



St. Catherine's Island Research on Wild Hogs and Yellow Nutsedge to be Published

In 1997, Dr. Jonathan Evans brought his section of the Sewanee Island Ecology class to the northern and eastern sand dunes on St. Catherine's Island, Ga. These dune swales were colonized mostly by grasses, sedges, and other native plants. However, the class spotted patches of soil disturbance where plants had been uprooted. The island's invasive feral hogs (*Sus scrofa*)



had foraged in the dune swales, using their snouts to root around in the soil, searching for underground plant parts to eat. In particular, the wild hogs delighted in feasting on the tubers of invasive yellow nutsedge (*Cyperus esculentus*). Areas of these disturbed dune swales were established as permanent plots to monitor the plant response to hog disturbances, along with paired undisturbed control plots. Interestingly, Dr. Evans and his class noticed that yellow nutsedge seemed to be the primary beneficiary of the hog disturbances, recolonizing the disturbed area rapidly in the years following disturbance.

For 12 years, different sets of students helped monitor yellow nutsedge populations within established hog disturbance sites and in paired undisturbed areas. The average number of yellow nutsedge culms (stems) per random quadrat per site was documented each year, and in years of hog disturbance events in the sites, data were taken on culm density, tuber (underground storage organ) density, and percent native cover. Dr. Evans hypothesized that the wild hogs, in mixing up the soil and removing the native plant cover, were maintaining yellow nutsedge populations as a result of removal of competition. Though the hogs likely ate many of the yellow nutsedge tubers, remaining tubers would be

able to recolonize the disturbance, promoting the plant's long-term persistence.

To test whether hogs were involved in the long-term facilitation of yellow nutsedge populations, we hypothesized that yellow nutsedge culm and tuber densities would be higher in disturbed plots, and that percent native cover would be lower in disturbed



plots. We also reasoned that wild hogs must re-disturb sites multiple times to remove plant competition to promote the long-term persistence of yellow nutsedge.

With Dr. Kristen Cecala's help, we ran models to examine the effect of year and disturbance on yellow nutsedge culm density, tuber density, and percent native cover at each site. We found that disturbed plots had more yellow nutsedge culms and tubers, and a lower percent cover of native species. Using yearly culm density data, we found that yellow nutsedge culm density increased after a hog disturbance event, and that hogs returned to previously-disturbed sites to forage approximately every five years.

We concluded that yellow nutsedge populations were being maintained by wild hog foraging behavior as a result of their repeated mixing of the soil, which removed

native plants. This is a positive interaction between invasive species in which one invasive species benefits the other. We believe that this represents a novel opportunistic and facultative interaction between two introduced species with no evolutionary history together.

We also noted that this interaction resembles farming—when hogs visit a site to forage, they mix up the soil and remove live plant cover, much like a farmer tending his crop. Interestingly, it is thought that yellow nutsedge was one of the first agricultural crops to be grown by humans. A variant, *Cyperus esculentus* var. *sativus* is still grown as a crop in some parts of the world. We believe that yellow nutsedge is a successful crop for both humans and hogs due to its clonal nature.

In conclusion, we found that wild hog foraging in the dune swales of St. Catherine's Island results in an incomplete harvest of yellow nutsedge tubers, which allows yellow nutsedge to grow clonally in the competition-reduced environment. This demographic study reveals how an invasive species can positively facilitate another invasive species. Invasive-invasive positive interactions and mutualisms may become more common as non-native species are introduced into native communities around the world.

This research will be published in the Open Access journal *Ecology and Evolution*: Oldfield, C. A., and J. E. Evans. 2016. Twelve years of repeated wild hog activity promotes population maintenance of an invasive clonal plant in a coastal dune ecosystem. *Ecology and Evolution*. doi: 10.1002/ece3.2045.

—Callie Oldfield



Wildflower Walks Through the Years and Across the State



Spring is the peak wildflower walk season for the Sewanee Herbarium. Besides the numerous walks we offer on the Domain, especially in Shakerag Hollow, the Herbarium volunteer staff has been invited over the years to lead walks in other areas.

The most outstanding opportunity is the annual Spring Wildflower Pilgrimage in Great Smoky Mountains National Park. The first Pilgrimage took place in April of 1951, directed by Dr. A. J. Sharp, head of the Botany Department of the University of Tennessee, Park Naturalist Arthur Stupka, and Bart Lieper with the Gatlinburg Chamber of Commerce. It was Mr. Lieper's idea to create an event that would bring people to the Smokies during some season other than the summer. The event has become something of a reunion for botanists of the Southeast, and Dr. George Ramseur, director *emeritus* of the herbarium, began leading walks for the Pilgrimage in the 70s. In 1998, the whole Herbarium staff participated in the Pilgrimage and most of us have continued to do so over the years since then.

The park is an amazing place for spring wildflowers. Owing to the topography and the geology, one can in one long weekend see practically the

whole gamut of the spring wildflower season, from the earliest spring ephemerals like trout lily and spring beauty at 5,000 ft. near Newfound Gap to gay-wings and bleeding heart in the limestone-derived soils in the Cades Cove area. There are at least eight species of trillium in the Park, also found in varying habitats.

At the first event in 1951, there was a lot of rain. Afraid that attendees would



not get to see the flowers, Gatlinburg Garden Club member, Lucinda Ogle, picked some of the rarer ones from her own wildflower garden, put them in 24 empty Coke bottles in a crate, and carried them by hand to the event's central meeting place. Her efforts have expanded to a display of over 100 specimens, still brought from private gardens (to which they are later returned), labeled with common and scientific names and on view in the conference center. The Coke bottle display was reproduced on at least one anniversary event for the Pilgrimage.

Locally, the Herbarium has collaborated with the South Cumberland

State Park to lead wildflower walks as early as 1997 and continuing now with participation in the annual Trails and Trilliums event. Trails and Trilliums was originally held on the campus of St. Andrew's-Sewanee School and is now held at the Monteagle Sunday School Assembly. Hike offerings have expanded over the years and include many walks in the park as well as on the University Domain. The timing of the event, coincides with the peak of the spring wildflowers in bloom in the Sewanee area.

For an earlier view of the flowers, one can head to Rock Island State Park, north of Sewanee but at lower elevation so spring wildflowers bloom there a couple of weeks ahead. The park is at the confluence of three rivers—Collins, Caney Fork, and Rocky—and has some spectacular waterfalls. Mary Priestley, herbarium curator, has helped lead walks there for their Spring Waterfall and Wildflower Tour in March for the last several years.

—Yolande Gottfried



Spring Calendar of Events

Roark's Cove

Sun., April 3, 2 p.m., Yolande Gottfried

A private property at the base of the plateau is being made available for a wildflower walk to see some species not seen on the upper plateau, such as Virginia bluebells (*Mertensia virginica*) and possibly some early shooting star (*Dodecatheon meadia*), as well as trilliums and much more. Meet at the Sewanee tennis courts parking lot (on Green's View Road behind the Sewanee Inn site) to carpool or caravan to the location of this easy to moderate walk.

Shakerag Hollow

Sat., April 9, 10 a.m., Jon Evans

Jon Evans is the director of the Sewanee Herbarium and has led many walks in Shakerag. This is Sewanee's "Mecca" for wildflower lovers, and the flowers should be diverse and abundant. Meet at the Green's View parking lot (past the golf course). Two miles, moderate to strenuous, with one fairly challenging incline.

Collins Gulf West Hike

Sun., April 10, 9 a.m., Mary Priestley

This section of the South Cumberland State Park rivals Shakerag Hollow for diversity and abundance of spring wildflowers. Wear sturdy footwear, pack water and lunch, and bring cameras! Meet at the Collins West trailhead in Gruetli-Laager. Six miles, moderate to strenuous with 600-foot elevation change. For directions to the Collins West trailhead, contact the South Cumberland State Park Visitors' Center (931.924.2980).

Trails & Trilliums, Fri.–Sun, April 15–17

A detailed description of this event is included elsewhere in this issue of *The Plant Press*. Herbarium staff and volunteers will lead the following hikes:

- Shakerag Hollow, Fri., April 15, 1:30 p.m., Yolande and Robin Gottfried
- Shakerag Hollow, Sat., April 16, 10:30 a.m., Yolande and Robin Gottfried

See the Trails & Trilliums website, www.trailsandrilliums.org/hiking.html, for details about these hikes. Numbers are limited and pre-registration is encouraged.

66th Annual Spring Wildflower Pilgrimage

Great Smoky Mountains National Park, April 19–23

Mary Priestley will lead nature journaling workshops on Wednesday and Thursday mornings as part of the Pilgrimage program of events. Please see www.springwildflowerpilgrimage.org for more information. Registration online is recommended.

Shakerag Hollow

Sat., April 23, 1:30 p.m., Mary Priestley

The spring wildflowers in Shakerag Hollow are superb! Meet at the Green's View parking lot (past the golf course). Two miles, moderate to strenuous, with one fairly challenging incline.

Garlic Mustard Pull

Sun., April 24, 1:30 p.m., Mary Priestley

Join in the annual campaign to control this invasive exotic plant that is threatening to take over some sensitive areas of our forest. It is easy to pull (even good to eat when young and tender!). No equipment is necessary but work gloves would be a good idea. Meet at Morgan's Steep.

The Herbarium sponsors a **nature journaling group** that meets Thursdays, 9–11 a.m. led by Mary Priestley. All are welcome. Email Mary for more information at marypriestly@bellsouth.net.

All times are CST or CDT.

Wear appropriate shoes on all of these walks. Risks involved in hiking include physical exertion, rough terrain, forces of nature, and other hazards not present in everyday life. Picking flowers and digging plants are prohibited in all of the above-mentioned natural areas.

For more information on these or other Sewanee Herbarium events, please contact Yolande Gottfried at the Herbarium (931.598.3346) or by email at ygottfri@sewanee.edu. A map of meeting place locations is available at sewanee.edu/media/offices/herbarium/sewanee_herbarium_maps.pdf.

THE SEWANEE PLANT PRESS

The Sewanee Herbarium
Dr. Jon Evans, Director
Biology Department
The University of the South
735 University Avenue
Sewanee, TN 37383

WEBSITE

sewanee.edu/offices/herbarium

EDITOR

Mary Priestley
marypriestley@bellsouth.net

CALENDAR

Yolande Gottfried
ygottfri@sewanee.edu

CONTRIBUTORS

Callie Oldfield
oldfica0@sewanee.edu

Linda Parrish
info@trailsandrilliums.org

COMPOSITOR

Tammy Elliott

Drawings, by Mary Priestley, are of early spring wildflowers—bloodroot, spring beauty, hepatica, and pepper-and-salt—and nutsedge and its "farmers."

HERBARIUM BLOG

sewaneeherbarium.wordpress.com

Friends of the Sewanee Herbarium

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THE UNIVERSITY OF THE SOUTH

Herbarium, Biology Department
735 University Avenue
Sewanee, TN 37383-1000

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Trails and Trilliums: Celebrating the Natural Wonder of the South Cumberland Plateau

The Friends of South Cumberland State Park will hold the 13th annual Trails and Trilliums Festival April 15–17 at the Monteagle Sunday School Assembly. The weekend opens Friday with hikes to Shakerag Hollow and Lost Cove followed in the evening by the Trails and Trilliums Children's Choir Concert and Student Art Exhibition in the Assembly Auditorium. A casual reception, Wine and Wildflowers, will preview the works of guest artists participating in ART for the PARK.

On Saturday both casual and dedicated hikers can sign up for any of 11 guided hikes. Vans will carry participants to Lost Cove, Fiery Gizzard,

Foster Falls, Grundy Lakes, and Hawkins Cove where the soon-to-be-developed Mountain Goat Trail borders a South Cumberland State Park Natural Area. Herbarium curators will help lead several of the hikes.

Programs include Tennessee State Natural Heritage Botanist Todd Crabtree discussing the white fringeless orchid, a plateau species under consideration for special conservation status. Among the art and vendor sales, Overhill Gardens will have a broad variety of native plants for gardeners. Saturday night's event is the ART for the PARK gala with dinner, art, and music.

At the Cumberland Wild Hike into History program on Sunday, a panel of historians, naturalists, and local experts will discuss the history of the South Cumberland including Native Americans, pioneers, sawmills, coal mines, and old-growth forests. More hikes are planned for Sunday, as well as an opportunity to learn about and build fairy houses. Artists, vendors, food, and music will be available throughout the day.

Registration is open online at www.TrailsandTrilliums.org.

—Linda Parrish