

BLACK ROCK FOREST NEWS

Winter 2015

Black Rock Forest Consortium

Volume XXV, No.1

Major Conservation Milestone as Forest Partners with State and OSI

In October, New York's governor, Andrew Cuomo, announced an agreement between the state of New York, the Open Space Institute (OSI), and the Black Rock Forest Preserve that permanently preserves the Forest's nearly 3800 acres from development, adds 32 acres to the Forest, creates a fund of more than \$1 million to conserve priority land parcels that adjoin the Forest, and grants permanent public access to the Forest's trails. The conservation easement, the largest ever in the Hudson Highlands, will sustain the biodiversity of the Forest and surrounding lands and benefit the public.

The Black Rock Forest Consortium worked with the Black Rock Forest Preserve (which owns the Forest and leases it to the Consortium), OSI, and the New York State Office of Parks, Recreation and Historic Preservation to craft an easement that would allow the Consortium to build additional structures, as needed for its research and education

programs, within tightly defined areas. The agreement also provides that the Consortium must allow public access to at least 23 miles of trails, but can reroute or change those trails as needed in the future; it also allows the Consortium to restrict access, as it currently does, when necessary for public safety.

Andrew Chmar, executive director of the Hudson Highlands Land Trust, said, "We congratulate our conservation partners at the Black Rock Forest Consortium, Open Space Institute, and New York State Parks for making history with the largest conservation easement in the Hudson Highlands. The nearly 3800 acres of Black Rock Forest permanently preserved is an extraordinary outcome, particularly as it happened within 60 miles of New York City. The benefits of this landscape-scale project to the people of the region are enormous — truly a legacy to be proud of for all involved."

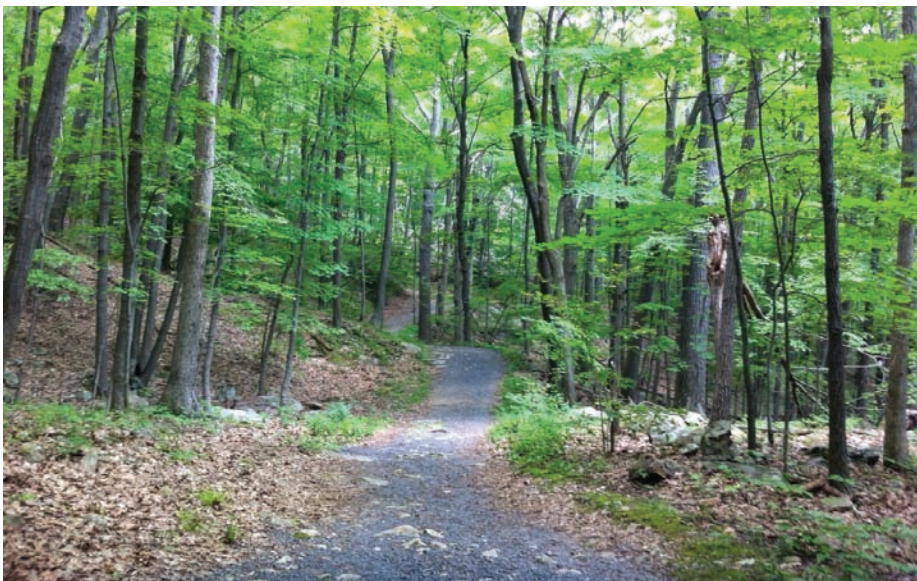
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New York Funds New Visitor Access Pathway

Through its Environmental Protection Fund award program, New York State has granted \$216,924 to the Black Rock Forest Consortium for a new Visitor Access Pathway. Starting from the parking lot at the entrance to the Forest, the Pathway will enable visitors to the Forest to avoid the main entrance road, with its vehicular traffic. It will be 8- to 10-foot wide at all points, with a gentle grade, an even and stable tread, culverts for drainage, and the same treasured view as the road. Additionally, as the first part of the pathway will be completely ADA-compliant, it will open up the beauties of the Forest to new visitors, including wheelchair users, families with strollers, and the elderly.

The grant will fund building about half the pathway, which will, when complete, connect with the Forest's trail network. (Once the first part of the Pathway is underway, the Consortium will seek additional funding to complete it.) The grant provides for matching contributions from the Consortium, including stone from the Forest for all stone walls and tread construction and supervised volunteer work by school groups and others who will help with corridor work and trail clearing, as well as tread construction. The Newburgh Enlarged City School District, the Cornwall Central School District, the Storm King School, and the Cornwall Conservation Advisory Council all enthusiastically endorsed collaborating on the project. In a letter of support to the state, Michael Brooks, Assistant Superintendent for Instruction of the Cornwall district, wrote "The District is interested in partnering on this project through the service opportunities it will provide for students to volunteer as helpers during construction. We plan to

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The easement guarantees public access to trails in the Forest

Report from the Executive Director

Black Rock Forest Consortium will host its ninth biennial Research Symposium this year on Monday, June 22. We invite anyone doing research in Black Rock Forest or elsewhere in the Highlands region to attend and present a short talk about their work. The volume of papers and posters presented at the Symposium has increased over time, from 10 - 20 in the first few years to 30 - 40 or more presented at each of the last several symposia.

Research in Black Rock Forest dates back to 1930, and thanks to support provided by members of the Stillman family, descendants of the Forest's founder Ernest Stillman, last fall we were able to provide online access to the first 46 research papers produced in Black Rock Forest through our website (<http://blackrockforest.org/research/environmental-data/forest-legacy-data>). Research topics in those early years ranged from pioneering studies of soil fertility, tree nutritional status as revealed by leaf chemical analysis, and tree root distributions and relationships with soil fungi to many practical topics in what was then the relatively new field of forestry.

Over time, the breadth of research in Black Rock Forest has broadened and evolved, mirroring trends at other places and institutions. As a recent report of the National Academy of Sciences stated, field stations like Black Rock Forest "place scientists on the front lines of our changing Earth, helping them gather the data needed to better understand shifting climate and ecosystems and make robust projections of future conditions." Authors of Black Rock Forest research papers in recent years have ranged from undergraduates to seasoned scientists, time scales from nearly instantaneous to millennia, and spatial scales from microscopic to global. Our website now makes many of these recent Forest research papers also available online (<http://blackrockforest.org/research/publications>).



Among the dozen most recent papers is one by Vladimir Ovtsharenko and colleagues documenting the biodiversity of spiders in Black Rock Forest: 279 different species including some found for the first time in New York State. In a study of animal responses to loss of forest canopy trees, Katie Keck and colleagues found that small mammal diversity decreased overall but that white-footed mice were relatively insensitive to even major canopy disturbance. In another recent paper by Meng Xu, Joel Cohen, and me, we found that Taylor's Law, a mathematical relationship between the mean and variance of population densities, holds for groups of forest trees regardless of how they are grouped. And in another new paper published in *New Phytologist* by Owen Atkin and many co-authors including Consortium President Kevin Griffin, Black Rock Forest comprises one study site in a worldwide plant respiration database from 100 sites. The results clarify how this important parameter varies with global temperature and aridity patterns and will help improve models of the terrestrial biosphere.

Black Rock Forest Consortium's efforts to help advance scientific understanding of the natural world include being open to new lines of research as they arise over time and to new ideas and methods. The Consortium's website makes it clear that investigators do not need to be affiliated with a Consortium institution to work in Black Rock Forest; indeed anyone can propose a research project which will be reviewed for compatibility with ongoing research by Consortium scientists. The Forest's diversity of landscapes, organisms, and ecosystem processes are available for all to study, in a permanently protected setting, and with a great deal of background information freely available. And for those of you with something to share with others, we hope to see you at the Forest on June 22.

— Dr. William Schuster

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The Black Rock Forest Consortium advances scientific understanding through research, education and conservation programs. It is a not-for-profit 501(c)(3) organization supported by membership dues, grants, and gifts.

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Founding Chairman

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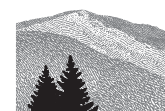
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Major Conservation Milestone

(continued from page 1)

Importance for Biodiversity

Research has shown that Black Rock Forest and other large, contiguous forests are vital for conserving many species whose future is uncertain, such as forest-interior birds like the wood thrush and cerulean warbler, mammals with large home range needs such as otters and bobcats, and active fish species like brook trout (the state fish) that require clear, cold streams. But additional enhancement of ecological connectivity between large natural areas such as the Forest and Schumemunk and Storm King State Parks is also vital for many species to survive over the long run. Recent studies have shown that the area around Black Rock Forest both is highly resilient — and thus likely to support high biological diversity in the future — and is located at a critical crossroads for allowing species to migrate to survive climate change.

“The provisions of the new agreement ensure continuity of natural ecological processes across time and across the landscape, supporting the ability of many native species to survive in the future,” says Dr. William Schuster, the Consortium’s executive director. “We are most grateful to the Open Space Institute and to New York State’s far-sighted lead-

ership for their critical roles in making this happen.”

Dr. Kevin Griffin, who has conducted a wide variety of research in the Forest and who serves as the Consortium’s president, agrees. “The new easement is extremely important to the conservation of the oak-dominated deciduous forests which are widespread in the Highlands region. These forests provide vital ecosystem services like clean water, carbon storage, and critical wildlife habitat. They also provide a wealth of educational and recreational opportunities. Black Rock Forest has a long and important tradition of scientific research that has enriched our understanding of forests. The conservation easement aligns perfectly with the goals of the Consortium and should ensure these traditions continue.”

Another key provision of the agreement is the creation of the fund, to be jointly administered by the Preserve and OSI, to conserve additional parcels that adjoin the Forest, either by purchase or by easement. Dr. Schuster has worked for several years, with partners like OSI, Orange County Land Trust, Hudson Highlands Land Trust, Storm King Art Center, and the US Military Academy at West Point, to come up with a list of priority lands that are important for preserving a wildlife corridor stretching from the Forest and Storm King Mountain on the east to Schunemunk Mountain State Park on

the west. The funds from this agreement will allow the conservation of some of the most important land in this corridor.

Importance for the Public

The New York — New Jersey Trail Conference, a member of the Consortium, has long provided volunteers who maintain the Forest’s some 23 miles of trails. “Black Rock Forest has always been generously open to the public and the Trail Conference has been proud to help maintain the trails in good hiking condition,” says Ed Goodell, the Trail Conference’s executive director. “This easement guarantees that these trails, which are a public treasure, remain open forever.” Rose Harvey, the commissioner of the State’s Office of Parks, Recreation and Historic Preservation noted that “Governor Cuomo has been working hard to increase outdoor recreational opportunities across the state.”

And Kim Elliman, the president of OSI, said, “This agreement, the result of a successful public-private partnership, ensures the long-term protection of thousands of scenic and ecologically significant acres, while improving public access for visitors. For OSI, this project implements our core priorities: critical land conservation, improved public access, support for state parks, and preservation of climate change-resilient landscapes and habitat corridors.” 🌲



The easement protects all of the Forest from development.

Summer Science Camp Features New Courses

Black Rock Forest Consortium's popular Summer Science Camp is returning in 2015, with the week of July 6-10 set aside for middle school students (ages 12-15) and the week of July 13-17 for high school students (ages 15-18). Students may stay in the Forest Lodge, with 24-hour supervision, or come as day campers. With the exception of the all-day Biodiversity Blitz, taught as in previous years by Dr. Terryanne Maenza-Gmelch from Barnard College, campers can choose one class for the morning and one for the afternoon.

Last year's campers and parents were enthusiastic about the program. "I loved being able to go out in the field every day . . . and look for all kinds of herps and still learn," said one student. One parent wrote, "My daughter loves [science] even more now." And another commented, "I cannot stress enough how impressive all staff are at Black Rock. Not only did I feel secure that my child was well cared for, I felt each staff member I encountered had

a genuine interest in the students." The camp is certified by the Orange County Department of Health and an emergency medical technician is on site at all times.

This year's camp brings new classes to supplement old favorites. Sam Keany, a physics teacher and Chair of Science at the Browning School, will teach a course on engineering from nature. Not only will students examine the motion and mechanical behavior of macroinvertebrates caught in the ponds and woods and record their observations, but they also will have the opportunity to design and build water vehicle propulsion systems and microturbines for on-site testing. "Evolution has spent millions of years developing very effective wings, paddles, and jets for insect propulsion," Mr. Keany explains. "Increasingly, engineers look to living systems for inspiration and to borrow design ideas."

Another new course is taught by a recent graduate of the American Museum of Natural History's Gilder Graduate

School. Dr. Phillip Barden will explore animal behavior with students through observation and a class project. "At the end of the week, campers will know how to tell the temperature by the sound of cricket chirps, why sparrows in Maine won't understand songs from those in Virginia, and what exactly cats are doing when they nuzzle their owners," Dr. Barden promises. And Sara Pace, who has a masters degree in conservation biology from Columbia, will teach a new course entitled "Living Light: Studying Wildlife through a Photographic Lens."

The Consortium will continue to partner with the Storm King Art Center on an art of scientific observation course and with the Hudson Valley Writing Project at SUNY New Paltz on a nature writing course. Other courses include ones on trees, cold-blooded animals, birds, and insects. The complete catalog is available from the Consortium's web site, and parents and students can register online or by calling the Consortium office. 🌲



Understanding the Distribution of Trees That Fix Nitrogen from the Air

As a scientist from Columbia University's Department of Ecology, Evolution and Environmental Biology, Dr. Duncan Menge, is testing a hypothesis about the unusual global distribution of trees that are able to fix nitrogen from the air. Black Rock Forest, which is at the northern edge of the range of the predominant nitrogen-fixing tree species in the eastern United States, black locust (*Robinia pseudoacacia*), is one of the locations of his multi-site research.

Nitrogen is necessary for plant growth, and is the most abundant gas in the atmosphere, but most plants can't make use of this gas and their growth is limited by the amount of nitrogen in the soil. However, some plants, including some tree species, have evolved symbiotic relationships with bacteria that "fix" atmospheric nitrogen and convert it into a form that they can use. As Dr. Menge explains, "These nitrogen-fixing trees

have abundant access to nitrogen, but there is a cost to their symbiotic association: they provide carbon to the bacteria and thus sacrifice some of their own growth to maintain the symbiosis. So nitrogen-fixing trees comprise only a small proportion of tree species on earth."

Dr. Menge is studying a peculiarity of the distribution pattern of these nitrogen-fixing trees. While more would be expected in temperate zones, where there is less nitrogen in the soil, more are actually found in tropical areas where there is more nitrogen in the soil. His hypothesis suggests that differential regulation of nitrogen fixation could explain the pattern, with those trees that can rapidly adjust the fixation rate to meet nitrogen demand being more abundant, versus those that cannot readily regulate the rate of fixation.

"Understanding the behavior of black locust is a key part of understanding this

latitudinal pattern," says Dr. Menge. "In Black Rock, we will measure how black locust trees respond to different amounts of nitrogen in the soil. Do they stop fixing nitrogen when they have enough from the soil? Do they continue to fix the same amount regardless of soil nitrogen? Or is it somewhere in between?"

He and his colleagues will conduct identical studies with a variety of other tree species in Oregon and Hawaii, and with some 20 different species under controlled conditions in the Barnard College greenhouse. This research is significant, Dr. Menge points out, because the ability to use nitrogen is so important to forest growth, and forests in turn absorb carbon dioxide from the atmosphere, thus mitigating climate change. He expects that both undergraduate and graduate students will participate in the research at the Forest and in the Barnard greenhouse. 🌲

New Visitor Access *(cont. from p. 1)*

bring this opportunity to the attention of teachers, student groups, and clubs. We hope that many will choose to participate and be rewarded in knowing that they helped build something of long-lasting benefit to a great many people."

Eddie Walsh, a preeminent trail designer who has worked for the New York — New Jersey Trail Conference, prepared the plans for the Visitor Access Pathway, and construction is scheduled to start this spring, with anticipated completion by November. The Consortium will also create interpretive signage, including information about two stone foundations and a stone wall that the Pathway will pass by. In the late 1800s, these were used as storage buildings and housing for livestock by the Mailley family. Dr. Neil Maher, an environmental historian who has studied previous human habitation in the Forest, will provide guidance on this project, and an archaeology survey will ensure that the exact route of the Pathway will avoid any disturbance to historic structures or artifacts.

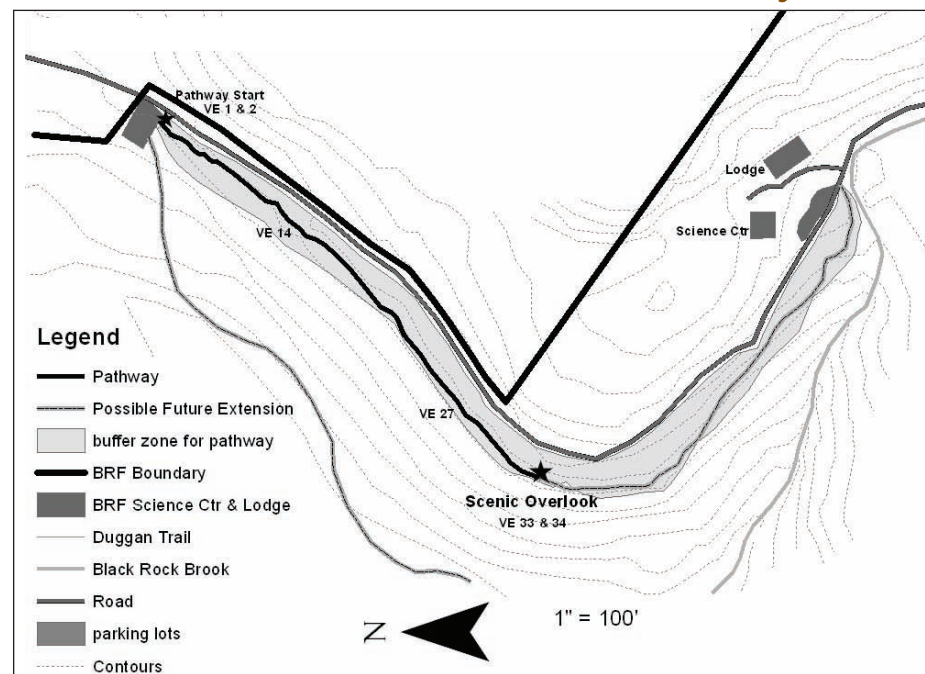
Many people and organizations supported the Consortium's application to the state for funding, including State Senator Bill Larkin, the Palisades Interstate Park Commission, the Cornwall Central School District, the New York — New Jersey Trail Conference, and Independent Living. Douglas Hovey, the executive director of Independent Living, which serves people with disabilities in the mid-Hudson region, wrote to the state that he enthusiastically supported the Pathway because it would allow people with disabilities, including those in wheelchairs, to "travel through mature forests and past fern-covered cliffs to a hilltop with views up the Hudson River." He added that "people with disabilities want to get out and enjoy nature and the trails in the woods just like everyone else, and this will provide an amazing opportunity for them to do so."

"Technically challenging due to the steep terrain, this Access Pathway will trace a surprisingly gentle path across the rocky north slope of Whitehorse Mountain, providing a delightful new way for visitors to enter or leave the Forest," says Dr. William Schuster, the Consortium's executive director. "Connecting directly to the Highlands Trail at its eastern end and eventually to the rest of Black Rock's trails at the other end, a great variety of new loop hikes and recreational opportunities will now be possible." 🐾



View from the scenic overlook on the Visitor Access Pathway.

Site Plan — Black Rock Forest Visitor Access Pathway



RESEARCH STUDIES IN THE BLACK ROCK FOREST 2015

The Black Rock Forest Consortium is committed to encouraging collaboration among member institutions and also between researchers and students.

Nitrogen Fixation and Nutrient Cycling Experiments in Black Rock Forest.

Duncan Menge (Columbia University). *Contact: dm2972@columbia.edu*

Resolving Advection Issues in Eddy-Flux Measurements in Complex Terrain.

Chuxiang Yi, Xiyang Xu, Eric Kutter, and George Hendrey (Queens College). *Contact: Chuxiang Yi (Chuxiang.Yi@qc.cuny.edu)*

Are Garlic Mustard Effects on Soil Processes and Microbial Communities

Reversible? Kristina Stinson (Harvard Forest) and Serita Frey (University of New Hampshire). *Contact: Kristina Stinson (kstinson@harvard.edu)*

Mercury Concentrations and Exposure Levels in Terrestrial Foodwebs: Pathways for Mercury Bioaccumulation in Insectivorous Songbird Communities in New York State.

David Evers (Biodiversity Research Institute). *Contact: devers@bri.com*

Linking Holocene Vegetation and Carbon Accumulation with Hydrological Change Using Macrofossils, C/N, Stable Isotopes and Biomarkers from Sutherland Pond/Fen and Tamarack Pond.

Dorothy Peteet (Lamont-Doherty Earth Observatory of Columbia University). *Contact: peteet@ldeo.columbia.edu*

Analysis of Avian Diversity in Relation to Vegetation Composition and Structure in the Black Rock Forest-Schunnemunk Mountain Wildlife Corridor.

Terryanne Maenza-Gmelch (Barnard College). *Contact: tm263@columbia.edu*

Scaling of Variability in Populations, Individuals, and Ccosystems: Taylor's law and Beyond.

Joel E. Cohen and Meng Xu (Rockefeller University), and William Schuster (Black Rock Forest Consortium). *Contact: Joel Cohen (jcohen@rockefeller.edu)*

Physiological Response to Temperature across Nine Tree Species in a

Northeastern Temperate Forest. Angelica Patterson and Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University). *Contact: Kevin Griffin (griffin@ldeo.columbia.edu)*

The Future of Oak Forests. William Schuster (Black Rock Forest Consortium), Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), Shahid Naeem (Columbia University), Kathleen Weathers and Amanda Elliott Lindsey (Cary Institute for Ecosystem Studies), and Jerry Melillo (The Ecosystems Center, Marine Biological Laboratory). *Contact: William Schuster (wschuster@blackrockforest.org)*

Native Plant Performance along an Urbanization Gradient. Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), William Schuster (Black Rock Forest Consortium). *Contact: Kevin Griffin (griffin@ldeo.columbia.edu)*

Loss of Foundation Tree Species: Consequences for Small Mammal Assemblages in Forest Ecosystems. Katie Keck and Kate McFadden (Clemson University), Katie Pavlis and William Schuster (Black Rock Forest Consortium). *Contact: Katie Keck (krh1985@gmail.com)*

Effects of Tree Girdling and Herbivory on Mesofauna Communities in a Temperate Deciduous Forest. Natalie Bray (Columbia University) and Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University). *Contact: Natalie Bray (nab2165@columbia.edu)*

Neil Tyson To Speak at Luncheon

Communicating science effectively is the theme of this year's Black Rock Forest Consortium benefit luncheon on May 4 from 12 to 2 PM at the Metropolitan Club in New York City. The speaker will be science communicator extraordinaire Dr. Neil deGrasse Tyson, director of the Hayden Planetarium at the American Museum of Natural History and a prolific author and host of *Cosmos*, *Nova ScienceNOW*, and *StarTalk Radio*. He will be interviewed by Dr. Kim Kastens, a scientist at the Lamont-Doherty Earth Observatory of Columbia University. He will receive the William T. Golden Award for innovative leadership in science and science education, named after the Consortium's founder.

Lisbeth Uribe, a science teacher at the School at Columbia and a New York State finalist for the Presidential Awards for Excellence in Mathematics and Science Teaching for 2014, will also speak, focusing on communicating science to students. Coached by Ms. Uribe, the school's robotics team has qualified to represent the United States in international RoboCupJunior competitions for seven years.

The luncheon is chaired by Sibyl R. Golden, with Samantha Kappagoda, Dr. David K. A. Mordecai, and Catherine Morrison Golden serving as vice-chairs. A committee is in formation.

Tables and tickets are named in recognition of the connection between astronomical processes and those on earth and in our forests. Guests can purchase a Photon table for \$25,000, a Higgs Boson table for \$10,000, or a Sun table for \$5000, or Chloroplast tickets for \$1000, Oxygen tickets for \$500, or Glucose tickets for \$250.

"Our luncheon always provides a great opportunity to learn from experts about important scientific issues, hear about new Consortium programs, and see old friends and new faces," notes Dr. William Schuster, the Forest's executive director. "This year's theme is especially important. Only informed audiences can make responsible decisions on critical issues such as environmental concerns. Many of the greatest advances in human understanding have come when scientific knowledge gains were truly grasped by the public." 🌲

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Forest News in Brief

Research Symposium Monday June 22.

In partnership with the Palisades Interstate Park Commission, the Consortium will host its ninth biennial Black Rock Forest/Highlands Research Symposium. The Symposium will include 15-minute talks on current research at the Forest and in the Highlands more generally, as well as a poster session. It will be held at the Science Center and in the Forest Lodge from 9 AM to 5 PM. Abstracts from previous research symposia are available on the Consortium's web site at <http://blackrockforest.org/research/research-symposia>. People interested in presenting or attending should contact the Consortium office.

Popular Birding Workshops Return!

The Consortium will once again sponsor Birding by Ear workshops on two spring Saturdays: May 30 and June 6. Dr. Terryanne Maenza-Gmelch, a Barnard professor, will lead participants on a two-hour, easy-to-moderate walk in Black Rock Forest through many different habitats to observe which birds occur in multiple locations in the Forest and which

are habitat-specific. Participants with smartphones can download Cornell University's free birding app, Merlin: <http://bit.ly/1frAcHC>. The Consortium will provide binoculars. The walks start at 8:30 AM at the upper parking lot. Each walk is limited to 15 participants; they are intended for adults and science-interested students 12 and older. The cost is \$10 per participant. RSVP to Emily Cunningham in the Forest office.

Dr. Schuster To Receive Hutchinson

Medal. Dr. William Schuster, the executive director of the Consortium, will be honored with the Garden Club of America's Frances K. Hutchinson Medal at an awards dinner on May 19. The Hutchinson Medal is awarded to "figures of national importance for distinguished service to conservation." Previous awardees include Rachel Carson, Dr. Thomas Lovejoy (who spoke at a Consortium lunch), Dr. E. O. Wilson, Roger Tory Peterson, Stewart Udall, and Lady Bird Johnson.

Family BioBlitz, Saturday June 27. Dr. Terryanne Maeza-Gmelch from Barnard

College will lead a workshop for families, including children as young as 5, finding and identifying as many birds, reptiles, amphibians, mammals, and plants as possible. The workshop will run from 3 to 6 PM. To register, contact the Consortium office.

Leaf and Pen Writing Retreat for

Educators, May 22-26. Join Leaf and Pen founder Eve Becker and fellow writers for this retreat, which offers four unstructured days to write in the Forest, surrounded by nature and away from everyday stresses and demands. Writers can workshop a piece and receive feedback for revising and polishing it. For those looking for inspiration, an "idea lab" will provide a spark. Participants have the option of sharing work aloud at evening readings, and will examine how retreat work can inform classroom practice. Eve Becker is a Pushcart Prize-winning author who teaches middle school English at The School at Columbia. To register, e-mail Eve at evebecker@gmail.com. For more information, visit www.leafpen.com.



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Report from the Forest Manager

Monitoring white-tailed deer health can tell us much about forest health. The data indicate low fawn and yearling weights despite the decreasing size of the Forest's deer population. The downward trend began in 2011. Adult does have continued to lactate into November to nurture their underdeveloped young. Subsequently, yearling numbers have dwindled and so has antler size. There was a total lack of acorn mast in 2011 and 2012 and thus acorns, available most years beginning in October, appear to be critical to pregnant female health, reproductive potential, survival, and development of their young.

Recent failures of acorn crops and increased dependency of deer on acorns both relate to the health condition of forests. Over the years, some tree species thrived while others were lost. Animal diets adapt, but the current forest lacks many former options for wildlife, and they have become more dependent on seasonal abundance of fruits and nuts.

The changed forest composition is further complicated by disease, pests, and expansion of non-native plants. Still, the mature forest developed a strong canopy 50 to 70 feet from the forest floor, while the understory became dominated by shade-tolerant trees and shrubs which grow slowly and thus provide food for deer. The browsing of overabundant deer in recent decades has depleted the understory, especially during years of poor acorn crops when alternate food sources become limited.

For decades, the nutrients in human communities have been increasing, resulting in deer immigration to these alternate food sources. This year, the deer take of the bow hunting task force of Cornwall-on-Hudson equaled the deer harvest in the Forest, despite the village having one-tenth the land mass and both deer herds displaying the same health deficiencies.

Coyotes factor in deer health and survival. Our winter deer tracking census has shown coyote tracks near and sometimes in deer pathways, revealing a fronting or herding behavior by coyotes. During the past 20 winters, only two deer have been confirmed coyote kills within the Forest, but coyote predation on springtime fawns has been difficult to assess. It is safe to say coyotes have been harassing deer, affecting their behavior and physical state, and perhaps contributing to deer seeking the relief and shelter of the human environment.

Weather events, including recent severe ice storms, have had substantial impact on the mature canopy. The breakage of large limbs and uprooting of entire trees has created ground disturbance and canopy openings that energize the growth of a vigorous understory. This can be seen in the vigorous sprouting of black birch, striped maple, sassafras, and tulip poplar and the release of American beech, hemlock, red and sugar maple, and hickory saplings, re-establishing a diversified understory and eventually a healthy deer herd.

—John Brady