Disturbance, like resources and regulating conditions, also greatly affects community composition and diversity. In fact, disturbance often interacts with these other environmental factors. After initial disturbance, diversity increases with time as more species immigrate to an area (Huston 1979, 1994). The increase in diversity is limited, however, tending to reach a maximum and then decline due to sequestering of resources by dominant individuals. Disturbance like natural treefalls, if gradual and constant, can increase species diversity by opening new niches and reducing competitive suppression by dominant species (Huston 1994). Large, intense, and sudden disturbance events generally tend to cause an initial decrease in diversity due to inability of sensitive species to survive the event. Plants that specialize to endure such disturbance are often short-lived perennials that can colonize and reproduce after disturbance events (Grime 1977). In western North Carolina this type of disturbance often causes heath dominated understories (White et al. 2001).

Timber harvesting activities disturb many aspects of natural herbaceous communities. Removal of trees increases erosion and leaching of nutrients from the soil, reducing resources for herbaceous plants. Compaction of soil from roads and heavy equipment used for logging reduces porosity and may increase erosion by reducing infiltration during rains (Huang et al. 1996; Xu et al. 2002). These changes in soil quality affect the ability of herbaceous plants to grow and reproduce. Timber harvest also reduces canopy cover, increasing light intensity on the forest floor. Once the successional understory is established, light is subsequently reduced below pre-harvest levels. This sudden change in light intensity decreases survival of many herbaceous species by affecting germination, seed production, and growth rates (Small and McCarthy 2002).

Objectives

The overall objective of this research was to identify environmental gradients associated with community composition in the Sandy Mush/ Newfound Mountain region of western North Carolina. A related goal was to use the relationships found in the study to predict vegetation types from environmental factors in the region. However, this application assumes that community composition is reliably predicted from landscape features and associated environmental characteristics. Therefore, the study will also test the effectiveness of predicting community type from landform indices and landscape-based stand classifications. If landscape features accurately predict community type, then stands that are classified as the same type of community

should be more similar in landscape features and other environmental variables than stands classified as different communities.

The tracts studied differed in age but included sites that were topographically similar. This combination creates an opportunity to also test whether recovery of vegetation from disturbance is linked to topography and other landscape features. If recovery of vegetation from disturbance varies with topography, then the effect of age on community composition will differ among sites that differ in landscape classification. No effect would suggest that communities do not vary in response to disturbance based on topography.

The study was carried out on Long Branch Environmental Education center and its associated wildlife conservation lands. The 643 ha area is part of the Sandy Mush Basin in Buncombe and Haywood Counties of western North Carolina, incorporating areas on Newfound Mountain and Sandy Mush Bald. It is in the part of the southern Appalachians that Braun (1950) classified as oak-chestnut forest. Elevations range from 829 to 1570 m (the highest point in Buncombe County). Annual precipitation for the region is around 200 cm. Mean regional temperatures range from -2 to 22 ° C (White et al. 2001). The area has been geologically uplifted and is comprised of a variety of soil types underlain by metamorphic sedimentary rock. Soils at the site are acidic, deep, and well drained in nature. Most of the study area was logged in the early to mid 1900s; however, Big Sandy Mush Bald was selectively logged 20 years ago. This tract will be considered to be young portion of the study area while the other two plots will be considered of old age. The study area primarily contains late to mid successional hardwood forests with ericaceous understory that includes rhododendron and azaleas.

Overstory vegetation was not quantified, but low elevation plots seemed to be dominated by *Liriodendron tulipifera* and *Tilia americana*, whereas middle and high elevation plots seemed to be dominated by *Quercus* species, primarily *Q. montana* in middle elevations and *Q. rubra* at high elevations. There also seemed to be a distinct shift from deciduous midstory of *Hydrangea arborescens, Acer pennsylvanicum*, and *Halesia tetraptera* to more ericaceous shrubs as elevation increased.

A total of 147 understory herbaceous species were observed during spring sampling and 137 species in summer sampling in the study area. Among the most frequently encountered were *Polystichum acrostichoides*, *Aster divaricatum*, *Impatiens pallida*, *Stellaria pubera, Smilacina racemosa, Viola sororia, Sedum ternatum*, and *Arisaema triphyllum*.

A total of 147 understory herbaceous species were observed during spring sampling and 137 species in summer sampling in the study area. Among the most frequently encountered were *Polystichum acrostichoides*, *Aster divaricatum*, *Impatiens pallida*, *Stellaria pubera, Smilacina racemosa, Viola sororia, Sedum ternatum*, and *Arisaema triphyllum*. Dominant species in various plots included *Galax aphylla*, *Cimicifuga racemosa*, *Laportea canadensis*, *Toxicodendron radicans,* and *Dennstaedtia punctilobula*. *Toxicodendron radicans*, as well as other woody vines, were included in the study due to their direct competition with herbs on the forest floor. Several rare and locally infrequent species were also encountered, including *Phacelia fimbriata, Cypripedium calceolus, Prenanthes trifoliolata, Solidago caesia,* and *Solidago lancifolia*.

Detrended correspondence analysis suggested that species in the LBEEC property respond to several environmental gradients. Spring and summer analyses were consistent with other existing research by identifying relationships between soil nutrients and species composition in an area (Austin 2002; Myers et al. 2004). Gilliam and Turrill (1993) also found calcium to hold the strongest correlation to vegetation composition. According to Nault and Gagnon (1988) many spring ephemerals, including *Allium tricoccum*, sequester large amounts of calcium and magnesium levels in the leaves and reproductive tissues. These nutrients are important in cells division and growth, and therefore are essential to plants. The spring vegetation classifications and DCA axes may have been related to these cations because they were released back into the soil that was then sampled in August. Relationships between vegetation and moisture and solar radiation were also confirmed by other research (Wiser et al. 1998). However, Collins and Pickett (1988) found that the amount of open sky above a plot did not influence understory cover or richness.

The use of landscape variables to determine vegetation type seems quite possible from the data generated in this study. A key based on the relationship between vegetation type and environmental variables has been generated for use on the LBEEC lands (Tables 8 and 9). Not all communities were able to be separated based on the measured environmental factors. This may be due to the vegetation responding to unmeasured variables. This may also be due to the alteration of successional patterns by immigrating species that makes the habitat more or less suitable to other species due to the their presence (Huston 1979).

Table 8. A key to spring communities based upon measured environmental variables. Types D and H can be differentiated based on D being at higher elevations and H at lower ones (Inclination to Western horizon <30=D, >30=H). Type C is on more southerly ridges that type B, but they are hard to differentiate with the measured variables.

Solar Radiation/Aspect	pH	P, K, and Mg	Ca	Class	Dominants
High-Southerly	Low	Low	Low	A	*Prenanthes* and *Smilacina*
High-Southerly	Moderate	Moderate	Low	E	*Galax* and *Clitoria*
Moderate-E/W	Low	Low	Low	B	*Polystichum* and *Stellaria*
Moderate-E/W	Low	Low	Low	C	*Parthenocissus* and *Toxicodendron*
Moderate-E/W	Moderate	Moderate	Low	G	*Viola sororia* and *canadensis*
Moderate-E/W	High	High	High	D	*Aster divaricatum* and *Smilacina*
Moderate-E/W	High	High	High	H	*Cimifuga* and *Sedum*
Low-Northerly	Low	Moderate	Low	F	*Laportea* and *Aster divaricatum*

Table 9. A key to summer communities based upon measured environmental variables. Either age refers to a mix of both young and old pots in that community type. Types L and R can be differentiated as type R is at the top of ridges and type L is not. Community types I and Q can not be differentiated based on these variables.

Elevation	Age	Solar Radiation/Aspect	Nitrogen	Class	Dominants
Low	Young	High-southerly	Medium	J	*Smilacina* and *Toxicodendron*
Low	Young	High-southerly	Low	M	*Prenanthes* and *Parthenocissus*
Low	Either	Moderate-E/W	Medium	P	*Aster divaricatum* and *Cimifuga*
Medium	Old	High-southerly	Medium	K	*Galax* and *Pyrularia*
Medium	Either	Moderate-E/W	High	N	*Polystichum* and *Prenanthes*
Medium	Either	Moderate-E/W	Medium	I	*Viola sororia* and *Impatiens*
Medium	Either	Moderate-E/W	Medium	Q	*Geranium* and *Polystichum*
Medium	Old	Moderate-E/W	Medium	O	*Smilacina* and *Toxicodendron*
High	Young	Low-Northerly	High	L	*Prenanthes* and *Parthenocissus*
High	Young	Low-Northerly	High	R	*Cimifuga* and *Stellaria*

Summer vegetation did not display an extremely strong relationship between environmental factors and summer communities. This discrepancy may be due to the higher sensitivity of spring ephemerals to environmental conditions, these ephemerals had senesced before summer analysis. Although spring communities were dominated by summer species, ephemerals did contribute to classification through their presence in spring data. Spring ephemerals have been found to be strongly competitive for soil nutrients, more so than summer flowering species, that may be responding to a wider variety of factors in effect later in the season (Meier et al. 1995; McKenna and Hole 2000). This trend, compounded by the fact that many spring ephemerals have limited dispersal, creates dense patches of these herbs (McLachlan and Bazely 2001). McKenna and Hole (2000) also found that it is rare that two species are alike in resources requirements, and therefore two individuals of the same species may be fit in different habitat types. Summer species may be more varied in requirements and responses than spring ephemerals that primarily respond to nutrients and light. The added correlation to soil in the spring by these spring ephemerals may also be due to the vernal dam effect in that spring ephemerals sequester large amounts of nutrient resources in a time of great turnover and loss of these nutrients (Eickmeier and Schussler 1993). The senescence of these plants later in the season nourishes summer herbs and may contribute greatly to the summer community composition.

The low correlation coefficients with environmental measures generated by this study could indicate that other factors play a larger role in community composition than previously believed. The strong relationship between total cover or biomass and the DCA axes reflects that increased nutrients allow for increased biomass, compounding the relationship between composition and nutrient gradients, however richness also increases linearly along the axis. Competition driven communities would show a decrease or saturation of species richness that coincided with increased biomass. Stevens and Carson (1999) stated that as nutrients increase, biomass responds and most species grow in size and fitness. While this prevents dominants from displacing all species, it does cause the gradual loss of already rare species. The absence of any reduction of richness seems to indicate that competition may play a minor role on the LBEEC land. Such findings agree with Muller (1990) who found competition to be a minor player in the composition of herbaceous understory in the Hubbard Brook experimental forest in New Hampshire.

Dispersal may be a large determinant of species richness and vegetation competition in the area. Dispersal due to historical distribution

and migration is considered one of the two pillars of the ecological explanation of plant distributions by Nekola and White (2002). This is displayed by the close placement of plots to neighboring plots in summer DCA analysis. This could be due to a "homesite advantage" in that plants grow and reproduce more successfully close to the origins of their genetic heritage (Bennington and McGraw 1995). The greatest contributor to this assumption is the fact that many forest herbs produce low numbers of seed and have very specialized dispersal methods (Gilliam and Turrill 1993; McLachlan and Bazely 2001). Therefore, many herbs would be located primarily in areas near their source, for example a population of the species that survived the logging disturbance. Damman and Cain (1998) found that disturbance greatly affected composition because it disrupted plants that reproduce clonally, causing the need for recolonization and a great shift in the community composition. This is demonstrated in the BSMB area where herbs were highly clustered in areas that were not damaged during harvest; such as areas by cliffs and areas near steep stream banks (unpublished results).

The lack of correlation between some of the measured environmental gradients and the DCA axes could indicate that plants are responding to unmeasured environmental gradients. The depth and lignin composition of leaf litter can greatly affect species composition (Melillo et al. 1982; Xiong and Nilsson 1999; Tillman 1993). Further study could be done on canopy composition and the resultant leaf litter for the LBEEC land to determine its effects on understory composition and nutrient cycling. The lack of correlation between nitrogen and the DCA axes was unexpected as many studies have shown the opposite to be true (Gilliam and Turrill 1993; Hutchinson et al. 1999). However, this study recorded total nitrogen levels rather than available nitrogen. This may have affected the results of this study and could account for the discrepancy. Hicks (1980) found vegetation in the Great Smoky Mountains to be best predicted by soil depth, microtopography, dominance of hemlock, and soil moisture. These variables were not measured by this study. It has also been found that two areas that seem similar do not always have the same influences on communities (McCay et al. 1997) and therefore the results for this study may not be widely applicable and should be further tested.

While there is a long held belief that environmental factors are the main determinant of community composition, the relationship between measured environmental factors and summer DCA axes in this study suggests that this may not be the case for summer dominants or that perhaps they respond to less obvious gradients. These results suggest that

it is better to do indirect ordination and allow the plant communities to reveal the gradients they experience with a posteriori testing of environmental factors than to impose the measured factors and restrict the axes of the ordination in a direct analysis. The direct gradient ordination such as CCA may be creating inadequate evaluations of communities by imposing only the commonly measured environmental variables on the identified correspondence axes and not evaluating the actual gradient to which the species are responding.

Reliability of distinguishing between communities using landscape variables

Stands classified as different communities differed primarily in soil nutrients and several topographic factors including aspect and elevation. Spring vegetation types seemed to have more meaningful relationships with measured environmental factors than summer vegetation types because more communities varied from each other in the spring. This was particularly interesting as the soil samples should have been more highly related to summer vegetation due to timing of collection. It is also interesting because summer communities were no less separated across the DCA axes when the mean values of communities were found for the axes. Age was very important to summer types with four groups having either all old or young plots, D and E only young and C and G only old plots. When comparing the average DCA1 scores from the appropriate correspondence analysis, spring types had tighter associations between the dominant species' scores, but this may be due to the inclusion of spring ephemerals into the spring analysis.

There were often common species with wide tolerances as the dominants in the summer vegetation types. This skewed the dominants' average away from the community average despite the most dominant species having a comparable score to the community score. Olivero and Hix (1998) found that species with adaptations to broad ranges of environmental conditions often indicated communities that did not coincide with their optima on a DCA axis. These facts may suggest that all data should be analyzed rather than dividing it into categories of spring and summer, thereby including the important contribution of spring ephemerals to the vegetation typing. It also leads me to believe that despite the absence of some summer species, the spring models generated in this study are far more meaningful than those for summer data. This would also explain how summer communities J and O could have different topographic situations and the same community dominants.

There were many species that had fidelity to specific summer vegetation types, giving added meaning to these classifications and highlighting the importance of dispersal and colonization in community composition. Some rarely encountered species were in vegetation type I including *Silene virginica, Houstonia longifolia, Penstemon laevigatus, Pilea pumila*, and *Heuchera parviflora*. *Cypripedium calceolus* and *Polygonatum pubescence* were only found in type L. *Phacelia fimbriata* was only located in one plot in community type L as well. *Lillium superbum* was entirely in type P and type J contained all of the *Lysimachia cilliata*. However, many species did not share community types, but were occurring in plots with close proximity including *Corallorhiza maculata* in 7 and 8, *Hypeircum hypercoides* in 3 and 4 and *Hypericum ellipticum* in 3 and 5, as well as *Monarda didyma* in plots 33, 34 and 35. This fact highlights the importance of dispersal to community composition.

The poor relationship between community types generated by vegetation data and environmental data independently verifies the interpretation of ordination results that these vegetation types are not responding solely to obvious environmental stimuli. If similar dendrograms can not be generated using environmental data, determination of communities from environmental factors alone in order to make land management decisions should not be done hastily. Further study should be devoted to these discrepancies between community composition and environmental gradients to determine if this phenomenon is widespread.

Answering the question about topography and recovery from disturbance

This study concurred with many others on the fact that disturbance affects soil nutrients and measures of species richness (Small and McCarthy 2002; Damman and Cain 1998; Mclachlan and Bazley 2001; Meier et al. 1995; Gilliam and Turrill 1993). Out of a list of soil calcium, magnesium, potassium, phosphorus, bulk density, pH, organic carbon, total nitrogen, and cation exchange capacity, Allen (1985) found that only bulk density and soil phosphorus would return to pre-harvest levels. How the interaction of disturbance and topography can affect community composition, however, has not been studied to a great degree. This was the secondary question asked by this study; “Is there a significant interaction between topography and community age with respect to community structure”?

The interaction in richness between elevation class and age demonstrates that high elevation areas have more difficulty in recovering from disturbance. High elevation areas are rich with rare species that will

likely not recover from logging due to sensitivity and shear loss of small and widely spaced reproducing individuals from direct destruction (White and Miller 1988; Miller 1986). Another factor could be the erosion of high elevation soils down to middle and low elevations, increasing their nutrients and total richness after the disturbance. Meier et al. (1995) found an age-elevation interaction affected distributions of *Trillium sp*. in the Appalachian Mountains. Gilliam and Turrill (1993) also found a similar interaction in central Appalachia. These facts have implications for forest management as middle and low elevation, as well as south facing plots can recover from disturbance faster that other areas and should be considered for harvest instead of other more sensitive areas. Rich north coves and high elevation areas should not be disturbed if at all possible to insure their integrity as forest communities.

The McNab landform index was tested for herbaceous communities. Its irrelevance to most of the data analysis indicates that herbaceous communities may not be as sensitive to landform as the canopy species. However, components of the landform index, including degree of inclination to the south, were important to several analyses indicating the herbs do respond to the amount of light they receive. Therefore the idea of how landforms shade plant communities does apply to herbaceous communities, just not the actual index itself. The index's power to determine stands has not been contested because canopy species were not surveyed; however, it is not as useful in small scale evaluation of understory communities.

Species richness and species responses

Multiple regression analysis supported many ideas about the effectors of species richness including age, nutrients, aspect, and elevation (White and Miller 1988; Miller 1986; Wiser et al. 1998; McEwan et al. 2005; Meier et al. 1995; Gilliam and Turrill 1993). White and Miller (1988) also found that species richness was best modeled by simple linear regressions.

Average richness was strongly related to the DCA1 for both spring and summer; however, total richness for plots was not. This may be due to the inclusion of rare species with increasing area that may be responding to different factors than what the DCA axes represent. White and Miller's (1988) findings of increased area as the best predictor of rare species richness would support this idea; however this could also be due to the fact that richness only represents a number. Both studies by McLachlan and Bazely (2001) and Gilliam and Turrill (1993) found no significant

differences in species richness, but extremely different species composition within their study areas. Total richness may stay relatively stable, while species composition changes between different species best suited to the area. This may be driven by environmental factors, dispersal, flowering time, or especially age of the area in reference to disturbances.

Individual species' responses to the gradient defined by the DCA's are important in evaluating an individual species' tolerance, as well as its optimum environmental conditions. The applications of this knowledge can allow for the identification of habitats that would be suitable for species reintroduction within the property, as well as location of the species based on the environment. The somewhat abstract relationship between topography and soil nutrients does not make this task easy. The DCA gradients are primarily nutrient driven and the relative location of the species must be evaluated using results that show how soil conditions respond to topographic variation. However the additional correlations to moisture, light, and possible competition and dispersal can allow the land manager to make assumptions about unknown locations of species, or of additional individuals if a location is already discovered.

Specifics on methods and results can be obtained via contact with Sara Martin

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Honoring Lewis & Clark

> *Botany I rank with the most valuable sciences, whether we consider its subjects as furnishing the principle subsistence of life to man and beast, delicious varieties for our tables, refreshments from our orchards, the adornments of our flower borders, shade and perfume of our groves, materials for out buildings, or medicaments for our bodies*. Thomas Jefferson

Before the year is out, and as the country winds down its celebration of the bicentennial of the Lewis & Clark Expedition, it is fitting that the NC Native Plant Society recognize in some small way the accomplishments of those who made the journey. The Expedition, envisioned and made possible by Thomas Jefferson, was underway in July of 1804 following a year of preparation. The stories of their adventures and discoveries are the subject of every child's schooling, and every amateur botanist's dreams.

For those whose interests continue, we can suggest the following reading list. For those with an interest in the plants that were collected on the expedition, also following is a list, complied by date and location, which would make for an interesting modern day adventure for those who have not already undertaken such a trip.

Suggested Reading (submitted by Rudi Schmid, Berkeley, CA).

1. Botkin, Daniel B. 2004. *Beyond the stony mountains: Nature in the American West from Lewis and Clark to today*. Oxford University Press, New York (www.oup.com). xvii, [ii], 284 pp., ill. (most col.), ISBN 0195162439 (HB), $38.00.

   Contents: L&C near St. Louis; changing Missouri R. (MR); e. woodlands; tall- grass prairie; restoring lower MR; Platte R., Lost Hills; L&C among the Mandans; Amer.'s Serengeti; upper MR; to the Rocky Mts.; Bitterroot Mts.; Snake, Columbia Rs.; forests at mouth of Columbia; in wake of L&C; biblio.; index
2. Johnsgard, Paul A. 2003. *Lewis and Clark on the Great Plains: A natural history*. University of Nebraska Press, Lincoln (www.nebraskapress.unl.edu), w/ the Center for Great Plains Studies,

Lincoln. xii, [1], 143 pp., ill., ISBN 0803276184 (PB), price unknown.

Contents: hist. overview; Kansas-Missouri, Nebraska-Iowa; Dakotas; Montana; L&C sites of biol., hist. interest in cen., upper Missouri Valley; biblio.; index.

3. Munger, Susan H. (text) & Thomas, Charlotte Staub (ill.). 2003. *Common to this country: Botanical discoveries of Lewis and Clark*. Artisan, New York (www.artisanbooks.com). 128 pp., ill. (most col.), ISBN 1579652247 (HB), $22.95.

   Contents: foreword by V. Klinkenborg; intro; descr. pt.; Lewis and Clark Herbarium; biblio.; note; no index.
4. The jewel in the crown (yes, it was a great 1984-85, 13 part TV series that I recently rewatched on DVD) of the expansionist phase in the history of the United States was the Lewis and Clark Expedition (1804-06). Botany and zoology were immensely enriched by this expedition, not only by its collections but also by the diaries of its participants, notably Captain
   Meriwether Lewis (1774-1809).
5. G.E. Moulton (ed.), *The journals of the Lewis & Clark Expedition*,
6. H.W. Phillips, *Plants of the Lewis and Clark Expedition* (2003),
7. S.A. Ritter, *Lewis and Clark's mountain wilds: A site guide to the plants and animals they encountered in the Bitterroots* (2002),
8. G. Wells & D. Anzinger, *Lewis and Clark meet Oregon's forests: Lessons from dynamic nature* (2001)

Munger & Thomas's book (128 pages) is an engaging account of 25 plant species, *Maclura pomifera* (osage orange) to *Oenothera cespitosa* (gumbo evening primrose), chronologically arranged as they were encountered by the expedition, supplemented with fine watercolors and copious excerpts from Meriwether Lewis's diary. It is a work to savor. Phillips's aforenoted book is comparable but broader in scope, whereas Ritter's aforecited work also includes animals, but focuses only on the Bitterroot Range in Idaho and Montana.

The little book by Johnsgard (156 pp.), who has written extensively on Nebraska, covers the Great-Plains segment of the expedition. It contains much natural history and is interestingly written, but its fine monochromatic illustration by Johnsgard (39 figures, 5 chapter vignettes, 6 maps) makes this

work less colorful than the others mentioned here.

Botkin's scholarly work (303 pp.) is a well- written history and natural history of the entire expedition, a fine and ambitious overview with comparisons to present conditions. Illustration is copious: 13 B&W and 81 color photos/paintings, 4 line drawings, but, alas, no general map of the expedition. Botkin's fascinating slant on LewisClarkiana is his then- and-now
comparisons, which are facilitated by some repeat photos. The book is a gem amidst the bicentennial Lewis-and-Clark effusia.

The Plants of the Lewis & Clark Expedition

* Not in the herbarium at The Academy of Natural Sciences in Philadelphia
** probable place, date

MISSOURI

- **Osage orange** (*Maclura pomifera*)
  St. Louis, March 26, 1804

The panhandle of Idaho was filled with great snowpuffs of ocean-spray blooms (Holodiscus discolor) in spring 1806 as the explorers waited for warmer weather before heading back east over the Bitterroot Range. The shrub still clings to cliffsides along the Clearwater River. Lewis documented it May 29, 1806, while at Camp Chopunnish. Photo by Joan Carlin, The Oregonian

NEBRASKA

- **Broad-leaved gum plant**, (*Grindelia squarrosa*)
  Dakota County, Aug. 17, 1804
- **Prairie apple** (*Pediomelum esculentum*)
  Site unknown, August 1804
- **Silvery buffalo-berry** (*Shepherdia argentea*)
  Niobrara River, Sept. 4, 1804

SOUTH DAKOTA

- **Lance-leaved psoralea** (*Psoralidium lanceolatum*)
  Upper Missour River, Date unknown, 1804
- **Large-flowered clammy weed** (*Polanisia trachysperma*)
  Vermillion, Aug. 25, 1804
- **Pink cleome** (*Cleome serrulata*)
  Vermillion, Aug. 25, 1804
- **Cut-leaved sideranthus** (*Machaeranthera pinnatifida*)
  Chamberlain, Sept. 15, 1804
- **Linear-leaved wormwood** (*Artemisia dracunculus*)
  Chamberlain, Sept. 15, 1804
- **Missouri milk vetch** (*Astragalus missouriensis*)
  Chamberlain, Sept. 18, 1804

- **Broomweed** (*Gutierrezia sarothrae*)
  Big Bend, Missouri River, South of Pierre, Sept. 19, 1804
- **Aromatic aster** (*Aster oblongifolius*)
  Big Bend, Missouri River, Sept. 21, 1804
- **Bushy atriplex** (*Atriplex canescens*)
  Big Bend, Missouri River, Sept. 21, 1804
- **Few-flowered psoralea** (*Psoralea tenuiflora*)
  Big Bend, Missouri River, Sept. 21, 1804
- **Squaw bush** (*Rhus trilobata*)
  Cheyenne River, Oct. 1, 1804
- **Hoary sagebrush** (*Artemisia cana*)
  Cheyenne River, Oct. 1, 1804
- **Long-leaved mugwort** (*Artemisia longifolia*)
  Cheyenne River, Oct. 1, 1804
- **Fetid rayless goldenrod** (*Ericameria nauseosa*)
  Cheyenne River, Oct. 2, 1804
- **Indian tobacco** (*Nicotiana quadrivalvis*)
  Grand River, Oct. 12, 1804

NORTH DAKOTA

- **Silver-leaved psoralea**, (*Pediomelum argophyllum*)
  Cannon Ball River, Oct. 17, 1804
- **Woods' rose** (*Rosa arkansana*)
  Cannon Ball River, Oct. 18, 1804
- *** Purple coneflower** (*Echinacea angustifolia*)
  Fort Mandan, April 7, 1805
- **White milkwort** (*Polygala alba*)
  McKenzie County, Aug. 10, 1806

MONTANA

- *** Fragile prickly pear** (*Opuntia fragilis*)
  Musselshell River, May 20, 1805
- *** Tansy** (*Tanacetum nuttallii*)
  Teton River, June 6, 1805
- *** Narrowleaf cottonwood** (*Populus angustifolia*)
  Great Falls, June 12, 1805
- *** White squaw currant** (*Ribes cereum*)
  Great Falls, June 18, 1805
- *** Dwarf thistle** (*Cirsium drummondii*)
  Three Forks, July 23, 1805
- *** Western paper birch** (*Betula occidentalis*)
  Jefferson River, Aug. 3, 1805
- **Lewis's monkey flower** (*Mimulus lewisii*)
  Lemhii Pass**, August 1805
- *** Western huckleberry** (*Vaccinium occidentale*)
  Lolo Trail, June 28, 1806
- *** Mountain lady's slipper** (*Cypripedium montanum*)
  Lolo Hot Springs, June 30, 1805
- **Black cottonwood** (*Populus balsamifera* ssp. *trichocarpa*)
  Travelers' Rest**, July 1 or 2, 1806

- **Needle and thread grass** (*Stipa comata*)
  Unknown site, July 8, 1806
- **Bitterroot** (*Lewisia rediviva*)
  Travelers' Rest, July 1 or 2, 1806
- **Owl's clover** (*Orthocarpus tenuifolius*)
  Travelers' Rest, July 1 or 2, 1806
- **Narrow-petaled stonecrop** (*Sedum stenopetalum*)
  Travelers' Rest, July 1 or 2, 1806
- **Small-headed clover** (*Trifolium microcephalum*)
  Travelers' Rest, July 1 or 2, 1806
- **Large monkey flower** (*Mimulus guttatus*)
  Missoula, July 4, 1806
- **Silverberry** (*Elaeagnus commutata*)
  Powell County, July 6, 1806
- **Silver oxytrope** (*Oxytropi besseyi*)
  Blackfoot River**, July 6, 1806**
- **Western blue-flag** (*Iris missouriensis*)
  Powell County, July 6, 1806
- **Lousewort** (*Pedicularis cystopteridifolia*)
  Powell County, July 6, 1806
- **Antelope bitterbrush** (*Purshia tridentata*)
  Powell County, July 6, 1806
- **Involucred fly-honeysuckle** (*Lonicera involucrata*)
  Lewis and Clark County, July 7, 1806
- **Great-flowered gaillardia** (*Gaillardia aristata*)
  Lewis and Clark County, July 7, 1806
- **Silvery lupine** (*Lupinus argenteus*)
  Lewis and Clark County, July 7, 1806
- **Glaucous zygadene** (*Zigadenus elegans*)
  Lewis and Clark County, July 7, 1806
- **Lewis's wild flax** (*Linum lewisii*)
  Rocky Mountain valleys, July 9, 1806
- **Scapose primrose** (*Oenothera cespitosa*)
  Great Falls, July 17, 1806
- **Nuttall's atriplex** (*Atriplex gardneri*)
  Marias River, July 20, 1806
- **Red false mallow** (*Sphaeralcea coccinea*)
  Marias River, July 20, 1806
- **Greasewood** (*Sarcobatus vermiculatus*)
  Marias River, July 20, 1806
- *** White-margined spurge** (*Euphorbia marginata*)
  Yellowstone River, July 28, 1806
- **Plains cottonwood** (*Populus deltoides* ssp. *monilifera*)
  Unknown site, August 1806

Fires are a natural part of the cycle of forest growth. Most are caused by lightning, though this one in the Bitterroot Range last July was caused by a spark. Lewis and Clark saw much evidence of fire along their trail, first on the prairie, then in the

forests. Tribes managed the forest by intentionally setting some fires. Today, fire management by the forest service is complicated by people moving their homes and towns into the forests.

IDAHO

- * **Rocky Mountain maple** (*Acer glabrum*)
  Lemhi River, Aug. 13, 1805
- * **Western red baneberry** (*Actaea arguta*)
  Lemhi River, Aug. 13, 1805
- **Sitka mountain ash** (*Sorbus scopulina*)
  Lemhi County, Sept. 4, 1805
- * **Western larch** (*Larix occidentalis*)
  Lolo Trail, September 1805
- * **Subalpine fir** (*Abies lasiocarpa*)
  Lolo Trail, September 1805
- * **Engelmann's spruce** (*Picea engelmannii*)
  Lolo Trail, September 1805
- * **Whitebark pine** (*Pinus albicaulis*)
  Lolo Trail, September 1805
- * **Lodgepole pine** (*Pinus contorta*)
  Lolo Trail, September 1805
- * **Sitka alder** (*Alnus sinuata*)
  Lolo Trail, September 1805
- * **Western red cedar** (*Thuja plicata*)
  Lolo Trail, September 1805
- * **Pacific yew** (*Taxus brevifolia*)
  Lolo Trail, September 1805
- * **Common snowberry** (*Symphoricarpos albus laevigatus*)
  Lolo Trail, Sept. 20, 1805
- **Ponderosa pine** (*Pinus ponderosa*)
  Canoe Camp, Oct. 1, 1805
- **Sticky laurel** (*Ceanothus velutinus*)
  Clearwater River**, Fall 1805**
- **Lewis's lomatium, Biscuit root** (*Lomatium triternatum*)
  Clearwater River, May 6, 1806
- **Lewis's syringa, Mock orange** (*Philadelphus lewisii*)
  Clearwater River, May 6, 1806
- **Rabbit brush** (*Chrysothamnus viscidiflorus*)
  Clearwater River, May 6, 1806
- **Showy phlox** (*Phlox speciosa*)
  Clearwater River, May 7, 1806
- **Yellow bell** (*Fritillaria pudica*)
  Clearwater River, May 8, 1806
- **Cut-leaf daisy** (*Erigeron compositus*)
  Clearwater River**, Date unknown

  ALL FROM CAMP CHOPUNNISH

  - **Mariposa lily** (*Calochortus elegans*)
    May 17, 1806
  - **Cascade penstemon** (*Penstemon wilcoxii*)

May 20, 1806
- **Sugar bowls** (*Clematis hirsutissima*)
  May 27, 1806
- **Cascara sagrada** (*Frangula purshiana*)
  May 29, 1806
- **Ocean-spray** (*Holodiscus discolor*)
  May 29, 1806
- **Tolmie's onion** (*Allium tolmiei*)
  May 30, 1806
- * **Geyer's onion** (*Allium geyeri*)
  May 30, 1806
- **Ragged robin** (*Clarkia pulchella*)
  June 1, 1806
- **Western wallflower** (*Erysimum capitatum*)
  June 1, 1806
- **Orange honeysuckle** (*Lonicera ciliosa*)
  June 5, 1806
- **Silky lupine** (*Lupinus sericeus*)
  June 5, 1806
- **Narrow-leaved skullcap** (*Scutellaria angustifolia*)
  June 5, 1806
- * **Giant rye grass** (*Elymus condensatus*)
  June 5, 1806
- **Oregon sunshine** (*Eriophyllum lanatum*)
  June 6, 1806
- **Virgate phacelia** (*Phacelia heterophylla*)
  June 9, 1806
- **Rayless chamomile** (*Matricaria matricarioides*)
  June 9, 1806

ALL FROM WEIPPE PRAIRIE AREA IN IDAHO

- **Blue bunch wheat grass** (*Festuca idahoensis*)
  June 10, 1806
- **Hair grass** (*Aira brevifolia*)
  June 10, 1806
- **Common lomatium** (*Lomatium dissectum* var. *multifidum*)
  June 10, 1806
- * **Umatilla gooseberry** (*Ribes cognatum*)
  June 10, 1806
- * **Cluster rose** (*Rosa pisocarpa*)
  June 10, 1806
- * **Nootka rose** (*Rosa nutkana*)
  June 10, 1806
- **Tassels** (*Geum triflorum*)
  June 12, 1806
- **Western snakeweed** (*Polygonum bistortoides*)
  June 12, 1806
- **Northern sun cup** (*Camissonia subacaulis*)
  June 14, 1806
- **Clustered swertia** (*Frasera fastigiata*)

June 14, 1806
- **Bear grass** (*Xerophyllum tenax*)
  June 15, 1806

ALL FROM THE LOLO TRAIL

- **Yellow fawn lily** (*Erythronium grandiflorum*)
  June 15, 1806
- **Shrubby penstemon** (*Penstemon fruticosus*)
  June 15, 1806
- **Petioled wake-robin** (*Trillium petiolatum*)
  June 15, 1806
- *** Yellow-flowering pea** (*Lathyrus ochroleucus*)
  June 16, 1806
- *** Northwest crimson columbine** (*Aquilegia formosa*)
  June 16, 1806
- **Sticky currant** (*Ribes viscosissimum*)
  June 16, 1806
- **Camas** (*Camassia quamash*)
  Weippe Prairie
  June 23, 1806
  (Snow forced the explorers back down from the Lolo Trail for 9 days, when this plant was picked from the prairie.)
- ***Angelica* sp.**
  June 25, 1806
- **California false hellebore** (*Veratrum californicum*)
  June 25, 1806
- **Lewis and Clark's synthyris** (*Synthyris missurica*)
  June 26, 1806
- **Scarlet gilia** (*Ipomopsis aggregata*)
  June 26, 1806
- **Jacob's ladder** (*Polemonium pulcherrimum*)
  June 27, 1806
- ***Long-tailed wild ginger** (*Asarum caudatum*)
  June 27, 1806
- ***Buckbrush; chaparral** (*Ceanothus sanguineus*)
  June 27, 1806
- **Western spring beauty** (*Claytonia lanceolata*)
  June 27, 1806
- **Linear-leaved montia** (*Lewisia triphylla*)
  June 27, 1806

OREGON

All from Snake River

- **Eaton's aster** (*Aster eatonii*)
  Oct. 11, 1805**
- *** Netleaf hackberry** (*Celtis reticulata*)
  Oct. 12, 1805
- *** Peach-leaved willow** (*Salix amygdaloides*)
  Oct. 12, 1805
- *** Slender willow** (*Salix exigua*)
  Oct. 12, 1805

    - *** Prickly pear cactus** (*Opuntia polyacantha*)
      Oct. 16, 1805
- **Vine maple** (*Acer circinatum*)
  Hood River County, Oct. 30, 1805
- **Madrone** (*Arbutus menziesii*)
  Columbia River, Nov. 1, 1805
- ***White alder** (*Alnus rhombifolia*)
  Cowlitz River, Nov. 6, 1805
- **Oregon boxwood** (*Paxistima myrsinites*)
  Cape Disappointment, Nov. 16, 1805
- ***Oregon ash** (*Fraxinus latifolia*)
  Astoria, Nov. 30, 1805
- ***California rhododendron** (*Rhododendron macrophyllum*)
  Astoria, Nov. 30, 1805
- *** California hazelnut** (*Corylus californica*)
  Deschutes River, Oct. 22, 1805
  ALL FROM FORT CLATSOP:
    - **Salal** (*Gaultheria shallon*)
      Jan. 20, 1806
    - *** Western bracken** (*Pteridium aquilinum pubescens*)
      Jan. 22, 1806
    - *** Seashore lupine** (*Lupinus littoralis*)
      Jan. 24, 1806
    - **Evergreen huckleberry** (*Vaccinium ovatum*)
      Jan. 27, 1806
    - *** Oregon crab apple** (*Pyrus fusca*)
      Jan. 28, 1806
    - *** Blue elderberry** (*Sambucus glauca*)
      Feb. 2, 1806
    - *** Sitka spruce** (*Picea sitchensis*)
      Feb. 4, 1806
    - *** Mountain hemlock** (*Tsuga mertensiana*)
      Feb. 5, 1806
    - *** Western white pine** (*Pinus monticola*)
      Feb. 6, 1806
    - **Grand fir** (*Abies grandis*)
      Feb. 6, 1806
    - *** Blue huckleberry** (*Vaccinium membranaceum*)
      Feb. 7, 1806
    - **Edible thistle** (*Cirsium edule*)
      March 13, 1806
    - *** Oregon wood-sorrel** (*Oxalis oregana*)
      March 15, 1806
    - *** Pacific blackberry** (*Rubus vitifolius*)
      March 15, 1806
    - *** Lyall's nettle** (*Urtica lyallii*)
      March 15, 1806
    - **Oregon white oak** (*Quercus garryana*)

March 26, 1806

- **Red alder** (*Alnus rubra*)
  Cowlitz River, March 26, 1806
- **Red-flowering currant** (*Ribes sanguineum*)
  Cowlitz River, March 27, 1806
- **Slender toothwort** (*Cardamine nuttallii*)
  Sandy River, April 1, 1806
- *** Nuttall's dogwood** (*Cornus nuttallii*)
  Sandy River, April 1806
- **Straggly gooseberry** (*Ribes divaricatum*)
  Lower Columbia, April 8, 1806
- **Mission bells; rice root** (*Fritillaria affinis*)
  Bradford Island, April 10, 1806
- **Western wake-robin** (*Trillium ovatum*)
  Bradford Island, April 10, 1806
- **Big-leaf maple** (*Acer macrophyllum*)
  Bonneville Dam, April 10, 1806
- **Oregon grape** (*Berberis aquifolium*)
  Celilo Falls, April 11, 1806
- **Dull Oregon grape** (*Berberis nervosa*)
  Celilo Falls, April 11, 1806
- **Balsam root** (*Balsamorhiza sagittata*)
  Skamania or Klickitat counties, Washington, April 14, 1806
  All from The Dalles
  - **Golden currant** (*Ribes aureum*)
    April 1806
  - **Menzies' larkspur** (*Delphinium menziesii*)
    April 14, 1806
  - **Saskatoon serviceberry** (*Amelanchier alnifolia*)
    April 15, 1806
  - **Thimbleberry** (*Rubus parviflorus*)
    April 15, 1806
  - **Salmonberry** (*Rubus spectabilis*)
    April 15, 1806
  - **Pestle parsnip** (*Lomatium nudicaule*)
    April 15, 1806
  - **Dark-leaved mugwort** (*Artemisia ludoviciana*)
    April 16, 1806**
  - **Large-headed clover** (*Trifolium macrocephalum*)
    April 17, 1806
  - **Small-flowered collinsia** (*Collinsia parviflora* var. *grandiflora*)
    April 17, 1806
  - **Wild hyacinth** (*Triteleia grandiflora*)
    April 17, 1806
  - **Narrow-leaved collomia** (*Collomia linearis*)
    April 17, 1806
  - **Linear-leaved phacelia** (*Phacelia linearis*)
    April 17, 1806

    - **Uropappus** (*Uropappus lindleyi*)
      April 17, 1806
    - **Slender popcorn flower** (*Plagiobothrys tenellus*)
      April 17, 1806
- *** Sagebrush** (*Artemisia tridentata*)
  Celilo Falls, April 20, 1806
- **Fennel** (*Osmorhiza occidentalis* or *O. chilensis*)
  Columbia River, April 25, 1806
- **Black hawthorn** (*Crataegus douglasii*)
  Walla Walla River, April 29, 1806
- **Cous** (*Lomatium cous*)
  Walla Walla River, April 29, 1806
- *** Spring birch** (*Betula fontinalis*)
  Walla Walla River, April 30, 1806

The following article is offered in anticipation of an exploration of the role that women have played in nature study and environmental protection in North Carolina. If you can suggest the name of a woman who should be considered, please contact the editor at kathyschlosser@aol.com, or write to 1402 Bearhollow Rd., Greensboro, NC 27410.

Women's Roles in Nature Study and Environmental Protection

Vera Norwood

A key initiating moment in the history of contemporary environmental movements occurred in 1962, with the publication of Rachel Carson's *Silent Spring*. In a book that alternates between naturalist essay and scientific study, Carson documented the threats chemical pesticides posed to humans and the plants and animals with whom we share the earth. She spoke out against chemical companies and government agencies that pursued pest eradication campaigns at the expense of the natural environment. *Silent Spring* was an enormous success, leading outraged citizens in communities across America to protest the application of hazardous chemicals like DDT to agricultural land, suburban green spaces, and wilderness preserves. *Silent Spring* helped push the country into an era of environmental protection heralded by bans on chemical pesticides, legislation improving air and water quality, and the establishment of the Environmental Protection Agency. The book earned Carson a place as a key figure in environmental history. But, environmental historians include scant other women among the pantheon of famous American naturalists, nature writers, or environmentalists. From Henry David Thoreau to Wendell Berry, it would seem that women scarcely have participated in efforts to define an ethical stance toward nature or to protect the environment.

Even among historians who focus on Carson's own time, she appears as a

singular woman working among male colleagues in science and government on important environmental issues. Scholars have ignored the fact that Carson received as much sustenance from other women as from sympathetic male colleagues. Equally important to her career as a scientist and nature writer were professional relationships, friendships, and public support developed among female government employees, journalists, nature writers, conservationists and scientists, and women's organizations. Carson established a readership among many of these women in the 1950s with her beautiful essays on sea life, *Under the Sea Wind*, *The Sea Around Us*, and *The Edge of the Sea*. As the controversy engendered by *Silent Spring* grew, women's voices were as instrumental in building support as were those of the male scientists and politicians who defended Carson's findings.

National organizations like the American Association of University Women and the National Council of Women recognized Carson's achievements and heeded her call to involve themselves in the environmental debates of the 1960s. Women in such conservation groups as the Audubon societies shared Carson's concern for wildlife preservation and worked to spread *Silent Spring*'s message. Presswomen provided her with information on local battles against chemical spraying and encouraged her interest in animal welfare issues. Carson and her colleagues lobbied congresswomen on environmental protection legislation.

Such evidence confirms that by the middle of the twentieth century, there existed in America a national network of female environmentalists with influential positions both in powerful public interest organizations and in publishing who played an active role in preserving the natural landscape. But, traditional environmental history, with its emphasis on the male-dominated terrain of wilderness exploration and preservation, has failed to consider how such a network might have developed and what the nature values of American women might be. To understand women's history in the study and preservation of nature, it is useful to note that Rachel Carson opened *Silent Spring* with a fable about a middle-class suburb whose homes, yards, and local nature preserves are attacked by an aerial spraying campaign that renders the neighborhood silent: "On the mornings that had once throbbed with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices, there was now no sound" (1). Her book's influence rests in part on Carson's brilliance in reaching into the supposed sanctuary of suburban neighborhoods and showing the cycles of death in

which they were now implicated. These were natural spaces which touched women's lives deeply. It was among the flora and fauna at home that American women first voiced their feelings about nature and first worked in conservation and preservation efforts.

The first American woman to gain a popular readership as a nature writer was James Fenimore Cooper's daughter, Susan. In 1850, four years before Henry David Thoreau published *Walden*, Susan Fenimore Cooper's *Rural Hours* appeared. At a time when women were encouraged to write literary novels about their domestic lives and when American intellectuals were developing a narrative about the native
American landscape as, uniquely, their "home," Susan Cooper produced a journal of the seasons around her country home in Otsego, New York that joined the two efforts. Secluded from the city but not at the mercy of the wilderness, Cooper lived in a household within a larger home that was nature. A mixture of wild and domesticated plants constituted the chief virtue in Susan Cooper's home. Herself a nativeborn American, Cooper elevated the native plants and animals around her home over the imported. An early advocate of forest preservation, she viewed the forest as not so much wild as indigenous; in this lay its merit. In *Rural Hours*, Cooper castigated a rising middle class that cut down its native pine forests in order to raise money to buy imported embellishments for its homes. Americans who truly believed in the republican ideals of the country should not engage in such wholesale destruction of their natural heritage.

While Cooper's book stands with the works of William Bartram, Henry David Thoreau, and John Burroughs as a nature essay aimed at a broad readership, she also spoke directly to a more specific audience of women. Cooper focussed much of her interest in nature study on interpretations of sexual differences and family life that she witnessed in the birds and flowering plants of her neighborhood, finding that many important moral lessons sprang from a close observation of nature's domestic affairs. Cooper encouraged women of her generation to take up nature study partly to improve their own characters. For example, she counseled her sisters to resist overcultivation—both in themselves and in their flowers. The wild rose was much lovelier than the grafted tree roses popular in some gardens. Grafted roses lacked modesty; "[they] remind one of the painful difference between the gentle, healthy-hearted daughter of home, . . . and the meretricious dancer, tricked out upon the stage to dazzle and bewilder, and be stared at by the mob" (2).

Women who bought grafted roses instead of preserving native roses endangered nature, American society, and women's status as moral standard bearers. Linking women's nature to the indigenous plants of America, Cooper framed women's appreciation and protection of such plants and their environments as an integral part of their female responsibilities. Many nineteenth-century women agreed with her assessment of their proper roles in society and in nature—and, like Cooper, maintained these roles within domestic boundaries.

Participation in nature study was encouraged in popular books aimed at women and in the burgeoning female seminaries. Almira Hart Lincoln Phelps and her sister, Emma Willard, helped establish women's schools across the country in the early decades of the nineteenth century. Almira Phelps strongly encouraged American women to study botany and developed a curriculum for use in female institutions. Her textbook, *Familiar Lectures on Botany* (1829), became the standard in women's schools. Women's roles encouraging nature study in the schools continued into the twentieth century. In 1911, Anna Botsford Comstock, the first female faculty member at Cornell, published the *Handbook of Nature Study*, a widely adopted guide instructing schoolteachers in methods for instilling an understanding of natural history in their students. The terrain for such educational efforts was not a far-off wilderness, but the green spaces just outside the doorstep.

Armed with such training, women produced many studies of the native plants and animals close to their homes. Mary Treat, of Vineland, New Jersey, for example, dedicated her life to the study of birds and insects. Her *Home Studies in Nature* (1885) argued that women could contribute to the burgeoning knowledge of America's natural history while remaining at home: "the smallest area around the well-chosen home will furnish sufficient material to satisfy all thirst of knowledge through the longest life" (3). Treat's detailed studies of birds, spiders, ants, wasps, and insectivorous plants earned her a place as a correspondent with Charles Darwin and the American botanist Asa Gray. In addition to nature essays, women took up the artistic delineation of American plants and animals. Flower painting, particularly reproductions of native plants close to home, was pursued by a number of artists, including Maria Oakey Dewing, Ellen Robbins, and Fidelia Bridges. Bridges made her mark as a professional

artist specializing in the birds and wildflowers of Connecticut's meadows and coastal flats.

Scientific illustration also offered women a career in natural history, beginning in the 1830s with the exquisite drawings of shells made by Helen Lawson. Helen was the daughter of Alexander Lawson, a Scottish immigrant who made his living as an engraver for natural history books. From the nineteenth century to the present, female artists have supported themselves by working as illustrators in museums and government. Women have been employed in significant numbers in producing illustrations for the publications of the Department of Agriculture, the U.S. Forest Service, and the Smithsonian Institution. Their drawings were most often made from specimens brought back from wilderness expeditions organized by male scientist/explorers. But, the women's work back home in these institutions also supported expanding knowledge of and appreciation for native American flora and fauna.

In addition to nature essays and art, women worked in numerous other popular venues. One common production was the edited collection of familiar poetry and native floral illustrations, exemplified in Sarah Hale's *Flora's Interpreter: or, the American Book of Flowers and Sentiments* (1832). Amateur botanists were particularly fond of wildflower handbooks. One of the most successful was Mrs. William Starr Dana's *How to Know the Wildflowers: A Guide to the Names, Haunts, and Habits of Our Common Wildflowers*
(1893). By the late-nineteenth century, ornamental gardening and garden literature had become women's province. Gardeners in the East desiring to incorporate natives in their flower beds read Celia Thaxter's *An Island Garden* (1894), in which she details her struggles to make an ornamental garden composed of native plants and imports on her island home off the coast of New Hampshire. Western women found their gardening lore in the San Diego nursery of Kate Olivia Sessions, the horticulturalist responsible for planting Balboa Park. Sessions taught many turn-of-the-century San Diegans the virtues of cultivating native plants.

Female-authored fiction was also quite popular in the turn of the century, and many of these domestic novels dealt with women's sensitivity to nature. One famous piece was Sarah Orne Jewett's *A White Heron*, in which a rural girl keeps the secret of a heron's nest on her land from an ornithologist who would kill the bird for his collection. One of the best-

selling novels of the early twentieth century was Gene Stratton Porter's *A Girl of the Limberlost* (1909), another story of a young girl's love of the plants and animals close to her home. *Girl of the Limberlost* was partly autobiographical. Porter lived near Limberlost swamp in rural Indiana and, besides fiction, wrote nature essays on the local birds and moths. In this she participated in women's surge into ornithology near the end of the nineteenth century. Birds were a popular subject for women, particularly as a result of their sustained involvement in public campaigns to save declining populations from both sport hunters and market hunters who killed thousands of native birds for
the fashion industry. Such women as Olive Thorne Miller and Florence Merriam produced field studies of bird behavior that melded scientific observation with sensitive nature writing. They were joined by other women artists and photographers who documented the local birds of home. One of the best known artists was Cordelia Stanwood of Ellsworth, Maine who made exhaustive photographic studies of the nesting behaviors of birds on her forty-acre property, earning an international reputation among ornithologists for her work.

Throughout the nineteenth century, very few women engaged in sport hunting or scientific collecting of wild animals. Natural history was a calling that most often drew the middle and upper classes; elite women felt bound by traditions concerning proper female behavior that stressed gentility. Hunting was unladylike. Women's view of themselves as protectors of nature—whether their concern was the disappearance of native wildflowers or native birds—was, in part, informed by such codes. Olive Thorne Miller, for example, took up bird study because she believed ornithology was moving away from specimen collecting and into study of live animal behavior in the field. Florence Merriam refused to collect specimens of birds she had trouble identifying by sight, feeling it was almost criminal to kill the little families she had come to know through field observation. Such compunctions reflected the common perception that had developed by the turn of the twentieth century that women's proper role in nature was to preserve and nurture the plants and animals with whom they shared homes and neighborhoods.

While female naturalists often eschewed hunting and collecting, such ethics did not prevent them from pursuing wilderness exploration. Women did not take part in the early-nineteenth century naturalist expeditions partly due to questions about their safety, and assumptions that they did not have the stamina for month's long treks through difficult terrain. Women's first

wilderness experiences often took place reasonably close to home or as a result of their family's move onto the frontier. In the middle of the nineteenth century, one could still find relatively untouched country in the East. One of the earliest female naturalists to explore such terrain found her subject in the remnant wilderness areas bounding her home. Kate Furbish, born in 1834, spent her life collecting, classifying, and drawing Maine's flora. Her watercolors earned her a reputation among other botanists for accuracy and beauty. Her published accounts of the pleasure she experienced exploring alone through the rugged, largely uninhabited regions of the state mirrored the joys other venturous women reported.

By the late-nineteenth century, Furbish had a good deal of company as women began making major contributions to field study in remote terrain. Alice Eastwood made numerous discoveries of new plants in the Colorado Rockies, while Florence Merriam studied the birds of California and New Mexico. Some of these women, like Merriam, who married the zoologist Vernon Bailey, worked in the field with husbands. Others, like Eastwood, explored isolated, uncharted terrain alone or with female colleagues. In whatever company they did their work, however, they still thought of nature and their roles in nature in gendered terms. Florence Merriam delighted in finding birds nesting—and wrote of nests as homes in the wilderness: "How one little home does make a place habitable! From bare silent woods it becomes a dwelling place" (4).

Women who journeyed westward across the frontier with their families made their homes in areas once considered wilderness, but they too tried to live lightly on the land. Some women settlers took up the nature essay, in which they raised the same questions about development in the West that Susan Cooper had in New York. One of the most famous regional writers of the early-twentieth century was Mary Hunter Austin. Austin's *The Land of Little Rain* (1903) celebrated the beauties of the deserts of Arizona, Nevada, and California in essays based on her travels alone through terrain not often frequented by solitary European-American women. Situating her own home in a small town on the edge of the desert, Austin contrasted her attempts to coax various wild plants and animals into her yard from a neglected field next door with her neighbor's plan to turn the field into town lots. Austin argued that "though the field may serve a good turn in those days it will hardly be happier" (5).

Just as Cooper's *Rural Hours* had warned New Yorkers against destroying

native plants and animals, *The Land of Little Rain* served as a cautionary tale to twentiethcentury settlers in the Southwest about the need to preserve a fragile landscape. During the twentieth century, women have continued to make their homes in the United States in areas bordering on or even within remnant wilderness. The nature essays based on such lives have enjoyed a wide readership. At the same time that Rachel Carson was writing evocative pieces on the oceans, Sally Carrigher, for example, was producing popular books on animal communities around her Forest Service cabin in California's Sequoia National Park. More adventurous women have gone even farther afield. Early in the twentieth century, Delia Akeley was leading expeditions to study monkeys and apes in Africa. In the 1930s, Osa Johnson and her husband, Martin, lived for extended periods on an isolated lake in Kenya while they made some of the first live action movies of native animals. Lois and Herb Crisler lived for eighteen months in the 1950s in the Arctic wilds of the Brooks Range filming caribou and wolves for a Disney documentary. By the 1960s, Dian Fossey was beginning her field study of the mountain gorillas in Rwanda.

Today, Cynthia Moss continues such work in her decades-long field study of the elephants of the Amboseli National Park in Kenya. Throughout their published narratives of these adventures, spanning the twentieth century, these women have reiterated their belief that it is their duty to protect and preserve the native flora and fauna among whom they have made their homes for extended periods.

From at least the middle of the nineteenth century, American women have been active participants in the study of nature, and they have developed a tradition about how best to inhabit the earth. The environmental values expressed in their writing and art and field studies have resulted in wide-ranging involvement in various conservation and preservation campaigns of the nineteenth and twentieth centuries. As well as being key figures in efforts to preserve wild birds from extinction, women have made important contributions to forest and river preservation efforts, to the development of green spaces in urban areas and protection of native plants and animals threatened by development, and to animal rights advocacy groups.

They have been a backbone of support for many environmental organizations, including the Audubon societies, the Sierra Club, and most recently, environmental justice groups tackling pollution in working class and minority neighborhoods. When, in *Silent Spring*, Rachel Carson

located the threats of chemical pollution within domestic spaces, she knew she could count on the support and activism of a generation of American women who had inherited a century-long history of female activism aimed at protecting not only human homes but the plants and animals of our larger home—the earth.

Endnotes

1. Rachel Carson, *Silent Spring* (1962; New York:Fawcett, 1964).
2. Susan Fenimore Cooper, *Rural Hours* (NewYork: George P. Putnam, 1850), 123.
3. Mary Treat, *Home Studies in Nature* (NewYork: Harper and Brothers, 1885), 6.
4. Florence A. Merriam, *A-Birding on a Bronco*(Boston: Houghton Mifflin, 1896), 218.
5. Mary Hunter Austin, *The Land of Little Rain*(1903; Albuquerque: University of New MexicoPress, 1974), 88.

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Vera Norwood is a professor of American Studies at the University of New Mexico. She is the author of Made From This Earth: American Women and Nature *(1993).*

Pteridology

Which fern really smells of hay?

Ne'er thought I'd stoop to learn,
Sniffing round a lady fern
In old age I'm finding, to my concern
The species are often too tough to discern.

I've even heard that the northern lady
May in fact be a wee bit shady;
Don't remember where I read
Her legs are colored harlot red.

And though she's not by any means little
She tends to be broadest about the middle
And like a harlot when she scores
Volcanically effuses golden spores.

What Shakespeare once termed the seed
These spores are really gold indeed;
Perhaps I might myself enrich
Lovin' the lovely red legged witch.

Scattering her golden "seed about" now,
Seeing if I just night find out how;
Yes, I am hoping she'll help me learn
How to sow the secret "seed" of fern.

But then there's the southern lady
Limbs sometimes flailing crazy
Pointing out in all directions
What may be my predilections?

And kinda like my old bass fiddle
Broadest below her ample middle
But they're not poised on stipes of red
Her gams are golden green instead.

But I heard someone extolling
They smell like hay in which they're rolling,
The expert he failed me, he didn't say
Whether northern or southern smelled like hay.

How will I ever discern
Is it the northern or southern fern
Like a roamin' raccoon foamin' rabies
Shall I sniff these woodland ladies

In order to more surely say
Tis the rebel smells like hay
After that there' still much one learns
From the little old lady ferns.

Most deciduous ferns are seasonal sinners
Shedding their foliage before the winters.
Yup, come the autumn they bed down
Yet continue living, underground.
Like southern Baptists, even I expound
It's kinky going down, underground.

What more can this redneck say
Spring will soon be on its way
And so I'll await the spring
Like a bot'nist doin' his thing.
In order to see which smell of hay
I'll sniff the ladies another day,
Then maybe I while the say away,
Knowing which one hit the hay.

anonymous poet

From the Society for Economic Botany Newsletter, Volume 17, Spring 2003.

2006 NCNPS schedule.

May 20 -21 We will visit the Chimney Rock, NC area. Saturday, James Padgett will lead us to World's Edge, Eagle Rock, or Rainbow Falls.

Saturday night Ron Lance (naturalist at Chimney Rock Park) & Sarah Martin (the 2004 NCNPS Shinn Grant recipient) will make presentations.

Sunday morning we will visit either Bat Cave, Rumbling Bald, or other Hickorynut Gorge sites.

June 10 Our annual pot luck picnic and plant auction will be held 12:00 - until at Hagen Stone Park, just south of Greensboro. We hope everyone will bring plants to auction! We have a special treat for the morning, 10:00 – 12:00. Ken Bridle, EcoLogic's principal biologist and past NCNPS President will use NCNPS member, Diane Laslie's backyard stream in Pleasant Garden to describe a stream's characteristics and if it needs restoration and do a benthic bug sampling to determine the water quality and discuss how different aquatic critters indicate different water quality and pollutant impacts. As a bonus you will get to see Diane's beautiful garden. Attendance will be limited to 25. Registration will open April 1st and will be 1st come 1st served.

October 6 – 8 We will visit the Charlotte, NC area
We hope to visit a piedmont prairie site, a Helianthus schweinitzii site and perhaps one of the institutional gardens

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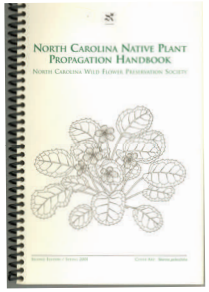

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North Carolina Native Plant Society, Inc.

Aims and Objectives

The North Carolina Native Plant Society was formed as the N. C. Wild Flower Preservation Society in 1951 by a group of individuals appreciative of native plants throughout the state and region. The purpose of the Society is to promote the conservation and enjoyment of native plants and their habitats through education, protection and propagation.

Quarterly meetings are held at "natural gardens" across the state. Members exchange seeds and propagated plants at these meetings. Other excursions are organized on a local basis throughout the year.

The Society newsletter is usually issued twice a year with articles and illustrations by professional and amateur contributors.

The Shinn Scholarship/Grant Fund sponsors research on native plants by undergraduate and graduate students. The fund is supported by member contributions and by gifts and memorials. Applications are made to the Scholarship/Grant Fund Committee for awards in May of each year.

The Society is a nonprofit organization under North Carolina and Internal Revenue Service regulations. Donations are tax deductible.

Correspondence concerning the Society and its programs may be addressed to:

North Carolina Native Plant Society, Inc.
C/o North Carolina Botanical Garden
Totten Center 3375, UNC-CH
Chapel Hill, NC 27599-3375

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