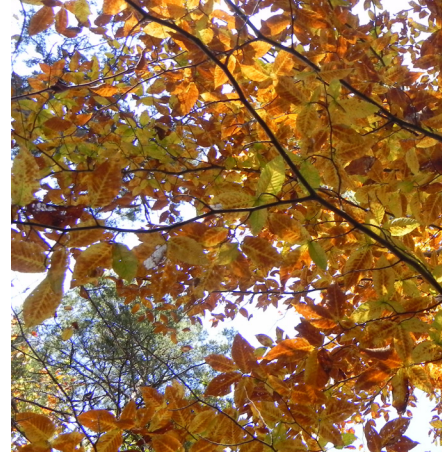


THE DUKE FOREST

LOG

A bulletin from the
Office of the Duke Forest

Fall 2015



Management Spotlight

Invasive Plant Species

Non-native invasive plant species ("invasives") are plants that grow outside of their native range and exhibit rapid rates of growth and spread. These species lack predators and diseases that naturally control them in their home ranges. As a result, invasives compete with native plants for sunlight, water, nutrients, and habitat. When they successfully displace native vegetation, they modify the habitat available for wildlife, including pollinators. Overall, invasives disrupt the ecology of our native ecosystems and represent a unique management challenge.

Invasives come from a variety of sources including the intentional planting of invasive stock by unknowing homeowners, and they thrive in areas that have been disturbed by human activities such as road building and residential development. The Duke Forest, once called an "an island of green in a sea of suburbs," does not lack for potential sources of invasives, and the disturbances created by active management can lead to their spread. In addition to human activities, natural disturbances such as hurricanes, tornadoes, and wildfires can help establish and spread invasives. Given that human and natural disturbances are both inevitable events, monitoring, treating, and tracking the spread of invasives is an increasingly important part of Duke Forest management.

To support these efforts, the Office of the Duke Forest hired Taylor Whitmire for a year-long Invasive Species Management Internship. Taylor recently graduated from North Carolina State University with a Bachelor of Science in Fisheries, Wildlife, and Conservation Biology and loves being in the woods! Besides being an uncanny attractor of wildlife, particularly snakes, Taylor focuses on increasing the number of acres monitored and treated for invasive species. With the help of staff and volunteers, Taylor targets invasive infestations in natural heritage areas and in areas that are managed for timber production – both important locations for the regeneration of native species and the preservation of healthy, growing tree stands.



Taylor Whitmire, Duke Forest Invasives Species Management Intern, examines recently sprayed Autumn Olive (*Elaeagnus umbellata*) along the historic Old Oxford Road in the Durham Division. Taylor received her Pesticide Applicator License earlier in the year and has worked closely with long time Forest Technician, Mike Burke, to learn safe and effective chemical application techniques. You might also notice their work on the Kudzu patch (*Pueraria montana*) along Erwin Road near Pickett, and the Kudzu and Wisteria creeping into the forest along Whitfield Road, near Gate 25.

Invasive photos: Bugwood.org contributors (clockwise from top left) Ronald F. Billings - TX Forest Service, Chris Evans - River to River CWMA, Jan Samanek - State Phytosanitary Administration, Leslie J. Mehrhoff - University of CT

Trees and shrubs and vines, oh my! Below is a snapshot of some of the worst invasive plant offenders on the Duke Forest, which range from trees to grasses. Clockwise from top left: Chinese Privet (*Ligustrum sinense*), Chinese Wisteria (*Wisteria sinensis*), Tree-of-heaven (*Ailanthus altissima*), and Japanese Stiltgrass (*Microstegium vimineum*). Each of these plants is currently on Taylor's hit list. Privet and wisteria are found in at least two of our registered natural heritage areas. Tree-of-heaven is present in a recent harvest area, and Japanese Stiltgrass is creeping along a new path toward New Hope Creek.

Duke Forest's Least Wanted



THE DUKE FOREST comprises over 7,000 acres of land in Durham, Orange, and Alamance counties and has been managed for research and teaching purposes since 1931. The mission of the Forest is to facilitate research that addresses fundamental and applied questions concerning forested and aquatic ecosystems and to aid in the instruction of students so that they will be informed citizens and effective stewards of our natural resources. In addition to supporting education at local universities, the Forest also participates in community outreach through tours and other events.

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www.dukeforest.duke.edu

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Forest Greetings

From the Director's Desk

I recently had the opportunity to speak at a couple notable events - first, at the fall meeting of the Sarah P. Duke Gardens Board of Advisors and second, at a dinner for the 75th celebration of forestry education at Duke University. Below, I share with you a few excerpts from those remarks that I hope will offer insight into what we're up to here on the Forest. But before diving into that, I want to acknowledge and thank our staff - Beverly, Brad, Jenna, Mike, and Taylor - for their tremendous dedication and commitment to the Duke Forest. They accomplish a dizzying amount of work (evidenced in part by the year-in-review stats on the following pages) that makes it possible for the Office of the Duke Forest to look forward in new and exciting ways.

"TREES AND FLOWERS ARE DELICATE THINGS AND ALWAYS TELL THEIR OWN TALES."

This statement was written in 1916 by Bishop John Kilgo, former president of Trinity College, to then president William Preston Few, under whose leadership Trinity became Duke and the forest was established. At the time, Bishop Kilgo was reflecting on Trinity's expanding landscape, and I believe it's an apt way to frame the ever-evolving story of the Duke Forest. I'll only share an abbreviated tale, but I want to recognize that the trees and flowers of our forest have been telling the tales of humans on the landscape for thousands of years...

As we look to the future, the forest continues to tell its tale, but we're perhaps thinking more of the delicate nature - as Bishop Kilgo said - of its trees and flowers, especially in the face of compounding threats like climate change, invasive species, and urbanization - all of which affect the forest's composition, its health, maybe even the benefits it provides or the ways we're able to use it.

We're thinking a lot about how to best steward its natural resources and maintain the services it provides for the university and the community. Importantly, we're not doing this in isolation. In fact, we're in the middle of a strategic engagement process to learn from students, staff, faculty, and community members about what they envision for the forest's future.

It's an exciting time, flush with unique opportunities to seize and potential new capacities to build. Here are a few that are in the works or ongoing:

Supporting the expansion of the forest as a teaching and research laboratory - The forest offers opportunity for experimentation and observation across a range of new technologies from drones to nanoparticles, and its role in supporting innovation across uncommon disciplines, e.g. arts and humanities, is yet untapped.

Continuing to value the role of the forest as an island of green in a sea of suburbs - The forest protects biodiversity but how will this change in the future as the broader landscape becomes more fragmented? We are convening conversations with local partners to explore this question and collaboratively discover opportunities to maintain habitat connectivity.

Developing restoration projects to bolster forest resiliency - The low-water concrete bridge provides access over New Hope Creek, but it is a partial barrier to water flow and animal movement. With guidance from federal partners, the forest is exploring options to remove it that would improve stream flow and instream habitats.

Implementing new projects to engage Durham Public Schools - A project to overhaul the forest's one and only interpretive trail, the Shepherd Nature Trail, is on the ground right now. During project design, the forest sought input from Durham Public Schools to better understand how the trail could provide a fun and effective field trip.

Offering novel public education and outreach experiences - As a nature destination with a rich legacy of scientific research, the forest is uniquely poised to help connect people with science - to help make scientific understanding more mainstream across a wider audience. In partnership with students, staff, and faculty at Duke, the forest hopes to discover creative ways to do so.

We are pushing forward in these new directions through partnerships at Duke, the Nicholas School, and in the community. Thinking hard about the trees and flowers - their delicate nature - and how the Duke Forest remains a vital and vibrant part of the Duke DNA.



Earle's Blazing Star (Liatris squarrulosa) - A rare fall bloom annually spotted in a registered natural heritage area within the Durham Division of the Duke Forest.

News and Updates

Shepherd Nature Trail Project Underway

The Duke Forest recently received a grant to support a project to overhaul its worn-out, outdated, but one and only interpretive trail. The trail is located off of Highway 751 in the Durham Division of the Duke Forest. Known as the Shepherd Nature Trail, it was developed by the National Civilian Conservation Corps and added to over the years by boy scouts and other students. It was intended to be a self-guided nature trail, but unfortunately, both signage and sections of the trail have fallen into disrepair.

The restoration and enhancement of the Shepherd Nature Trail will provide an opportunity for a wide audience to learn about the natural environment of the NC Piedmont and sustainable forest management. This project will improve the visibility, accessibility, and educational value of the trail through overhauling signage, improving trail conditions, and investing in infrastructure upgrades. Examples include:

- Replacing dense, difficult to read signage with bright, descriptive, and easy to read signs
- Replacing fence railings and bridge treads to improve safety and accessibility
- Rerouting trail sections to prevent erosion, improve accessibility, and minimize tripping hazards
- Building additional picnic tables near the trailhead to accommodate more users

This project is funded through the Duke Forest Improvement Fund and by the Durham County Matching Grants Program for Recreation and Open Space Projects.



The Shepherd Nature Trail now forms a single complete loop and sections that led through steep, eroding areas have been rerouted.



Examples of old, damaged signage and fencing. The Duke Forest is excited to be working with Nicholas School faculty member, Dr. Nicki Cagle, an environmental communications and education expert, on the development of new sign content.

Emerald Ash Borer Confirmed

The shiny green beetle is here! The Emerald Ash Borer (EAB), a non-native insect, was introduced to the U.S. through packing materials in 2002. Its presence was confirmed in North Carolina in 2013 and specifically within Durham and Orange Counties this past summer. The North Carolina Department of Agriculture and Consumer Services has issued a statewide quarantine on ash timber and firewood to prevent accidental movement of EAB to new areas. The EAB attacks all four species of Ash trees native to North Carolina, as well as White Fringetree, and causes death within 5 years. The Duke Forest contains a very small proportion of Ash and presently has no confirmed infestations. For more information and to stay up to date on the impacts of this pest, visit: www.ncforestservice.gov/forest_health/fh_eabfaq.htm

Deer Management Program Continues

We are well into our 8th season of the Duke Forest Deer Herd Reduction Program, which began September 28th and ends December 18th. For safety reasons, the Durham, Korstian, and Blackwood Divisions are closed for all recreation Monday-Friday but open on Saturdays and Sundays. For more information about deer in North Carolina and the deer management assistance program we participate in, visit the website of the NC Wildlife Resources Commission (NCWRC): www.ncwildlife.org. The NCWRC is the state agency responsible for conserving and sustaining the state's fish and wildlife resources through research, scientific management, wise use, and public input.



An adult EAB (Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org). Adults lay eggs on the bark of ash trees. When the eggs hatch, the larvae bore into the bark and feed on tissues that transport water and nutrients.

**DON'T MOVE
FIREWOOD.org**

A common cry you'll hear more and more of these days as we worry about the health of our forests in the face of invasive insects like the Emerald Ash Borer and Asian Long-horned Beetle. In the Duke Forest, we provide firewood at our picnic shelters and actually DO NOT ALLOW outside wood to come in. Check out the website for more info.

Year in Review

July 2014 - June 2015

Teaching & Research

The Duke Forest fulfills its primary mission by hosting a wide variety of researchers, educators, and students. Sixteen new research projects began this year, including three wildlife projects. Steve Hall, a consulting ecologist, initiated a survey of moths and butterflies to document their distribution and habitat associations, and to build a [Moths of North Carolina](#) website. Brooke Massa, a biologist with the NC Wildlife Resources Commission, searched for a state species of special concern, the Mole Salamander (*Ambystoma talpoideum*), to better understand its distribution across the Piedmont of North Carolina. Lastly, a volunteer with the NC Museum of Natural Sciences set-up camera traps to collect information for the eMammal project - a citizen-science effort to document mammal distribution and abundance. The forest also hosted its usual array of graduate, undergraduate, and K-12 field trips and class exercises, and for the 2nd year in a row, supported an executive education course, [Timberland Investments for Professionals](#), offered by the Duke Environmental Leadership program (nicholas.duke.edu/del).



The caterpillar of the Catalpa Sphinx Moth (*Ceratomia catalpae*) feeding on Catalpa tree leaves (Duke Forest, 7/28/15).



The caterpillar of the White-Blotched Heterocampa Moth (*Heterocampa umbrata*) prefers oak leaves. The bright pink coloring suggests that it is about to pupate (Duke Forest, 9/7/15).



AT A GLANCE

2014 - 2015

Number of research projects (16 new projects)	71
Number of primary investigators	56
Number of research affiliations	22
Total research dollars (25 of 71 reporting)	\$3,067,603
Number of teaching activities	17
Number of educators	15
Number of class visits	43
Number of participating students	459

Engagement & Outreach

Duke Forest staff offer tours, host volunteer events, and participate in group activities to provide opportunities for education and outreach about natural resources and forest management. This year, staff delivered lectures or workshops at several public and professional meetings, including: the North Carolina Invasive Plant Council annual meeting, the Appalachian Society of American Foresters annual meeting, and The Conservation Fund's Equity, Diversity, and Inclusion Convening. We hosted several volunteer events, including two visits from students at UNC's Kenan-Flagler Business School during which students got their hands dirty with trail maintenance and tree planting. Staff also partnered with SEEDS, a local Durham nonprofit focused on sustainable agriculture and organic gardening, by allowing volunteers to collect dead and downed cedar logs for garden fences (www.seedsnc.org), and collaborated with the artist Patrick Dougherty to provide materials – mostly maple saplings – needed for his recent sculpture at the NC Botanical Gardens (sculptureinthegarden.com).



AT A GLANCE

2014 - 2015

Number of tours and activities	14
Number of participants	437
Total outreach hours	32
Number of volunteer events	5
Number of participants	55
Total volunteer event hours	15




Year in Review

July 2014 - June 2015

Management & Stewardship

Management of the Duke Forest is guided by a comprehensive plan that promotes the Forest's academic mission while ensuring the protection of its natural resources. The management of the Forest is certified by the Rainforest Alliance to Forest Stewardship Council® guidelines, a strict set of environmental, social, and economic standards. In the past fiscal year, we executed operations on almost 600 acres, including 422 acres of harvests. Final regeneration cuts accounted for 45% of the harvested acreage and indicate areas in which new stands of pine and hardwood trees will be regrown. Intermediate cuts in the form of commercial thinnings were another 45% and involve stands in which the total density of trees is reduced to promote growth and minimize the incidence of pests and disease. Both harvest types are part of the Duke Forest's sustainable timber rotation – a model system for the responsible production of the natural fibers we all depend on.



AT A GLANCE

2014 - 2015

Harvests	422 acres	Stand Improvements	99 acres
Regeneration			
<i>Clear cut</i>	83	<i>Pre-commercial thinning</i>	62
<i>Selection</i>	38	<i>Prescribed burning</i>	31
<i>Seed tree</i>	26	<i>Site remediation</i>	4
<i>Shelterwood</i>	24	<i>Hardwood control</i>	1
<i>Patch cutting</i>	13	<i>Invasive control</i>	1
<i>Group retention</i>	8		
Intermediate		Plantings	43 acres
<i>Commercial thinning</i>	188		
Other harvests		Road Maintenance	62 miles
<i>Salvage harvest</i>	31	<i>Grading & repair</i>	5
<i>Seed tree removal</i>	11	<i>Mowing</i>	57

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Duke Forest Operations Manager, Jenna Schreiber, oversees a prescribed burn to reduce competition in a Longleaf Pine research stand. Prescribed burns help accomplish a variety of natural resource objectives and are conducted within a narrow window of precisely defined weather conditions.



A creative use of leftover Christmas trees to implement best management practices (BMPs) during a recent harvest. BMPs help protect water quality during forestry operations, and in this example, are helping to prevent runoff from the road from entering a nearby creek.



DUKE FOREST
Teaching & Research Laboratory
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THE DUKE FOREST LOG

Interested in making a tax-deductible contribution to support our efforts? Please do! We rely on the generosity of individuals and corporations to complete special projects like the Shepherd Nature Trail Restoration and to host events like the ones shown below.

Visit our website to give: dukeforest.duke.edu/giving-opportunities

UPCOMING EVENTS

Annual Gathering

Thursday, November 12th, 6 - 8:30 pm



An evening of food and drink to learn about activities on the Duke Forest with a special focus on forest resiliency.

Annual Research Tour

Friday, December 4th, 1 - 4 pm



An afternoon tour around Duke Forest to visit active research sites and learn about some of the topics under study.

All events are free and open to the public. For more information and to register, please visit: www.dukeforest.duke.edu

SAVE THE DATE for our 7th Annual Pine Cone Pacer 5K: April 16, 2016